

Supplementary data to be included in an online Appendix

Appendix figure S1. A flowchart of survey responses through the study

Appendix Table S1. Regression model results for Table 3. (adjusted percentages of people reporting positive experiences by long-term condition)

Appendix Table S2. Regression model results for Table 4. (adjusted percentages of people reporting positive experiences comparing people with one and more than one long term condition)

Appendix Table S3. OR (95%CI) for the association between multimorbidity & patient experience after adjustment for all domains of EQ5D (Anxiety/depression, Pain/discomfort, Usual activities, Self-care and Mobility) as categorical variables, after adjustment for the continuous EQ5D utility score and after adjustment for each domain alone

Appendix table S4. OR (95%CI) for the association between multimorbidity & patient experience, excluding people who report having long-term back problems

Appendix table S5. OR (95%CI) for the association between multimorbidity & patient experience. Sensitivity analysis exploring whether the same relationship between multimorbidity and patient experience is observed when instead of comparing good and very good responses with all others, “very good” responses alone are defined as a positive patient experience

Appendix table S6. OR (95%CI) for the association between multimorbidity & patient experience. Sensitivity analysis exploring whether the same relationship between multimorbidity and patient experience is observed after imputation for missing data

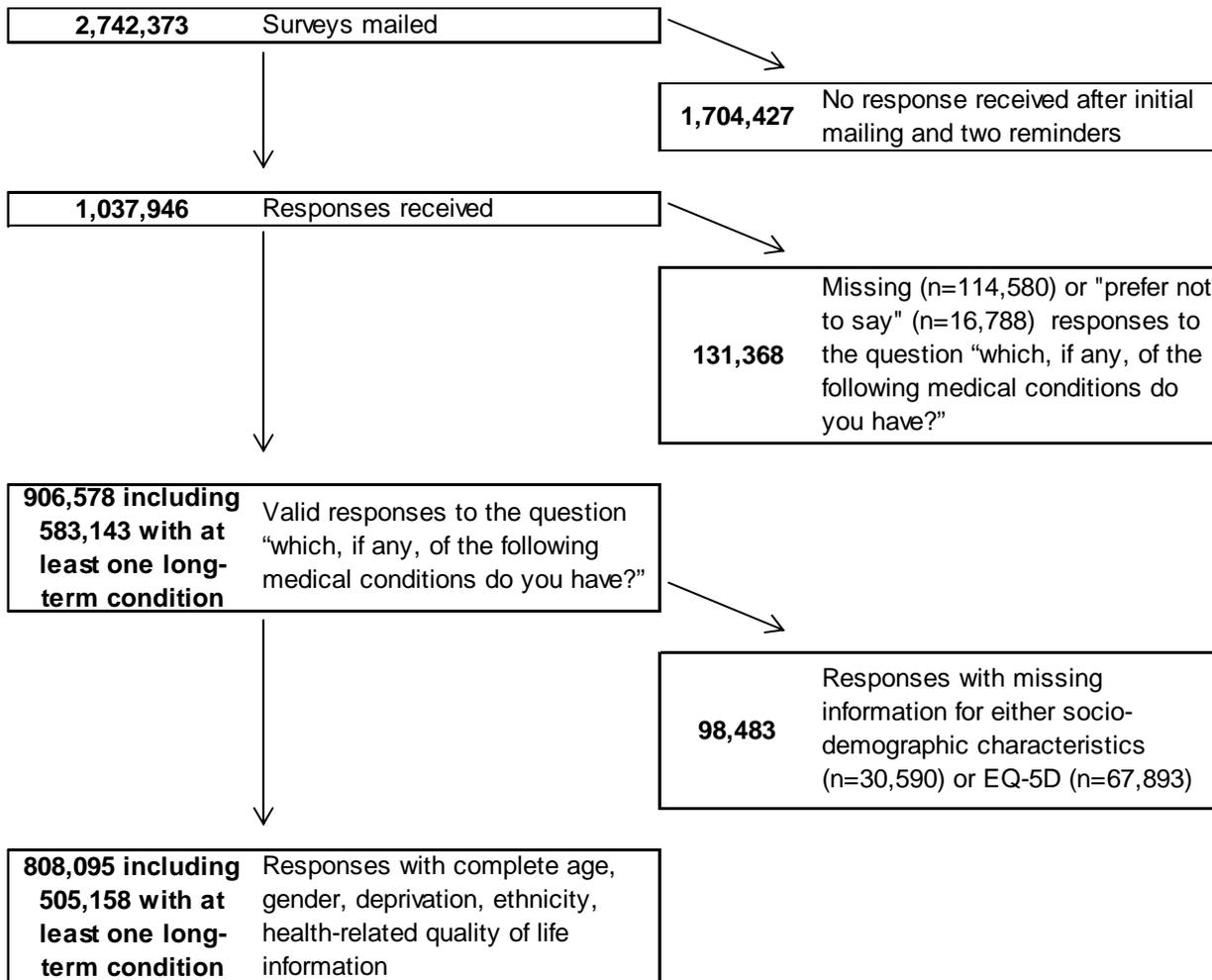
Further sensitivity analyses

In this analysis we included all long-term conditions listed in the GPPS questionnaire. As a further sensitivity analysis we excluded people reporting “Alzheimer’s disease or dementia”, “Blindness or severe visual impairment” and “Learning difficulty” as people with these conditions may have required support to complete the survey and reported patient experience may not only reflect their own experience, but also the experience of those people who helped them to fill in the questionnaire. The results of this sensitivity analysis did not impact our conclusions, and we found that increasing numbers of long term conditions were associated with poorer patient experience, even after excluding these groups. We chose to keep all people with long term conditions in the analysis in order that the experience of people from these vulnerable groups, who may be particularly likely to experience multimorbidity, be included in the analysis. We repeated this sensitivity analysis excluding people with long-term back problems and report the findings in appendix table 4. This analysis addresses the concern that the strong relationship between persistent back problems and poor reported patient experience could be driving the finding that the EQ-5D pain subscale is a strong explanatory factor in the relationship between increasing numbers of long-term conditions and patient experience. Findings were consistent with the main analysis.

Multimorbidity is considered in this analysis as a count of self-reported long-term conditions. We carried out analyses taking into account the effect of each condition and combinations of conditions (particularly exploring how having a long-term mental health condition might moderate the relationship between

multimorbidity and patient experience), using fixed effects and interactions. The results presented in this paper are the average experience of people with multimorbidity across all combinations; but these sensitivity analyses found that direction of effects seen (i.e. poorer patient experience with increasing multimorbidity) were consistent across all conditions. Appendix figure 2 illustrates the association between multimorbidity and patient experience stratified by long term condition.

Appendix figure S1: GPPS 2011-2012 survey responses flowchart



Appendix table S1. Regression model results for Table 3. (adjusted percentages of people reporting positive experiences by long-term condition)

	How easy it is to get to get through to someone at your GP surgery on the phone?	Overall, how would you describe your experience of making an appointment?	How often to you see or speak to the GP you prefer?	How helpful do you find the receptionists at your GP surgery?	Doctor communication	Nurse communication	Overall, how would you describe your experience of your GP surgery?
Gender	Male reference	reference	reference	reference	reference	reference	reference
	Female 0.97 (0.96-0.98)	1.02 (1.01-1.04)	0.85 (0.84-0.86)	1.05 (1.03-1.07)	1.02 (1.01-1.03)	1.05 (1.03-1.06)	1.07 (1.06-1.09)
Age group	18-24 0.76 (0.74-0.79)	0.53 (0.51-0.54)	0.45 (0.43-0.46)	0.42 (0.41-0.44)	0.50 (0.49-0.52)	0.74 (0.71-0.76)	0.45 (0.43-0.46)
	25-34 0.86 (0.84-0.88)	0.62 (0.61-0.63)	0.49 (0.48-0.51)	0.49 (0.48-0.51)	0.54 (0.53-0.55)	0.81 (0.79-0.83)	0.51 (0.49-0.52)
	35-44 0.92 (0.90-0.94)	0.72 (0.70-0.73)	0.55 (0.54-0.57)	0.65 (0.63-0.67)	0.70 (0.68-0.71)	0.90 (0.88-0.93)	0.67 (0.65-0.68)
	45-54 0.87 (0.85-0.89)	0.75 (0.73-0.76)	0.70 (0.68-0.71)	0.74 (0.72-0.76)	0.79 (0.78-0.80)	0.92 (0.90-0.94)	0.76 (0.74-0.77)
	55-64 reference	reference	reference	reference	reference	reference	reference
	65-74 1.24 (1.21-1.27)	1.71 (1.67-1.75)	1.41 (1.38-1.45)	1.73 (1.68-1.80)	1.52 (1.49-1.55)	1.48 (1.44-1.51)	1.75 (1.70-1.81)
	75-84 1.38 (1.35-1.42)	2.30 (2.23-2.37)	1.62 (1.58-1.67)	2.91 (2.77-3.06)	1.72 (1.68-1.77)	1.78 (1.73-1.83)	2.30 (2.22-2.39)
	85+ 1.54 (1.47-1.60)	2.21 (2.11-2.32)	1.31 (1.26-1.36)	3.05 (2.80-3.32)	1.38 (1.33-1.44)	1.56 (1.49-1.63)	1.72 (1.63-1.83)
Ethnic group	White reference	reference	reference	reference	reference	reference	reference
	Mixed 0.90 (0.84-0.97)	0.95 (0.89-1.02)	0.79 (0.73-0.86)	0.98 (0.89-1.07)	0.80 (0.75-0.85)	0.83 (0.77-0.89)	0.85 (0.79-0.92)
	Asian 0.72 (0.70-0.75)	0.67 (0.65-0.69)	0.57 (0.55-0.59)	0.78 (0.75-0.81)	0.84 (0.82-0.86)	0.68 (0.66-0.70)	0.70 (0.68-0.73)
	Black 1.06 (1.02-1.11)	1.26 (1.21-1.31)	0.55 (0.52-0.57)	1.54 (1.45-1.64)	1.17 (1.13-1.21)	1.00 (0.96-1.04)	1.47 (1.39-1.55)
	Other ethnic group 0.84 (0.80-0.88)	1.00 (0.96-1.05)	0.55 (0.53-0.58)	1.01 (0.95-1.06)	1.04 (1.00-1.08)	0.86 (0.82-0.90)	0.99 (0.95-1.04)
Socio-economic deprivation	1 (Affluent) reference	reference	reference	reference	reference	reference	reference
	2 1.00 (0.98-1.02)	1.03 (1.01-1.06)	0.99 (0.97-1.02)	1.01 (0.98-1.05)	1.02 (1.00-1.04)	1.05 (1.03-1.07)	0.99 (0.97-1.02)
	3 0.99 (0.97-1.02)	1.01 (0.99-1.04)	0.97 (0.95-0.99)	0.98 (0.94-1.01)	0.99 (0.97-1.01)	1.03 (1.01-1.06)	0.96 (0.93-0.99)
	4 0.97 (0.95-1.00)	1.01 (0.99-1.04)	0.93 (0.91-0.96)	0.95 (0.92-0.98)	0.97 (0.95-0.99)	1.05 (1.02-1.07)	0.92 (0.90-0.95)
	5 (Deprived) 0.97 (0.94-1.00)	1.04 (1.01-1.07)	0.89 (0.86-0.91)	0.97 (0.93-1.00)	0.98 (0.96-1.00)	1.10 (1.07-1.13)	0.92 (0.89-0.95)
Long term condition	No long-term conditions or more than one reference	reference	reference	reference	reference	reference	reference
	Alzheimer's disease or dementia 1.23 (1.00-1.50)	1.04 (0.85-1.26)	0.94 (0.78-1.14)	1.14 (0.82-1.58)	1.11 (0.94-1.32)	1.03 (0.84-1.25)	1.04 (0.81-1.32)
	Angina or long-term heart problem 1.11 (1.04-1.18)	1.19 (1.11-1.27)	1.19 (1.11-1.26)	1.06 (0.97-1.17)	1.25 (1.18-1.32)	1.14 (1.07-1.22)	1.29 (1.19-1.41)
	Arthritis or long-term joint problem 1.00 (0.97-1.04)	1.01 (0.97-1.04)	0.93 (0.90-0.97)	1.03 (0.98-1.09)	0.98 (0.95-1.02)	0.99 (0.95-1.03)	1.02 (0.97-1.06)
	Asthma or long-term chest problem 0.99 (0.96-1.02)	1.00 (0.97-1.03)	0.87 (0.84-0.90)	0.93 (0.89-0.97)	1.05 (1.02-1.08)	1.12 (1.08-1.16)	1.08 (1.04-1.12)
	Blindness or severe visual impairment 1.03 (0.85-1.23)	1.01 (0.85-1.21)	0.86 (0.71-1.04)	1.11 (0.85-1.45)	0.86 (0.74-1.00)	0.91 (0.76-1.09)	0.98 (0.79-1.20)
	Cancer in the last 5 years 1.09 (1.02-1.16)	1.14 (1.07-1.21)	1.17 (1.10-1.24)	1.03 (0.94-1.12)	1.21 (1.14-1.28)	1.09 (1.03-1.17)	1.11 (1.02-1.20)
	Deafness or severe hearing impairment 0.87 (0.80-0.94)	0.96 (0.89-1.04)	0.80 (0.74-0.87)	1.03 (0.91-1.16)	0.96 (0.89-1.02)	0.98 (0.90-1.06)	0.93 (0.85-1.03)
	Diabetes 1.25 (1.19-1.31)	1.26 (1.20-1.32)	1.21 (1.15-1.27)	1.07 (1.00-1.14)	1.24 (1.19-1.29)	1.28 (1.22-1.35)	1.34 (1.26-1.42)
	Epilepsy 1.22 (1.09-1.37)	1.20 (1.09-1.33)	1.10 (0.98-1.23)	1.14 (0.99-1.32)	1.15 (1.05-1.26)	0.97 (0.87-1.08)	1.25 (1.10-1.42)
	High blood pressure 1.18 (1.15-1.21)	1.27 (1.24-1.31)	1.28 (1.25-1.32)	1.18 (1.14-1.23)	1.25 (1.22-1.28)	1.12 (1.09-1.15)	1.39 (1.34-1.44)
	Kidney or liver disease 1.14 (1.00-1.30)	1.07 (0.96-1.21)	1.03 (0.91-1.18)	0.92 (0.79-1.08)	1.00 (0.90-1.11)	0.90 (0.80-1.02)	0.91 (0.79-1.04)
	Learning difficulty 1.34 (1.16-1.55)	1.69 (1.48-1.94)	0.91 (0.78-1.05)	1.74 (1.43-2.11)	1.38 (1.23-1.55)	1.25 (1.08-1.45)	1.70 (1.44-1.99)
	Long-term back problem 0.84 (0.81-0.88)	0.85 (0.82-0.88)	0.85 (0.81-0.88)	0.88 (0.83-0.92)	0.80 (0.78-0.83)	0.83 (0.80-0.86)	0.79 (0.75-0.82)
	Long-term mental health problem 1.10 (1.04-1.17)	1.15 (1.09-1.21)	1.78 (1.68-1.89)	1.15 (1.07-1.24)	1.14 (1.09-1.20)	0.85 (0.80-0.90)	1.25 (1.17-1.33)
	Long-term neurological problem 0.99 (0.91-1.09)	1.03 (0.94-1.12)	1.32 (1.21-1.45)	0.91 (0.81-1.02)	0.97 (0.90-1.05)	0.81 (0.75-0.88)	0.85 (0.77-0.93)
	Another long-term condition 0.96 (0.94-0.99)	0.93 (0.91-0.96)	1.11 (1.08-1.15)	0.89 (0.86-0.92)	0.91 (0.89-0.93)	0.86 (0.84-0.89)	0.88 (0.85-0.91)
	No long-term conditions* reference	reference	reference	reference	reference	reference	reference
	Any long-term condition* 0.96 (0.95-0.98)	0.99 (0.98-1.00)	1.38 (1.36-1.40)	0.94 (0.92-0.96)	0.99 (0.98-1.01)	0.91 (0.90-0.93)	1.03 (1.01-1.05)

Appendix table S2. Regression model results for Table 4. (adjusted percentages of people reporting positive experiences comparing people with one and more than one long term condition)

	How easy it is to get to get through to someone at your GP surgery on the phone?	Overall, how would you describe your experience of making an appointment?	How often to you see or speak to the GP you prefer?	How helpful do you find the receptionists at your GP surgery?	Doctor communication	Nurse communication	Overall, how would you describe your experience of your GP surgery?
Gender							
Male	reference	reference	reference	reference	reference	reference	reference
Female	0.97 (0.95-0.98)	1.02 (1.00-1.03)	0.85 (0.83-0.86)	1.05 (1.03-1.07)	1.01 (1.00-1.03)	1.04 (1.02-1.05)	1.07 (1.05-1.08)
Age group							
18-24	0.74 (0.71-0.76)	0.51 (0.49-0.52)	0.45 (0.44-0.47)	0.40 (0.39-0.42)	0.49 (0.48-0.50)	0.72 (0.69-0.74)	0.43 (0.42-0.45)
25-34	0.83 (0.81-0.85)	0.59 (0.58-0.61)	0.51 (0.49-0.52)	0.47 (0.45-0.48)	0.52 (0.51-0.53)	0.78 (0.76-0.80)	0.49 (0.47-0.50)
35-44	0.89 (0.87-0.91)	0.69 (0.68-0.70)	0.56 (0.55-0.57)	0.63 (0.61-0.65)	0.68 (0.66-0.69)	0.87 (0.85-0.89)	0.64 (0.62-0.66)
45-54	0.85 (0.83-0.87)	0.73 (0.72-0.74)	0.70 (0.69-0.72)	0.72 (0.70-0.74)	0.78 (0.76-0.79)	0.90 (0.88-0.92)	0.74 (0.72-0.76)
55-64	reference	reference	reference	reference	reference	reference	reference
65-74	1.26 (1.23-1.29)	1.74 (1.70-1.78)	1.40 (1.37-1.43)	1.77 (1.71-1.83)	1.55 (1.52-1.58)	1.50 (1.47-1.54)	1.79 (1.74-1.84)
75-84	1.42 (1.39-1.46)	2.37 (2.31-2.45)	1.58 (1.53-1.62)	3.02 (2.88-3.18)	1.77 (1.73-1.81)	1.84 (1.79-1.89)	2.37 (2.28-2.47)
85+	1.59 (1.52-1.66)	2.30 (2.19-2.41)	1.24 (1.19-1.29)	3.20 (2.94-3.49)	1.42 (1.37-1.48)	1.62 (1.55-1.69)	1.77 (1.67-1.88)
Ethnic group							
White	reference	reference	reference	reference	reference	reference	reference
Mixed	0.90 (0.84-0.97)	0.95 (0.89-1.02)	0.79 (0.73-0.86)	0.98 (0.89-1.07)	0.80 (0.75-0.85)	0.83 (0.77-0.89)	0.85 (0.79-0.92)
Asian	0.73 (0.71-0.75)	0.68 (0.66-0.69)	0.57 (0.55-0.59)	0.78 (0.76-0.81)	0.84 (0.82-0.86)	0.69 (0.67-0.71)	0.71 (0.69-0.73)
Black	1.07 (1.03-1.12)	1.27 (1.22-1.33)	0.55 (0.53-0.58)	1.55 (1.46-1.65)	1.18 (1.14-1.23)	1.01 (0.97-1.06)	1.49 (1.41-1.57)
Other ethnic group	0.84 (0.81-0.88)	1.01 (0.97-1.05)	0.55 (0.52-0.58)	1.01 (0.95-1.07)	1.04 (1.00-1.08)	0.86 (0.83-0.90)	1.00 (0.95-1.05)
Socio-economic deprivation							
1 (Affluent)	reference	reference	reference	reference	reference	reference	reference
2	1.00 (0.98-1.03)	1.04 (1.01-1.06)	0.99 (0.96-1.01)	1.02 (0.98-1.05)	1.02 (1.00-1.04)	1.05 (1.03-1.07)	0.99 (0.97-1.02)
3	1.00 (0.97-1.02)	1.02 (0.99-1.04)	0.96 (0.94-0.99)	0.98 (0.95-1.02)	0.99 (0.97-1.01)	1.04 (1.01-1.06)	0.96 (0.94-0.99)
4	0.98 (0.96-1.01)	1.02 (0.99-1.04)	0.92 (0.90-0.95)	0.96 (0.93-0.99)	0.97 (0.95-0.99)	1.06 (1.03-1.08)	0.93 (0.90-0.96)
5 (Deprived)	0.98 (0.96-1.01)	1.05 (1.03-1.08)	0.87 (0.84-0.89)	0.98 (0.95-1.02)	0.99 (0.96-1.01)	1.11 (1.08-1.14)	0.93 (0.90-0.96)
Long term condition							
No long term conditions	reference	reference	reference	reference	reference	reference	reference
One long term condition	1.01 (1.00-1.03)	1.04 (1.02-1.05)	1.15 (1.13-1.17)	0.98 (0.96-1.00)	1.03 (1.02-1.05)	0.98 (0.97-1.00)	1.05 (1.03-1.07)
More than one long term condition	0.87 (0.85-0.89)	0.86 (0.84-0.88)	1.23 (1.20-1.25)	0.83 (0.80-0.86)	0.90 (0.89-0.92)	0.87 (0.85-0.89)	0.89 (0.87-0.92)

Appendix table S3. OR (95%CI) for the association between multimorbidity & patient experience after adjustment for all domains of EQ5D (Anxiety/depression, Pain/discomfort, Usual activities, Self-care and Mobility) and after adjustment for each domain alone

		How easy it is to get to through to someone at your GP surgery on the phone?	Overall, how would you describe your experience of making an appointment?	How often to you see or speak to the GP you prefer?	How helpful do you find the receptionists at your GP surgery?	Doctor communication	Nurse communication	Overall, how would you describe your experience of your GP surgery?
Adjusted for age, gender, ethnicity, deprivation	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	0.99 (0.98-1.01)	1.03 (1.01-1.04)	1.33 (1.31-1.35)	0.96 (0.94-0.98)	1.02 (1.01-1.04)	0.94 (0.93-0.96)	1.06 (1.04-1.08)
	2	0.94 (0.92-0.96)	0.97 (0.95-0.99)	1.45 (1.42-1.49)	0.94 (0.91-0.97)	0.98 (0.96-0.99)	0.89 (0.87-0.91)	1.03 (1.00-1.06)
	3	0.88 (0.86-0.91)	0.89 (0.87-0.92)	1.47 (1.43-1.51)	0.85 (0.82-0.89)	0.93 (0.91-0.96)	0.86 (0.84-0.89)	0.96 (0.92-0.99)
4+	0.81 (0.78-0.83)	0.80 (0.77-0.82)	1.47 (1.42-1.52)	0.75 (0.72-0.79)	0.84 (0.82-0.87)	0.77 (0.75-0.80)	0.83 (0.80-0.87)	
Additionally adjusted for EQ5D	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.09 (1.07-1.11)	1.15 (1.13-1.16)	1.38 (1.36-1.41)	1.05 (1.03-1.08)	1.16 (1.15-1.18)	1.06 (1.04-1.08)	1.23 (1.21-1.26)
	2	1.11 (1.08-1.14)	1.18 (1.16-1.21)	1.55 (1.51-1.59)	1.12 (1.08-1.15)	1.22 (1.20-1.25)	1.09 (1.07-1.12)	1.35 (1.31-1.38)
	3	1.10 (1.07-1.14)	1.16 (1.12-1.20)	1.58 (1.53-1.63)	1.09 (1.05-1.15)	1.25 (1.22-1.29)	1.13 (1.10-1.17)	1.38 (1.33-1.43)
4+	1.07 (1.03-1.11)	1.10 (1.06-1.15)	1.57 (1.51-1.63)	1.06 (1.00-1.11)	1.19 (1.16-1.23)	1.07 (1.03-1.11)	1.31 (1.25-1.37)	
Adjusted for EQ5D (utility score)	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.06 (1.04-1.08)	1.10 (1.09-1.12)	1.35 (1.32-1.37)	1.04 (1.01-1.06)	1.10 (1.09-1.12)	1.01 (0.99-1.03)	1.17 (1.15-1.20)
	2	1.06 (1.04-1.09)	1.12 (1.10-1.15)	1.49 (1.45-1.53)	1.09 (1.06-1.13)	1.13 (1.11-1.15)	1.02 (1.00-1.05)	1.26 (1.23-1.30)
	3	1.06 (1.03-1.10)	1.12 (1.08-1.15)	1.53 (1.48-1.57)	1.09 (1.04-1.14)	1.18 (1.15-1.21)	1.07 (1.04-1.11)	1.32 (1.27-1.37)
4+	1.06 (1.02-1.10)	1.11 (1.07-1.15)	1.56 (1.50-1.62)	1.07 (1.01-1.13)	1.18 (1.15-1.22)	1.06 (1.02-1.10)	1.32 (1.26-1.38)	
Mobility	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.01 (0.99-1.03)	1.05 (1.03-1.06)	1.34 (1.31-1.36)	0.98 (0.96-1.01)	1.05 (1.03-1.06)	0.96 (0.95-0.98)	1.09 (1.07-1.11)
	2	0.98 (0.96-1.01)	1.02 (1.00-1.04)	1.47 (1.43-1.50)	0.99 (0.96-1.02)	1.03 (1.01-1.05)	0.93 (0.91-0.95)	1.11 (1.08-1.14)
	3	0.94 (0.92-0.97)	0.96 (0.93-0.99)	1.49 (1.44-1.54)	0.93 (0.89-0.98)	1.02 (0.99-1.04)	0.93 (0.90-0.96)	1.08 (1.04-1.12)
4+	0.88 (0.85-0.91)	0.88 (0.85-0.91)	1.50 (1.45-1.56)	0.85 (0.81-0.90)	0.95 (0.92-0.98)	0.85 (0.82-0.88)	0.97 (0.93-1.02)	
Self-care	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.00 (0.98-1.02)	1.03 (1.02-1.05)	1.33 (1.30-1.35)	0.97 (0.95-0.99)	1.03 (1.01-1.04)	0.95 (0.93-0.97)	1.07 (1.05-1.09)
	2	0.95 (0.93-0.97)	0.98 (0.96-1.01)	1.45 (1.41-1.48)	0.96 (0.93-0.99)	0.99 (0.97-1.01)	0.91 (0.89-0.93)	1.05 (1.03-1.08)
	3	0.90 (0.87-0.92)	0.91 (0.89-0.94)	1.46 (1.42-1.50)	0.89 (0.86-0.93)	0.95 (0.93-0.98)	0.89 (0.86-0.92)	1.00 (0.97-1.04)
4+	0.83 (0.80-0.86)	0.83 (0.81-0.86)	1.46 (1.41-1.51)	0.82 (0.78-0.86)	0.88 (0.85-0.90)	0.81 (0.79-0.84)	0.91 (0.87-0.95)	
Usual activities	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.03 (1.02-1.05)	1.08 (1.06-1.09)	1.34 (1.32-1.37)	1.01 (0.98-1.03)	1.08 (1.07-1.10)	0.99 (0.98-1.01)	1.14 (1.12-1.16)
	2	1.02 (0.99-1.04)	1.07 (1.05-1.09)	1.48 (1.45-1.52)	1.03 (1.00-1.06)	1.09 (1.07-1.11)	0.99 (0.97-1.01)	1.19 (1.16-1.23)
	3	0.99 (0.96-1.02)	1.03 (1.00-1.07)	1.51 (1.47-1.56)	0.99 (0.94-1.03)	1.10 (1.07-1.13)	1.02 (0.98-1.05)	1.20 (1.16-1.25)
4+	0.94 (0.91-0.97)	0.97 (0.94-1.01)	1.53 (1.48-1.59)	0.92 (0.88-0.97)	1.05 (1.01-1.08)	0.96 (0.92-0.99)	1.12 (1.08-1.18)	
Pain/discomfort	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.07 (1.05-1.09)	1.11 (1.09-1.13)	1.39 (1.36-1.41)	1.03 (1.00-1.05)	1.12 (1.10-1.13)	1.01 (0.99-1.03)	1.17 (1.15-1.20)
	2	1.08 (1.05-1.10)	1.13 (1.11-1.16)	1.56 (1.53-1.60)	1.07 (1.04-1.11)	1.15 (1.13-1.17)	1.02 (1.00-1.04)	1.25 (1.22-1.29)
	3	1.06 (1.03-1.10)	1.10 (1.07-1.14)	1.61 (1.56-1.66)	1.03 (0.99-1.08)	1.16 (1.13-1.19)	1.03 (1.00-1.06)	1.25 (1.21-1.30)
4+	1.02 (0.99-1.06)	1.04 (1.00-1.07)	1.61 (1.55-1.67)	0.97 (0.92-1.02)	1.09 (1.05-1.12)	0.94 (0.91-0.98)	1.16 (1.11-1.21)	
Anxiety/depression	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.03 (1.01-1.04)	1.07 (1.05-1.09)	1.33 (1.31-1.36)	1.00 (0.98-1.02)	1.08 (1.06-1.10)	1.00 (0.98-1.02)	1.12 (1.10-1.15)
	2	0.99 (0.97-1.02)	1.05 (1.02-1.07)	1.46 (1.42-1.49)	1.00 (0.97-1.04)	1.07 (1.05-1.09)	0.99 (0.97-1.01)	1.14 (1.11-1.17)
	3	0.95 (0.93-0.98)	0.99 (0.96-1.02)	1.47 (1.43-1.52)	0.94 (0.90-0.98)	1.06 (1.04-1.09)	1.00 (0.97-1.03)	1.11 (1.07-1.16)
4+	0.90 (0.87-0.93)	0.93 (0.89-0.96)	1.48 (1.43-1.53)	0.86 (0.82-0.91)	1.01 (0.98-1.04)	0.95 (0.91-0.98)	1.03 (0.98-1.07)	

Appendix tableS4. OR (95%CI) for the association between multimorbidity & patient experience, excluding people who report having long-term back problems

		How easy it is to get to get through to someone at your GP surgery on the phone?	Overall, how would you describe your experience of making an appointment?	How often to you see or speak to the GP you prefer?	How helpful do you find the receptionists at your GP surgery?	Doctor communication	Nurse communication	Overall, how would you describe your experience of your GP surgery?
Adjusted for age, gender, ethnicity, deprivation	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.02 (1.00-1.04)	1.06 (1.04-1.07)	1.37 (1.34-1.40)	0.98 (0.96-1.00)	1.06 (1.04-1.07)	0.97 (0.95-0.98)	1.11 (1.09-1.13)
	2	0.99 (0.97-1.02)	1.02 (0.99-1.04)	1.51 (1.47-1.54)	0.97 (0.94-1.01)	1.03 (1.01-1.05)	0.93 (0.91-0.96)	1.12 (1.09-1.15)
	3	0.93 (0.90-0.96)	0.95 (0.92-0.98)	1.51 (1.46-1.57)	0.88 (0.84-0.93)	0.98 (0.95-1.01)	0.90 (0.87-0.93)	1.05 (1.00-1.10)
4+	0.86 (0.82-0.90)	0.82 (0.79-0.86)	1.48 (1.41-1.55)	0.75 (0.70-0.81)	0.87 (0.83-0.90)	0.77 (0.74-0.81)	0.85 (0.80-0.90)	
Additionally adjusted for EQ5D (Utility Score)	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.09 (1.07-1.11)	1.14 (1.12-1.16)	1.40 (1.37-1.42)	1.06 (1.03-1.08)	1.15 (1.13-1.16)	1.04 (1.02-1.06)	1.23 (1.21-1.26)
	2	1.12 (1.09-1.14)	1.17 (1.15-1.20)	1.56 (1.52-1.60)	1.13 (1.09-1.17)	1.20 (1.17-1.22)	1.08 (1.05-1.10)	1.37 (1.33-1.42)
	3	1.12 (1.08-1.16)	1.19 (1.14-1.23)	1.60 (1.54-1.66)	1.11 (1.06-1.18)	1.24 (1.20-1.28)	1.12 (1.08-1.16)	1.44 (1.38-1.51)
4+	1.12 (1.07-1.17)	1.13 (1.08-1.19)	1.60 (1.52-1.68)	1.04 (0.97-1.12)	1.22 (1.17-1.27)	1.06 (1.01-1.12)	1.33 (1.25-1.41)	
Adjusted for EQ5D (Pain/Discomfort only)	Long-term conditions							
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.08 (1.06-1.10)	1.13 (1.11-1.15)	1.41 (1.39-1.44)	1.03 (1.01-1.06)	1.14 (1.12-1.15)	1.02 (1.00-1.04)	1.21 (1.18-1.23)
	2	1.11 (1.08-1.13)	1.15 (1.13-1.18)	1.60 (1.56-1.64)	1.08 (1.05-1.12)	1.18 (1.15-1.20)	1.04 (1.02-1.07)	1.31 (1.27-1.35)
	3	1.09 (1.05-1.13)	1.14 (1.10-1.18)	1.63 (1.58-1.69)	1.04 (0.99-1.10)	1.18 (1.15-1.22)	1.04 (1.01-1.08)	1.32 (1.26-1.38)
4+	1.06 (1.01-1.11)	1.03 (0.98-1.08)	1.61 (1.54-1.69)	0.93 (0.87-1.00)	1.09 (1.04-1.14)	0.93 (0.88-0.97)	1.13 (1.07-1.20)	

Appendix table S5. OR (95%CI) for the association between multimorbidity & patient experience. Sensitivity analysis exploring whether the same relationship between multimorbidity and patient experience is observed when instead of comparing “good” and “very good” responses with all others, “very good” responses alone are defined as a positive patient experience

		How easy it is to get to through to someone at your GP surgery on the phone?	Overall, how would you describe your experience of making an appointment?	How often do you see or speak to the GP you prefer?	How helpful do you find the receptionists at your GP surgery?	Doctor communication	Nurse communication	Overall, how would you describe your experience of your GP surgery?
Positive experience defined as “good” or “very good” responses – main findings from this paper								
Adjusted for age, gender, ethnicity, deprivation	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	0.99 (0.98-1.01)	1.03 (1.01-1.04)	1.33 (1.31-1.35)	0.96 (0.94-0.98)	1.02 (1.01-1.04)	0.94 (0.93-0.96)	1.06 (1.04-1.08)
	1	0.94 (0.92-0.96)	0.97 (0.95-0.99)	1.45 (1.42-1.49)	0.94 (0.91-0.97)	0.98 (0.96-0.99)	0.89 (0.87-0.91)	1.03 (1.00-1.06)
	2	0.88 (0.86-0.91)	0.89 (0.87-0.92)	1.47 (1.43-1.51)	0.85 (0.82-0.89)	0.93 (0.91-0.96)	0.86 (0.84-0.89)	0.96 (0.92-0.99)
	3	0.81 (0.78-0.83)	0.80 (0.77-0.82)	1.47 (1.42-1.52)	0.75 (0.72-0.79)	0.84 (0.82-0.87)	0.77 (0.75-0.80)	0.83 (0.80-0.87)
Additionally adjusted for EQ5D	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	1.09 (1.07-1.11)	1.15 (1.13-1.16)	1.38 (1.36-1.41)	1.05 (1.03-1.08)	1.16 (1.15-1.18)	1.06 (1.04-1.08)	1.23 (1.21-1.26)
	1	1.11 (1.08-1.14)	1.18 (1.16-1.21)	1.55 (1.51-1.59)	1.12 (1.08-1.15)	1.22 (1.20-1.25)	1.09 (1.07-1.12)	1.35 (1.31-1.38)
	2	1.10 (1.07-1.14)	1.16 (1.12-1.20)	1.58 (1.53-1.63)	1.09 (1.05-1.15)	1.25 (1.22-1.29)	1.13 (1.10-1.17)	1.38 (1.33-1.43)
	3	1.07 (1.03-1.11)	1.10 (1.06-1.15)	1.57 (1.51-1.63)	1.06 (1.00-1.11)	1.19 (1.16-1.23)	1.07 (1.03-1.11)	1.31 (1.25-1.37)
Positive experience defined as “very good” responses – sensitivity analysis								
Adjusted for age, gender, ethnicity, deprivation	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	1.13 (1.12-1.15)	1.09 (1.07-1.10)	1.26 (1.24-1.28)	1.17 (1.16-1.19)	1.14 (1.13-1.16)	1.09 (1.07-1.10)	1.16 (1.15-1.18)
	1	1.15 (1.13-1.17)	1.06 (1.05-1.08)	1.32 (1.29-1.35)	1.22 (1.20-1.24)	1.16 (1.15-1.18)	1.10 (1.08-1.12)	1.19 (1.17-1.20)
	2	1.16 (1.13-1.18)	1.03 (1.01-1.05)	1.31 (1.28-1.34)	1.24 (1.21-1.27)	1.18 (1.16-1.21)	1.12 (1.10-1.15)	1.18 (1.16-1.21)
	3	1.17 (1.15-1.20)	0.99 (0.97-1.01)	1.29 (1.26-1.33)	1.22 (1.19-1.25)	1.20 (1.18-1.23)	1.14 (1.12-1.17)	1.16 (1.13-1.19)
Additionally adjusted for EQ5D	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	1.15 (1.14-1.17)	1.13 (1.12-1.15)	1.28 (1.26-1.30)	1.20 (1.18-1.21)	1.17 (1.15-1.18)	1.12 (1.11-1.14)	1.21 (1.19-1.22)
	1	1.19 (1.17-1.21)	1.16 (1.14-1.18)	1.36 (1.33-1.39)	1.27 (1.25-1.29)	1.21 (1.19-1.23)	1.18 (1.16-1.20)	1.28 (1.26-1.30)
	2	1.23 (1.20-1.25)	1.18 (1.15-1.20)	1.37 (1.34-1.41)	1.31 (1.28-1.34)	1.25 (1.23-1.28)	1.25 (1.22-1.28)	1.34 (1.31-1.37)
	3	1.28 (1.25-1.32)	1.20 (1.17-1.23)	1.39 (1.35-1.44)	1.32 (1.29-1.36)	1.31 (1.28-1.34)	1.34 (1.31-1.37)	1.39 (1.35-1.42)

Findings from this sensitivity analysis which compared reporting “very good” care to all other responses, gave a somewhat different picture to the main analysis. Before adjusting for health related quality of life, people with long term conditions were more likely to report “very good” experiences of care. Thus, scores from this group were polarised with respondents more likely to report both negative and very positive experiences.

We suggest that there are three possible reasons for this. The first is that people with long term conditions interpret the response scales for the survey question in different ways from people without long term health conditions, for example, research looking at patient experience in hospital care in the United States found that people with higher educational attainment were less likely to use the extremes of response scales¹. We do not think that this is the correct explanation here, however, as it is unlikely that a person would develop different response tendencies on developing a long term health condition.

We find that people with long term conditions are in fact more likely to report “very good” experiences, while at the same time being more likely to report negative experiences. Comparing this to the main findings it would appear that people with multiple long term conditions may be more polarised in reporting their experiences or care. A possible explanation for this finding, therefore, is that people with multiple long term health conditions have more interactions with primary care than other people, and this higher frequency of interactions might result in more variation in reported experience. Alternatively, it may be that the complex needs of those with long term conditions leads to an increase in both the best and worst experiences.

1. Elliott MN, Haviland AM, Kanouse DE, et al. Adjusting for subgroup differences in extreme response tendency in ratings of health care: impact on disparity estimates. Health services research 2009;44(2 Pt 1):542-61.

Appendix table S6. OR (95%CI) for the association between multimorbidity & patient experience. Sensitivity analysis exploring whether the same relationship between multimorbidity and patient experience is observed after imputation for missing data

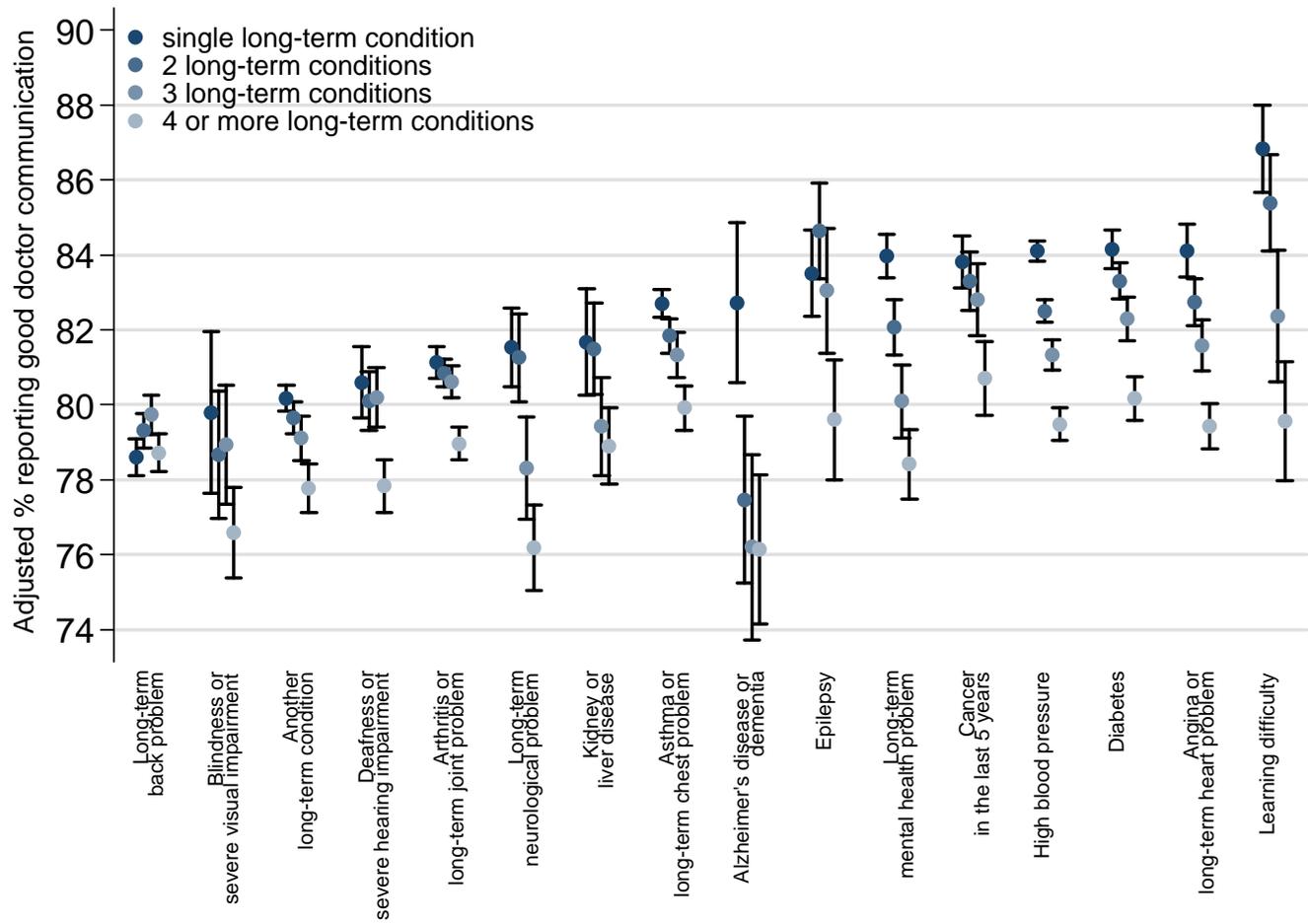
		How easy it is to get to through to someone at your GP surgery on the phone?	Overall, how would you describe your experience of making an appointment?	How often to you see or speak to the GP you prefer?	How helpful do you find the receptionists at your GP surgery?	Doctor communication	Nurse communication	Overall, how would you describe your experience of your GP surgery?
Main findings from this paper								
Adjusted for age, gender, ethnicity, deprivation	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	reference	reference	reference	reference	reference	reference	reference
	1	0.99 (0.98-1.01)	1.03 (1.01-1.04)	1.33 (1.31-1.35)	0.96 (0.94-0.98)	1.02 (1.01-1.04)	0.94 (0.93-0.96)	1.06 (1.04-1.08)
	2	0.94 (0.92-0.96)	0.97 (0.95-0.99)	1.45 (1.42-1.49)	0.94 (0.91-0.97)	0.98 (0.96-0.99)	0.89 (0.87-0.91)	1.03 (1.00-1.06)
	3	0.88 (0.86-0.91)	0.89 (0.87-0.92)	1.47 (1.43-1.51)	0.85 (0.82-0.89)	0.93 (0.91-0.96)	0.86 (0.84-0.89)	0.96 (0.92-0.99)
4+	0.81 (0.78-0.83)	0.80 (0.77-0.82)	1.47 (1.42-1.52)	0.75 (0.72-0.79)	0.84 (0.82-0.87)	0.77 (0.75-0.80)	0.83 (0.80-0.87)	
Additionally adjusted for EQ5D	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.09 (1.07-1.11)	1.15 (1.13-1.16)	1.38 (1.36-1.41)	1.05 (1.03-1.08)	1.16 (1.15-1.18)	1.06 (1.04-1.08)	1.23 (1.21-1.26)
	2	1.11 (1.08-1.14)	1.18 (1.16-1.21)	1.55 (1.51-1.59)	1.12 (1.08-1.15)	1.22 (1.20-1.25)	1.09 (1.07-1.12)	1.35 (1.31-1.38)
	3	1.10 (1.07-1.14)	1.16 (1.12-1.20)	1.58 (1.53-1.63)	1.09 (1.05-1.15)	1.25 (1.22-1.29)	1.13 (1.10-1.17)	1.38 (1.33-1.43)
4+	1.07 (1.03-1.11)	1.10 (1.06-1.15)	1.57 (1.51-1.63)	1.06 (1.00-1.11)	1.19 (1.16-1.23)	1.07 (1.03-1.11)	1.31 (1.25-1.37)	
Findings after imputation for missing data								
Adjusted for age, gender, ethnicity, deprivation	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.01 (1.00-1.03)	1.04 (1.02-1.05)	1.28 (1.26-1.30)	1.00 (0.98-1.01)	1.04 (1.03-1.06)	0.97 (0.96-0.98)	1.07 (1.05-1.09)
	2	0.95 (0.94-0.97)	0.99 (0.97-1.00)	1.38 (1.35-1.40)	0.98 (0.95-1.01)	0.99 (0.98-1.01)	0.92 (0.91-0.94)	1.04 (1.01-1.06)
	3	0.90 (0.88-0.92)	0.91 (0.88-0.93)	1.39 (1.36-1.42)	0.90 (0.87-0.94)	0.94 (0.92-0.97)	0.89 (0.86-0.91)	0.97 (0.94-1.01)
4+	0.83 (0.80-0.85)	0.81 (0.78-0.83)	1.37 (1.34-1.41)	0.79 (0.75-0.82)	0.84 (0.82-0.87)	0.79 (0.77-0.81)	0.83 (0.80-0.86)	
Additionally adjusted for EQ5D	Long-term conditions	reference	reference	reference	reference	reference	reference	reference
	0	reference	reference	reference	reference	reference	reference	reference
	1	1.07 (1.06-1.09)	1.11 (1.09-1.13)	1.30 (1.29-1.32)	1.07 (1.05-1.09)	1.12 (1.11-1.14)	1.04 (1.02-1.05)	1.17 (1.15-1.20)
	2	1.07 (1.05-1.09)	1.13 (1.11-1.15)	1.43 (1.40-1.46)	1.13 (1.10-1.17)	1.15 (1.13-1.17)	1.06 (1.04-1.08)	1.26 (1.23-1.29)
	3	1.08 (1.05-1.11)	1.13 (1.10-1.16)	1.48 (1.44-1.52)	1.14 (1.09-1.18)	1.19 (1.16-1.22)	1.11 (1.08-1.14)	1.32 (1.28-1.37)
4+	1.08 (1.04-1.12)	1.11 (1.07-1.15)	1.50 (1.44-1.56)	1.11 (1.05-1.16)	1.18 (1.15-1.22)	1.10 (1.06-1.13)	1.30 (1.24-1.36)	

Multiple imputation for missing data made only trivial differences to the findings from this paper.

A single imputation model was used to produce fine imputed datasets using the ICE package¹ Stata. The model used all seven experience items in their binary form which were treated, along with gender, as binary data. Age, ethnicity, deprivation quintile and number of long-term conditions were also included with the same coding as used in the analysis model and treated as multinomial data. Finally EQ5D was also included in the imputation model which was treated as a continuous variable, using matching to ensure an appropriate distribution. Unfortunately it was not possible to include practice in the imputation model as the software does not support random effects. Each of the five imputed datasets were analysed with a set of model identical to those used for the main analysis (i.e. including a random effect for practice). Estimates and standard errors from the five sets of models were combined using Rubin's rules²

1. Royston P. Multiple imputation of missing values: further update of ice, with an emphasis on interval censoring. *Stata Journal*, 2007; 7: 445–464
2. Rubin DB. *Multiple Imputation for Nonresponse in Surveys*. New York: J. Wiley & Sons, 1987

Appendix figure S2. Adjusted proportion of responders endorsing a positive experience of doctor communication by long-term condition, stratified by number of co-morbidities



The key finding illustrated by this figure is that the patient experience (in this example of experience of doctor communication) varied somewhat between conditions, however people with increasing numbers of co-morbidities on average reported poorer patient experience consistently across all conditions. We were particularly concerned that the impact of multimorbidity may be particularly different among people with mental health problems, but the pattern of the association between multimorbidity and poorer experience is consistent here as well in comparison with other long term conditions.