BMJ open

How do adults with physical disability experience primary care? A nationwide cross-sectional survey of access among patients in England.

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2013-004714
Article Type:	Research
Date Submitted by the Author:	18-Dec-2013
Complete List of Authors:	Popplewell, Nicola; Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge Rechel, Boika; London School of Hygiene and Tropical Medicine, Department of Disease Control Abel, Gary; Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge
Primary Subject Heading:	Health services research
Secondary Subject Heading:	General practice / Family practice, Rehabilitation medicine, Public health, Epidemiology
Keywords:	PRIMARY CARE, HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, REHABILITATION MEDICINE, EPIDEMIOLOGY

TITLE: How do adults with physical disability experience primary care? A nationwide cross-sectional survey of access among patients in England.

CORRESPONDING AUTHOR: Dr Nicola Popplewell; c/o Cambridge Centre for Health Services Research, Institute of Public Health, Forvie Site, University of Cambridge School of Clinical Medicine, Box 113 Cambridge Biomedical Campus, Cambridge CB2 0SR; n.popplewell@ntlworld.com; telephone 01223 560196; no fax.

AUTHOR AFFILIATIONS:

- Dr Nicola Popplewell, Visiting Researcher, Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge, Cambridge, United Kingdom.
- Dr Boika PD Rechel, Department of Disease Control, London School of Hygiene & Tropical Medicine, London, UK.
- Dr Gary Abel, Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge, Cambridge, United Kingdom.

KEYWORDS: primary health care; disabled persons; delivery of healthcare; access to healthcare.

WORD COUNT: 3250

ABSTRACT:

Objectives: Almost a quarter of adults in England report a longstanding condition limiting physical activities. However, recent overseas evidence suggests poorer access to healthcare for disabled people. This study aimed to compare patient-reported access to English primary care for adults with and without physical disability.

Design: Secondary analysis of the 2010/11 General Practice Patient Survey (response rate 35.9%) using logistic regression.

Setting & participants: 1,780,977 patients, from 8384 English general practices, who provided information on longstanding conditions limiting basic physical activity. 41,389 of these patients reported unmet need to see a doctor in the previous six months.

Outcomes: Difficulty getting to the GP surgery as a reason for unmet need to see a doctor in the preceding six months; difficulty getting into the surgery building.

Results: Estimated prevalence of physical disability was 17.2% (95% CI 17.0-17.3%). 17.9% (95% CI 17.4-18.4%) of patients with an unmet need to see a doctor were estimated to experience this due to difficulty getting to the surgery, and 2.2% (95% CI 2.2-2.3%) of all patients registered with a GP were estimated to experience difficulty getting into surgery buildings. Adjusting for gender, age, health status and employment, difficulty getting to the surgery explaining unmet need was more likely for patients with physical disability than for those without. Similarly, difficulty getting into surgery buildings was more likely amongst physically disabled patients. Both associations were stronger amongst patients aged 65 to 84 years.

Conclusions: Adults in England with physical disability experience worse physical access into primary care buildings than those without. Physical disability is also associated with increased unmet healthcare need due to difficulty getting to GP premises, compared to the experience of adults without physical disability. Increasing age further exacerbates these

problems. Access to primary care in England for patients with physical disability needs improving.

ARTICLE SUMMARY

Strengths and limitations of this study

- The study provides recent evidence relevant to the United Kingdom on associations between physical disability and access to and into primary care in England.
- The study obtained wide, national coverage across England using a very large sample and a sampling technique maximising representativeness and generalisability to the adult population of England who are registered with a GP, and allowing precise population estimates.
- The survey instrument (the General Practice Patient Survey) was tested thoroughly and steps taken to maximise response and minimise error and information bias.
- The 36% response rate for the General Practice Patient Survey and item non-response leading to exclusion from analysis has the potential to introduce selection bias. If present, such bias would most likely lead to underestimated associations between physical disability and physical access to and into GP surgeries.
- Measurement error is also possible: physical disability is difficult to measure in surveys, and the validity of the method used to determine unmet need to see a doctor could not be tested using this dataset.

INTRODUCTION

Physical disability is a major global concern,(1) and represents the commonest form of disability in Great Britain:(2) during 2009, 22% of men and 23% of women in the United

Kingdom reported a longstanding condition that limited activities.(3) Such disabilities can cause increased morbidity, mortality and healthcare need.(1,4,5)

Consequently, the World Health Organization emphasises that people with disabilities require access to healthcare and recommends their needs be met by primary health care, with specialist referral where necessary.(1) However, such access is influenced by interactions between a person's impairment and their physical and social environments, so that individuals can experience limited access to preventive care, diagnosis and treatment.(1,5–9) Therefore, higher unmet health need exists amongst people with disability than amongst people without (World Health Survey 2002-2004).(1) Specific problems in accessing primary care include "*physical, attitudinal, expertise-related and systemic"* barriers experienced when "*finding a doctor, getting an appointment, entering and using the facilities, and obtaining quality care"*.(6) Such problems can worsen with increasing age,(10,11) and can also result in delayed presentation, worse prognosis, and further increased need.(12,13) Therefore, ensuring rights of access to healthcare for people with disabilities is important: the 2008 United Nations *Convention on the Rights of Persons with Disabilities* sought to ensure such access,(14) and international consensus amongst health and disability experts has concluded that investigating barriers experienced by people with disability when accessing healthcare remains a top priority.(15)

In the UK, the *Convention on the Rights of Persons with Disabilities* has been ratified and the Equality Act 2010 passed,(16) such that reasonable accessibility to primary care and transport services are expected. However, although almost all adults in England have access to primary care via registration with a National Health Service (NHS) general practitioner (GP), limited recent empirical evidence exists regarding patient experience of general practice

accessibility amongst physically disabled patients.(17) Therefore, this study seeks to add to the predominantly North American literature on this subject using data from the 2010/11 nationwide General Practice Patient Survey (GPPS), which is used by the Department of Health in England to assess patient experience of primary care.(18)

This study explores whether adult patients with physical disability, registered with English GPs, experience difficulty accessing primary care compared to patients without such disability. In particular, we assess experience of inability to get to the surgery as a reason for unmet need to see a doctor in the preceding six months; and inability to get into the surgery building.

METHODS

Study Design and General Practice Patient Survey

This study was a secondary analysis of 2010/11 GPPS data obtained using a nationwide, cross-sectional survey, sampling from adults registered with an English NHS GP.(19) Details of questionnaire development,(19–21) and the questionnaires themselves are available elsewhere, as are eligibility criteria and sample size calculation for the GPPS.(19) 8397 practices with eligible patients were identified and patients stratified by practice, age-band, then gender, before 5,561,368 patients were selected systematically on a '1 in n' basis.(19) Small practices and those with known low response rates were oversampled. Full details are published elsewhere:(19) 1,994,410 responses were received (GPPS response rate 35.9%).

Study Samples

Associations between physical disability and access into surgery buildings were assessed in a sample of 1,780,977 GPPS respondents who were sent a questionnaire and answered the

survey question "*Do you have any of the following long-standing conditions?*"(19) (response rate for this item 32.0%). Respondents could report up to six categories of condition, including "*a condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, lifting or carrying*", thus providing information on the presence of a physical disability. They could also confirm they had no such conditions.

Associations between physical disability and difficulty getting to the surgery as a reason for unmet need to see a doctor were assessed in a sub-sample of 41,389 patients who provided information on longstanding conditions and indicated an unmet need to see a doctor in the previous six months on the GPPS.(19) Respondents with missing data for when they last saw a doctor (n=48,090) or why they had not seen a doctor (n=8,976) were not included in the sub-sample.

Study Observations

Respondents who ticked "*I couldn't get to the GP surgery or health centre easily*" in response to "*If you haven't seen a doctor in the past 6 months, why is that?*" were classed as having difficulty getting to the surgery (four other possible reasons were allowed, with respondents invited to tick all that apply).(19) Ease of access into the surgery was assessed using "*How easy do you find it to get into the building at your GP surgery or health centre?*". Responses of "*Not very easy*" or "*Not at all easy*" were defined as "Difficulty", and "*Very easy*" or "*Fairly easy*" as "No difficulty".

Gender; age group (eight categories); employment status (eight categories); self-reported health status (five ordinal categories); presence or absence of each of five other longstanding conditions (deafness/severe hearing impairment; blindness/severe visual impairment; learning

difficulty; psychological/emotional condition; other); and ethnic group (combined from sixteen Office for National Statistics categories(22) into six) were identified from GPPS responses. Four categories of rurality(23) and population-based quintiles of the 2007 Lower Super-Output Area Indices of Multiple Deprivation (IMD)(24) were determined from the patient's postcode of residence. Mode of survey completion and patient-level weights accounting for survey design and non-response, derived by the survey provider, were also in the dataset.(19)

Statistical Analyses

The percentages of the population that report physical disability and study outcomes were calculated using weights, thereby accounting for sampling procedures and survey non-response by age, gender and practice. All other analysis was un-weighted. Initial un-weighted analyses used only data that was complete for all variables in Table 1, though final analyses reported here only excluded observations with missing age, gender, employment, health status, or outcome data.

Results for both outcomes were obtained using univariable and multivariable logistic regression, using population-averaged, generalised estimating equations with exchangeable correlation matrices and robust standard errors, thereby accounting for correlation of observations by practice and assessing patient-level associations across England. Combined Wald tests were used for hypothesis tests. In the adjusted models, age and gender were considered *a priori* confounders. All other covariates were added to the models in sequence, based on their effects on the associations of interest in preliminary analyses, and remained if the odds ratio altered compared to the unadjusted model. An interaction term was added to

the final models to assess whether associations between physical disability and outcomes varied with age group.

All analysis was completed using Stata MP v11.2.

RESULTS

Participants

Figure 1 shows the flow of patients for the GPPS and those eligible for this study: 8384 practices were represented in the larger sample, and 7738 in the sub-sample. Un-weighted sample descriptions by physical disability are shown in Table 1. The main sample for un-weighted analysis comprised 1,634,853 observations (21.5% with physical disability) from 8380 practices (146,124 eligible observations excluded due to missing covariate and outcome data). 38,468 observations (29.3% with physical disability) from 7658 practices were available for analysis of the sub-sample after similarly excluding 2,921 observations.

Table 1: Characteristics of respondents by physical disability, for the analysed samples*

		Main study sample n=1,634,853		Sub-sample with unmet need to see a doctor n=38,468	
		Physical disability n=351,526 (%†)	No physical disability n=1,283,327 (%†)	Physical disability n=11,283 (%†)	No physical disability n=27,185 (%†)
Gender*	Male‡	157,019 (44.7)	554,422 (43.2)	4,285 (38.0)	13,213 (48.6)
Age (years)*	18 to 24	2,691 (0.8)	71,817 (5.6)	132 (1.2)	2,269 (8.4)
	25 to 24	7,691 (2.2)	167,918 (13.1)	302 (2.7)	5,106 (18.8)
	35 to 44	18,649 (5.3)	222,772 (17.4)	571 (5.1)	5,944 (21.9)
	45 to 54	41,042 (11.7)	257,128 (20.0)	1,148 (10.2)	6,277 (23.1)
	55 to 64‡	78,930 (22.5)	268,128 (20.9)	1,817 (16.1)	4,509 (16.6)
	65 to 74	91,298 (26.0)	192,063 (15.0)	1,747 (15.5)	1,787 (6.6)
	75 to 84	80,809 (23.0)	86,959 (6.8)	2,478 (22.0)	845 (3.1)
	85 or over	30,416 (8.7)	16,542 (1.3)	3,088 (27.4)	448 (1.7)
Employment*	Full-time work‡	37,305 (10.6)	544,202 (42.4)	1,123 (10.0)	15,099 (55.5)
	Part-time work	19,607 (5.6)	195,281 (15.2)	427 (3.8)	3,361 (12.4)
	Full-time education	1,183 (0.3)	29,297 (2.3)	53 (0.5)	965 (3.6)
	Unemployed	12,497 (3.6)	57,576 (4.5)	307 (2.7)	1,434 (5.3)
	Permanently sick/disabled	73,016 (20.8)	24,719 (1.9)	3,591 (31.8)	858 (3.2)
	Retired	184,616 (52.5)	313,383 (24.4)	5,167 (45.8)	3,160 (11.6)
	Looking after home	18,370 (5.2)	87,044 (6.8)	397 (3.5)	1,333 (4.9)
	Something else	4,932 (1.4)	31,825 (2.5)	218 (1.9)	975 (3.6)
Health status*	Excellent	2,939 (0.8)	138,724 (10.8)	53 (0.5)	2,246 (8.3)
	Very good	22,236 (6.3)	455,991 (35.5)	406 (3.6)	7,684 (28.3)
	Good‡	87,631 (24.9)	493,157 (38.4)	1,745 (15.5)	10,947 (40.3)
	Fair	160,144 (45.6)	172,142 (13.4)	4,792 (42.5)	5,245 (19.3)
	Poor	78,576 (22.4)	23,313 (1.8)	4,287 (38.0)	1,063 (3.9)
Deafness§	Yes	62,550 (18.0)	80,352 (6.3)	2,624 (23.3)	1,270 (4.7)
Blindness§	Yes	17,299 (4.9)	14,459 (1.1)	1,287 (11.4)	427 (1.6)
Psychological condition§	Yes	31,841 (9.1)	63,033 (4.9)	1,058 (9.4)	1,710 (6.3)
Learning difficulty§	Yes	8,501 (2.4)	15,145 (1.2)	283 (2.5)	431 (1.6)
Other condition§	Yes	125,635 (35.7)	334,734 (26.1)	4,516 (40.0)	6,970 (25.6)
No longstanding conditions§	Yes	6,405 (1.8)	838,324 (65.3)	155 (1.4)	17,717 (65.2)

Rurality	Urban‡	305,404	(86.9)	1,095,041	(85.3)	9,904 (87.8)	24,433 (89.9)
	Town/fringe	36,746	(10.5)	145,699	(11.4)	1,121 (9.9)	2,282 (8.4)
	Village	7,871	(2.2)	35,780	(2.8)	220 (2.0)	386 (1.4)
	Hamlet/isolated	1,447	(0.4)	6,573	(0.5)	38 (0.3)**	84 (0.3)**
	Missing	58	(0.0)	234	(0.0)		
IMD quintile††	1 (least deprived)	45,541	(13.0)	243,518	(19.0)	1,346 (11.9)	3,951 (14.5)
	2	58,233	(16.6)	253,672	(19.8)	1,833 (16.3)	4,541 (16.7)
	3	66,615	(19.0)	256,456	(20.0)	2,156 (19.1)	5,222 (19.2)
	4	78,685	(22.4)	262,021	(20.4)	2,565 (22.7)	6,464 (23.8)
	5 (most deprived)‡	102,193	(29.1)	266,592	(20.8)	3,374 (29.9)	6,983 (26.0)
	Missing	259	(0.1)	1,068	(0.1)	9 (0.1)	24 (0.1)
Ethnicity	White‡	316,882	(90.1)	1,104,565	(86.1)	10,328 (91.5)	21,393 (78.7)
	Mixed	1,788	(0.5)	11,202	(0.8)	66 (0.6)	367 (1.4)
	Asian	14,712	(4.2)	74,715	(5.8)	311 (2.8)	2,408 (8.9)
	Black	7,301	(2.1)	40,939	(3.2)	205 (1.8)	1,125 (4.1)
	Chinese	622	(0.2)	7,451	(0.6)	29 (0.3)	347 (1.3)
	Other	6,407	(1.8)	31,313	(2.4)	193 (1.7)	1,122 (4.1)
	Missing	3,814	(1.1)	13,142	(1.0)	151 (1.3)	423 (1.6)
Collection mode‡‡	Paper‡	343,063	(97.6)	1,218,887	(95.0)	10,937 (96.9)	24,993 (91.9)
	Telephone	86	(0.0)	63	(0.0)	346 (3.1)**	2,192 (8.1)**
	Online	8,377	(2.4)	64,377	(5.0)		
Difficulty getting to the surgery	Yes	Not applicable		Not applicable		5,012 (44.4)	2,727 (10.0)
Difficulty getting into GP building	Yes	16,534	(4.7)	20,473	(1.6)	Not applicable	Not applicable

* Descriptive analysis of main sample excludes 146,124 eligible observations (including 55,853 with physical disability (PD)) due to missing data for age ($n_{missing}$=12,226; 3,839 with PD); gender (n=9,205; 2,938 with PD); health status (n=20,607; 8,558 with PD); employment (n=76,179; 32,949 with PD); or outcome (n=44,130; 14,616 with PD). Descriptive analysis of sub-sample excludes 2,921 eligible observations (1,593 with PD) due to missing data for age ($n_{missing}$=343; 146 with PD); gender (n=297; 141 with PD); health status (n=610; 302 with PD); or employment (n=1,994; 1,178 with PD).

† Not all percentages sum to 100% due to rounding.

‡ Reference category. "No" was the reference category for longstanding conditions and outcomes.

§ All longstanding conditions had the same missing data as PD.

** Categories combined to maintain anonymity.

†† Scores of 8.257, 13.525, 20.741, and 33.511 as cut-points to create population-level equal groups.(25)

‡‡ No missing data for mode of collection.

Over half the respondents in both study samples were female. Similarly, the majority of those in the main sample were aged 55 years or over. The commonest reported employment was full-time work (35.6% of main sample; 42.2% of sub-sample) and self-reported health status was predominantly good (35.5% of main sample; 33.0% of sub-sample). Deprivation scores were reasonably spread throughout deprivation groups, though the greatest proportions of respondents were from more deprived areas.

Table 1 also shows that patients in both samples with physical disability were more likely than those without to be white, aged 55 years or over, retired, from more deprived areas, and have only fair or poor health, and any other longstanding condition. Patients with unmet health need who also reported physical disability were more likely to be women.

Estimated prevalence

The estimated percentage of patients with physical disability in the population (calculated using non-response and design weights) was 17.2% (95% CI 17.0-17.3%) amongst adults registered with a GP in England and 23.8% (95% CI 23.3-24.3%) in those with an unmet need to see a doctor. Similarly population estimates based on weighted analyses suggest that 17.9% (95% CI 17.4-18.4%) of patients with an unmet need would cite difficulty getting to the surgery as a reason for that unmet need. This was substantially higher amongst patients with physical disability (43.1%; 95% CI 41.9-44.2%) than non-disabled patients (10.1%; 95% CI 9.6-10.5%). Also we estimate that 2.2% (95% CI 2.2-2.3%) of the adult population had difficulty getting into surgery premises. Again this was higher amongst patients with physical disability (4.9%; 95% CI 4.8-5.0%) than non-disabled patients; (1.7%; 95% CI 1.6-1.7%).

Associations between physical disability and access to surgeries

Unadjusted and adjusted associations derived from regression analyses are shown in Table 2. There was strong evidence for interactions between physical disability and age group (Wald tests p<0.001), so adjusted associations are shown by age group. These analyses showed that difficulty getting to the surgery as a reason for unmet need to see a doctor in the previous six months was associated with physical disability after adjusting for gender, age, health status and employment. The strength of association between physical disability and difficulty getting to the surgery amongst these patients increased with age until aged 65 to 74 years (OR=3.94; 95% CI 3.22-4.81, p<0.001), but was reduced amongst patients aged 85 or over (OR=1.49; 95% CI 1.21-1.83, p<0.001). No evidence was found of an association for age groups less than 45 years (see Table 2).

Table 2: Associations between physical disability and difficulty getting to the surgery amongst patients with unmet health need, and between physical disability and difficulty getting into the surgery building: for each outcome results are derived from 2 logistic regression models (unadjusted, and an adjusted model allowing the association to vary by age group)[*].

		Unmet need due to difficulty getting to surgery (n=38,468)		Difficulty getting into building (n=1,634,853)	
		OR (95% CI)	Wald test p-value	OR (95% CI)	Wald test p-value
Unadjusted		7.16 (6.78-7.56)	<0.001	3.10 (3.02-3.17)	<0.001
Adjusted for gender, health status and employment, by age (years)[†]	18 to 24	1.04 (0.62-1.76)	0.874	1.74 (1.45-2.10)	<0.001
	25 to 34	0.99 (0.70-1.39)	0.951	1.25 (1.11-1.40)	<0.001
	35 to 44	1.11 (0.88-1.41)	0.387	1.11 (1.02-1.21)	0.012
	45 to 54	1.39 (1.17-1.66)	<0.001	1.34 (1.27-1.46)	<0.001
	55 to 64	2.03 (1.73-2.38)	<0.001	1.46 (1.38-1.54)	<0.001
	65 to 74	3.94 (3.22-4.81)	<0.001	1.97 (1.86-2.09)	<0.001
	75 to 84	3.22 (2.68-3.87)	<0.001	2.39 (2.23-2.55)	<0.001
	85 or over	1.49 (1.21-1.83)	<0.001	2.14 (1.97-2.34)	<0.001

[*] Full model outputs (including interaction terms allowing the association to vary by age group) are shown for both outcomes in Appendices A and B.

[†] Derived from a model including an interaction between physical disability and age group. For both outcomes, combined Wald tests for significance of interaction term had p<0.001.

Strong evidence for an association between physical disability and difficulty getting into surgeries also existed, which remained after adjusting for the same covariates. For this outcome, evidence for such an association existed for all age groups, though the association was weakest amongst patients aged 35 to 44 years (OR 1.11; 95% CI 1.02-1.21, p=0.012), before reaching its greatest strength in the 75 to 84 years age group (OR 2.39; 95% CI 2.23-2.55, p<0.001).

DISCUSSION

Physical disability is common in the English population (in this study, estimated prevalence 17.2%, rising to almost a quarter of those with unmet need to see a doctor). Amongst adult patients with physical disability who are registered with primary care in England, 43.1% are estimated to have unmet health need due to difficulty getting to the surgery, and 4.9% find difficulty entering their GP's building. Strong evidence existed for associations between physical disability and both difficulty getting to the surgery as a reason for unmet health need to see a doctor, and difficulty getting into surgery premises. These associations were modified by age, with physically disabled patients who were aged 65 years or over generally experiencing the most difficulty with access to and into their GP's premises.

The main strength of this study is the wide, national coverage obtained using a very large sample and a sampling technique that maximised representativeness and generalisability to the adult population of England who are registered with a GP. This further allowed precise population estimates. Additionally, the survey was tested thoroughly and steps taken to maximise response and minimise error and information bias.(19–21) The main limitations are the low response rate for the GPPS and item non-response leading to exclusion from analysis. These potentially introduce selection bias. We suggest the most likely effect of such

bias, if present, would be underestimated associations between physical disability and physical access to and into GP surgeries. This is because we consider that physically disabled patients may be under-represented, with their disability impairing ability to respond to the GPPS, particularly amongst those with more severe disability. It is also more likely that patients with the most severe disability experience the most difficulty accessing primary care, yet this would not be recorded in they did not respond. Similarly, item non-response to questions regarding difficulty accessing the surgery is also more likely amongst those with no difficulties, who are most likely to be the non-disabled patients. However, the magnitude of any such underestimate is difficult to predict. Furthermore, literature on survey methodology suggests non-response bias is not inevitable when high non-response occurs, particularly in probability surveys,(26) and is supported in analyses of other GPPS questions.(25) Potential measurement error is another limitation: physical disability is difficult to measure,(1) depending only on respondents' interpretations of the GPPS question regarding presence of a longstanding condition limiting basic physical activity that was used in past United States and Irish censuses.(27,28) Any interpretation error here is most likely to have underestimated disability prevalence, and censuses are known to give lower estimates than disability surveys:(1,28) prevalence of physical disability here was 5-6% lower than recent UK estimates that included all disability types.(3) Similarly, unmet need to see a doctor was determined indirectly by inference from patients who had not seen a doctor in the preceding six months and their stated reasons why not (including that they had not needed to), rather than using a direct question regarding their unmet need: it was not possible to test the validity of this using the dataset.

This study adds to existing literature in view of its size and English primary care setting, thus expanding and updating the predominantly North American evidence on the healthcare

experience of disabled patients. It also focuses on a specific type of disability, rather than investigating all disability, potentially enabling clearer explanation of the associations found and identification of specific actions likely to benefit this patient group.

Our findings are consistent with literature of various types from other countries that has generally found physical access to and into a variety of healthcare premises to be problematic for people with a range of disabilities,(5–7,9,11,13,17,29–32) though evidence of compliance with American Disability Act design guidance and fewer problems is beginning to emerge in the USA.(33,34) With respect to the interaction between physical disability and age, others have also found increasing difficulties for older patients with disability: in high-income countries, the World Health Survey (2002-2004) found the highest prevalence of transport issues as a reason for unmet health need occurred in people with disability aged 60 years and over(1) and satisfaction with access to care is worse for disabled patients aged over 65 years in the United States.(30) In this study, the observed association between physical disability and unmet need due to difficulty getting to the surgery weakened amongst the oldest disabled patients (aged 85 years and over). This finding is supported by a smaller study of accessibility of health services in Sao Paolo, Brazil amongst persons with various disabilities that also found a weaker association between disability and accessibility experience amongst patients aged 77 years or older than for younger patients.(32) Such a reduction in the strength of association amongst the eldest patients may be due to an increased willingness of these patients to ask for home visits and/or GPs willingness to provide them. In contrast to our findings and those from the USA outlined above, Allen and Mor found that, amongst people with various disabilities, missed doctor's appointments due to unmet transport needs occurred more amongst working age adults than those aged 65 years and over in the USA.(35) However, there was only weak evidence that age per se explained unmet transport

needs in that study: greater poverty amongst younger respondents probably explained the difference. No studies specifically investigating the interaction between physical disability and age with respect to difficulty getting into healthcare premises were identified.

We consider that the associations we observed are most likely due to difficulty accessing useable and/or affordable transport, and problems with physical and architectural barriers at surgery premises (e.g. heavy doors, absent or steep ramps), since these have been described as the main barriers to primary care by physically disabled American patients(9) and noted by many others.(1,5,7,11,31,36) Lack of assistive devices and insufficient help from others have also been reported,(6,13,35) which could also explain our findings. We also believe that increased probability of difficulty getting to the surgery as a reason for unmet need for patients with physical disability and increasing age is due to worsening difficulties in accessing private and public transport experienced with aging. Patterns of transport use in the UK suggest reduced access to private transport over time amongst older people with physical difficulties, which is not fully compensated by increased public transport use;(37) frequency of all trips reduces with aging; and the proportion of adults with mobility difficulties, age 70 years and over, reporting difficulty with travel to healthcare is greater than for all adults with mobility difficulties.(38) Therefore, relatively good access to transport may account for the apparent lack of an association in this study between physical disability and difficulty getting to the surgery as a reason for unmet need for patients aged less than 45 years. However, caution should be applied when interpreting this apparent lack of an association as confidence intervals were relatively wide. Finally, we believe that the probability of difficulty getting into buildings being reported may increase with age. We consider this may occur if age-related worsening of co-ordination and strength exacerbates difficulties arising from the physical architecture that are already experienced by patients

with other physical disability, and/or if increasing surgery usage with age highlights physical access problems, thus increasing the reporting of difficulties.

Potential consequences of these findings include adverse health consequences for patients with physical disability who are unable to see their doctor due to difficulty getting to the surgery. Improving access and meeting reasonable expectations for access and transport to and into primary care premises for patients with physical disability needs continued action from many, including:

- Increased collaboration between government departments (central and local), transport providers, the NHS (including GPs), charities, and patients to improve timely, affordable access from patients' homes to GP premises.
- Audits of the physical accessibility of primary care premises with improvements made where necessary, and consideration of newer, more accessible premises if necessary alterations are impractical;
- Continued advocacy efforts by physically disabled patients, and their representatives, in making their needs known.

Finally, despite the evidence from overseas cited above, there remains a significant gap in the literature investigating determinants of access to primary care for physically disabled patients in England, including "attitudinal, expertise-related and systemic"(6) barriers and consideration of practice-related factors, transport, costs, architecture and the support available to patients. Therefore, in addition to the practical actions outlined above, further quantitative and qualitative work is needed to help inform policy and practice to successfully improve access to English primary care for patients with physical disability.

ACKNOWLEDGEMENTS

The authors acknowledge the work of the Department of Health, its academic advisers, and Ipsos MORI in conceiving, developing and performing the GPPS, and of all the patients who completed it. Particular thanks go to Professor Martin Roland of the Primary Care Unit of the Department of Public Health and Primary Care at the University of Cambridge for his involvement in study conception and enabling Visiting Researcher status for NP. NP also thanks Camille Maringe of the London School of Hygiene and Tropical Medicine (LSHTM) for reviewing initial plans for the study; Jacqueline Bell, also of LSHTM, for advising on appropriate use of survey commands in STATA; and Professor John Campbell of Exeter University for reviewing the manuscript.

FOOTNOTES

Contributors NP conceived the final research question and aims and objectives, reviewed the literature, produced the analysis plan, undertook data preparation and manipulation specific to this study, performed the analyses, and drafted the manuscript. GA participated in study conception, reviewed the analysis plan, contributed to the analysis, and critically reviewed the manuscript. BR contributed to decisions on the scope of analyses and critically reviewed the manuscript. All authors have approved the final version.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests NP has a close family member with a long-standing physical disability.

Ethics approval This study was approved by the ethics committee of the London School of Hygiene and Tropical Medicine. No ethical approval was needed for the GPPS since it is classified as service evaluation.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Anonymised individual level data were provided to the Health Services Research Group at the University of Cambridge by Ipsos MORI, with a covering confidentiality agreement with the Department of Health. Under this agreement we are not at liberty to share the dataset with third parties.

REFERENCES

1. World Health Organization. *World Report on Disability 2011*. Malta: World Health Organization; 2011. http://www.who.int/disabilities/world_report/2011/report.pdf.
2. Office for Disability Issues. *Disability prevalence fact sheet. Disability prevalence estimates 2010/11*. London: Office for Disability Issues, 2012. http://odi.dwp.gov.uk/docs/res/factsheets/disability-prevalence.pdf (accessed February 2013).
3. Gunning N. Longstanding illness and personal care plans. In: Craig R, Hirani V, eds. *Health Survey for England 2009. Volume 1. Health and lifestyles.* London: The NHS Information Centre for Health and Social Care, 2010:19-35. https://catalogue.ic.nhs.uk/publications/public-health/surveys/heal-surv-heal-life-eng-2009/heal-surv-heal-life-eng-2009-rep-v2.pdf.

4. World Health Organization. *Disability and health. Fact sheet no. 352*. 2011. http://www.who.int/mediacentre/factsheets/fs352/en/index.html (accessed February 2013).

5. Dejong G, Palsbo SE, Beatty PW, et al. The organization and financing of health services for persons with disabilities. *Milbank Q*. 2002;**80**(2):261–301. doi:10.1111/1468-0009.t01-1-00004 [published Online First: 14 August 2002].

6. McColl MA, Forster D, Shortt SED, et al. Physician experiences providing primary care to people with disabilities. *Healthc Policy*. 2008 Aug;**4**(1):e129–e147.

7. Scheer J, Kroll T, Neri MT, et al. Access barriers for persons with disabilities. The consumer's perspective. *J Disabil Policy Stud*. 2003;**13**(4):221-30. doi:10.1177/10442073030130040 4.

8. Iezzoni LI, McCarthy EP, Davis RB, et al. Use of screening and preventive services among women with disabilities. *Am J Med Qual*. 2001 Jul-Aug;**16**(4):135–44. doi:10.1177/106286060101600405.

9. Morrison EH, George V, Mosqueda L. Primary care for adults with physical disabilities: perceptions from consumer and provider focus groups. *Fam Med*. 2008 Oct;**40**(9):645–51.

10. Chaix B, Veugelers PJ, Boëlle P-Y, et al. Access to general practitioner services: the disabled elderly lag behind in underserved areas. *Eur J Public Health*. 2005 Jun;**15**(3):282 –7. doi:10.1093/eurpub/cki082 [published Online First: 7 June 2005].

11. Huber M, Stanciole A, Wahlbeck K, Tamsma N, Torres F, Jelfs E, Bremner J. *Quality in and equality of access to healthcare services*. Brussels: European Commission, 2008. http://www.euro.centre.org/data/1237457784_41597.pdf

12. Van Brakel WH. Measuring health-related stigma -- a literature review. *Psychol Health Med*. 2006 Aug;**11**(3):307–34. doi:10.1080/13548500600595160 [published Online First: 23 Jan 2007].

13. Lawthers AG, Pransky GS, Peterson LE, et al. Rethinking quality in the context of persons with disability. *Int J Qual Health Care*. 2003 Jan 8;**15**(4):287–99. doi:10.1093/intqhc/mzg048.

14. United Nations. *Convention on the Rights of Persons with Disabilities and Optional Protocol*. New York: United Nations, 2006. http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf.

15. Tomlinson M, Swartz L, Officer A, et al. Research priorities for health of people with disabilities: an expert opinion exercise. *Lancet*. 2009 Nov 28;**374**(9704):1857–62. doi:10.1016/S0140-6736(09)61910-3.

16. Great Britain. *Equality Act 2010*. (c.15). London: HMSO. http://www.legislation.gov.uk/ukpga/2010/15/pdfs/ukpga_20100015_en.pdf.

17. Donnelly C, McColl MA, Charlifue S, et al. Utilization, access and satisfaction with primary care among people with spinal cord injuries: a comparison of three countries. *Spinal Cord*. 2007 Jan;**45**(1):25–36. doi:10.1038/sj.sc.3101933 [published Online First: 30 May 2006].

18. Ipsos MORI. *The GP Patient Survey*. [Online]. 2012. http://www.gp-patient.co.uk/ (accessed February 2013).

19. Ipsos MORI. *Technical Annex for the GP Patient Survey. 2010/11 Annual Report*. London: Ipsos MORI, 2011. http://www.gp-patient.co.uk/results/download/y5q4/y5q4_AnnualTechnical.pdf (accessed September 2012).

20. Ipsos MORI. *Technical Annex for the GP Patient Survey. 2009/10 Annual Report*. London: Ipsos MORI, 2010. http://www.gp-patient.co.uk/results/download/y4q4/y4q4_AnnualTechnical_unweighted.pdf (accessed September 2012).

21. Campbell J, Smith P, Nissen S, et al. The GP Patient Survey for use in primary care in the National Health Service in the UK - development and psychometric characteristics. *BMC Fam Pr*. 2009 Aug 22;**10**(1):57. doi:10.1186/1471-2296-10-57.

22. National Statistics. *Census 2001. England Individual Form.* Titchfield: National Statistics, 2001. http://www.ons.gov.uk/ons/guide-method/census/census-2001/about-census-2001/census-2001-forms/index.html.

23. Office for National Statistics. *Rural-Urban Definition (England and Wales).* [Online]. 2009. http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-urban-definition--england-and-wales-/index.html (accessed November 2013).

24. Noble M, McLennan D, Wilkinson K, Whitworth A, Barnes H, Dibben C. *The English Indices of Deprivation 2007*. London: Department for Communities and Local Government, 2008. http://webarchive.nationalarchives.gov.uk/20100410180038/http://communities.gov.uk/documents/communities/pdf/733520.pdf.

25. Roland M, Elliott M, Lyratzopoulos G, et al. Reliability of patient responses in pay for performance schemes: analysis of national General Practitioner Patient Survey data in England. *BMJ*. 2009 Sep 29;339:b3851. doi:10.1136/bmj.b385 [published Online First 29 September 2009].

26. Groves R. Nonresponse rates and nonresponse bias in household surveys. *Public Opin Q* 2006;**70**(5):646–75. doi:10.1093/poq/nfl033.

27. Bureau of the Census, US Department of Commerce. *United States Census 2000. H. Disability and Caregivers.* Washington, DC: Bureau of the Census, 1998. http://www.census.gov/dmd/www/pdf/09h_di.pdf (accessed November 2013).

28. Central Statistics Office. *National disability survey 2006: first results*. Dublin: Stationery Office, 2008. http://www.cso.ie/en/media/csoie/releasespublications/documents/otherreleases/nationaldisability/National%20Disability%20Survey%202006%20First%20Results%20full%20report.pdf.

29. Anderson P, Kitchin R. Disability, space and sexuality: access to family planning services. *Soc Sci Med*. 2000 Oct 16;**51**(8):1163–73. doi:10.1016/S0277-9536(00)00019-8.

30. Iezzoni LI, Davis RB, Soukup J, et al. Satisfaction with quality and access to health care among people with disabling conditions. *Int J Qual Health Care*. 2002 Oct;**14**(5):369–81. doi:10.1093/intqhc/14.5.369.

31. Graham CL, Mann JR. Accessibility of primary care physician practice sites in South Carolina for people with disabilities. *Disabil Health J*. 2008 Oct;**1**(4):209–14. doi:10.1016/j.dhjo.2008.06.001.

32. Castro SS, Cieza A, Cesar CL. Problems with accessibility to health services by persons with disabilities in Sao Paulo, Brazil. *Disabil Rehabil*. 2011;**33**(17-18):1693–8. doi:10.3109/09638288.2010.541542 [published Online First: 20 Dec 2010].

33. Mudrick NR, Breslin ML, Liang M, et al. Physical accessibility in primary health care settings: Results from California on-site reviews. *Disabil Health J*. 2012 Jul;**5**(3):159–67. doi:10.1016/j.dhjo.2012.02.002 [published Online First: 24 May 2012].

34. Harrington AL, Hirsch MA, Hammond FM, et al. Assessment of primary care services and perceived barriers to care in persons with disabilities. *Am J Phys Med Rehabil*. 2009 Oct;**88**(10):852–63. doi:10.1097/PHM.0b013e3181b30745.

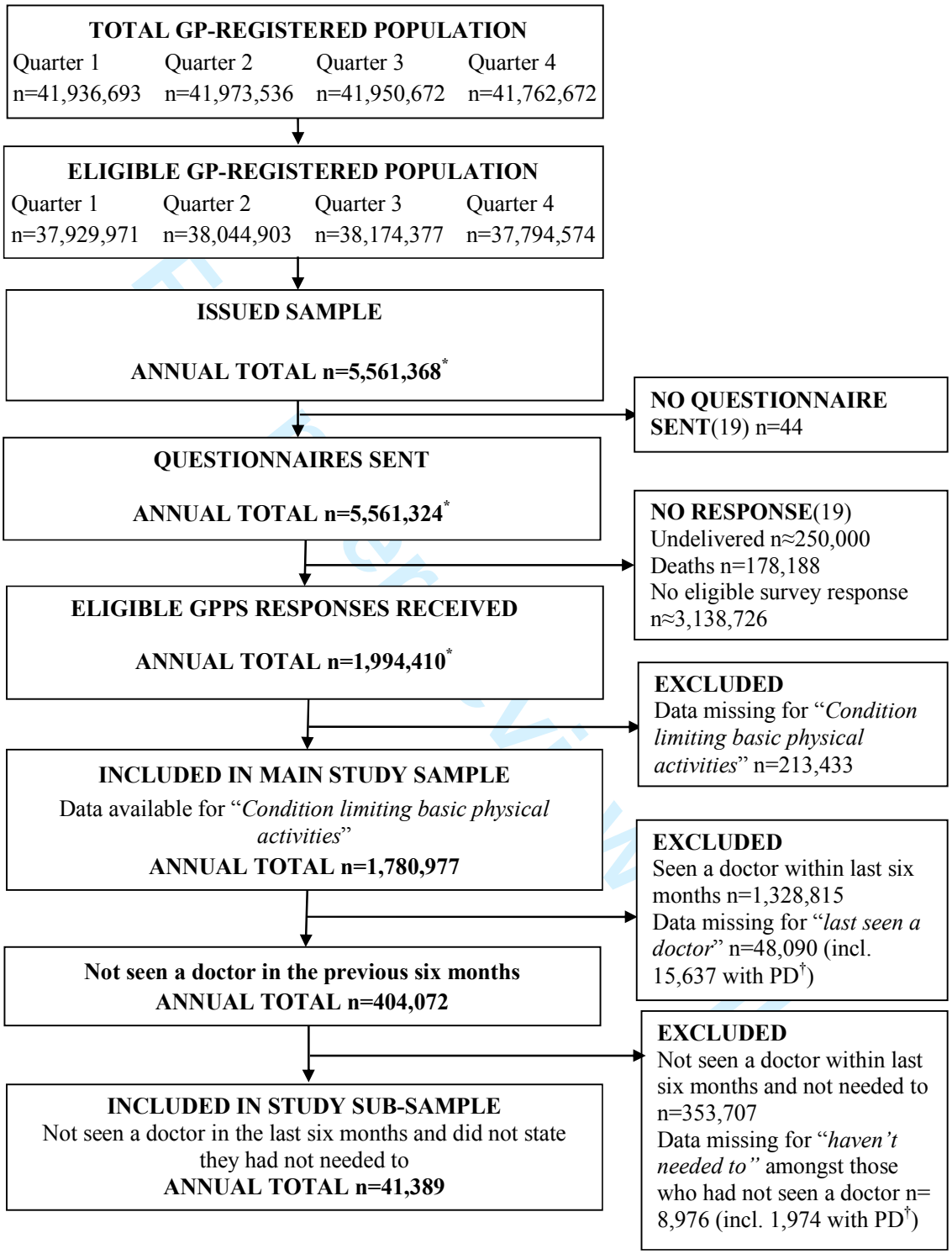
35. Allen S, Mor V. The prevalence and consequence of unmet need. Contrasts between older and younger adults with disability. *Med Care*. 1997 Nov;**35**(11):1135–48.

36. Iezzoni LI, Killeen MB, O'Day BL. Rural residents with disabilities confront substantial barriers to obtaining primary care. *Health Serv Res*. 2006 Aug;**41**(4 Pt 1):1258–75. doi:10.1111/j.1475-6773.2006.00534.x [published Online First: 31 March 2006].

37. Breeze E, Lang I. Physical functioning in a community context. In: Banks J, Breeze E, Lessof C, Nazroo J, eds. *Living in the 21st Century: Older People in England. The 2006 English Longitudinal Study of Ageing (Wave 3)*. London: The Institute for Fiscal Studies, 2008:57-117. http://www.ifs.org.uk/elsa/report08/ch3.pdf.

38. Department for Transport. *Health-related Travel Difficulties. Personal Travel Factsheet - March 2010*. London: Department for Transport, 2010. http://webarchive.nationalarchives.gov.uk/20100304070241/http://www.dft.gov.uk/pgr/statistics/datatablespublications/personal/ntsfactsheets/NTSHealthrelated.pdf (accessed March 2013).

Figure 1: Flow diagram of data for the GPPS and samples used for this study



* Quarterly values are detailed elsewhere.(19)
† PD = Physical disability.

Appendix A: Odds ratios and p-values for the adjusted model examining the relationship between physical disability and difficulty getting to the surgery as a reason for unmet need to see a doctor in the preceding six months, allowing the association to vary by age group.

Parameter		Odds Ratio (95% CI)	Combined Wald test p-value
Physical disability	No	0	<0.001
	Yes	2.03 (1.73-2.38)	
Age (years)	18 to 24	1.46 (1.20-1.77)	<0.001
	25 to 34	1.35 (1.16-1.58)	
	35 to 44	1.37 (1.19-1.59)	
	45 to 54	1.20 (1.04-1.39)	
	55 to 64	0	
	65 to 74	0.88 (0.72-1.09)	
	75 to 84	2.55 (2.08-3.13)	
	85 or over	9.54 (7.60-11.99)	
Physical disability*age group interaction by age group	18 to 24	0.51 (0.30-0.89)	<0.001
	25 to 34	0.49 (0.34-0.71)	
	35 to 44	0.55 (0.41-0.73)	
	45 to 54	0.69(0.54-0.87)	
	55 to 64	0	
	65 to 74	1.94 (1.51-2.49)	
	75 to 84	1.59 (1.25-2.02)	
	85 or over	0.74 (0.57-0.95)	
Employment	Full-time work	0	<0.001
	Part-time work	0.68 (0.59-0.78)	
	Full-time education	1.02 (0.81-1.29)	
	Unemployed	1.11 (0.94-1.30)	
	Permanently sick/disabled	2.28 (2.03-2.56)	
	Retired	1.24 (1.10-1.40)	
	Looking after home	0.93 (0.80-1.08)	
	Something else	0.72 (0.58-0.89)	
Health status	Excellent	0.86 (0.73-1.01)	<0.001
	Very good	1.02 (0.92-1.12)	
	Good	0	
	Fair	1.33 (1.22-1.44)	
	Poor	1.99 (1.80-2.20)	
Gender	Male	0	<0.001
	Female	1.17 (1.10-1.24)	

Appendix B: Odds ratios and p-values for the adjusted model examining the relationship between physical disability and difficulty getting into surgery buildings in the preceding six months, allowing for the association to vary by age group.

Parameter		Odds ratio (95% CI)	Combined Wald test p-value
Physical disability	No	0	<0.001
	Yes	1.46 (1.38-1.54)	
Age (years)	18 to 24	1.72 (1.60-1.86)	<0.001
	25 to 34	1.85 (1.75-1.96)	
	35 to 44	1.53 (1.46-1.61)	
	45 to 54	1.10 (1.04-1.15)	
	55 to 64	0	
	65 to 74	0.97 (0.91-1.03)	
	75 to 84	1.31 (1.22-1.41)	
	85 or over	3.31 (3.03-3.63)	
Physical disability*age group interaction by age group	18 to 24	1.20 (0.99-1.45)	<0.001
	25 to 34	0.86 (0.76-0.97)	
	35 to 44	0.77 (0.70-0.84)	
	45 to 54	0.94 (0.86-1.02)	
	55 to 64	0	
	65 to 74	1.35 (1.25-1.46)	
	75 to 84	1.64 (1.51-1.78)	
	85 or over	1.47 (1.33-1.63)	
Employment	Full-time work	0	<0.001
	Part-time work	1.11 (1.07-1.16)	
	Full-time education	0.91 (0.82-1.01)	
	Unemployed	1.04 (0.98-1.11)	
	Permanently sick/disabled	1.82 (1.74-1.91)	
	Retired	0.94 (0.90-0.98)	
	Looking after home	1.16 (1.10-1.22)	
	Something else	1.52 (1.41-1.63)	
Health status	Excellent	0.76 (0.72-0.80)	<0.001
	Very good	0.80 (0.77-0.83)	
	Good	0	
	Fair	1.40 (1.35-1.44)	
	Poor	2.53 (2.45-2.65)	
Gender	Male	0	<0.001
	Female	1.31 (1.28-1.34)	

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1: title refers to "Cross-sectional survey"
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2-3: Follows BMJ Open guidance
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pages 3-5: First three paragraphs of introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5: Final paragraph of introduction
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5: Secondary analysis of cross-sectional survey; first sentence of methods
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5: See "Study Design and General Practice Patient Survey" – refers to GPPS literature
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Pages 5-6: See "Study Design and General Practice Patient Survey" – refers to GPPS literature for GPPS participants. See "Study Samples" for this study.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pages 6-7: See "Study Observations"
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pages 6-7, 9-10: See second paragraph of "Study Observations" & Table 1
Bias	9	Describe any efforts to address potential sources of bias	Page 5: Sampling and data collection and management details given in cited GPPS references
Study size	10	Explain how the study size was arrived at	Pages 5-6: References cited in "Study Design and General Practice Patient Survey" cover GPPS sample size. "Study Samples" provides information on how the study size was obtained for these analyses
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which	Pages 7 & 10: Derivation of the Index of Multiple

		groupings were chosen and why	Deprivation score quintiles is described in the second paragraph of "Study observations" and Table 1. All other variables were categorical
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pages 7-8: Descriptive and logistic regression analyses detailed in "Statistical Analyses" paragraphs
		(*b*) Describe any methods used to examine subgroups and interactions	Pages 7-8: Interaction term detailed in the final sentence of the 2nd paragraph of "Statistical Analyses"
		(*c*) Explain how missing data were addressed	Page 7: First paragraph of "Statistical Analyses"
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 7: Weighted analyses discussed in first paragraph of "Statistical Analyses"
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pages 8 and Figure 1: See "Participants" paragraph and Figure
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pages 8-11: See Table 1 & "Participants" paragraphs
		(b) Indicate number of participants with missing data for each variable of interest	Pages 9-10: See Table 1 & footnotes
Outcome data	15*	Report numbers of outcome events or summary measures	Pages 9-10: See Table 1
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 7-8, 12-14: Table 2, methods (penultimate paragraph), and "Associations between physical disability and access to surgeries" paragraphs of results
		(*b*) Report category boundaries when continuous variables were categorized	Page 10: See Table 1 footnotes for IMD quintile categorisation
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 11: See results section "Estimated prevalence" for population prevalence estimates
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 14: First discussion paragraph
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pages 14-15: Second paragraph of the discussion
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14-18: First six paragraphs of discussion
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 14-15: Second paragraph of the discussion
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19: See footnotes

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

How do adults with physical disability experience primary care? A nationwide cross-sectional survey of access among patients in England.

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2013-004714.R1
Article Type:	Research
Date Submitted by the Author:	06-Jun-2014
Complete List of Authors:	Popplewell, Nicola; Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge Rechel, Boika; London School of Hygiene and Tropical Medicine, Department of Disease Control Abel, Gary; Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge
Primary Subject Heading:	Health services research
Secondary Subject Heading:	General practice / Family practice, Rehabilitation medicine, Public health, Epidemiology
Keywords:	PRIMARY CARE, HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PUBLIC HEALTH, REHABILITATION MEDICINE, EPIDEMIOLOGY

TITLE: How do adults with physical disability experience primary care? A nationwide cross-sectional survey of access among patients in England.

CORRESPONDING AUTHOR: Dr Nicola Popplewell; c/o Cambridge Centre for Health Services Research, Institute of Public Health, Forvie Site, University of Cambridge School of Clinical Medicine, Box 113 Cambridge Biomedical Campus, Cambridge CB2 0SR; n.popplewell@ntlworld.com; telephone 01223 560196; no fax.

AUTHOR AFFILIATIONS:

- Dr Nicola Popplewell, Visiting Researcher, Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge, Cambridge, United Kingdom.
- Dr Boika PD Rechel, Department of Disease Control, London School of Hygiene & Tropical Medicine, London, UK.
- Dr Gary Abel, Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge, Cambridge, United Kingdom.

KEYWORDS: primary health care; disabled persons; delivery of healthcare; access to healthcare.

WORD COUNT: 3250

ABSTRACT:

Objectives: Almost a quarter of adults in England report a longstanding condition limiting physical activities. However, recent overseas evidence suggests poorer access to healthcare for disabled people. This study aimed to compare patient-reported access to English primary care for adults with and without physical disability.

Design: Secondary analysis of the 2010/11 General Practice Patient Survey (response rate 35.9%) using logistic regression.

Setting & participants: 1,780,977 patients, from 8384 English general practices, who provided information on longstanding conditions limiting basic physical activity. 41,389 of these patients reported unmet need to see a doctor in the previous six months.

Outcomes: Difficulty getting to the GP surgery as a reason for unmet need to see a doctor in the preceding six months; difficulty getting into the surgery building.

Results: Estimated prevalence of physical disability was 17.2% (95% CI 17.0-17.3%). 17.9% (95% CI 17.4-18.4%) of patients with an unmet need to see a doctor were estimated to experience this due to difficulty getting to the surgery, and 2.2% (95% CI 2.2-2.3%) of all patients registered with a GP were estimated to experience difficulty getting into surgery buildings. Adjusting for gender, age, health status and employment, difficulty getting to the surgery explaining unmet need was more likely for patients with physical disability than for those without. Similarly, difficulty getting into surgery buildings was more likely amongst physically disabled patients. Both associations were stronger amongst patients aged 65 to 84 years.

Conclusions: Adults in England with physical disability experience worse physical access into primary care buildings than those without. Physical disability is also associated with increased unmet healthcare need due to difficulty getting to GP premises, compared to the experience of adults without physical disability. Increasing age further exacerbates these

problems. Access to primary care in England for patients with physical disability needs improving.

ARTICLE SUMMARY

Strengths and limitations of this study

- The study provides recent evidence relevant to the United Kingdom on associations between physical disability and access to and into primary care in England.
- The study obtained wide, national coverage across England using a very large sample and a sampling technique maximising representativeness and generalisability to the adult population of England who are registered with a GP, and allowing precise population estimates.
- The survey instrument (the General Practice Patient Survey) was tested thoroughly and steps taken to maximise response and minimise error and information bias.
- The 36% response rate for the General Practice Patient Survey and item non-response leading to exclusion from analysis has the potential to introduce selection bias. If present, such bias would most likely lead to underestimated associations between physical disability and physical access to and into GP surgeries.
- Measurement error is also possible: physical disability is difficult to measure in surveys, and the validity of the method used to determine unmet need to see a doctor could not be tested using this dataset.

INTRODUCTION

Physical disability is a major global concern,(1) and represents the commonest form of disability in Great Britain:(2) during 2009, 22% of men and 23% of women in the United Kingdom reported a longstanding condition that limited activities.(3) Such disabilities can cause increased morbidity, mortality and healthcare need.(1,4,5)

Consequently, the World Health Organization emphasises that people with disabilities require access to healthcare and recommends their needs be met by primary health care, with specialist referral where necessary.(1) However, such access is influenced by interactions between a person's impairment and their physical and social environments, so that individuals can experience limited access to preventive care, diagnosis and treatment.(1,5–9) Therefore, higher unmet health need exists amongst people with disability than amongst people without (World Health Survey 2002-2004).(1) Specific problems in accessing primary care include "*physical, attitudinal, expertise-related and systemic"* barriers experienced when "*finding a doctor, getting an appointment, entering and using the facilities, and obtaining quality care"*.(6) Such problems can worsen with increasing age,(10,11) and can also result in delayed presentation, worse prognosis, and further increased need.(12,13) Therefore, ensuring rights of access to healthcare for people with disabilities is important: the 2008 United Nations *Convention on the Rights of Persons with Disabilities* sought to ensure such access,(14) and international consensus amongst health and disability experts has concluded that investigating barriers experienced by people with disability when accessing healthcare remains a top priority.(15)

In the UK, the *Convention on the Rights of Persons with Disabilities* has been ratified and the Equality Act 2010 passed,(16) such that reasonable accessibility to primary care and transport services are expected. However, although almost all adults in England have access to primary care via registration with a National Health Service (NHS) general practitioner (GP), limited recent empirical evidence exists regarding patient experience of general practice accessibility amongst physically disabled patients.(17, 18). An analysis of the Life Opportunities Survey has shown that individuals with chronic health conditions or impairments were more likely to report a range of issues with access to healthcare, from being able to get to appointments and getting into buildings, to lack of help with communication. (18). In light of this paucity of evidence, this study seeks to add to the predominantly North American literature on this subject using data from the 2010/11 nationwide General Practice Patient Survey (GPPS), which is used by the Department of Health in England to assess patient experience of primary care.(19)

This study explores whether adult patients with physical disability, registered with English GPs, experience difficulty accessing primary care compared to patients without such disability. In particular, we assess experience of inability to get to the surgery as a reason for unmet need to see a doctor in the preceding six months; and inability to get into the surgery building.

METHODS

Study Design and General Practice Patient Survey

This study was a secondary analysis of 2010/11 GPPS data obtained using a nationwide, cross-sectional survey, sampling from adults registered with an English NHS GP.(20) Details of questionnaire development,(20–22) and the questionnaires themselves are available

elsewhere, as are eligibility criteria and sample size calculation for the GPPS.(20) 8397 practices with eligible patients were identified and patients stratified by practice, age-band, then gender, before 5,561,368 patients were selected systematically on a '1 in n' basis.(20) Small practices and those with known low response rates were oversampled. Full details are published elsewhere:(20) 1,994,410 responses were received (GPPS response rate 35.9%).

Study Samples

Associations between physical disability and access into surgery buildings were assessed in a sample of 1,780,977 GPPS respondents who were sent a questionnaire and answered the survey question "*Do you have any of the following long-standing conditions?*"(20) (response rate for this item 32.0%). Respondents could report up to six categories of condition, including "*a condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, lifting or carrying*", thus providing information on the presence of a physical disability. They could also confirm they had no such conditions.

Associations between physical disability and difficulty getting to the surgery as a reason for unmet need to see a doctor were assessed in a sub-sample of 41,389 patients who provided information on longstanding conditions and indicated an unmet need to see a doctor in the previous six months on the GPPS.(20) Respondents with missing data for when they last saw a doctor (n=48,090) or why they had not seen a doctor (n=8,976) were not included in the sub-sample.

Study Observations

Respondents who ticked "*I couldn't get to the GP surgery or health centre easily*" in response to "*If you haven't seen a doctor in the past 6 months, why is that?*" were classed as

having difficulty getting to the surgery (four other possible reasons were allowed, with respondents invited to tick all that apply).(20) Ease of access into the surgery was assessed using "*How easy do you find it to get into the building at your GP surgery or health centre?*". Responses of "*Not very easy*" or "*Not at all easy*" were defined as "Difficulty", and "*Very easy*" or "*Fairly easy*" as "No difficulty".

Gender; age group (eight categories); employment status (eight categories); self-reported health status (five ordinal categories); presence or absence of each of five other longstanding conditions (deafness/severe hearing impairment; blindness/severe visual impairment; learning difficulty; psychological/emotional condition; other); and ethnic group (combined from sixteen Office for National Statistics categories(23) into six) were identified from GPPS responses. Four categories of rurality(24) and population-based quintiles of the 2007 Lower Super-Output Area Indices of Multiple Deprivation (IMD)(25) were determined from the patient's postcode of residence. Mode of survey completion and patient-level weights accounting for survey design and non-response, derived by the survey provider, were also in the dataset.(20)

Statistical Analyses

The percentages of the population that report physical disability and study outcomes were calculated using weights, thereby accounting for sampling procedures and survey non-response by age, gender and practice. All other analysis was un-weighted. Initial un-weighted analyses used only data that was complete for all variables in Table 1, though final analyses reported here only excluded observations with missing age, gender, employment, health status, or outcome data.

Results for both outcomes were obtained using univariable and multivariable logistic regression, using population-averaged, generalised estimating equations with exchangeable correlation matrices and robust standard errors, thereby accounting for correlation of observations by practice and assessing patient-level associations across England. Combined Wald tests were used for hypothesis tests. In the adjusted models, age and gender were considered *a priori* confounders. All other covariates were added to the models in sequence, based on their effects on the associations of interest in preliminary analyses, and remained if the odds ratio altered compared to the unadjusted model. An interaction term was added to the final models to assess whether associations between physical disability and outcomes varied with age group.

All analysis was completed using Stata MP v11.2.

RESULTS

Participants

Figure 1 shows the flow of patients for the GPPS and those eligible for this study: 8384 practices were represented in the larger sample, and 7738 in the sub-sample. Un-weighted sample descriptions by physical disability are shown in Table 1. The main sample for un-weighted analysis comprised 1,634,853 observations (21.5% with physical disability) from 8380 practices (146,124 eligible observations excluded due to missing covariate and outcome data). 38,468 observations (29.3% with physical disability) from 7658 practices were available for analysis of the sub-sample after similarly excluding 2,921 observations.

Table 1: Characteristics of respondents by physical disability, for the analysed samples*

		Main study sample n=1,634,853		Sub-sample with unmet need to see a doctor n=38,468	
		Physical disability n=351,526 (%†)	No physical disability n=1,283,327 (%†)	Physical disability n=11,283 (%†)	No physical disability n=27,185 (%†)
Gender*	Male‡	157,019 (44.7)	554,422 (43.2)	4,285 (38.0)	13,213 (48.6)
Age (years)*	18 to 24	2,691 (0.8)	71,817 (5.6)	132 (1.2)	2,269 (8.4)
	25 to 24	7,691 (2.2)	167,918 (13.1)	302 (2.7)	5,106 (18.8)
	35 to 44	18,649 (5.3)	222,772 (17.4)	571 (5.1)	5,944 (21.9)
	45 to 54	41,042 (11.7)	257,128 (20.0)	1,148 (10.2)	6,277 (23.1)
	55 to 64‡	78,930 (22.5)	268,128 (20.9)	1,817 (16.1)	4,509 (16.6)
	65 to 74	91,298 (26.0)	192,063 (15.0)	1,747 (15.5)	1,787 (6.6)
	75 to 84	80,809 (23.0)	86,959 (6.8)	2,478 (22.0)	845 (3.1)
	85 or over	30,416 (8.7)	16,542 (1.3)	3,088 (27.4)	448 (1.7)
Employment*	Full-time work‡	37,305 (10.6)	544,202 (42.4)	1,123 (10.0)	15,099 (55.5)
	Part-time work	19,607 (5.6)	195,281 (15.2)	427 (3.8)	3,361 (12.4)
	Full-time education	1,183 (0.3)	29,297 (2.3)	53 (0.5)	965 (3.6)
	Unemployed	12,497 (3.6)	57,576 (4.5)	307 (2.7)	1,434 (5.3)
	Permanently sick/disabled	73,016 (20.8)	24,719 (1.9)	3,591 (31.8)	858 (3.2)
	Retired	184,616 (52.5)	313,383 (24.4)	5,167 (45.8)	3,160 (11.6)
	Looking after home	18,370 (5.2)	87,044 (6.8)	397 (3.5)	1,333 (4.9)
	Something else	4,932 (1.4)	31,825 (2.5)	218 (1.9)	975 (3.6)
Health status*	Excellent	2,939 (0.8)	138,724 (10.8)	53 (0.5)	2,246 (8.3)
	Very good	22,236 (6.3)	455,991 (35.5)	406 (3.6)	7,684 (28.3)
	Good‡	87,631 (24.9)	493,157 (38.4)	1,745 (15.5)	10,947 (40.3)
	Fair	160,144 (45.6)	172,142 (13.4)	4,792 (42.5)	5,245 (19.3)
	Poor	78,576 (22.4)	23,313 (1.8)	4,287 (38.0)	1,063 (3.9)
Deafness§	Yes	62,550 (18.0)	80,352 (6.3)	2,624 (23.3)	1,270 (4.7)
Blindness§	Yes	17,299 (4.9)	14,459 (1.1)	1,287 (11.4)	427 (1.6)
Psychological condition§	Yes	31,841 (9.1)	63,033 (4.9)	1,058 (9.4)	1,710 (6.3)
Learning difficulty§	Yes	8,501 (2.4)	15,145 (1.2)	283 (2.5)	431 (1.6)
Other condition§	Yes	125,635 (35.7)	334,734 (26.1)	4,516 (40.0)	6,970 (25.6)
No longstanding conditions§	Yes	6,405 (1.8)	838,324 (65.3)	155 (1.4)	17,717 (65.2)

Rurality	Urban‡	305,404	(86.9)	1,095,041	(85.3)	9,904	(87.8)	24,433	(89.9)
	Town/fringe	36,746	(10.5)	145,699	(11.4)	1,121	(9.9)	2,282	(8.4)
	Village	7,871	(2.2)	35,780	(2.8)	220	(2.0)	386	(1.4)
	Hamlet/isolated	1,447	(0.4)	6,573	(0.5)	38	(0.3)**	84	(0.3)**
	Missing	58	(0.0)	234	(0.0)				
IMD quintile††	1 (least deprived)	45,541	(13.0)	243,518	(19.0)	1,346	(11.9)	3,951	(14.5)
	2	58,233	(16.6)	253,672	(19.8)	1,833	(16.3)	4,541	(16.7)
	3	66,615	(19.0)	256,456	(20.0)	2,156	(19.1)	5,222	(19.2)
	4	78,685	(22.4)	262,021	(20.4)	2,565	(22.7)	6,464	(23.8)
	5 (most deprived)‡	102,193	(29.1)	266,592	(20.8)	3,374	(29.9)	6,983	(26.0)
	Missing	259	(0.1)	1,068	(0.1)	9	(0.1)	24	(0.1)
Ethnicity	White‡	316,882	(90.1)	1,104,565	(86.1)	10,328	(91.5)	21,393	(78.7)
	Mixed	1,788	(0.5)	11,202	(0.8)	66	(0.6)	367	(1.4)
	Asian	14,712	(4.2)	74,715	(5.8)	311	(2.8)	2,408	(8.9)
	Black	7,301	(2.1)	40,939	(3.2)	205	(1.8)	1,125	(4.1)
	Chinese	622	(0.2)	7,451	(0.6)	29	(0.3)	347	(1.3)
	Other	6,407	(1.8)	31,313	(2.4)	193	(1.7)	1,122	(4.1)
	Missing	3,814	(1.1)	13,142	(1.0)	151	(1.3)	423	(1.6)
Collection mode‡‡	Paper‡	343,063	(97.6)	1,218,887	(95.0)	10,937	(96.9)	24,993	(91.9)
	Telephone	86	(0.0)	63	(0.0)	346	(3.1)**	2,192	(8.1)**
	Online	8,377	(2.4)	64,377	(5.0)				
Difficulty getting to the surgery	Yes	Not applicable		Not applicable		5,012	(44.4)	2,727	(10.0)
Difficulty getting into GP building	Yes	16,534	(4.7)	20,473	(1.6)	Not applicable		Not applicable	

* Descriptive analysis of main sample excludes 146,124 eligible observations (including 55,853 with physical disability (PD)) due to missing data for age ($n_{missing}$=12,226; 3,839 with PD); gender (n=9,205; 2,938 with PD); health status (n=20,607; 8,558 with PD); employment (n=76,179; 32,949 with PD); or outcome (n=44,130; 14,616 with PD). Descriptive analysis of sub-sample excludes 2,921 eligible observations (1,593 with PD) due to missing data for age ($n_{missing}$=343; 146 with PD); gender (n=297; 141 with PD); health status (n=610; 302 with PD); or employment (n=1,994; 1,178 with PD).

† Not all percentages sum to 100% due to rounding.

‡ Reference category. "No" was the reference category for longstanding conditions and outcomes.

§ All longstanding conditions had the same missing data as PD.

** Categories combined to maintain anonymity.

†† Scores of 8.257, 13.525, 20.741, and 33.511 as cut-points to create population-level equal groups.(25)

‡‡ No missing data for mode of collection.

Over half the respondents in both study samples were female. Similarly, the majority of those in the main sample were aged 55 years or over. The commonest reported employment was full-time work (35.6% of main sample; 42.2% of sub-sample) and self-reported health status was predominantly good (35.5% of main sample; 33.0% of sub-sample). Deprivation scores were reasonably spread throughout deprivation groups, though the greatest proportions of respondents were from more deprived areas.

Table 1 also shows that patients in both samples with physical disability were more likely than those without to be white, aged 55 years or over, retired, from more deprived areas, and have only fair or poor health, and any other longstanding condition. Patients with unmet health need who also reported physical disability were more likely to be women.

Estimated prevalence

The estimated percentage of patients with physical disability in the population (calculated using non-response and design weights) was 17.2% (95% CI 17.0-17.3%) amongst adults registered with a GP in England and 23.8% (95% CI 23.3-24.3%) in those with an unmet need to see a doctor. Similarly population estimates based on weighted analyses suggest that 17.9% (95% CI 17.4-18.4%) of patients with an unmet need would cite difficulty getting to the surgery as a reason for that unmet need. This was substantially higher amongst patients with physical disability (43.1%; 95% CI 41.9-44.2%) than non-disabled patients (10.1%; 95% CI 9.6-10.5%). Also we estimate that 2.2% (95% CI 2.2-2.3%) of the adult population had difficulty getting into surgery premises. Again this was higher amongst patients with physical disability (4.9%; 95% CI 4.8-5.0%) than non-disabled patients; (1.7%; 95% CI 1.6-1.7%).

Associations between physical disability and access to surgeries

Unadjusted and adjusted associations derived from regression analyses are shown in Table 2. There was strong evidence for interactions between physical disability and age group (Wald tests p<0.001), so adjusted associations are shown by age group. These analyses showed that difficulty getting to the surgery as a reason for unmet need to see a doctor in the previous six months was associated with physical disability after adjusting for gender, age, health status and employment. The strength of association between physical disability and difficulty getting to the surgery amongst these patients increased with age until aged 65 to 74 years (OR=3.94; 95% CI 3.22-4.81, p<0.001), but was reduced amongst patients aged 85 or over (OR=1.49; 95% CI 1.21-1.83, p<0.001). No evidence was found of an association for age groups less than 45 years (see Table 2).

Table 2: Associations between physical disability and difficulty getting to the surgery amongst patients with unmet health need, and between physical disability and difficulty getting into the surgery building: for each outcome results are derived from 2 logistic regression models (unadjusted, and an adjusted model allowing the association to vary by age group)[*].

		Unmet need due to difficulty getting to surgery (n=38,468)		Difficulty getting into building (n=1,634,853)	
		OR (95% CI)	Wald test p-value	OR (95% CI)	Wald test p-value
Unadjusted		7.16 (6.78-7.56)	<0.001	3.10 (3.02-3.17)	<0.001
Adjusted for gender, health status and employment, by age (years)[†]	18 to 24	1.04 (0.62-1.76)	0.874	1.74 (1.45-2.10)	<0.001
	25 to 34	0.99 (0.70-1.39)	0.951	1.25 (1.11-1.40)	<0.001
	35 to 44	1.11 (0.88-1.41)	0.387	1.11 (1.02-1.21)	0.012
	45 to 54	1.39 (1.17-1.66)	<0.001	1.36 (1.27-1.46)	<0.001
	55 to 64	2.03 (1.73-2.38)	<0.001	1.46 (1.38-1.54)	<0.001
	65 to 74	3.94 (3.22-4.81)	<0.001	1.97 (1.86-2.09)	<0.001
	75 to 84	3.22 (2.68-3.87)	<0.001	2.39 (2.23-2.55)	<0.001
	85 or over	1.49 (1.21-1.83)	<0.001	2.14 (1.97-2.34)	<0.001

[*] Full model outputs (including interaction terms allowing the association to vary by age group) are shown for both outcomes in Appendices A and B.

[†] Derived from a model including an interaction between physical disability and age group. For both outcomes, combined Wald tests for significance of interaction term had p<0.001.

Strong evidence for an association between physical disability and difficulty getting into surgeries also existed, which remained after adjusting for the same covariates. For this outcome, evidence for such an association existed for all age groups, though the association was weakest amongst patients aged 35 to 44 years (OR 1.11; 95% CI 1.02-1.21, p=0.012), before reaching its greatest strength in the 75 to 84 years age group (OR 2.39; 95% CI 2.23-2.55, p<0.001).

DISCUSSION

Physical disability is common in the English population (in this study, estimated prevalence 17.2%, rising to almost a quarter of those with unmet need to see a doctor). Amongst adult patients with physical disability who are registered with primary care in England, 43.1% are estimated to have unmet health need due to difficulty getting to the surgery, and 4.9% find difficulty entering their GP's building. Strong evidence existed for associations between physical disability and both difficulty getting to the surgery as a reason for unmet health need to see a doctor, and difficulty getting into surgery premises. These associations were modified by age, with physically disabled patients who were aged 65 years or over generally experiencing the most difficulty with access to and into their GP's premises.

The main strength of this study is the wide, national coverage obtained using a very large sample and a sampling technique that maximised representativeness and generalisability to the adult population of England who are registered with a GP. This further allowed precise population estimates. Additionally, the survey was tested thoroughly and steps taken to maximise response and minimise error and information bias.(20–22) The main limitations are the low response rate for the GPPS and item non-response leading to exclusion from analysis. These potentially introduce selection bias. We suggest the most likely effect of such

bias, if present, would be underestimated associations between physical disability and physical access to and into GP surgeries. This is because we consider that physically disabled patients may be under-represented, with their disability impairing ability to respond to the GPPS, particularly amongst those with more severe disability. It is also more likely that patients with the most severe disability experience the most difficulty accessing primary care, yet this would not be recorded in they did not respond. Similarly, item non-response to questions regarding difficulty accessing the surgery is also more likely amongst those with no difficulties, who are most likely to be the non-disabled patients. However, the magnitude of any such underestimate is difficult to predict. Furthermore, literature on survey methodology suggests non-response bias is not inevitable when high non-response occurs, particularly in probability surveys,(27) and is supported in analyses of other GPPS questions.(26) Potential measurement error is another limitation: physical disability is difficult to measure,(1) depending only on respondents' interpretations of the GPPS question regarding presence of a longstanding condition limiting basic physical activity that was used in past United States and Irish censuses.(28,29) Any interpretation error here is most likely to have underestimated disability prevalence, and censuses are known to give lower estimates than disability surveys:(1,29) prevalence of physical disability here was 5-6% lower than recent UK estimates that included all disability types.(3) Similarly, unmet need to see a doctor was determined indirectly by inference from patients who had not seen a doctor in the preceding six months and their stated reasons why not (including that they had not needed to), rather than using a direct question regarding their unmet need: it was not possible to test the validity of this using the dataset. By its nature this study was limited to aspects of accessibility to healthcare that were asked about in the GPPS. We note that physical access is not limited to getting to and getting into premises and that accessibility of examining space and equipment are also important.

This study adds to existing literature in view of its size and English primary care setting, thus expanding and updating the predominantly North American evidence on the healthcare experience of disabled patients. It also focuses specificically on physical disability, rather than investigating all disability, potentially enabling clearer explanation of the associations found and identification of specific actions likely to benefit this patient group. It should be remembered, however, that problems of access are also an issue for those with learning disabilities and/or mental health problems. (33)

Our findings are consistent with literature of various types from other countries that has generally found physical access to and into a variety of healthcare premises to be problematic for people with a range of disabilities,(5–7,9,11,13,17,30–34) though evidence of compliance with American Disability Act design guidance and fewer problems is beginning to emerge in the USA.(35,36) With respect to the interaction between physical disability and age, others have also found increasing difficulties for older patients with disability: in high-income countries, the World Health Survey (2002-2004) found the highest prevalence of transport issues as a reason for unmet health need occurred in people with disability aged 60 years and over(1) and satisfaction with access to care is worse for disabled patients aged over 65 years in the United States.(31) In this study, the observed association between physical disability and unmet need due to difficulty getting to the surgery weakened amongst the oldest disabled patients (aged 85 years and over). This finding is supported by a smaller study of accessibility of health services in Sao Paolo, Brazil amongst persons with various disabilities that also found a weaker association between disability and accessibility experience amongst patients aged 77 years or older than for younger patients.(34) Such a reduction in the strength of association amongst the eldest patients may be due to an increased willingness of

these patients to ask for home visits and/or GPs willingness to provide them. In contrast to our findings and those from the USA outlined above, Allen and Mor found that, amongst people with various disabilities, missed doctor's appointments due to unmet transport needs occurred more amongst working age adults than those aged 65 years and over in the USA.(37) However, there was only weak evidence that age per se explained unmet transport needs in that study: greater poverty amongst younger respondents probably explained the difference. No studies specifically investigating the interaction between physical disability and age with respect to difficulty getting into healthcare premises were identified.

We consider that the associations we observed are most likely due to difficulty accessing useable and/or affordable transport, and problems with physical and architectural barriers at surgery premises (e.g. heavy doors, absent or steep ramps), since these have been described as the main barriers to primary care by physically disabled American patients(9) and noted by many others.(1,5,7,11,32,38) Lack of assistive devices and insufficient help from others have also been reported,(6,13,37) which could also explain our findings. We also believe that increased probability of difficulty getting to the surgery as a reason for unmet need for patients with physical disability and increasing age is due to worsening difficulties in accessing private and public transport experienced with aging. Patterns of transport use in the UK suggest reduced access to private transport over time amongst older people with physical difficulties;(39) and that the proportion of adults with mobility difficulties, age 70 years and over, reporting difficulty with travel to healthcare is greater than for all adults with mobility difficulties.(40) Finally, we believe that the probability of difficulty getting into buildings being reported may increase with age. We consider this may occur if age-related worsening of co-ordination and strength exacerbates difficulties arising from the physical architecture that are already experienced by patients with other physical disability, and/or if

increasing surgery usage with age highlights physical access problems, thus increasing the reporting of difficulties.

Potential consequences of these findings include adverse health consequences for patients with physical disability who are unable to see their doctor due to difficulty getting to the surgery. Improving access and meeting reasonable expectations for access and transport to and into primary care premises for patients with physical disability needs continued action from many, including:

- Increased collaboration between government departments (central and local), transport providers, the NHS (including GPs), charities, and patients to improve timely, affordable access from patients' homes to GP premises.
- Audits of the physical accessibility of primary care premises with improvements made where necessary, and consideration of newer, more accessible premises if necessary alterations are impractical;
- Continued advocacy efforts by physically disabled patients, and their representatives, in making their needs known.

Finally, despite the evidence from overseas cited above, there remains a significant gap in the literature investigating determinants of access to primary care for physically disabled patients in England, including "attitudinal, expertise-related and systemic"(6) barriers. Evidence of such barriers is dominated by North American research. For example, a survey of rehabilitation clinic out-patients found barriers to primary care such as refusal to provide care, lack of accommodation for special needs when examination is needed (e.g. by providing appropriate equipment, and/or assistance with transfer), and the patient needing to educate the clinician.(36) A qualitative study of disabled patients who had reported healthcare access

problems found evidence of poor attitudes of clinicians and other staff, including inadequate knowledge of, and training in, disability, over-focusing on the disability rather than the patients' current problem or preventative needs, and constraints on time.(7) A survey conducted in the UK found that individuals with chronic health conditions or impairments were more likely to report problems with inexperienced or unhelpful staff, discrimination, anxiety or lack of confidence, lack of information and lack of help with communication.(18) These and other practice-related factors, transport, costs, architecture and the support available to patients are also under-researched in England. Therefore, in addition to the practical actions outlined above, further quantitative and qualitative work is needed to help inform policy and practice to successfully improve access to English primary care for patients with physical disability.

ACKNOWLEDGEMENTS

The authors acknowledge the work of the Department of Health, its academic advisers, and Ipsos MORI in conceiving, developing and performing the GPPS, and of all the patients who completed it. Particular thanks go to Professor Martin Roland of the Primary Care Unit of the Department of Public Health and Primary Care at the University of Cambridge for his involvement in study conception and enabling Visiting Researcher status for NP. NP also thanks Camille Maringe of the London School of Hygiene and Tropical Medicine (LSHTM) for reviewing initial plans for the study; Jacqueline Bell, also of LSHTM, for advising on appropriate use of survey commands in STATA; and Professor John Campbell of Exeter University for reviewing the manuscript.

FOOTNOTES

Contributors NP conceived the final research question and aims and objectives, reviewed the literature, produced the analysis plan, undertook data preparation and manipulation specific to this study, performed the analyses, and drafted the manuscript. GA participated in study conception, reviewed the analysis plan, contributed to the analysis, and critically reviewed the manuscript. BR contributed to decisions on the scope of analyses and critically reviewed the manuscript. All authors have approved the final version.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests NP has a close family member with a long-standing physical disability.

Ethics approval This study was approved by the ethics committee of the London School of Hygiene and Tropical Medicine. No ethical approval was needed for the GPPS since it is classified as service evaluation.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data available.

REFERENCES

1. World Health Organization. *World Report on Disability 2011*. Malta: World Health Organization; 2011. http://www.who.int/disabilities/world_report/2011/report.pdf.
2. Office for Disability Issues. *Disability prevalence fact sheet. Disability prevalence estimates 2010/11*. London: Office for Disability Issues, 2012. http://odi.dwp.gov.uk/docs/res/factsheets/disability-prevalence.pdf (accessed February 2013).
3. Gunning N. Longstanding illness and personal care plans. In: Craig R, Hirani V, eds. *Health Survey for England 2009. Volume 1. Health and lifestyles.* London: The NHS Information Centre for Health and Social Care, 2010:19-35. https://catalogue.ic.nhs.uk/publications/public-health/surveys/heal-surv-heal-life-eng-2009/heal-surv-heal-life-eng-2009-rep-v2.pdf.
4. World Health Organization. *Disability and health. Fact sheet no. 352*. 2011. http://www.who.int/mediacentre/factsheets/fs352/en/index.html (accessed February 2013).
5. Dejong G, Palsbo SE, Beatty PW, et al. The organization and financing of health services for persons with disabilities. *Milbank Q*. 2002;**80**(2):261–301. doi:10.1111/1468-0009.t01-1-00004 [published Online First: 14 August 2002].
6. McColl MA, Forster D, Shortt SED, et al. Physician experiences providing primary care to people with disabilities. *Healthc Policy*. 2008 Aug;**4**(1):e129–e147.
7. Scheer J, Kroll T, Neri MT, et al. Access barriers for persons with disabilities. The consumer's perspective. *J Disabil Policy Stud*. 2003;**13**(4):221-30. doi:10.1177/104420730301300404.

8. Iezzoni LI, McCarthy EP, Davis RB, et al. Use of screening and preventive services among women with disabilities. *Am J Med Qual*. 2001 Jul-Aug;**16**(4):135–44. doi:10.1177/106286060101600405.

9. Morrison EH, George V, Mosqueda L. Primary care for adults with physical disabilities: perceptions from consumer and provider focus groups. *Fam Med*. 2008 Oct;**40**(9):645–51.

10. Chaix B, Veugelers PJ, Boëlle P-Y, et al. Access to general practitioner services: the disabled elderly lag behind in underserved areas. *Eur J Public Health*. 2005 Jun;**15**(3):282 –7. doi:10.1093/eurpub/cki082 [published Online First: 7 June 2005].

11. Huber M, Stanciole A, Wahlbeck K, et al. *Quality in and equality of access to healthcare services*. Brussels: European Commission, 2008. http://www.euro.centre.org/data/1237457784_41597.pdf

12. Van Brakel WH. Measuring health-related stigma -- a literature review. *Psychol Health Med*. 2006 Aug;**11**(3):307–34. doi:10.1080/13548500600595160 [published Online First: 23 Jan 2007].

13. Lawthers AG, Pransky GS, Peterson LE, et al. Rethinking quality in the context of persons with disability. *Int J Qual Health Care*. 2003 Jan 8;**15**(4):287–99. doi:10.1093/intqhc/mzg048.

14. United Nations. *Convention on the Rights of Persons with Disabilities and Optional Protocol*. New York: United Nations, 2006. http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf.

15. Tomlinson M, Swartz L, Officer A, et al. Research priorities for health of people with disabilities: an expert opinion exercise. *Lancet*. 2009 Nov 28;**374**(9704):1857–62. doi:10.1016/S0140-6736(09)61910-3.

16. Great Britain. *Equality Act 2010*. (c.15). London: HMSO. http://www.legislation.gov.uk/ukpga/2010/15/pdfs/ukpga_20100015_en.pdf.

17. Donnelly C, McColl MA, Charlifue S, et al. Utilization, access and satisfaction with primary care among people with spinal cord injuries: a comparison of three countries. *Spinal Cord*. 2007 Jan;**45**(1):25–36. doi:10.1038/sj.sc.3101933 [published Online First: 30 May 2006].

18. Allerton L, Emerson E, British adults with chronic health conditions or impairments face significant barriers to accessing health services, Public Health (2012), http://dx.doi.org/10.1016/j.puhe.2012.08.003

19. Ipsos MORI. *The GP Patient Survey*. [Online]. 2012. http://www.gp-patient.co.uk/ (accessed February 2013).

20. Ipsos MORI. *Technical Annex for the GP Patient Survey. 2010/11 Annual Report*. London: Ipsos MORI, 2011. http://www.gp-patient.co.uk/results/download/y5q4/y5q4_AnnualTechnical.pdf (accessed September 2012).

21. Ipsos MORI. *Technical Annex for the GP Patient Survey. 2009/10 Annual Report*. London: Ipsos MORI, 2010. http://www.gp-patient.co.uk/results/download/y4q4/y4q4_AnnualTechnical_unweighted.pdf (accessed September 2012).

22. Campbell J, Smith P, Nissen S, et al. The GP Patient Survey for use in primary care in the National Health Service in the UK - development and psychometric characteristics. *BMC Fam Pr*. 2009 Aug 22;**10**(1):57. doi:10.1186/1471-2296-10-57.

23. National Statistics. *Census 2001. England Individual Form*. Titchfield: National Statistics, 2001. http://www.ons.gov.uk/ons/guide-method/census/census-2001/about-census-2001/census-2001-forms/index.html.

24. Office for National Statistics. *Rural-Urban Definition (England and Wales)*. [Online]. 2009. http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-urban-definition--england-and-wales-/index.html (accessed November 2013).

25. Noble M, McLennan D, Wilkinson K, et al. *The English Indices of Deprivation 2007*. London: Department for Communities and Local Government, 2008. http://webarchive.nationalarchives.gov.uk/20100410180038/http://communities.gov.uk/documents/communities/pdf/733520.pdf.

26. Roland M, Elliott M, Lyratzopoulos G, et al. Reliability of patient responses in pay for performance schemes: analysis of national General Practitioner Patient Survey data in England. *BMJ*. 2009 Sep 29;339:b3851. doi:10.1136/bmj.b385 [published Online First 29 September 2009].

27. Groves R. Nonresponse rates and nonresponse bias in household surveys. *Public Opin Q* 2006;**70**(5):646–75. doi:10.1093/poq/nfl033.

28. Bureau of the Census, US Department of Commerce. *United States Census 2000. H. Disability and Caregivers.* Washington, DC: Bureau of the Census, 1998. http://www.census.gov/dmd/www/pdf/09h_di.pdf (accessed November 2013).

29. Central Statistics Office. *National disability survey 2006: first results*. Dublin: Stationery Office, 2008. http://www.cso.ie/en/media/csoie/releasespublications/documents/otherreleases/nationaldisability/National%20Disability%20Survey%202006%20First%20Results%20full%20report.pdf.

30. Anderson P, Kitchin R. Disability, space and sexuality: access to family planning services. *Soc Sci Med*. 2000 Oct 16;**51**(8):1163–73. doi:10.1016/S0277-9536(00)00019-8.

31. Iezzoni LI, Davis RB, Soukup J, et al. Satisfaction with quality and access to health care among people with disabling conditions. *Int J Qual Health Care*. 2002 Oct;**14**(5):369–81. doi:10.1093/intqhc/14.5.369.

32. Graham CL, Mann JR. Accessibility of primary care physician practice sites in South Carolina for people with disabilities. *Disabil Health J*. 2008 Oct;**1**(4):209–14. doi:10.1016/j.dhjo.2008.06.001.

33. Disability Rights Commission. Equal Treatment: Closing the Gap. A formal investigation into physical health inequalities experienced by people with learning disabilities and/or mental health problems, 2006

34. Castro SS, Cieza A, Cesar CL. Problems with accessibility to health services by persons with disabilities in Sao Paulo, Brazil. *Disabil Rehabil*. 2011;**33**(17-18):1693–8. doi:10.3109/09638288.2010.541542 [published Online First: 20 Dec 2010].

35. Mudrick NR, Breslin ML, Liang M, et al. Physical accessibility in primary health care settings: Results from California on-site reviews. *Disabil Health J*. 2012 Jul;**5**(3):159–67. doi:10.1016/j.dhjo.2012.02.002 [published Online First: 24 May 2012].

36. Harrington AL, Hirsch MA, Hammond FM, et al. Assessment of primary care services and perceived barriers to care in persons with disabilities. *Am J Phys Med Rehabil*. 2009 Oct;**88**(10):852–63. doi:10.1097/PHM.0b013e3181b30745.

37. Allen S, Mor V. The prevalence and consequence of unmet need. Contrasts between older and younger adults with disability. *Med Care*. 1997 Nov;**35**(11):1135–48.

38. Iezzoni LI, Killeen MB, O'Day BL. Rural residents with disabilities confront substantial barriers to obtaining primary care. *Health Serv Res*. 2006 Aug;**41**(4 Pt 1):1258–75. doi:10.1111/j.1475-6773.2006.00534.x [published Online First: 31 March 2006].

39. Breeze E, Lang I. Physical functioning in a community context. In: Banks J, Breeze E, Lessof C, Nazroo J, eds. *Living in the 21st Century: Older People in England. The 2006*

English Longitudinal Study of Ageing (Wave 3). London: The Institute for Fiscal Studies, 2008:57-117. http://www.ifs.org.uk/elsa/report08/ch3.pdf.

40. Department for Transport. *Health-related Travel Difficulties. Personal Travel Factsheet - March 2010*. London: Department for Transport, 2010. http://webarchive.nationalarchives.gov.uk/20100304070241/http://www.dft.gov.uk/pgr/statistics/datatablespublications/personal/ntsfactsheets/NTSHealthrelated.pdf (accessed March 2013).

Figure Captions

Figure 1: Flow diagram of data for the GPPS and samples used for this study

TITLE: How do adults with physical disability experience primary care? A nationwide cross-sectional survey of access among patients in England.

CORRESPONDING AUTHOR: Dr Nicola Popplewell; c/o Cambridge Centre for Health Services Research, Institute of Public Health, Forvie Site, University of Cambridge School of Clinical Medicine, Box 113 Cambridge Biomedical Campus, Cambridge CB2 0SR; n.popplewell@ntlworld.com; telephone 01223 560196; no fax.

AUTHOR AFFILIATIONS:

- Dr Nicola Popplewell, Visiting Researcher, Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge, Cambridge, United Kingdom.
- Dr Boika PD Rechel, Department of Disease Control, London School of Hygiene & Tropical Medicine, London, UK.
- Dr Gary Abel, Cambridge Centre for Health Services Research, Department of Public Health and Primary Care, University of Cambridge, Cambridge, United Kingdom.

KEYWORDS: primary health care; disabled persons; delivery of healthcare; access to healthcare.

WORD COUNT: 3250

ABSTRACT:

Objectives: Almost a quarter of adults in England report a longstanding condition limiting physical activities. However, recent overseas evidence suggests poorer access to healthcare for disabled people. This study aimed to compare patient-reported access to English primary care for adults with and without physical disability.

Design: Secondary analysis of the 2010/11 General Practice Patient Survey (response rate 35.9%) using logistic regression.

Setting & participants: 1,780,977 patients, from 8384 English general practices, who provided information on longstanding conditions limiting basic physical activity. 41,389 of these patients reported unmet need to see a doctor in the previous six months.

Outcomes: Difficulty getting to the GP surgery as a reason for unmet need to see a doctor in the preceding six months; difficulty getting into the surgery building.

Results: Estimated prevalence of physical disability was 17.2% (95% CI 17.0-17.3%). 17.9% (95% CI 17.4-18.4%) of patients with an unmet need to see a doctor were estimated to experience this due to difficulty getting to the surgery, and 2.2% (95% CI 2.2-2.3%) of all patients registered with a GP were estimated to experience difficulty getting into surgery buildings. Adjusting for gender, age, health status and employment, difficulty getting to the surgery explaining unmet need was more likely for patients with physical disability than for those without. Similarly, difficulty getting into surgery buildings was more likely amongst physically disabled patients. Both associations were stronger amongst patients aged 65 to 84 years.

Conclusions: Adults in England with physical disability experience worse physical access into primary care buildings than those without. Physical disability is also associated with increased unmet healthcare need due to difficulty getting to GP premises, compared to the experience of adults without physical disability. Increasing age further exacerbates these

problems. Access to primary care in England for patients with physical disability needs improving.

ARTICLE SUMMARY

Strengths and limitations of this study

- The study provides recent evidence relevant to the United Kingdom on associations between physical disability and access to and into primary care in England.
- The study obtained wide, national coverage across England using a very large sample and a sampling technique maximising representativeness and generalisability to the adult population of England who are registered with a GP, and allowing precise population estimates.
- The survey instrument (the General Practice Patient Survey) was tested thoroughly and steps taken to maximise response and minimise error and information bias.
- The 36% response rate for the General Practice Patient Survey and item non-response leading to exclusion from analysis has the potential to introduce selection bias. If present, such bias would most likely lead to underestimated associations between physical disability and physical access to and into GP surgeries.
- Measurement error is also possible: physical disability is difficult to measure in surveys, and the validity of the method used to determine unmet need to see a doctor could not be tested using this dataset.

INTRODUCTION

Physical disability is a major global concern,(1) and represents the commonest form of disability in Great Britain:(2) during 2009, 22% of men and 23% of women in the United

Kingdom reported a longstanding condition that limited activities.(3) Such disabilities can cause increased morbidity, mortality and healthcare need.(1,4,5)

Consequently, the World Health Organization emphasises that people with disabilities require access to healthcare and recommends their needs be met by primary health care, with specialist referral where necessary.(1) However, such access is influenced by interactions between a person's impairment and their physical and social environments, so that individuals can experience limited access to preventive care, diagnosis and treatment.(1,5–9) Therefore, higher unmet health need exists amongst people with disability than amongst people without (World Health Survey 2002-2004).(1) Specific problems in accessing primary care include "*physical, attitudinal, expertise-related and systemic"* barriers experienced when "*finding a doctor, getting an appointment, entering and using the facilities, and obtaining quality care"*.(6) Such problems can worsen with increasing age,(10,11) and can also result in delayed presentation, worse prognosis, and further increased need.(12,13) Therefore, ensuring rights of access to healthcare for people with disabilities is important: the 2008 United Nations *Convention on the Rights of Persons with Disabilities* sought to ensure such access,(14) and international consensus amongst health and disability experts has concluded that investigating barriers experienced by people with disability when accessing healthcare remains a top priority.(15)

In the UK, the *Convention on the Rights of Persons with Disabilities* has been ratified and the Equality Act 2010 passed,(16) such that reasonable accessibility to primary care and transport services are expected. However, although almost all adults in England have access to primary care via registration with a National Health Service (NHS) general practitioner (GP), limited recent empirical evidence exists regarding patient experience of general practice

accessibility amongst physically disabled patients.(17, 18). An analysis of the Life Opportunities Survey has shown that individuals with chronic health conditions or impairments were more likely to report a range of issues with access to healthcare, from being able to get to appointments and getting into buildings, to lack of help with communication. (18). ~~Therefore~~In light of this paucity of evidence, this study seeks to add to the predominantly North American literature on this subject using data from the 2010/11 nationwide General Practice Patient Survey (GPPS), which is used by the Department of Health in England to assess patient experience of primary care.(~~18~~19)

This study explores whether adult patients with physical disability, registered with English GPs, experience difficulty accessing primary care compared to patients without such disability. In particular, we assess experience of inability to get to the surgery as a reason for unmet need to see a doctor in the preceding six months; and inability to get into the surgery building.

METHODS

Study Design and General Practice Patient Survey

This study was a secondary analysis of 2010/11 GPPS data obtained using a nationwide, cross-sectional survey, sampling from adults registered with an English NHS GP.(~~19~~20) Details of questionnaire development,(~~19~~20–~~21~~22) and the questionnaires themselves are available elsewhere, as are eligibility criteria and sample size calculation for the GPPS.(~~19~~20) 8397 practices with eligible patients were identified and patients stratified by practice, age-band, then gender, before 5,561,368 patients were selected systematically on a '1 in n' basis.(~~19~~20) Small practices and those with known low response rates were oversampled.

Full details are published elsewhere:(~~19~~20) 1,994,410 responses were received (GPPS response rate 35.9%).

Study Samples

Associations between physical disability and access into surgery buildings were assessed in a sample of 1,780,977 GPPS respondents who were sent a questionnaire and answered the survey question "*Do you have any of the following long-standing conditions?*"(~~19~~20) (response rate for this item 32.0%). Respondents could report up to six categories of condition, including "*a condition that substantially limits one or more basic physical activities, such as walking, climbing stairs, lifting or carrying*", thus providing information on the presence of a physical disability. They could also confirm they had no such conditions.

Associations between physical disability and difficulty getting to the surgery as a reason for unmet need to see a doctor were assessed in a sub-sample of 41,389 patients who provided information on longstanding conditions and indicated an unmet need to see a doctor in the previous six months on the GPPS.(~~19~~20) Respondents with missing data for when they last saw a doctor (n=48,090) or why they had not seen a doctor (n=8,976) were not included in the sub-sample.

Study Observations

Respondents who ticked "*I couldn't get to the GP surgery or health centre easily*" in response to "*If you haven't seen a doctor in the past 6 months, why is that?*" were classed as having difficulty getting to the surgery (four other possible reasons were allowed, with respondents invited to tick all that apply).(~~19~~20) Ease of access into the surgery was assessed

using "*How easy do you find it to get into the building at your GP surgery or health centre?*". Responses of "*Not very easy*" or "*Not at all easy*" were defined as "Difficulty", and "*Very easy*" or "*Fairly easy*" as "No difficulty".

Gender; age group (eight categories); employment status (eight categories); self-reported health status (five ordinal categories); presence or absence of each of five other longstanding conditions (deafness/severe hearing impairment; blindness/severe visual impairment; learning difficulty; psychological/emotional condition; other); and ethnic group (combined from sixteen Office for National Statistics categories(232) into six) were identified from GPPS responses. Four categories of rurality(243) and population-based quintiles of the 2007 Lower Super-Output Area Indices of Multiple Deprivation (IMD)(254) were determined from the patient's postcode of residence. Mode of survey completion and patient-level weights accounting for survey design and non-response, derived by the survey provider, were also in the dataset.(1920)

Statistical Analyses

The percentages of the population that report physical disability and study outcomes were calculated using weights, thereby accounting for sampling procedures and survey non-response by age, gender and practice. All other analysis was un-weighted. Initial un-weighted analyses used only data that was complete for all variables in Table 1, though final analyses reported here only excluded observations with missing age, gender, employment, health status, or outcome data.

Results for both outcomes were obtained using univariable and multivariable logistic regression, using population-averaged, generalised estimating equations with exchangeable

correlation matrices and robust standard errors, thereby accounting for correlation of observations by practice and assessing patient-level associations across England. Combined Wald tests were used for hypothesis tests. In the adjusted models, age and gender were considered *a priori* confounders. All other covariates were added to the models in sequence, based on their effects on the associations of interest in preliminary analyses, and remained if the odds ratio altered compared to the unadjusted model. An interaction term was added to the final models to assess whether associations between physical disability and outcomes varied with age group.

All analysis was completed using Stata MP v11.2.

RESULTS

Participants

Figure 1 shows the flow of patients for the GPPS and those eligible for this study: 8384 practices were represented in the larger sample, and 7738 in the sub-sample. Un-weighted sample descriptions by physical disability are shown in Table 1. The main sample for un-weighted analysis comprised 1,634,853 observations (21.5% with physical disability) from 8380 practices (146,124 eligible observations excluded due to missing covariate and outcome data). 38,468 observations (29.3% with physical disability) from 7658 practices were available for analysis of the sub-sample after similarly excluding 2,921 observations.

Table 1: Characteristics of respondents by physical disability, for the analysed samples*

		Main study sample n=1,634,853		Sub-sample with unmet need to see a doctor n=38,468	
		Physical disability n=351,526 (%†)	No physical disability n=1,283,327 (%†)	Physical disability n=11,283 (%†)	No physical disability n=27,185 (%†)
Gender*	Male‡	157,019 (44.7)	554,422 (43.2)	4,285 (38.0)	13,213 (48.6)
Age (years)*	18 to 24	2,691 (0.8)	71,817 (5.6)	132 (1.2)	2,269 (8.4)
	25 to 24	7,691 (2.2)	167,918 (13.1)	302 (2.7)	5,106 (18.8)
	35 to 44	18,649 (5.3)	222,772 (17.4)	571 (5.1)	5,944 (21.9)
	45 to 54	41,042 (11.7)	257,128 (20.0)	1,148 (10.2)	6,277 (23.1)
	55 to 64‡	78,930 (22.5)	268,128 (20.9)	1,817 (16.1)	4,509 (16.6)
	65 to 74	91,298 (26.0)	192,063 (15.0)	1,747 (15.5)	1,787 (6.6)
	75 to 84	80,809 (23.0)	86,959 (6.8)	2,478 (22.0)	845 (3.1)
	85 or over	30,416 (8.7)	16,542 (1.3)	3,088 (27.4)	448 (1.7)
Employment*	Full-time work‡	37,305 (10.6)	544,202 (42.4)	1,123 (10.0)	15,099 (55.5)
	Part-time work	19,607 (5.6)	195,281 (15.2)	427 (3.8)	3,361 (12.4)
	Full-time education	1,183 (0.3)	29,297 (2.3)	53 (0.5)	965 (3.6)
	Unemployed	12,497 (3.6)	57,576 (4.5)	307 (2.7)	1,434 (5.3)
	Permanently sick/disabled	73,016 (20.8)	24,719 (1.9)	3,591 (31.8)	858 (3.2)
	Retired	184,616 (52.5)	313,383 (24.4)	5,167 (45.8)	3,160 (11.6)
	Looking after home	18,370 (5.2)	87,044 (6.8)	397 (3.5)	1,333 (4.9)
	Something else	4,932 (1.4)	31,825 (2.5)	218 (1.9)	975 (3.6)
Health status*	Excellent	2,939 (0.8)	138,724 (10.8)	53 (0.5)	2,246 (8.3)
	Very good	22,236 (6.3)	455,991 (35.5)	406 (3.6)	7,684 (28.3)
	Good‡	87,631 (24.9)	493,157 (38.4)	1,745 (15.5)	10,947 (40.3)
	Fair	160,144 (45.6)	172,142 (13.4)	4,792 (42.5)	5,245 (19.3)
	Poor	78,576 (22.4)	23,313 (1.8)	4,287 (38.0)	1,063 (3.9)
Deafness§	Yes	62,550 (18.0)	80,352 (6.3)	2,624 (23.3)	1,270 (4.7)
Blindness§	Yes	17,299 (4.9)	14,459 (1.1)	1,287 (11.4)	427 (1.6)
Psychological condition§	Yes	31,841 (9.1)	63,033 (4.9)	1,058 (9.4)	1,710 (6.3)
Learning difficulty§	Yes	8,501 (2.4)	15,145 (1.2)	283 (2.5)	431 (1.6)
Other condition§	Yes	125,635 (35.7)	334,734 (26.1)	4,516 (40.0)	6,970 (25.6)
No longstanding conditions§	Yes	6,405 (1.8)	838,324 (65.3)	155 (1.4)	17,717 (65.2)

Rurality	Urban‡	305,404	(86.9)	1,095,041	(85.3)	9,904 (87.8)	24,433 (89.9)
	Town/fringe	36,746	(10.5)	145,699	(11.4)	1,121 (9.9)	2,282 (8.4)
	Village	7,871	(2.2)	35,780	(2.8)	220 (2.0)	386 (1.4)
	Hamlet/isolated	1,447	(0.4)	6,573	(0.5)	38 (0.3)**	84 (0.3)**
	Missing	58	(0.0)	234	(0.0)		
IMD quintile††	1 (least deprived)	45,541	(13.0)	243,518	(19.0)	1,346 (11.9)	3,951 (14.5)
	2	58,233	(16.6)	253,672	(19.8)	1,833 (16.3)	4,541 (16.7)
	3	66,615	(19.0)	256,456	(20.0)	2,156 (19.1)	5,222 (19.2)
	4	78,685	(22.4)	262,021	(20.4)	2,565 (22.7)	6,464 (23.8)
	5 (most deprived)‡	102,193	(29.1)	266,592	(20.8)	3,374 (29.9)	6,983 (26.0)
	Missing	259	(0.1)	1,068	(0.1)	9 (0.1)	24 (0.1)
Ethnicity	White‡	316,882	(90.1)	1,104,565	(86.1)	10,328 (91.5)	21,393 (78.7)
	Mixed	1,788	(0.5)	11,202	(0.8)	66 (0.6)	367 (1.4)
	Asian	14,712	(4.2)	74,715	(5.8)	311 (2.8)	2,408 (8.9)
	Black	7,301	(2.1)	40,939	(3.2)	205 (1.8)	1,125 (4.1)
	Chinese	622	(0.2)	7,451	(0.6)	29 (0.3)	347 (1.3)
	Other	6,407	(1.8)	31,313	(2.4)	193 (1.7)	1,122 (4.1)
	Missing	3,814	(1.1)	13,142	(1.0)	151 (1.3)	423 (1.6)
Collection mode‡‡	Paper‡	343,063	(97.6)	1,218,887	(95.0)	10,937 (96.9)	24,993 (91.9)
	Telephone	86	(0.0)	63	(0.0)	346 (3.1)**	2,192 (8.1)**
	Online	8,377	(2.4)	64,377	(5.0)		
Difficulty getting to the surgery	Yes	Not applicable		Not applicable		5,012 (44.4)	2,727 (10.0)
Difficulty getting into GP building	Yes	16,534	(4.7)	20,473	(1.6)	Not applicable	Not applicable

* Descriptive analysis of main sample excludes 146,124 eligible observations (including 55,853 with physical disability (PD)) due to missing data for age ($n_{missing}$=12,226; 3,839 with PD); gender (n=9,205; 2,938 with PD); health status (n=20,607; 8,558 with PD); employment (n=76,179; 32,949 with PD); or outcome (n=44,130; 14,616 with PD). Descriptive analysis of sub-sample excludes 2,921 eligible observations (1,593 with PD) due to missing data for age ($n_{missing}$=343; 146 with PD); gender (n=297; 141 with PD); health status (n=610; 302 with PD); or employment (n=1,994; 1,178 with PD).

† Not all percentages sum to 100% due to rounding.

‡ Reference category. "No" was the reference category for longstanding conditions and outcomes.

§ All longstanding conditions had the same missing data as PD.

** Categories combined to maintain anonymity.

†† Scores of 8.257, 13.525, 20.741, and 33.511 as cut-points to create population-level equal groups.(25)

‡‡ No missing data for mode of collection.

Over half the respondents in both study samples were female. Similarly, the majority of those in the main sample were aged 55 years or over. The commonest reported employment was full-time work (35.6% of main sample; 42.2% of sub-sample) and self-reported health status was predominantly good (35.5% of main sample; 33.0% of sub-sample). Deprivation scores were reasonably spread throughout deprivation groups, though the greatest proportions of respondents were from more deprived areas.

Table 1 also shows that patients in both samples with physical disability were more likely than those without to be white, aged 55 years or over, retired, from more deprived areas, and have only fair or poor health, and any other longstanding condition. Patients with unmet health need who also reported physical disability were more likely to be women.

Estimated prevalence

The estimated percentage of patients with physical disability in the population (calculated using non-response and design weights) was 17.2% (95% CI 17.0-17.3%) amongst adults registered with a GP in England and 23.8% (95% CI 23.3-24.3%) in those with an unmet need to see a doctor. Similarly population estimates based on weighted analyses suggest that 17.9% (95% CI 17.4-18.4%) of patients with an unmet need would cite difficulty getting to the surgery as a reason for that unmet need. This was substantially higher amongst patients with physical disability (43.1%; 95% CI 41.9-44.2%) than non-disabled patients (10.1%; 95% CI 9.6-10.5%). Also we estimate that 2.2% (95% CI 2.2-2.3%) of the adult population had difficulty getting into surgery premises. Again this was higher amongst patients with physical disability (4.9%; 95% CI 4.8-5.0%) than non-disabled patients; (1.7%; 95% CI 1.6-1.7%).

Associations between physical disability and access to surgeries

Unadjusted and adjusted associations derived from regression analyses are shown in Table 2. There was strong evidence for interactions between physical disability and age group (Wald tests $p<0.001$), so adjusted associations are shown by age group. These analyses showed that difficulty getting to the surgery as a reason for unmet need to see a doctor in the previous six months was associated with physical disability after adjusting for gender, age, health status and employment. The strength of association between physical disability and difficulty getting to the surgery amongst these patients increased with age until aged 65 to 74 years (OR=3.94; 95% CI 3.22-4.81, $p<0.001$), but was reduced amongst patients aged 85 or over (OR=1.49; 95% CI 1.21-1.83, $p<0.001$). No evidence was found of an association for age groups less than 45 years (see Table 2).

Table 2: Associations between physical disability and difficulty getting to the surgery amongst patients with unmet health need, and between physical disability and difficulty getting into the surgery building: for each outcome results are derived from 2 logistic regression models (unadjusted, and an adjusted model allowing the association to vary by age group)[*].

		Unmet need due to difficulty getting to surgery (n=38,468)		Difficulty getting into building (n=1,634,853)	
		OR (95% CI)	Wald test p-value	OR (95% CI)	Wald test p-value
Unadjusted		7.16 (6.78-7.56)	<0.001	3.10 (3.02-3.17)	<0.001
Adjusted for gender, health status and employment, by age (years)[†]	18 to 24	1.04 (0.62-1.76)	0.874	1.74 (1.45-2.10)	<0.001
	25 to 34	0.99 (0.70-1.39)	0.951	1.25 (1.11-1.40)	<0.001
	35 to 44	1.11 (0.88-1.41)	0.387	1.11 (1.02-1.21)	0.012
	45 to 54	1.39 (1.17-1.66)	<0.001	1.~~34~~ 36 (1.27-1.46)	<0.001
	55 to 64	2.03 (1.73-2.38)	<0.001	1.46 (1.38-1.54)	<0.001
	65 to 74	3.94 (3.22-4.81)	<0.001	1.97 (1.86-2.09)	<0.001
	75 to 84	3.22 (2.68-3.87)	<0.001	2.39 (2.23-2.55)	<0.001
	85 or over	1.49 (1.21-1.83)	<0.001	2.14 (1.97-2.34)	<0.001

[*] Full model outputs (including interaction terms allowing the association to vary by age group) are shown for both outcomes in Appendices A and B.

[†] Derived from a model including an interaction between physical disability and age group. For both outcomes, combined Wald tests for significance of interaction term had p<0.001.

Strong evidence for an association between physical disability and difficulty getting into surgeries also existed, which remained after adjusting for the same covariates. For this outcome, evidence for such an association existed for all age groups, though the association was weakest amongst patients aged 35 to 44 years (OR 1.11; 95% CI 1.02-1.21, p=0.012), before reaching its greatest strength in the 75 to 84 years age group (OR 2.39; 95% CI 2.23-2.55, p<0.001).

DISCUSSION

Physical disability is common in the English population (in this study, estimated prevalence 17.2%, rising to almost a quarter of those with unmet need to see a doctor). Amongst adult patients with physical disability who are registered with primary care in England, 43.1% are estimated to have unmet health need due to difficulty getting to the surgery, and 4.9% find difficulty entering their GP's building. Strong evidence existed for associations between physical disability and both difficulty getting to the surgery as a reason for unmet health need to see a doctor, and difficulty getting into surgery premises. These associations were modified by age, with physically disabled patients who were aged 65 years or over generally experiencing the most difficulty with access to and into their GP's premises.

The main strength of this study is the wide, national coverage obtained using a very large sample and a sampling technique that maximised representativeness and generalisability to the adult population of England who are registered with a GP. This further allowed precise population estimates. Additionally, the survey was tested thoroughly and steps taken to maximise response and minimise error and information bias.(~~19~~20 ~~21~~22) The main limitations are the low response rate for the GPPS and item non-response leading to exclusion from analysis. These potentially introduce selection bias. We suggest the most likely effect

of such bias, if present, would be underestimated associations between physical disability and physical access to and into GP surgeries. This is because we consider that physically disabled patients may be under-represented, with their disability impairing ability to respond to the GPPS, particularly amongst those with more severe disability. It is also more likely that patients with the most severe disability experience the most difficulty accessing primary care, yet this would not be recorded in they did not respond. Similarly, item non-response to questions regarding difficulty accessing the surgery is also more likely amongst those with no difficulties, who are most likely to be the non-disabled patients. However, the magnitude of any such underestimate is difficult to predict. Furthermore, literature on survey methodology suggests non-response bias is not inevitable when high non-response occurs, particularly in probability surveys,(276) and is supported in analyses of other GPPS questions.(265) Potential measurement error is another limitation: physical disability is difficult to measure,(1) depending only on respondents' interpretations of the GPPS question regarding presence of a longstanding condition limiting basic physical activity that was used in past United States and Irish censuses.(287,298) Any interpretation error here is most likely to have underestimated disability prevalence, and censuses are known to give lower estimates than disability surveys:(1,298) prevalence of physical disability here was 5-6% lower than recent UK estimates that included all disability types.(3) Similarly, unmet need to see a doctor was determined indirectly by inference from patients who had not seen a doctor in the preceding six months and their stated reasons why not (including that they had not needed to), rather than using a direct question regarding their unmet need: it was not possible to test the validity of this using the dataset. By its nature this study was limited to aspects of accessibility to health-care that were asked about in the GPPS. We note that physical access is not limited to getting to and getting into premises and that accessibility of examining space and equipment are also important.

This study adds to existing literature in view of its size and English primary care setting, thus expanding and updating the predominantly North American evidence on the healthcare experience of disabled patients. It also focuses ~~on a~~ specific[ically on physical ~~type of~~ disability, rather than investigating all disability, potentially enabling clearer explanation of the associations found and identification of specific actions likely to benefit this patient group. It should be remembered, however, that problems of access are also an issue for those with learning disabilities and/or mental health problems. (33)

Our findings are consistent with literature of various types from other countries that has generally found physical access to and into a variety of healthcare premises to be problematic for people with a range of disabilities,(5–7,9,11,13,17,30~~29~~–3~~4~~2) though evidence of compliance with American Disability Act design guidance and fewer problems is beginning to emerge in the USA.(~~33~~35,~~34~~36) With respect to the interaction between physical disability and age, others have also found increasing difficulties for older patients with disability: in high-income countries, the World Health Survey (2002-2004) found the highest prevalence of transport issues as a reason for unmet health need occurred in people with disability aged 60 years and over(1) and satisfaction with access to care is worse for disabled patients aged over 65 years in the United States.(3~~0~~1) In this study, the observed association between physical disability and unmet need due to difficulty getting to the surgery weakened amongst the oldest disabled patients (aged 85 years and over). This finding is supported by a smaller study of accessibility of health services in Sao Paolo, Brazil amongst persons with various disabilities that also found a weaker association between disability and accessibility experience amongst patients aged 77 years or older than for younger patients.(~~32~~34) Such a reduction in the strength of association amongst the eldest patients may be due to an

increased willingness of these patients to ask for home visits and/or GPs willingness to provide them. In contrast to our findings and those from the USA outlined above, Allen and Mor found that, amongst people with various disabilities, missed doctor's appointments due to unmet transport needs occurred more amongst working age adults than those aged 65 years and over in the USA.(375) However, there was only weak evidence that age per se explained unmet transport needs in that study: greater poverty amongst younger respondents probably explained the difference. No studies specifically investigating the interaction between physical disability and age with respect to difficulty getting into healthcare premises were identified.

We consider that the associations we observed are most likely due to difficulty accessing useable and/or affordable transport, and problems with physical and architectural barriers at surgery premises (e.g. heavy doors, absent or steep ramps), since these have been described as the main barriers to primary care by physically disabled American patients(9) and noted by many others.(1,5,7,11,321,386) Lack of assistive devices and insufficient help from others have also been reported,(6,13,3537) which could also explain our findings. We also believe that increased probability of difficulty getting to the surgery as a reason for unmet need for patients with physical disability and increasing age is due to worsening difficulties in accessing private and public transport experienced with aging. Patterns of transport use in the UK suggest reduced access to private transport over time amongst older people with physical difficulties~~, which is not fully compensated by increased public transport use~~;(397) ~~frequency of all trips reduces with aging;~~ and that the proportion of adults with mobility difficulties, age 70 years and over, reporting difficulty with travel to healthcare is greater than for all adults with mobility difficulties.(4038) ~~Therefore, relatively good access to transport may account for the apparent lack of an association in this study between physical disability~~

~~and difficulty getting to the surgery as a reason for unmet need for patients aged less than 45 years. However, caution should be applied when interpreting this apparent lack of an association as confidence intervals were relatively wide.~~ Finally, we believe that the probability of difficulty getting into buildings being reported may increase with age. We consider this may occur if age-related worsening of co-ordination and strength exacerbates difficulties arising from the physical architecture that are already experienced by patients with other physical disability, and/or if increasing surgery usage with age highlights physical access problems, thus increasing the reporting of difficulties.

Potential consequences of these findings include adverse health consequences for patients with physical disability who are unable to see their doctor due to difficulty getting to the surgery. Improving access and meeting reasonable expectations for access and transport to and into primary care premises for patients with physical disability needs continued action from many, including:

- Increased collaboration between government departments (central and local), transport providers, the NHS (including GPs), charities, and patients to improve timely, affordable access from patients' homes to GP premises.
- Audits of the physical accessibility of primary care premises with improvements made where necessary, and consideration of newer, more accessible premises if necessary alterations are impractical;
- Continued advocacy efforts by physically disabled patients, and their representatives, in making their needs known.

Finally, despite the evidence from overseas cited above, there remains a significant gap in the literature investigating determinants of access to primary care for physically disabled patients

in England, including "attitudinal, expertise-related and systemic"(6) barriers. Evidence of such barriers is dominated by North American research. For example, a survey of rehabilitation clinic out-patients found barriers to primary care such as refusal to provide care, lack of accommodation for special needs when examination is needed (e.g. by providing appropriate equipment, and/or assistance with transfer), and the patient needing to educate the clinician.(36) A qualitative study of disabled patients who had reported healthcare access problems found evidence of poor attitudes of clinicians and other staff, including inadequate knowledge of, and training in, disability, over-focusing on the disability rather than the patients' current problem or preventative needs, and constraints on time.(7)~~and consideration of~~ A survey conducted in the U.K. found that individuals with chronic health conditions or impairments were more likely to report problems with inexperienced or unhelpful staff, discrimination, anxiety or lack of confidence, lack of information and lack of help with communication.(18) These and other practice-related factors, transport, costs, architecture and the support available to patients are also under-researched in England. Therefore, in addition to the practical actions outlined above, further quantitative and qualitative work is needed to help inform policy and practice to successfully improve access to English primary care for patients with physical disability.

ACKNOWLEDGEMENTS

The authors acknowledge the work of the Department of Health, its academic advisers, and Ipsos MORI in conceiving, developing and performing the GPPS, and of all the patients who completed it. Particular thanks go to Professor Martin Roland of the Primary Care Unit of the Department of Public Health and Primary Care at the University of Cambridge for his involvement in study conception and enabling Visiting Researcher status for NP. NP also thanks Camille Maringe of the London School of Hygiene and Tropical Medicine (LSHTM)

for reviewing initial plans for the study; Jacqueline Bell, also of LSHTM, for advising on appropriate use of survey commands in STATA; and Professor John Campbell of Exeter University for reviewing the manuscript.

FOOTNOTES

Contributors NP conceived the final research question and aims and objectives, reviewed the literature, produced the analysis plan, undertook data preparation and manipulation specific to this study, performed the analyses, and drafted the manuscript. GA participated in study conception, reviewed the analysis plan, contributed to the analysis, and critically reviewed the manuscript. BR contributed to decisions on the scope of analyses and critically reviewed the manuscript. All authors have approved the final version.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests NP has a close family member with a long-standing physical disability.

Ethics approval This study was approved by the ethics committee of the London School of Hygiene and Tropical Medicine. No ethical approval was needed for the GPPS since it is classified as service evaluation.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Anonymised individual level data were provided to the Health Services Research Group at the University of Cambridge by Ipsos MORI, with a covering confidentiality agreement with the Department of Health. Under this agreement we are not at liberty to share the dataset with third parties. No additional data available.

related to the Contribution ("the Contribution") have the right to grant on behalf of all authors and do grant on behalf of all authors, a licence to the BMJ Publishing Group Ltd and its licensees, to permit this Contribution (if accepted) to be published in BMJ Open and any other BMJ Group products and to exploit all subsidiary rights, as set out in the licence at: http://bmjopen.bmj.com/site/about/licence.pdf.

REFERENCES

1. World Health Organization. *World Report on Disability 2011*. Malta: World Health Organization; 2011. http://www.who.int/disabilities/world_report/2011/report.pdf.
2. Office for Disability Issues. *Disability prevalence fact sheet. Disability prevalence estimates 2010/11*. London: Office for Disability Issues, 2012. http://odi.dwp.gov.uk/docs/res/factsheets/disability-prevalence.pdf (accessed February 2013).
3. Gunning N. Longstanding illness and personal care plans. In: Craig R, Hirani V, eds. *Health Survey for England 2009. Volume 1. Health and lifestyles*. London: The NHS Information Centre for Health and Social Care, 2010:19-35. https://catalogue.ic.nhs.uk/publications/public-health/surveys/heal-surv-heal-life-eng-2009/heal-surv-heal-life-eng-2009-rep-v2.pdf.
4. World Health Organization. *Disability and health. Fact sheet no. 352*. 2011. http://www.who.int/mediacentre/factsheets/fs352/en/index.html (accessed February 2013).
5. Dejong G, Palsbo SE, Beatty PW, et al. The organization and financing of health services for persons with disabilities. *Milbank Q*. 2002;**80**(2):261–301. doi:10.1111/1468-0009.t01-1-00004 [published Online First: 14 August 2002].

6. McColl MA, Forster D, Shortt SED, et al. Physician experiences providing primary care to people with disabilities. *Healthc Policy*. 2008 Aug;**4**(1):e129–e147.

7. Scheer J, Kroll T, Neri MT, et al. Access barriers for persons with disabilities. The consumer's perspective. *J Disabil Policy Stud*. 2003;**13**(4):221-30. doi:10.1177/104420730301300404.

8. Iezzoni LI, McCarthy EP, Davis RB, et al. Use of screening and preventive services among women with disabilities. *Am J Med Qual*. 2001 Jul-Aug;**16**(4):135–44. doi:10.1177/106286060101600405.

9. Morrison EH, George V, Mosqueda L. Primary care for adults with physical disabilities: perceptions from consumer and provider focus groups. *Fam Med*. 2008 Oct;**40**(9):645–51.

10. Chaix B, Veugelers PJ, Boëlle P-Y, et al. Access to general practitioner services: the disabled elderly lag behind in underserved areas. *Eur J Public Health*. 2005 Jun;**15**(3):282 –7. doi:10.1093/eurpub/cki082 [published Online First: 7 June 2005].

11. Huber M, Stanciole A, Wahlbeck K, Tamsma N, Torres F, Jelfs E, Bremner J. *Quality in and equality of access to healthcare services*. Brussels: European Commission, 2008. http://www.euro.centre.org/data/1237457784_41597.pdf

12. Van Brakel WH. Measuring health-related stigma -- a literature review. *Psychol Health Med*. 2006 Aug;**11**(3):307–34. doi:10.1080/13548500600595160 [published Online First: 23 Jan 2007].

13. Lawthers AG, Pransky GS, Peterson LE, et al. Rethinking quality in the context of persons with disability. *Int J Qual Health Care*. 2003 Jan 8;**15**(4):287–99. doi:10.1093/intqhc/mzg048.

14. United Nations. *Convention on the Rights of Persons with Disabilities and Optional Protocol*. New York: United Nations, 2006. http://www.un.org/disabilities/documents/convention/convoptprot-e.pdf.

15. Tomlinson M, Swartz L, Officer A, et al. Research priorities for health of people with disabilities: an expert opinion exercise. *Lancet*. 2009 Nov 28;**374**(9704):1857–62. doi:10.1016/S0140-6736(09)61910-3.

16. Great Britain. *Equality Act 2010*. (c.15). London: HMSO. http://www.legislation.gov.uk/ukpga/2010/15/pdfs/ukpga_20100015_en.pdf.

17. Donnelly C, McColl MA, Charlifue S, et al. Utilization, access and satisfaction with primary care among people with spinal cord injuries: a comparison of three countries. *Spinal Cord*. 2007 Jan;**45**(1):25–36. doi:10.1038/sj.sc.3101933 [published Online First: 30 May 2006].

18. Allerton L, Emerson E, British adults with chronic health conditions or impairments face significant barriers to accessing health services, Public Health (2012), http://dx.doi.org/10.1016/j.puhe.2012.08.003

189. Ipsos MORI. *The GP Patient Survey*. [Online]. 2012. http://www.gp-patient.co.uk/ (accessed February 2013).

1209. Ipsos MORI. *Technical Annex for the GP Patient Survey. 2010/11 Annual Report*. London: Ipsos MORI, 2011. http://www.gp-patient.co.uk/results/download/y5q4/y5q4_AnnualTechnical.pdf (accessed September 2012).

210. Ipsos MORI. *Technical Annex for the GP Patient Survey. 2009/10 Annual Report*. London: Ipsos MORI, 2010. http://www.gp-patient.co.uk/results/download/y4q4/y4q4_AnnualTechnical_unweighted.pdf (accessed September 2012).

Formatted: Space After: 12 pt

22. Campbell J, Smith P, Nissen S, et al. The GP Patient Survey for use in primary care in the National Health Service in the UK - development and psychometric characteristics. *BMC Fam Pr*. 2009 Aug 22;**10**(1):57. doi:10.1186/1471-2296-10-57.

23. National Statistics. *Census 2001. England Individual Form*. Titchfield: National Statistics, 2001. http://www.ons.gov.uk/ons/guide-method/census/census-2001/about-census-2001/census-2001-forms/index.html.

24. Office for National Statistics. *Rural-Urban Definition (England and Wales)*. [Online]. 2009. http://www.ons.gov.uk/ons/guide-method/geography/products/area-classifications/rural-urban-definition-and-la/rural-urban-definition--england-and-wales-/index.html (accessed November 2013).

25. Noble M, McLennan D, Wilkinson K, Whitworth A, Barnes H, Dibben C. *The English Indices of Deprivation 2007*. London: Department for Communities and Local Government, 2008. http://webarchive.nationalarchives.gov.uk/20100410180038/http://communities.gov.uk/documents/communities/pdf/733520.pdf.

26. Roland M, Elliott M, Lyratzopoulos G, et al. Reliability of patient responses in pay for performance schemes: analysis of national General Practitioner Patient Survey data in England. *BMJ*. 2009 Sep 29;339:b3851. doi:10.1136/bmj.b385 [published Online First 29 September 2009].

27. Groves R. Nonresponse rates and nonresponse bias in household surveys. *Public Opin Q* 2006;**70**(5):646–75. doi:10.1093/poq/nfl033.

28. Bureau of the Census, US Department of Commerce. *United States Census 2000. H. Disability and Caregivers*. Washington, DC: Bureau of the Census, 1998. http://www.census.gov/dmd/www/pdf/09h_di.pdf (accessed November 2013).

29. Central Statistics Office. *National disability survey 2006: first results*. Dublin: Stationery Office, 2008. http://www.cso.ie/en/media/csoie/releasespublications/documents/otherreleases/nationaldisability/National%20Disability%20Survey%202006%20First%20Results%20full%20report.pdf.

30. Anderson P, Kitchin R. Disability, space and sexuality: access to family planning services. *Soc Sci Med*. 2000 Oct 16;**51**(8):1163–73. doi:10.1016/S0277-9536(00)00019-8.

31. Iezzoni LI, Davis RB, Soukup J, et al. Satisfaction with quality and access to health care among people with disabling conditions. *Int J Qual Health Care*. 2002 Oct;**14**(5):369–81. doi:10.1093/intqhc/14.5.369.

32. Graham CL, Mann JR. Accessibility of primary care physician practice sites in South Carolina for people with disabilities. *Disabil Health J*. 2008 Oct;**1**(4):209–14. doi:10.1016/j.dhjo.2008.06.001.

33. Disability Rights Commission. Equal Treatment: Closing the Gap. A formal investigation into physical health inequalities experienced by people with learning disabilities and/or mental health problems, 2006

34. Castro SS, Cieza A, Cesar CL. Problems with accessibility to health services by persons with disabilities in Sao Paulo, Brazil. *Disabil Rehabil*. 2011;**33**(17-18):1693–8. doi:10.3109/09638288.2010.541542 [published Online First: 20 Dec 2010].

35. Mudrick NR, Breslin ML, Liang M, et al. Physical accessibility in primary health care settings: Results from California on-site reviews. *Disabil Health J*. 2012 Jul;**5**(3):159–67. doi:10.1016/j.dhjo.2012.02.002 [published Online First: 24 May 2012].

Formatted: Space After: 12 pt

364. Harrington AL, Hirsch MA, Hammond FM, et al. Assessment of primary care services and perceived barriers to care in persons with disabilities. *Am J Phys Med Rehabil*. 2009 Oct;**88**(10):852–63. doi:10.1097/PHM.0b013e3181b30745.

375. Allen S, Mor V. The prevalence and consequence of unmet need. Contrasts between older and younger adults with disability. *Med Care*. 1997 Nov;**35**(11):1135–48.

368. Iezzoni LI, Killeen MB, O'Day BL. Rural residents with disabilities confront substantial barriers to obtaining primary care. *Health Serv Res*. 2006 Aug;**41**(4 Pt 1):1258–75. doi:10.1111/j.1475-6773.2006.00534.x [published Online First: 31 March 2006].

397. Breeze E, Lang I. Physical functioning in a community context. In: Banks J, Breeze E, Lessof C, Nazroo J, eds. *Living in the 21st Century: Older People in England. The 2006 English Longitudinal Study of Ageing (Wave 3)*. London: The Institute for Fiscal Studies, 2008:57-117. http://www.ifs.org.uk/elsa/report08/ch3.pdf.

4038. Department for Transport. *Health-related Travel Difficulties. Personal Travel Factsheet - March 2010*. London: Department for Transport, 2010. http://webarchive.nationalarchives.gov.uk/20100304070241/http://www.dft.gov.uk/pgr/statistics/datatablespublications/personal/ntsfactsheets/NTSHealthrelated.pdf (accessed March 2013).

Figure Captions

Figure 1: Flow diagram of data for the GPPS and samples used for this study

Formatted: Font: Bold

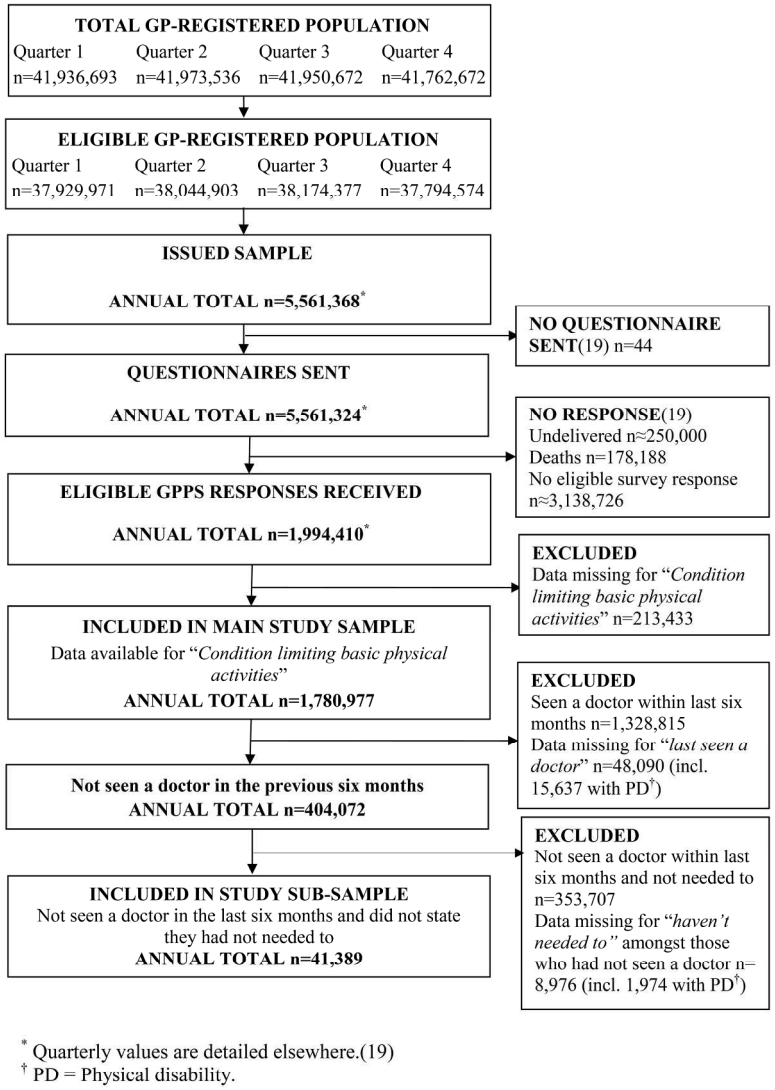


Figure 1: Flow diagram of data for the GPPS and samples used for this study
190x254mm (300 x 300 DPI)

Appendix A: Odds ratios and p-values for the adjusted model examining the relationship between physical disability and difficulty getting to the surgery as a reason for unmet need to see a doctor in the preceding six months, allowing the association to vary by age group.

Parameter		Odds Ratio (95% CI)	Combined Wald test p-value
Physical disability	No	0	<0.001
	Yes	2.03 (1.73-2.38)	
Age (years)	18 to 24	1.46 (1.20-1.77)	<0.001
	25 to 34	1.35 (1.16-1.58)	
	35 to 44	1.37 (1.19-1.59)	
	45 to 54	1.20 (1.04-1.39)	
	55 to 64	0	
	65 to 74	0.88 (0.72-1.09)	
	75 to 84	2.55 (2.08-3.13)	
	85 or over	9.54 (7.60-11.99)	
Physical disability*age group interaction by age group	18 to 24	0.51 (0.30-0.89)	<0.001
	25 to 34	0.49 (0.34-0.71)	
	35 to 44	0.55 (0.41-0.73)	
	45 to 54	0.69(0.54-0.87)	
	55 to 64	0	
	65 to 74	1.94 (1.51-2.49)	
	75 to 84	1.59 (1.25-2.02)	
	85 or over	0.74 (0.57-0.95)	
Employment	Full-time work	0	<0.001
	Part-time work	0.68 (0.59-0.78)	
	Full-time education	1.02 (0.81-1.29)	
	Unemployed	1.11 (0.94-1.30)	
	Permanently sick/disabled	2.28 (2.03-2.56)	
	Retired	1.24 (1.10-1.40)	
	Looking after home	0.93 (0.80-1.08)	
	Something else	0.72 (0.58-0.89)	
Health status	Excellent	0.86 (0.73-1.01)	<0.001
	Very good	1.02 (0.92-1.12)	
	Good	0	
	Fair	1.33 (1.22-1.44)	
	Poor	1.99 (1.80-2.20)	
Gender	Male	0	<0.001
	Female	1.17 (1.10-1.24)	

Appendix B: Odds ratios and p-values for the adjusted model examining the relationship between physical disability and difficulty getting into surgery buildings in the preceding six months, allowing for the association to vary by age group.

Parameter		Odds ratio (95% CI)	Combined Wald test p-value
Physical disability	No	0	<0.001
	Yes	1.46 (1.38-1.54)	
Age (years)	18 to 24	1.72 (1.60-1.86)	<0.001
	25 to 34	1.85 (1.75-1.96)	
	35 to 44	1.53 (1.46-1.61)	
	45 to 54	1.10 (1.04-1.15)	
	55 to 64	0	
	65 to 74	0.97 (0.91-1.03)	
	75 to 84	1.31 (1.22-1.41)	
	85 or over	3.31 (3.03-3.63)	
Physical disability*age group interaction by age group	18 to 24	1.20 (0.99-1.45)	<0.001
	25 to 34	0.86 (0.76-0.97)	
	35 to 44	0.77 (0.70-0.84)	
	45 to 54	0.94 (0.86-1.02)	
	55 to 64	0	
	65 to 74	1.35 (1.25-1.46)	
	75 to 84	1.64 (1.51-1.78)	
	85 or over	1.47 (1.33-1.63)	
Employment	Full-time work	0	<0.001
	Part-time work	1.11 (1.07-1.16)	
	Full-time education	0.91 (0.82-1.01)	
	Unemployed	1.04 (0.98-1.11)	
	Permanently sick/disabled	1.82 (1.74-1.91)	
	Retired	0.94 (0.90-0.98)	
	Looking after home	1.16 (1.10-1.22)	
	Something else	1.52 (1.41-1.63)	
Health status	Excellent	0.76 (0.72-0.80)	<0.001
	Very good	0.80 (0.77-0.83)	
	Good	0	
	Fair	1.40 (1.35-1.44)	
	Poor	2.55 (2.45-2.65)	
Gender	Male	0	<0.001
	Female	1.31 (1.28-1.34)	

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	Page 1: title refers to "Cross-sectional survey"
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Page 2-3: Follows BMJ Open guidance
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Pages 3-5: First three paragraphs of introduction
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5: Final paragraph of introduction
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5: Secondary analysis of cross-sectional survey; first sentence of methods
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5: See "Study Design and General Practice Patient Survey" – refers to GPPS literature
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	Pages 5-6: See "Study Design and General Practice Patient Survey" – refers to GPPS literature for GPPS participants. See "Study Samples" for this study.
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Pages 6-7: See "Study Observations"
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Pages 6-7, 9-10: See second paragraph of "Study Observations" & Table 1
Bias	9	Describe any efforts to address potential sources of bias	Page 5: Sampling and data collection and management details given in cited GPPS references
Study size	10	Explain how the study size was arrived at	Pages 5-6: References cited in "Study Design and General Practice Patient Survey" cover GPPS sample size. "Study Samples" provides information on how the study size was obtained for these analyses
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which	Pages 7 & 10: Derivation of the Index of Multiple

		groupings were chosen and why	Deprivation score quintiles is described in the second paragraph of "Study observations" and Table 1. All other variables were categorical
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Pages 7-8: Descriptive and logistic regression analyses detailed in "Statistical Analyses" paragraphs
		(*b*) Describe any methods used to examine subgroups and interactions	Pages 7-8: Interaction term detailed in the final sentence of the 2nd paragraph of "Statistical Analyses"
		(*c*) Explain how missing data were addressed	Page 7: First paragraph of "Statistical Analyses"
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Page 7: Weighted analyses discussed in first paragraph of "Statistical Analyses"
		(*e*) Describe any sensitivity analyses	NA
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Pages 8 and Figure 1: See "Participants" paragraph and Figure
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Pages 8-11: See Table 1 & "Participants" paragraphs
		(b) Indicate number of participants with missing data for each variable of interest	Pages 9-10: See Table 1 & footnotes
Outcome data	15*	Report numbers of outcome events or summary measures	Pages 9-10: See Table 1
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 7-8, 12-14: Table 2, methods (penultimate paragraph), and "Associations between physical disability and access to surgeries" paragraphs of results
		(*b*) Report category boundaries when continuous variables were categorized	Page 10: See Table 1 footnotes for IMD quintile categorisation
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 11: See results section "Estimated prevalence" for population prevalence estimates
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 14: First discussion paragraph
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Pages 14-15: Second paragraph of the discussion
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 14-18: First six paragraphs of discussion
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 14-15: Second paragraph of the discussion
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	Page 19: See footnotes

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

We would like to thank the reviewers for their positive reviews. We have made some changes to the manuscript in response to these. We detail our response to each of the individual points below with the reviewer's original comments shown in italics. Also, in addition we have made two very minor, second decimal place, typo corrections to odds ratios (one in Table 2 and one in Appendix B) that were picked up after submission.

Reviewer: 1

This is a very useful contribution to the discussion over accessibility of health facilities to people with disabilities. It is an excellent first step and I hope the authors will pursue some additional aspects of accessibility. For example, it should be noted that physical access does not stop at the door – accessibility of examining space and equipment is also very influential in the experience disabled people have in primary care.

Thank you for the positive endorsement of our paper. Unfortunately this work is limited to considering only those aspects of access that and covered by the survey that we are using, namely the GP Patient Survey. As this only considers the basic questions of getting to and getting into a GP surgery that is all we can cover in this paper. We have noted this as a limitation adding the following text to the discussion section, paragraph 2.

"By its nature this study was limited to aspects of accessibility to health care that were asked about in the GPPS. We note that physical access is not limited to getting to and getting into premises and that accessibility of examining space and equipment are also important."

I am pleased to see the authors awareness of attitudinal, expertise and systemic barriers as well, and that these deserve further consideration. I would appreciate a bit more discussion of these more subtle impediments to equitable care provision.

Thank you for this suggestion. We have added some further discussion of these issues in the final section of the discussion.

Finally, I am not in support of the focus on transportation. This is a concern for another jurisdiction, and in my view, permits health authorities and physicians to deflect responsibility away from themselves and onto others. For this journal, it would be preferable to focus on health system and provider issues, and to draw clear implications for action in those two constituencies.

Whilst we agree that the issue of transportation should not detract from health authorities' role and physician's role it remains an important issue since access begins with the patient's ability to get to health care premises. As such authorities and physicians should have responsibility to advocate, liaise and to promote good transport access, as well as ensuring that their own premises/services are accessible. We take on board the fact that the emphasis on the issue of transportation may have been too great and in light of this we have reduced the discussion of this issue (Discussion paragraph 5).

Reviewer: 2

While sparse, there is a little more UK literature on disability and access to healthcare that may be of interest to the authors (and readers). This includes the report (2006) of the Formal Investigation of the Disability Rights Commission into access to (primary) healthcare and Allerton, L., & Emerson, E. (2012). Individuals with impairments face significant barriers to accessing health services in the United Kingdom. Public Health 126, 920-927.
Thank you for these suggestions. We have discussed the Allerton and Emerson paper in the introduction by adding the following text

"An analysis of the Life Opportunities Survey has shown that individuals with chronic health conditions or impairments were more likely to report a range of issues with access to healthcare, from being able to get to appointments and getting into buildings, to lack of help with communication. "

We also noted the broader barriers to healthcare identified in this paper in the final paragraph of the discussion by including the following text

"A survey conducted in the UK found that individuals with chronic health conditions or impairments were more likely to report problems with inexperienced or unhelpful staff, discrimination, anxiety or lack of confidence, lack of information and lack of help with communication."

Further we have mentioned the DRC report in the third paragraph of the discussion with the addition of the following text.

"It should be remembered, however, that problems of access are also an issue for those with learning disabilities and/or mental health problems."