Socioeconomic status of practice location and Australian GP registrars’ training: a cross-sectional analysis

Dominica Moad1,2, Amanda Tapley1,2, Alison Fielding1,2, Mieke L. van Driel3, Elizabeth G. Holliday1, Jean I. Ball4, Andrew R. Davey1,2, Kristen FitzGerald5,6, Neil A. Spike7,8,9 and Parker Magin1,2,10*

Abstract

Background: Socioeconomic status (SES) is a major determinant of health. In Australia, areas of socioeconomic disadvantage are characterised by complex health needs and inequity in primary health care provision. General Practice (GP) registrars play an important role in addressing workforce needs, including equitable health care provision in areas of greater socioeconomic disadvantage.

We aimed to characterize GP registrars’ practice location by level of socioeconomic disadvantage, and establish associations (of registrar, practice, patient characteristics, and registrars’ clinical behaviours) with GP registrars training being undertaken in areas of greater socioeconomic disadvantage.

Methods: A cross-sectional analysis from the Registrars’ Clinical Encounters in Training (ReCEnT) study. ReCEnT is an ongoing, multi-centre, cohort study that documents 60 consecutive consultations by each GP registrar once in each of their three six-monthly training terms. The outcome factor was the practice location’s level of socioeconomic disadvantage, defined using the Index of Relative Socio-economic Disadvantage (SEIFA-IRSD). The odds of being in the lowest quintile was compared to the other four quintiles. Independent variables related to the registrar, patient, practice, and consultation.

Results: A total of 1,736 registrars contributed 241,945 consultations. Significant associations of training being in areas of most disadvantage included: the registrar being full-time, being in training term 1, being in the rural training pathway; patients being Aboriginal or Torres Strait Islander, or from a non-English-speaking background; and measures of continuity of care.

Conclusions: Training in areas of greater social disadvantage, as well as addressing community need, may provide GP registrars with richer learning opportunities.

Keywords: Socioeconomic status, General Practice, Vocational Training

Background

Socioeconomic status (SES) is a major determinant of health, and of central importance to the work of health care providers, including general practitioners (GPs, family physicians) [1, 2]. At the individual and area of residence level, greater socioeconomic disadvantage is associated with a disproportionate burden of disease, with higher rates of illness across all categories,
particularly chronic diseases and multi-morbidity, and within a wider context of the concomitants of lower SES, including under- or unemployment, insecure housing, and poor social supports [3–5]. There are strong associations of residing in an area of greater socioeconomic disadvantage and disease risk factors, including smoking and poor nutrition, as well as lower uptake of preventative care including immunisations and health-screening [4–7].

An adequate supply of primary care physicians attenuates disparities in health across socioeconomic status [2]. But people in areas of greater socioeconomic disadvantage have increased difficulty accessing primary healthcare, including longer wait times and shorter consultation times, resulting in lower rates of patient enablement and patient satisfaction [3, 8–12]. This represents a manifestation of the ‘inverse care law’, where workforce shortages and maldistribution see those with the highest needs of healthcare receiving the least care [9, 13].

Thus, addressing SES-related health inequities relies on an ongoing workforce of adequately educated and trained general practitioners (GPs). The training period for GP registrars (specialist vocational trainees in general practice) provides an opportunity to influence their future work practices as GPs, and can assist in preparing GPs to respond to the medical, psychological and social needs of the most socioeconomically disadvantaged within Australia’s evolving primary health care system.

Clinical experience is fundamental in the adequate preparation of GP registrars for the complexities and challenges of future independent practice. Structural changes in junior hospital doctor clinical experience can limit pre-vocational exposure to factors critical to care of disadvantaged populations, including the comprehensive management of patients with chronic disease and multi-morbidity. This makes it more important that registrars gain adequate exposure during vocational training [14].

It is therefore plausible that GP registrars training in areas of lower SES may benefit from a richer training experience, with increased exposure to higher levels of multimorbidity and more complex medical and psychosocial patient presentations. GPs practising in areas of socioeconomic disadvantage encounter higher rates of complex multi-morbidity and chronic disease, and may have a greater engagement in promoting preventative health care (through screening for biological and behavioural influences on health) [3]. However, the potential educational benefits from training in areas of socioeconomic disadvantage have not been well-established or explored.

In addition to preparing registrars clinically, it is argued that government-funded GP training organisations bear a social obligation to acknowledge, and redress the inequality in healthcare across socioeconomic areas [15, 16]. Promoting training in high-needs areas provides both short- and long-term benefits [16]. By training in areas of socioeconomic disadvantage, GP registrars contribute to the current GP workforce in often-underserved areas, while obtaining a real world orientation to their social responsibilities as GPs.

The current exploratory study aimed to a) characterize GP registrars’ practice location by level of socioeconomic disadvantage, and b) to establish associations of training in areas of greater socioeconomic disadvantage; including registrar, practice, and patient characteristics, and registrars’ clinical behaviours.

**Methods**

This cross-sectional analysis took place within the Registrars’ Clinical Encounters in Training (ReCEnT) study.

**ReCEnT**

ReCEnT is a cohort study of individual registrars’ in-consultation clinical and educational experience. The complete methodology is described elsewhere [17]. Briefly, GP registrars collect data once at approximately the midpoint in each of their three six-month mandatory general practice training terms, capturing demographic data, diagnoses, investigations/management, and educational training aspects of 60 consecutive patient consultations. The project is an intrinsic element of registrars’ training, and is compulsory [18, 19]. Registrars may also provide informed written consent to their data being used for research purposes. From 2010 to 2015 it was conducted in Regional Training Providers (RTPs) across five of Australia’s six states and, from 2016 (after a reorganization of Australian GP vocational training), in three Regional Training Organizations (RTOs) in three Australian states and the Australian Capital Territory.

The number of registrars from participating RTPs/RTOs consenting to use of ReCEnT for research purposes determined the sample size for this study.

**Patient and Public Involvement**

Patients or members of the public were not involved as participants in this study.

**Outcome factor**

The outcome factor was a measure of the registrar’s practice location level of socioeconomic disadvantage. Practice location postcode was used to define the practice Socio-Economic Index for Area Relative Index of Disadvantage (SEIFA-IRSD) which we determined to be the most appropriate of the SEIFA indexes for this research question [20]. The SEIFA -IRSD summarises a range of social and economic variables of an area to provide an
index of relative disadvantage. While low income is the strongest indicator of disadvantage, additional variables include employment type/unemployment, education, rent repayments, disability, internet connection, and household relationships such as single parenting, separation, and divorce [20].

All GP training practices who have participated in ReCEnT were ranked by SEIFA-IRSD. The ranked-by-SEIFA-IRSD practices were categorized to form five quintiles, and then stratified so the SEIFA-IRSD quintile of greatest disadvantage was compared to the other four quintiles.

**Independent variables**

Independent variables related to the registrar, patient, practice, consultation, and consultation outcomes.

Registrar variables included age, gender, full-time/part-time status, training term, place of medical qualification (Australia or International), training pathway, non-English speaking background, and whether the registrar had worked at the practice before.

Practice variables included practice size (number of full-time equivalent GPs, with practices with less than five GPs categorised as small), geographic location (rurality) (using practice postcode to define Australian Standard Geographical Classification-Remoteness Area, ASGC-RA) [21], training region, and bulk-billing policy (whether consultations are free to the patient).

Patient characteristics included age, gender, and whether the patient identified as Aboriginal and/or Torres Strait Islander, was from a non-English speaking background, and was a continuing patient or was new to the practice, or to the registrar.

Consultation characteristics included consultation duration, number of problems/diagnoses managed, and whether the registrar sought information or assistance during the consultation (from their supervisor/trainer, from a specialist, or from hard-copy or electronic sources), whether the problem was classified as a chronic disease [22], if any procedures were performed, and if the patient was seen by a practice nurse.

Consultation outcomes included whether any imaging or pathology tests were ordered, whether any follow-ups were arranged, if any medications were prescribed, if any referrals were made, and if the registrar generated any learning goals during the consultation.

**Statistical Analysis**

This was a cross-sectional analysis. Analysis was performed on 16 rounds of data collected between 2010 and 2017. Individual regions contributed 2 to 17 rounds of data depending on when they entered the project and on continuity/discontinuity across the 2015-2016 restructuring of Australian GP vocational training. The unit of analysis was the consultation.

The proportion of consultations in the lowest SEIFA-IRSD quintile was calculated with 95% Confidence Interval (CIs).

Univariate logistic regressions were undertaken to examine the relationships between the outcome factor and independent variables. Variables with a P-value of <0.20 were considered for inclusion in the multivariable logistic regression model. Logistic regression was used within the generalised estimating equations framework, to account for repeated measures within registrars. Once multivariable models were fitted, model reduction was assessed. Covariates not reaching p<0.20 in the multivariable model were tested for removal from the model. If the covariate's removal did not substantively change the resulting model (defined as any covariate in the model having a change in the effect size (odds ratio) of greater than 10%), the covariate was removed from the final model.

To examine different facets of our research question, three models were built, each with ‘quintile of greatest socioeconomic disadvantage’ as the dependent variable.

To examine the associations of a consultation being conducted in the greatest disadvantage quintile (i.e., lowest SEIFA-IRSD quintile), patient, practice and registrar independent variables were included in a multivariable regression model.

To examine how consultations conducted in the area of greatest disadvantage quintile differ from other consultations, the above variables were included in a second multivariable model along with the following additional variables: consultation duration, the number of problems addressed during the consultation, if chronic conditions were managed, and if any sources of information or advice were consulted.

To examine how outcomes of consultations in areas of the quintile of greatest disadvantage compared to those of other consultations, all variables from the previous models were included in a final multivariable model along with the following additional variables: if procedures were performed, follow-up organised, and whether learning goals were generated.

The rationale for building three models was that associations of a registrar’s consultation being conducted in the lowest SEIFA-IRSD quintile practice will include patient, registrar and practice factors, but evaluation of these associations may be compromised by inclusion in the multivariable model of factors operating once the consultation is progressing. Similarly, evaluation of the content of the consultation may be compromised by the inclusion in this model of outcomes arising from the consultation.
Of the 29 covariates of interest, 24 were considered for inclusion in the multivariable model. However, ‘region’ and ‘rurality’, were subsequently removed from the model, due to high correlation of these variables with each other and with the outcome, causing instability of parameter estimates due to data sparsity and collinearity.

Variables were considered statistically significant if the $P$-value was <0.05.

Analyses were completed using Stata 13.1 (Statacorp, Texas, USA) and SAS version 9.4.

Ethics approval
Ethics approval was from the University of Newcastle Human Research Ethic Committee, Reference H-2009-0323.

Results
The analyses included 1,736 individual registrars (response rate 96.2%) contributing 241,945 consultations, of which 44,310 (18.3% [95% CI: 18.2-18.5]) were conducted in practices in the lowest SEIFA-IRSD quintile.

Characteristics of the registrars and their practices are shown in Table 1.

Characteristics associated with training in a practice in the lowest SEIFA-IRSD quintile versus the four highest quintiles are presented in Table 2.

Results of univariate and multivariable logistic regression models are presented in Table 3.

Multivariable associations
Statistically significant (at $p<0.05$ level) registrar-level multivariable associations of conducting a consultation in the lowest SEIFA-IRSD quintile practices included: the registrar working full-time (OR 0.48 [95% CI: 0.44, 0.52] for part-time work), being on the rural training pathway (OR 4.22 [95% CI: 2.06-8.65]), and to have worked at the practice before (OR 1.22 [95% CI: 1.13, 1.31]). Younger (OR 0.75 [95% CI: 0.72- 0.78] for each year) and less experienced (ORs 0.64 [95% CI: 0.60-0.68] and 0.50 [95% CI: 0.46-0.54] for Terms 2 and 3, respectively, compared to Term 1) registrars were more likely to undertake training in practices of lowest SEIFA-IRSD quintile.

Statistically significant practice-level factors included small practice size (OR 3.62 [95% CI: 3.38- 3.87]) and routinely bulk-billing (OR 17.5 [95% CI: 16.1-19.0]). Significant patient-level associations included: the patient being of Aboriginal and Torres Strait Island background (OR 1.49 [95% CI: 1.23- 1.80]), of non-English speaking background (OR 2.89 [95% CI: 2.68-3.13]), having seen the registrar previously (OR 0.89 [95% CI: 0.84, 0.93] for being new to the registrar and OR 0.89 [95% CI: 0.81-0.97] for being new to the practice).

There were no significant multivariable consultation-level or consultation-outcome associations.

Table 1  Characteristics of participating registrars, including by round of data collection (registrar-round)

| Registrar characteristics (n=1736) | n (%) |
|-----------------------------------|-------|
| Registrar gender                  | Female 1114 (64.2) |
| Qualified as doctor in Australia  | Yes 1724 (82.5) |
| Training Pathway                  | General 1277 (74.1) |

| Registrar-round characteristics (n= 4072) | n (%) |
|------------------------------------------|-------|
| Registrar works full-time               | Yes 3077 (77.7) |
| Age (years)                              | Mean ± SD 324 ± 6.1 |
|                                          | <=30 1825 (45.9) |
|                                          | 31-40 1684 (42.3) |
|                                          | 41-50 389 (9.8) |
|                                          | 51+ 80 (2.0) |
| Training term                            | Term 1 1614 (39.6) |
|                                          | Term 2 1469 (36.1) |
|                                          | Term 3 989 (24.3) |
| Registrar worked at practice previously | Yes 994 (24.7) |
| Practice routinely bulk-bills            | Yes 894 (22.3) |
| Practice Size (No. GPs working at the practice) | Small (1-4 GPs) 1427 (36.1) |
|                                          | Large (5+ GPs) 2527(63.9) |
| Rurality                                 | Major city 2443 (60.2) |
|                                          | Inner regional 1024 (25.2) |
|                                          | Outer regional remote 594 (14.6) |
Table 2  Characteristics associated with lowest SEIFA-IRSD quintile\(^a\) and highest 4 SEIFA-IRSD quintiles\(^a\) \((n=241,945)\)\(^b\)

| Variable | Class | Lowest quintile\(^a\) n (%) | Highest 4 quintiles\(^a\) n (%) | \(p\) |
|----------|-------|-----------------------------|---------------------------------|------|
| **Registrar Variables** | | | | |
| Registrar gender | Male | 18306 (41) | 70561 (36) | 0.064 |
| | Female | 26004 (59) | 127074 (64) | |
| Registrar Full-Time or Part-Time | Part-time | 9488 (22) | 42851 (22) | <0.001 |
| | Full-time | 33876 (78) | 149195 (78) | |
| Training term | Term 1 | 19348 (44) | 76513 (39) | <0.001 |
| | Term 2 | 15661 (35) | 71614 (36) | |
| | Term 3 | 9301 (21) | 49508 (25) | |
| Worked at practice previously | No | 31894 (73) | 147753 (76) | <0.001 |
| | Yes | 11996 (27) | 47085 (24) | |
| Qualified as doctor in Australia | No | 9075 (21) | 33516 (17) | 0.201 |
| | Yes | 34995 (79) | 162779 (83) | |
| Pathway | General | 30867 (70) | 149094 (76) | 0.181 |
| | Rural | 13145 (30) | 47289 (24) | |
| Non English Speaking background | No | 9368 (21) | 30096 (15) | 0.01 |
| | Yes | 34762 (79) | 165988 (85) | |
| Registrar age | mean (SD) | 32 (6) | 32 (6) | <0.001 |
| **Practice Variables** | | | | |
| Practice size | Small | 20593 (47) | 64277 (34) | <0.001 |
| | Large | 22770 (53) | 127297 (66) | |
| Region | Region 1 | 7196 (16) | 57084 (29) | <0.001 |
| | Region 2 | 5628 (13) | 17844 (9) | |
| | Region 3 | 11663 (26) | 18762 (9) | |
| | Region 4 | 15775 (36) | 82700 (42) | |
| | Region 5 | 527 (1) | 6489 (3) | |
| | Region 6 | 3521 (8) | 14756 (7) | |
| Practice routinely bulk bills | No | 26883 (62) | 158480 (81) | <0.001 |
| | Yes | 16647 (38) | 36595 (19) | |
| Rurality | Major city | 23291 (53) | 121805 (62) | <0.001 |
| | Regional/remote | 21019 (47) | 75207 (38) | |
| **Patient Variables** | | | | |
| Patient age group | 0-14 | 6818 (16) | 35095 (18) | <0.001 |
| | 15-34 | 11976 (27) | 52934 (27) | |
| | 35-64 | 16778 (38) | 72566 (37) | |
| | 65+ | 8130 (19) | 34045 (17) | |
| Patient gender | Male | 17252 (40) | 75055 (39) | 0.015 |
| | Female | 26077 (60) | 117639 (61) | |
| Aboriginal and Torres Strait Islander | No | 40277 (98) | 183157 (99) | <0.001 |
| | Yes | 889 (2) | 2517 (1) | |
| Non-English Speaking Background | No | 35225 (85) | 175804 (94) | <0.001 |
| | Yes | 6371 (15) | 11115 (6) | |
| Patient/practice status | Existing patient | 19487 (45) | 77234 (40) | <0.001 |
| | New to registrar | 20838 (48) | 102124 (53) | |
| | New to practice | 2910 (7) | 14067 (7) | |
| **Consultation Variables** | | | | |
| Sought assistance (any source) | No | 33095 (75) | 153168 (78) | <0.001 |
| | Yes | 11215 (25) | 44467 (22) | |
| Chronic problem | No | 31631 (71) | 145957 (74) | <0.001 |
| | Yes | 12679 (29) | 51678 (26) | |
Table 2 (continued)

| Variable                        | Class | Lowest quintile<sup>a</sup> n (%) | Highest 4 quintiles<sup>b</sup> n (%) | p  |
|---------------------------------|-------|-----------------------------------|--------------------------------------|----|
| Procedure performed             | No    | 39529 (89)                        | 178213 (90)                          | 0.002 |
|                                 | Yes   | 4781 (11)                         | 19422 (10)                           |     |
| Seen by practice nurse          | No    | 39847 (90)                        | 177741 (91)                          | 0.719 |
|                                 | Yes   | 4215 (10)                         | 18504 (9)                            |     |
| Consultation duration           | mean (SD) 18 (9) | 17 (9)                 | <0.001 |
| Number of problems managed      | mean (SD) 2 (1) | 2 (1)                       | <0.001 |
| Consultation Outcomes Variables | Imaging ordered No | 39405 (89) | 175527 (89) | 0.646 |
|                                 | Yes   | 4905 (11)                         | 22108 (11)                           |     |
| Follow-up ordered               | No    | 18096 (41)                        | 89785 (45)                           | <0.001 |
|                                 | Yes   | 26214 (59)                        | 107850 (55)                          |     |
| Pathology ordered               | No    | 34649 (78)                        | 153738 (78)                          | 0.430 |
|                                 | Yes   | 9661 (22)                         | 43897 (22)                           |     |
| Medication prescribed           | No    | 18330 (41)                        | 84381 (43)                           | 0.276 |
|                                 | Yes   | 25980 (59)                        | 113254 (57)                          |     |
| Referral made                   | No    | 36744 (83)                        | 163768 (83)                          | 0.700 |
|                                 | Yes   | 7566 (17)                         | 33867 (17)                           |     |
| Learning goals generated        | No    | 31167 (73)                        | 145215 (76)                          | <0.001 |
|                                 | Yes   | 11494 (27)                        | 45812 (24)                           |     |

<sup>a</sup> Quintile based on SEIFA-IRSD categorisation within the population of ReCEnT participating teaching practices.

<sup>b</sup> Numbers may not add up to 241,945 due to missing data

Discussion

Main Findings and comparison with existing literature

While existing research into established GPs and GP registrars often examines socioeconomic status as a study variable, few studies focus on SES as the outcome factor. This study is therefore unique in highlighting key considerations for GP registrars training in practices in areas of socioeconomic disadvantage.

In this study, registrars who undertook training in areas of greater socioeconomic disadvantage had greater exposure to patient populations known to have a greater burden of chronic disease, multi-morbidity, and complex social needs. This included patients of Aboriginal and/or Torres Strait Islander background, and patients from a non-English-speaking background [5]. This is consistent with patient demographics of areas of greater socioeconomic disadvantage in Australia [23].

GP registrar’s continuity of care was also a theme of the results, with patients in more disadvantaged areas being more likely to have seen the registrar previously. The patient was also less likely to be new to the practice. And registrars in disadvantaged area practices were more likely to have worked at the practice previously. This cluster of findings suggests continuity of care. Maintaining a relationship with a GP is an essential element to patient engagement and satisfaction [12], and is also recognised as of significant benefit for the registrar in preparing them for independent practice [24].

Registrars were also more likely to be on the rural pathway, which we have found previously to provide a more diverse clinical experience [25], and there was some evidence (p=0.057) for an association with more problems seen per encounter than in areas of higher SES. These findings, along with the opportunity to treat patients from higher-needs groups and increased continuity of care, support the potential for a clinically richer training experience for registrars at practices in of greater socioeconomic disadvantage.

We also found that GP registrars in their first training term were significantly more likely to work in areas of greater disadvantage than those in later terms. This suggests an educational ‘immersion’ in the rich training experience for registrars at practices in of greater socioeconomic disadvantage.

Strengths and limitations

A strength of this study is the generalisability of results. The ReCEnT study covers all categories of rurality and includes a comprehensive mix of SES areas. The large sample size and a high response rate [26], as well as a
Due to the cross-sectional nature of this study, however, we can only demonstrate associations, not causation. A possible limitation of this study is the use of practice, as opposed to patients’, geographic level of disadvantage. However, while practices themselves may see a mix of patients from all SES backgrounds, the focus of this study was to highlight the experiences of registrars within these practices overall, rather than with any individual patient. A further limitation is that we have data only on the content of individual consultations. We do not have data on past medical or social history, or medicine regimens.

**Table 3** Associations of registrars’ practice location socioeconomic status from univariate and multivariable logistic regression

| Factor group | Variable | Class | Univariate | OR (95% CI) | p | Adjusted | OR (95% CI) | p |
|--------------|----------|-------|------------|-------------|---|----------|-------------|---|
| Model i. Registrar, Practice and Patient Variables | Registrar Variables | Non-English Speaking Background | Yes | 0.42 (0.21, 0.81) | 0.011 | 0.33 (0.14, 0.76) | 0.009 |
| | Registrar Full-time or Part-time | Part-time | 0.56 (0.53, 0.60) | <.001 | 0.48 (0.44, 0.52) | <.001 |
| | Pathway | Rural | 1.48 (0.83, 2.63) | 0.181 | 4.22 (2.06, 8.65) | <.001 |
| | Registrar age | | 0.65 (0.63, 0.66) | <.001 | 0.75 (0.72, 0.78) | <.001 |
| | Registrar gender | Female | 0.61 (0.36, 1.03) | 0.064 | 0.65 (0.34, 1.22) | 0.179 |
| | Training term | Term 2 | 0.70 (0.67, 0.73) | <.001 | 0.64 (0.60, 0.68) | <.001 |
| | Referent: Term 1 | Term 3 | 0.46 (0.44, 0.48) | <.001 | 0.50 (0.46, 0.54) | <.001 |
| | Worked at practice previously | Yes | 0.74 (0.70, 0.78) | <.001 | 1.22 (1.13, 1.31) | <.001 |
| | Practice Factors | Practice routinely bulk bills | Yes | 13.8 (12.8, 14.7) | <.001 | 17.5 (16.1, 19.0) | <.001 |
| | | Practice size | Small | 3.75 (3.55, 3.95) | <.001 | 3.62 (3.38, 3.87) | <.001 |
| | Patient factors | Patient Aboriginal or Torres Strait Islander | Yes | 1.74 (1.48, 2.04) | <.001 | 1.49 (1.23, 1.80) | <.001 |
| | | Patient Non-English Speaking Background | Yes | 3.70 (3.48, 3.94) | <.001 | 2.89 (2.68, 3.13) | <.001 |
| | | Patient gender | Female | 0.96 (0.92, 0.99) | 0.015 | 0.94 (0.90, 0.99) | 0.015 |
| | | Patient age group | 0-14 | 0.86 (0.81, 0.91) | <.001 | 0.91 (0.85, 0.98) | 0.011 |
| | Referent: 15-34 | 35-64 | 1.02 (0.98, 1.07) | 0.350 | 1.10 (1.04, 1.16) | 0.001 |
| | | 65+ | 0.97 (0.92, 1.02) | 0.262 | 1.05 (0.98, 1.12) | 0.195 |
| | | Patient/practice status | New to practice | 0.86 (0.80, 0.93) | <.001 | 0.89 (0.81, 0.97) | 0.010 |
| | | Referent: Existing Patient | New to registrar | 0.85 (0.82, 0.88) | <.001 | 0.89 (0.84, 0.93) | <.001 |
| Model ii. Registrar, practice, patient, and all consultation variables | Consultation Variables | Chronic problem | Yes | 1.12 (1.08, 1.17) | <.001 | 1.04 (0.99, 1.10) | 0.138 |
| | | Consultation duration | Yes | 1.01 (1.01, 1.01) | <.001 | 1.00 (1.00, 1.00) | 0.878 |
| | | Number of problems managed | Yes | 1.08 (1.05, 1.10) | <.001 | 1.03 (1.00, 1.07) | 0.057 |
| | | Procedure performed | Yes | 1.09 (1.03, 1.16) | <.002 | 1.07 (0.99, 1.15) | 0.101 |
| | | Sought help any source | Yes | 1.10 (1.05, 1.15) | <.001 | 0.99 (0.93, 1.05) | 0.715 |
| Model iii. Registrar, practice, patient, and all consultation variables | Consultation Outcome Variables | Learning goals generated | Yes | 1.11 (1.06, 1.16) | <.001 | 0.99 (0.93, 1.05) | 0.680 |

**Table 3** shows a comprehensive list of relevant independent variables making for a fine-grained exploration of associations of practice SES are strengths.

Implications for policy and practice

There were associations identified in this study that indicate a richer training experience for GP registrars who train in practices located in areas of greater socioeconomic disadvantage. These include associations with working with patients from groups with clinical complexity, and with markers of greater continuity of care. This may contribute to registrars’ learning, as well as helping meet the current health care needs of disadvantaged areas (noting that registrars comprise 13% of Australia’s general practice workforce (by headcount [27, 28])). An implication is that registrars should be strongly encouraged to train in lower SES-areas.
It might be thought that early exposure to the richness and complexity of medicine in disadvantaged areas may, in itself, encourage registrars to continue to work in these areas, including post-Fellowship. Our findings, however, of an association of later training term with less disadvantaged practice setting may suggest that registrars may move away from more disadvantaged practices during training (though our cross-sectional study cannot establish temporal patterns in registrars’ practice location). If this is so, it may be a concern that this trend could continue into registrars’ post-Fellowship choices of practice location. This may suggest attempts to address areas of high need, such as low socioeconomic disadvantage via GP vocational training, may be limited in rebalancing health equity and workforce issues beyond the immediate effect of vocational training time.

An additional consideration is that while we have found evidence of training in lower-SES areas providing a rich educational environment, this may also represent a clinically challenging environment (especially the challenges of complex multimorbid disease in socially complex contexts). That we have found that registrar experience in lower-SES areas is ‘front-loaded’ earlier in training may have implications for vocational GP training. Within the apprenticeship-like model of Australian GP vocational training, supervisor in-practice oversight of registrars’ learning and practice is concentrated to greater support early in training. Given that structural approaches to redress the ratio of first-term to later-term registrars in disadvantaged practices may be difficult to implement, our findings suggest that front-loading of supervisory support could be even further resourced in disadvantaged areas.

Implications for future research
Future research is required to understand in greater detail the experiences of registrars in areas of greater socioeconomic disadvantage, and what influence this has on their future placement and practice location choices. Careful consideration needs to be given to less experienced registrars training in areas of socioeconomic disadvantage, and what supports may be required if this pattern continues.

Further research of this area would assist in understanding the experiences of those working in disadvantaged areas, as well as the impact practice location SES has on the learning outcomes for GP registrars.

Conclusion
Our findings suggest that GP registrars training in areas of greater socioeconomic disadvantage are exposed to a broader range of clinical and educational experiences and learning opportunities. Registrars should consider undertaking training in these areas to take advantage of the range of these experiences. The continued support of registrars working in these areas, and the encouragement of more senior registrars to work there, also has the potential to assist in addressing health inequity experienced within these communities.

Acknowledgements
We acknowledge the contribution of the GP registrars and practices of the participating Regional Training Organisations, GP Synergy, Eastern Victoria GP Training and General Practice Training Tasmania and of the previous participating Regional Training Providers.

Authors’ contributions
DM devised the design of this analysis under the supervision of PM, AF & AT. AT, JB and EH analysed the data. DM drafted the manuscript. PM supervised the study progress. KF, NS, MV & AD provided intellectual input to the study design and manuscript. All authors contributed to critical revision of the manuscript. All authors read and approved the manuscript prior to submission.

Funding
The ReCEnT project was funded from 2010 to 2015 by the participating educational organisations: General Practice Training Valley to Coast, the Victorian Metropolitan Alliance, General Practice Training Tasmania, Adelaide to Outback GP Training Program, and Tropical Medical Training, all of which were funded by the Australian Government. From 2016-2019, ReCEnT was funded by an Australian Department of Health commissioned research grant and supported by GP Synergy Regional Training Organisation. GP Synergy is funded by the Australian Government. From 2019 the project is funded by GP Synergy in collaboration with Eastern Victoria General Practice Training and Tasmanian General practice Training, both of which are funded by the Australian Government.

Availability of data and materials
The datasets analysed during the current study is not available due to the determination of the Human Research Ethics Committee.

Declarations
Ethics approval and consent to participate
The study was performed in accordance with the Declaration of Helsinki. Informed consent was obtained from all subjects. This project has ethics approval through University of Newcastle’s Human Research Ethics Committee H-2009-0323.

Consent for publication
Not applicable.

Competing interests
DM, PM, AF, AT & AD are employees of GP Synergy; KF is an employee of General Practice Training Tasmania; NS is an employee of Eastern Victoria General Practice training. Other authors have no competing interest.

Author details
1The University of Newcastle, School of Medicine and Public Health, Callaghan, NSW, Australia. 2GP Synergy, Regional Training Organisation, NSW & ACT Research and Evaluation Unit, Newcastle, NSW, Australia. 3The University of Queensland Faculty of Medicine, Primary Care Clinical Unit, Brisbane, QLD, Australia. 4Hunter Medical Research Institute, Clinical Research Design, IT and Statistical Support Unit (CReDITSS), New Lambton, NSW, Australia. 5University of Tasmania, School of Medicine, Hobart, TAS, Australia. 6General Practice Training Tasmania (GPTT), Regional Training Organisation, Hobart, TAS, Australia. 7Eastern Victoria General Practice Training (EVGPT), 15 Cato Street, Hawthorn, VIC 3122, Australia. 8Monash University, School of Rural Health, Churchill, VIC 3842, Australia. 9Department of General Practice, The University of Melbourne, Carlton, VIC 3053, Australia. 10University of Newcastle, School of Medicine and Public Health, University Drive, Callaghan, NSW 2308, Australia.
1. Norbury M, Mercer SW, Gillies J, Furler J, Watt GCM. Time to care: tackling health inequalities through primary care. Fam Pract. 2011;28(1):1–3.
2. Starfield B, Leiyu S, Macinko J. Contribution of Primary Care to Health Systems and Health. Milbank Q. 2005;83(3):457–502.
3. Furler J, Young D. Prevention and socioeconomic disadvantage. Aust Fam Physician. 2005;34(10):821–76.
4. Achat HM, Thomas P, Close GR, Morekerken LR, Harris MF. General health care service utilisation: where, when and by whom in a socioeconomically disadvantaged population. Aust J Prim Health. 2010;16(2):132–40.
5. Australian Institute of Health and Welfare. Australia's health 2018. Australia’s health series no. 16. Canberra: AIHW; 2018.
6. Veugelers PJ, Yip AM. Socioeconomic disparities in health care use: does universal coverage reduce inequalities in health? J Epidemiol Community Health. 2003;57(6):424–8.
7. Phillips JE, Klein WMP. Socioeconomic Status and Coronary Heart Disease Risk: The Role of Social Cognitive Factors. Soc Personal Psychol Compass. 2010;4(9):704–27.
8. Furler JS, Harris E, Chondros P, Powell Davies PG, Harris MF, Young DY. The inverse care law revisited: impact of disadvantaged location on accessing longer GP consultation times. Med J Aust. 2002;177(2):80–3.
9. Hart JT. The inverse care law. Lancet. 1971;1: https://doi.org/10.1016/s0140-6736(71)92410-x.
10. Mercer SW, Higgins M, Bikker AM, Fitzpatrick B, McConnachie A, Lloyd SM, et al. General Practitioners’ Empathy and Health Outcomes: A Prospective Observational Study of Consultations in Areas of High and Low Deprivation. Ann Fam Med. 2016;14(2):117–24.
11. Britt HC, Valenti L, Miller GC. Determinants of consultation length in Australian general practice. Med J Aust. 2005;183(2):68–71.
12. Australian Institute of Health and Welfare. Healthy Communities: coordination of health care – experiences with GP care among patients aged 45 and over. AIHW 2016 In: Cat. no. CHC 2, ed. Canberra: AIHW; 2018.
13. Watt G. The inverse care law today. Lancet. 2002;360(9328):252–4.
14. Wearne S, Magin P, Spike N. Preparation for general practice vocational training – time for a rethink? Med J Aust. 2018;209(2):S2–4.
15. Larkins S, Michielsen K, Iputo J, Elsanousi S, Mammen M, Graves L. Impact of selection strategies on representation of underserved populations and intention to practise: international findings. Med Educ. 2015;49:60–72.
16. Boelen C. Adapting health care institutions and medical schools to society. 2011. Available from: http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/3235.0Main+Features12011.0. Accessed 16 Jul 2021.
17. Morgan S, Magin P, Henderson KM, Goode SM, Scott J, Bowe SJ, et al. Study protocol: The registrar clinical encounters in training (ReCEnT) project. Educational and research aspects of documenting general practice trainees’ clinical experience. Aust Fam Physician. 2015;9:681.
18. Morgan S, Henderson K, Tapley A, Scott J, van Driel M, Thomson A, et al. How we use patient encounter data for reflective learning in family medicine training. Med Teach. 2015;37(10):897–900.
19. Australian Bureau of Statistics. Technical Paper Socio-Economic Indexes For Areas (SEIFA) 2016 Belconnen ACT. Commonwealth of Australia. 2018. The Australian Bureau of Statistics. The Australian Standard Geographical Classification (ASGC) Remoteness Structure. Commonwealth of Australia. 2011. Available from: http://www.abs.gov.au/websitedbs/d3310114 nsf/home/remoteness+structure. Accessed 16 Jul 2021.
20. O’Halloran J, Miller GC, Britt H. Defining chronic conditions for primary care with ICPC-2. Fam Pract. 2004;21(4):381–6.
21. Gordon J, Valenti L, Bayram C, Miller GC. An analysis of general practice encounters by socioeconomic disadvantage. Aust Fam Physician. 2016;45(10):702–5.
22. Wiener-Ogilvie S, Bennison J, Smith V. General practice training environment and its impact on preparedness. Educ Prim Care. 2014;25(1):8–17.
23. Tapley A, Davey AR, van Driel ML, Holiday EG, Morgan S, Mulequiny K, et al. General practice training in regional and rural Australia. A cross-sectional analysis of the Registrar Clinical Encounters in Training study. AJRH. 2020;28(1):32–41.
24. Bonevski B, Magin P, Horton G, Foster M, Girgis A. Response rates in GP surveys – trialling two recruitment strategies. Aust Fam Physician. 2011;40(6):27–30.
25. Radloff A, Clarke L, Matthews D. AGPT Program National Report on the 2019 Registrar Satisfaction Survey: Australian General Practice Training Program; 2019.
26. Australian Government: Department of Health. Health workforce data. Commonwealth of Australia 2020. Available from: https://hwd.health.gov.au/summary.html#part-1. Accessed 6 Jul 2021.

Publisher’s Note
Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.