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RESEARCH ARTICLE

A quantitative exploration of attitudes towards deprescribing in patients with multimorbidity and polypharmacy in primary care

[version 1; peer review: 2 approved with reservations]

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Abstract

Objectives

Population ageing has led to an increase in multimorbidity and

polypharmacy. Some medications may need to be stopped, but patient attitudes towards deprescribing are poorly understood. This study explores attitudes towards (de) prescribing in patients with multimorbidity in the UK primary care.

Design

Cross-sectional study.

Setting

UK Practice Survey.

Participants

Patients with multimorbidity were invited to complete the Revised Patients' Attitudes Towards Deprescribing (rPATD) Questionnaire using an Evergreen Life's Personal Health Record App (Manchester, UK). The responses were linked to electronic health records. Anonymised data were analysed in a trusted research environment (University of Liverpool) for group comparisons and using multivariable logistic regression to identify factors associated with satisfaction with current medications.

Results

A total 1,019 patients participated in the study (n = 365 aged <65, 30% males; n = 654 ≥ 65, 57% males). Most patients were satisfied with their current medications (74% aged <65, 70% aged ≥65) but were willing to stop one or more of their regular medicines if their doctor said it was possible (82%, 68% accordingly). Polypharmacy, use of antihypertensive drugs, and antidepressants were associated with patient-reported burden in taking medicines. Frailty did not influence patient deprescribing attitudes. Patients who were satisfied with current medications had fewer medications. Independent predictors of satisfaction with current medications were higher total involvement and appropriateness scores, and lower total burden score.

Conclusions

Most patients with multimorbidity would consider stopping some of their medications, even when they are generally satisfied with the treatments they received. Frailty status does not imply willingness to stop medications. Clinicians should discuss medication deprescribing for shared decision.

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Any reports and responses or comments on the article can be found at the end of the article.

Plain Language summary

People who live with several long-term health conditions often take

many different medicines. Sometimes, stopping or reducing medicines that are no longer helpful – known as “deprescribing” – can improve health and reduce side effects. However, we do not fully understand how patients feel about having their medicines reviewed or stopped.

In this study, we asked over 1,000 adults in the UK who have multiple long-term conditions to complete a short questionnaire about their views on deprescribing. The survey was delivered through the Evergreen Life Personal Health Record app and linked to information from their GP records.

Most people said they were satisfied with the medicines they currently take. Despite this, the majority also said they would be willing to stop one or more medicines if their doctor advised it was safe. People taking five or more medicines (polypharmacy) were more likely to feel burdened by their treatments. Those taking antidepressants or blood pressure medicines were also more likely to feel unsure about whether their medicines were appropriate.

We also looked at whether frailty affected people’s views. We found that people living with frailty had similar attitudes to deprescribing as those without frailty.

Overall, our findings suggest that many patients are open to discussing whether they still need all their medicines. This highlights the importance of regular medication reviews and shared decision-making between patients and healthcare professionals.

Keywords
multimorbidity; polypharmacy, primary care, deprescribing, frailty, antidepressants

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Strengths and limitations of this study

Strengths

Purposefully collected large survey data from general population using a validated tool.

Limitations

The population is restricted to Evergreen Life PHR App users. The reported views on deprescribing may differ from those when deprescribing is offered.

Introduction

Ageing populations, changes in lifestyle risk factors, and medical advances are associated with an increase in multimorbidity, wherein people live with two or more long-term conditions, often leading to polypharmacy.[1] The prevalence of polypharmacy in the UK is increasing. In England, for example, the number of medications dispensed in primary care increased by 53.8% between 2001 and 2011.[2] While many, even complex, medication regimes are entirely appropriate to improve both survival and quality of life; polypharmacy (using ≥5 regular medications) can be associated with increased risk of medicine-related harm, including hospital admission, poorer quality of life, and mortality.[3] Potentially inappropriate polypharmacy occurs when medication risks outweigh their potential for benefit in the context of the prescription, and individual, as a whole. Deprescribing is defined as supervised discontinuation or dose reduction of one or more medications which are considered clinically inappropriate.[4] Deprescribing may decrease medication burden and risks of medication-related harm such as hospital admission which accrue with polypharmacy,[5] and improve health outcomes in selected patients, particularly the frail and elderly.[6] In 2021, the UK government commissioned an independent review in England to develop a plan to reduce overprescribing, including inappropriate polypharmacy. This highlighted a significant increase in NHS prescribing attributable in large part to specific organ-based, primarily preventative prescribing, particularly for people living with multiple long-term conditions. An individual taking ten or more regular medicines is three times more likely to be admitted to hospital because of an adverse drug reaction (ADR).[7] Primary care is a major source of prescribing, responsible for more than one billion prescription items dispensed annually in the UK, with an estimated 10% being inappropriately prescribed.[8] A number of factors decrease the confidence of clinicians to deprescribe: the information for coordinating care is hard to assemble and understand, particularly in time-constrained consultations; there is often lack of appropriate guidance for complex patients with multimorbidity, with the majority of guidelines largely based on single-condition research evidence; and clinicians voice concerns regarding potential patient conflicts and attitudes toward deprescribing.[9] Understanding patient views toward deprescribing is thus essential for better education strategies, efficient communication from clinicians and compliance with medication.

There is limited information on public views on deprescribing in the UK. The Revised Patients' Attitudes Towards Deprescribing (rPATD) Questionnaire: Versions for Older Adults and Caregivers tool has been developed and validated to understand deprescribing attitudes in older adults and has been used in different countries.[10] The questionnaire consists of 22 Likert-scale questions designed to assess patients' attitudes across four domains that explore the perception of burden, appropriateness, concern about stopping and involvement in decision making.

This study aims to explore attitudes towards deprescribing in patients with multimorbidity and polypharmacy associated with high-risk of medicines harm, in the UK primary care setting. A preliminary version of this work has been reported previously.[11]

Methods

Patient and public involvement

A PPIE co-investigator within the DynAIRx programme, who has lived experience relevant to multimorbidity and polypharmacy, was involved from the outset of this study and helped shape the research question to ensure it reflected patient priorities. They contributed feedback on early drafts of the study design, analysis, and manuscript through regular standing programme meetings. As the study used an existing validated questionnaire and recruitment occurred in the Evergreen Life app, patients and the public were not involved in selecting outcome measures or recruitment processes. Plans for dissemination will continue to be informed by the DynAIRx PPIE group to ensure findings are shared in ways that are meaningful to patients and wider communities.

Study design

Eligible registered users of Evergreen Life's Personal Health Record (PHR) App (Manchester, UK) were invited to participate in a survey on their attitudes to deprescribing using the rPATD questionnaire.[10] Evergreen Life is a private company empowering individuals to create and add to a free digital Personal Health Record (PHR), access online NHS services and deliver wellness insights based on data held in the PHR. The PHR contains self-reported behavioural data, medical data (imported from electronic health records (eHR)) and genetic (genotyped) data. The databases are encrypted

at rest and transit, working to ISO 27001, Cyber Essentials Plus, the Data Security and Protection Toolkit and the Information Governance Toolkit. The app has national coverage with 1.2 million users. It is broadly representative of the UK population in terms of age, gender, ethnicity and IMD (https://www.evergreen-life.co.uk/descriptive-statistics/#1).

Informed consent for participation in the study has been obtained. App users can consent for personal data, including through responses to wellness surveys, to be used in specific research studies. Following consent and completion of a survey, Evergreen Life anonymises and aggregates data for research purposes. Data is grouped into categories representing binary and ranged values so no single person can be identified from the aggregated results. Furthermore, to ensure small user counts could not become disclosive in combination with other categories, they redact any of these categories with a low number of users present. Our study received ethical approval from North-East – Newcastle & North Tyneside Research Ethics Committee (REC reference 22/NE/0088). Offers to participate in the survey were sent through the app three occasions, a minimum of 72 hours apart. It was acceptable for participants to not respond to some questions.

Eligible participants were existing users of Evergreen Life PHR App including adults aged ≥18 years with multimorbidity defined as ≥2 long-term conditions who consented for participation in the survey. Multimorbidity was defined according to the Academy of Medical Sciences definition as co-existence of ≥2 chronic conditions, each one of which is either a physical non-communicable disease of long duration (e.g., cardiovascular disease, diabetes mellitus, cancer), a mental health condition of long duration (e.g., a mood disorder, schizophrenia, dementia), or an infectious disease of long duration (e.g., HIV or hepatitis C).[12] A disease code list for 186 chronic health conditions was developed by a group of general physicians. Frailty was defined using electronic Frailty index (eFI). Polypharmacy was defined as use of ≥5 medications issued ≥4 times within a 12-month period. Medication data was obtained from GP prescription data derived from the primary care eHR, not self-report category within the PHR.

Participants were asked to score their rPATD answers using a score range from strongly disagree (1) to strongly agree (5). Average scores were calculated in four domains of five questions each, based on the person's own perception: total involvement score, with higher scores indicating more patient involvement with their medicines/deprescribing; total burden score, with higher scores indicating them seeing their medications more burdensome; total appropriateness score, with higher scores indicating the patients viewed their medications more appropriate; and total concerns about stopping score, with higher scores indicating more potential concerns the patients had about stopping one or more of their medications. Additionally, two questions were global questions not included in any scores: 'Overall, I am satisfied with my current medicines' and 'If my doctor said it was possible I would be willing to stop one or more of my regular medicines.' The rPATD questionnaire responses were collated and cross-referenced against the pseudo-anonymised patient demographic and clinical characteristics. Following this data were fully anonymised prior to analyses conduced within a Trustworthy Research Environment at the University of Liverpool. Sub-group analysis of the relationship between attitudes towards deprescribing and antidepressant and antihypertensive use was undertaken, owing to the high prevalence of use of these medications in the population.

Consent:

When creating an account, all Evergreen users give their permission for the company to gather, process and store personal information for the purpose of providing the company services (according to the companies terms of use and privacy policy).

In addition, Evergreeen users who participated in DynAIRx were asked using electronic consent screens as part of their study onboarding if they were willing to participate in the research and share their information with the university. Only deidentified data from users who consented to these screens was shared with the university.

Statistical analysis

Continuous data are summarised as means and standard deviations (SD) with independent groups compared using a two-sample Student t-test. Categorical data are summarised as the number of survey respondents and the percentage giving specific responses, and associations between categories were compared using Fisher test. Logistic regression was used to explore factors associated with satisfaction with current medications. P-values <0.05 were considered statistically significant. Analyses were undertaken using R software (version 4.3, using R Markdown 2024, tidyverse, epitools, finalfit packages, reproducible table tables produced using gtsummary package).

Results

A total of 11,765 eligible patients were invited to participate in the survey, of whom 1,019 participated (response rate of 8.7%). They included 365 patients aged <65 years (mean (SD) age 51 (10) years, 30% males, 91% of White ethnic origin)

and 654 patients aged ≥65 years (age 74 (6) years, 57% males, 96% of White ethnic origin). The age, sex and ethnicity profiles of those invited vs participating in the survey were similar. Demographic and clinical characteristics of study participants are summarized in Suppl. Table 1.

Overall, patients in the older group were more satisfied with their current medications (74% vs 70%, p = 0.006) and would be willing to stop one or more of their regular medicines if their doctor said it was possible (82% vs 68%, p = 0.001). The older groups showed lower total involvement scores, total burden scores and total concerns about stopping scores ($p < 0.05$ for all). The mean number of currently prescribed medications was 7.5 (SD 4.4) in those aged <65 and 6.9 (SD 3.9) in those aged ≥65.Most participants were satisfied with their current medications (either satisfied or very satisfied survey choice), 70% aged <65, and 74% aged ≥65. Still, most would be willing to stop one or more of their regular medicines if their doctor said it was possible (68% aged <65, 82% aged ≥65). The willingness to stop medication(s) was highest in those aged ≥65 if receiving antihypertensive drugs (see Figure 1).

Polypharmacy

In patients aged <65, those with polypharmacy (≥5 regular medications, n = 262) had a higher mean total burden score of 2.74 (SD 0.86) compared to those without polypharmacy (n = 103, mean score of 2.41 (SD 0.72), p = 0.001). In patients aged ≥65, those with polypharmacy (n = 456) have increased total burden score, total concerns about stopping score and lower total appropriateness score compared to those without polypharmacy (n = 198, $p < 0.001$ for all) (Table 1).

Antihypertensive medications

Antihypertensive drugs were used by 210 (56%) patients aged <65, and 499 (76%) of those aged ≥65 (Table 2). Patients aged <65 years who used antihypertensive drugs had a higher total burden score vs those without these drugs (p = 0.036). Among patients aged ≥65, those receiving antihypertensive drugs were more willing to stop one or more of their regular medicines (83% vs 75% in those not receiving antihypertensive medication, p = 0.011), had a higher total burden score and lower total appropriateness score ($p < 0.001$ for both).

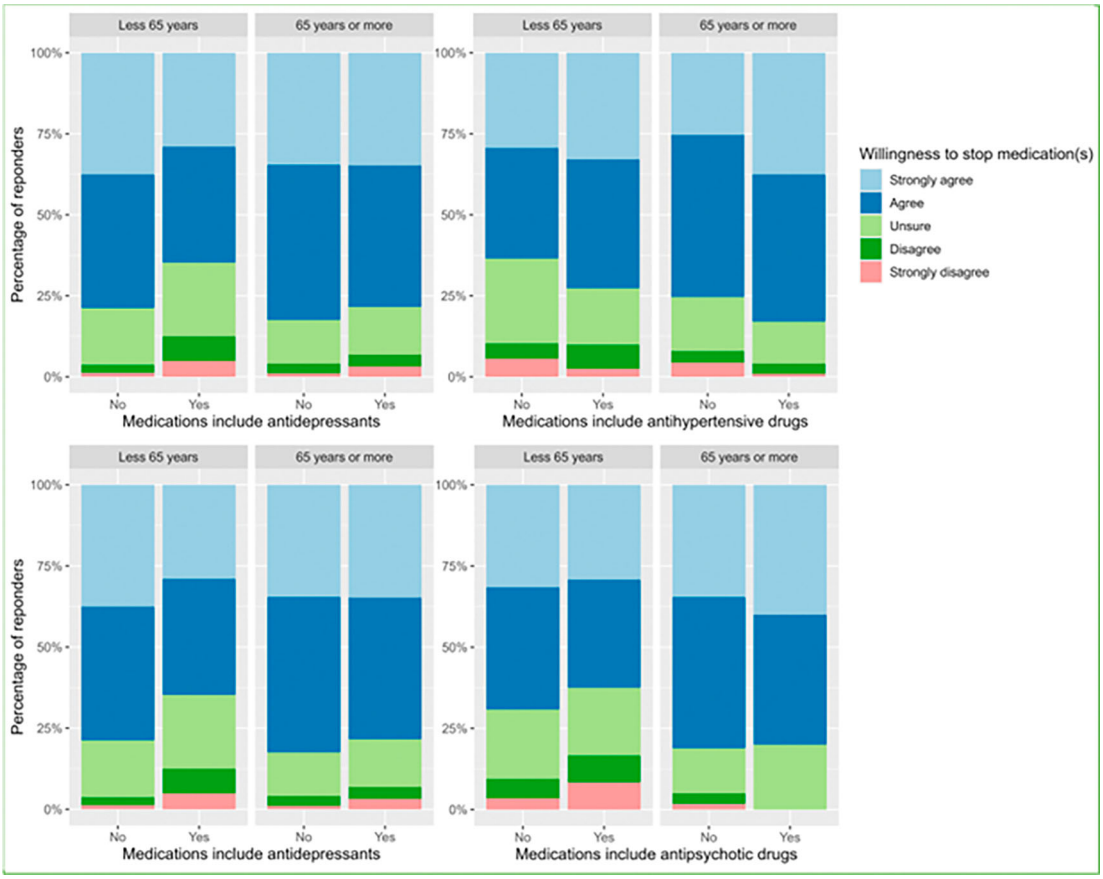


Figure 1. Willingness to stop medications in the study group.

Table 1. **Effect of polypharmacy (5 or more regular medications) on attitudes to deprescribing.**

	Polypharmacy: <65 years				Polypharmacy: ≥65 years			
Characteristic	**N**	**No n = 103**	**Yes n = 262**	**p**	**N**	**No n = 198**	**Yes n = 456**	**p**
Age, years, Mean (SD)	365	49 (11)	51 (10)	0.020	654	73 (5)	74 (6)	0.004
Male sex, n (%), n (%)	364	30 (29%)	79 (30%)	0.90	653	118 (60%)	254 (56%)	0.39
White ethnicity, n (%)	234	52 (91%)	161 (91%)	>0.99	350	106 (98%)	229 (95%)	0.16
Body mass index, kg/m2, Mean (SD)	348	30 (6)	33 (8)	<0.001	641	27.2 (4.9)	28.5 (5.5)	0.002
History of smoking, n (%)	238	32 (52%)	106 (60%)	0.29	376	72 (65%)	156 (59%)	0.30
Alcohol use, unis/ month, Mean (SD)	165	24 (39)	13 (28)	0.13	219	25 (37)	19 (32)	0.28
Frailty, n (%)	0	0 (NA%)	0 (NA%)		575	69 (36%)	179 (46%)	0.025
Bone fracture, n (%)	365	16 (16%)	51 (19%)	0.45	654	27 (14%)	59 (13%)	0.80
Hypertension, n (%)	365	17 (17%)	83 (32%)	0.004	654	76 (38%)	231 (51%)	0.005
Myocardial infarction, n (%)	365	0 (0%)	6 (2.3%)	0.19	654	0 (0%)	20 (4.4%)	<0.001
Heart failure, n (%)	365	0 (0%)	1 (0.4%)	>0.99	654	2 (1.0%)	19 (4.2%)	0.050
COPD, n (%)	365	0 (0%)	7 (2.7%)	0.20	654	6 (3.0%)	35 (7.7%)	0.023
Diabetes type 1, n (%)	365	0 (0%)	10 (3.8%)	0.068	654	0 (0%)	6 (1.3%)	0.19
Diabetes type 2, n (%)	365	8 (7.8%)	51 (19%)	0.007	654	16 (8.1%)	86 (19%)	<0.001
Chronic kidney disease, n (%)	365	3 (2.9%)	7 (2.7%)	>0.99	654	17 (8.6%)	64 (14%)	0.053
Dementia, n (%)	365	1 (1.0%)	0 (0%)	0.28	654	0 (0%)	2 (0.4%)	>0.99
Count of currently prescribed medications, Mean (SD)	365	3.1 (0.8)	9.2 (4.0)	<0.001	654	3.1 (0.8)	8.6 (3.5)	<0.001
Antihypertensive medications, n (%)	365	46 (45%)	164 (63%)	0.002	654	115 (58%)	384 (84%)	<0.001
Antidepressants, n (%)	365	69 (67%)	197 (75%)	0.12	654	37 (19%)	174 (38%)	<0.001
Antipsychotic medications, n (%)	365	4 (3.9%)	24 (9.2%)	0.12	654	1 (0.5%)	4 (0.9%)	>0.99
High anticholinergic burden, n (%)	343	47 (55%)	217 (84%)	<0.001	530	52 (45%)	290 (70%)	<0.001
Anticholinergic burden, Mean (SD)	343	3.8 (2.7)	7.9 (6.0)	<0.001	530	2.9 (2.5)	4.8 (3.7)	<0.001
Overall, I am satisfied with my current medicines, n (%)	362			0.20	639			0.007
Strongly agree		21 (21%)	48 (18%)			45 (23%)	85 (19%)	
Agree		59 (58%)	125 (48%)			117 (60%)	228 (51%)	

Table 1. *Continued*

	Polypharmacy: <65 years				Polypharmacy: ≥65 years			
Characteristic	**N**	**No n = 103**	**Yes n = 262**	**p**	**N**	**No n = 198**	**Yes n = 456**	**p**
Unsure		16 (16%)	60 (23%)			30 (15%)	112 (25%)	
Disagree		6 (5.9%)	21 (8.1%)			2 (1.0%)	14 (3.1%)	
Strongly disagree		0 (0%)	6 (2.3%)			0 (0%)	6 (1.3%)	
If my doctor said it was possible I would be willing to stop one or more of my regular medicines, n (%)	287			0.93	578			0.92
Strongly agree		23 (32%)	67 (31%)			55 (33%)	145 (35%)	
Agree		27 (37%)	80 (37%)			81 (48%)	188 (46%)	
Unsure		15 (21%)	46 (21%)			25 (15%)	55 (13%)	
Disagree		4 (5.5%)	14 (6.5%)			6 (3.6%)	13 (3.2%)	
Strongly disagree		4 (5.5%)	7 (3.3%)			2 (1.2%)	8 (2.0%)	
Total involvement score, Mean (SD)	344	4.39 (0.48)	4.40 (0.52)	0.90	627	4.32 (0.54)	4.30 (0.47)	0.78
Total burden score, Mean (SD)	287	2.41 (0.72)	2.74 (0.86)	0.001	582	2.04 (0.67)	2.57 (0.77)	<0.001
Total appropriateness score, Mean (SD)	277	3.59 (0.83)	3.42 (0.83)	0.13	565	3.66 (0.71)	3.22 (0.80)	<0.001
Total concerns about stopping score, Mean (SD)	268	2.89 (0.81)	2.98 (0.85)	0.46	544	2.39 (0.68)	2.66 (0.68)	<0.001

Antidepressants

Antidepressant drugs were used by 266 (73%) patients aged <65, and 211 (32%) of those aged ≥65 years (Table 3). Patients aged <65 years who used antidepressant drugs had a lower total appropriateness score ($p = 0.041$) and a higher total concern about stopping score (<0.001). Among patients aged ≥65, fewer of those receiving antidepressants were satisfied with their current medications (68% vs 78% of those without antidepressants, $p < 0.001$). Patients aged ≥65 using antidepressants had a higher total burden score ($p = 0.002$), a lower total appropriateness score ($p = 0.024$), and a higher total concern about stopping score ($p < 0.001$). The effects of antipsychotic medications were not analysed separately due to the small number of participants receiving these drugs (n = 28, aged <65, n = 5, aged ≥65).

Frailty

The analysis included 248 (43%) patients with frailty and 327 without frailty, all aged ≥65 years (Suppl. Table 2). There was no significant difference in attitudes to deprescribing between patients with and without frailty ($p > 0.05$ for all metrics).

Characteristics associated with satisfaction with current medications.

Among total responders 476 patients (70%) were satisfied with current medications (satisfied or very satisfied choice) (Table 4). Patients who were satisfied with current medications had fewer prescribed medications (mean 7.4 (SD 4.0) vs 8.3 (4.1), $p = 0.007$), were less likely to have polypharmacy (75% vs 85%, $p = 0.004$) and less likely to use antidepressants (50% vs 60%, $p < 0.024$). Patients satisfied with current medications had a higher total involvement score, a higher total appropriateness score, and lower total concerns about stopping score ($p < 0.001$ for all). Independent predictors of satisfaction with current medications were a higher total involvement score ($p = 0.002$), a lower total burden score ($p = 0.028$), and a higher total appropriateness score ($p < 0.001$) (Table 5). Independent predictors of being willing to stop one or more of regular medicines were higher total involvement score ($p = 0.02$), higher total burden score ($p = 0.001$), lower total appropriateness score ($p < 0.001$), lower total concerns about stopping score ($p < 0.001$) and male sex ($p = 0.013$).

Table 2. **Effect of antihypertensives drug use on attitudes to deprescribing.**

	Antihypertensive drugs: <65 years				Antihypertensive drugs: ≥65 years			
Characteristic	**N**	**No n = 155**	**Yes n = 210**	**p**	**N**	**No n = 155**	**Yes n = 499**	**p**
Age, years, Mean (SD)	365	49 (10)	52 (10)	0.025	654	73 (6)	74 (6)	0.11
Male sex, n (%), n (%)	364	40 (26%)	69 (33%)	0.16	653	69 (45%)	303 (61%)	<0.001
White ethnicity, n (%)	234	90 (91%)	123 (91%)	>0.99	350	77 (99%)	258 (95%)	0.21
Body mass index, kg/m2, Mean (SD)	348	31 (7)	33 (8)	0.036	641	26.4 (4.6)	28.6 (5.4)	<0.001
History of smoking, n (%)	238	57 (59%)	81 (57%)	0.89	376	54 (63%)	174 (60%)	0.71
Alcohol use, unis/ month, Mean (SD)	165	11 (25)	18 (34)	0.12	219	20 (33)	21 (34)	0.86
Frailty, n (%)	0	0 (NA%)	0 (NA%)		575	51 (38%)	197 (45%)	0.14
Bone fracture, n (%)	365	28 (18%)	39 (19%)	>0.99	654	27 (17%)	59 (12%)	0.078
Hypertension, n (%)	365	3 (1.9%)	97 (46%)	<0.001	654	8 (5.2%)	299 (60%)	<0.001
Myocardial infarction, n (%)	365	0 (0%)	6 (2.9%)	0.041	654	1 (0.6%)	19 (3.8%)	0.058
Heart failure, n (%)	365	0 (0%)	1 (0.5%)	>0.99	654	1 (0.6%)	20 (4.0%)	0.037
COPD, n (%)	365	2 (1.3%)	5 (2.4%)	0.70	654	14 (9.0%)	27 (5.4%)	0.13
Diabetes type 1, n (%)	365	3 (1.9%)	7 (3.3%)	0.53	654	2 (1.3%)	4 (0.8%)	0.63
Diabetes type 2, n (%)	365	18 (12%)	41 (20%)	0.045	654	12 (7.7%)	90 (18%)	0.001
Chronic kidney disease, n (%)	365	2 (1.3%)	8 (3.8%)	0.20	654	10 (6.5%)	71 (14%)	0.011
Dementia, n (%)	365	1 (0.6%)	0 (0%)	0.42	654	0 (0%)	2 (0.4%)	>0.99
Count of currently prescribed medications, Mean (SD)	365	6.4 (3.9)	8.3 (4.6)	<0.001	654	5.2 (3.3)	7.4 (3.9)	<0.001
Polypharmacy, n (%)	365	98 (63%)	164 (78%)	0.002	654	72 (46%)	384 (77%)	<0.001
antidepressants, n (%)	365	116 (75%)	150 (71%)	0.48	654	56 (36%)	155 (31%)	0.24
Antipsychotic medications, n (%)	365	17 (11%)	11 (5.2%)	0.048	654	3 (1.9%)	2 (0.4%)	0.089
High anticholinergic burden, n (%)	343	104 (71%)	160 (81%)	0.038	530	73 (60%)	269 (66%)	0.24
Anticholinergic burden, Mean (SD)	343	6.0 (5.2)	7.5 (6.0)	0.019	530	4.3 (3.8)	4.4 (3.5)	0.91
Overall, I am satisfied with my current medicines, n (%)	362			0.055	639			0.22
Strongly agree		39 (25%)	30 (14%)			34 (23%)	96 (20%)	
Agree		68 (44%)	116 (56%)			85 (56%)	260 (53%)	

Table 2. *Continued*

	Antihypertensive drugs: <65 years				Antihypertensive drugs: ≥65 years			
Characteristic	**N**	**No n = 155**	**Yes n = 210**	**p**	**N**	**No n = 155**	**Yes n = 499**	**p**
Unsure		31 (20%)	45 (22%)			25 (17%)	117 (24%)	
Disagree		14 (9.1%)	13 (6.3%)			6 (4.0%)	10 (2.0%)	
Strongly disagree		2 (1.3%)	4 (1.9%)			1 (0.7%)	5 (1.0%)	
If my doctor said it was possible I would be willing to stop one or more of my regular medicines, n (%)	287			0.20	578			0.011
Strongly agree		37 (29%)	53 (33%)			35 (25%)	165 (38%)	
Agree		43 (34%)	64 (40%)			69 (50%)	200 (45%)	
Unsure		33 (26%)	28 (17%)			23 (17%)	57 (13%)	
Disagree		6 (4.8%)	12 (7.5%)			5 (3.6%)	14 (3.2%)	
Strongly disagree		7 (5.6%)	4 (2.5%)			6 (4.3%)	4 (0.9%)	
Total involvement score, Mean (SD)	344	4.45 (0.51)	4.35 (0.51)	0.071	627	4.36 (0.45)	4.29 (0.51)	0.15
Total burden score, Mean (SD)	287	2.54 (0.82)	2.75 (0.84)	0.036	582	2.17 (0.73)	2.49 (0.78)	<0.001
Total appropriateness score, Mean (SD)	277	3.52 (0.85)	3.42 (0.82)	0.35	565	3.58 (0.81)	3.28 (0.78)	<0.001
Total concerns about stopping score, Mean (SD)	268	2.98 (0.82)	2.94 (0.85)	0.71	544	2.59 (0.74)	2.58 (0.68)	0.93

Discussion

The paper presents the first assessment of patient attitudes towards deprescribing in the context of multimorbidity in the UK primary care setting. The study shows that even though most patients with multimorbidity are generally satisfied with their current medications, most (68% aged <65, 82% aged ≥65) would still be willing to stop one or more of their regular medicines if their doctor said it was possible. Polypharmacy was associated with a higher total burden score of using medications across age groups. Moreover, in those aged ≥65, patients with polypharmacy were more likely to be concerned with the appropriateness of their medications but, at the same time, more concerned about stopping them. This highlights the patient's uncertainty about how medication changes may affect their health, even though ideas of stopping medications appear attractive. Unfortunately, the current clinical recommendations provide little guidance, adding pressure to both clinicians and patients.

Hypertension is the leading risk factor for cardiovascular and renal diseases and cognitive impairments with antihypertensives widely used. However, while uncomplicated hypertension is typically asymptomatic, its treatments could cause adverse effects, including falls with uncertainty about optimal blood pressure targets in older people.[13] Indeed, our study shows that the use of antihypertensive medications, which were prescribed to 56% of those under 65 years and 76% of those ≥65 years, is of particular concern for patients. Their use was associated with a higher total burden score; patients whose medications included antihypertensive drugs were more willing to reduce the number of their medications and had a lower total appropriateness score.

Similarly, patients receiving antidepressants were less satisfied with their medications and had a lower total appropriateness score. There was an interesting observation that patients aged ≥65 whose medication included antidepressants were less likely to feel that their medications were appropriate and more concerned about stopping their medications. This is perhaps related to ongoing concerns about discontinuation effects that can occur on deprescribing antidepressants, although evidence from recent intervention trial shows this can be achieved successfully with support.[14] The latter was not observed about antihypertensive drugs, and could be due to the background presence of mental health issues (e.g.,

Table 3. **Effect of antidepressant use on attitudes to deprescribing.**

	Antidepressants: <65 years				Antidepressants: ≥65 years			
Characteristic	**N**	**No n = 99**	**Yes n = 266**	**p**	**N**	**No n = 443**	**Yes n = 211**	**p**
Age, years, Mean (SD)	365	53 (9)	50 (10)	0.001	654	74 (6)	73 (6)	0.006
Male sex, n (%), n (%)	364	44 (45%)	65 (24%)	<0.001	653	283 (64%)	89 (42%)	<0.001
White ethnicity, n (%)	234	42 (86%)	171 (92%)	0.16	350	223 (95%)	112 (97%)	0.78
Body mass index, kg/m2, Mean (SD)	348	30 (7)	33 (8)	<0.001	641	27.6 (4.8)	29.1 (6.1)	0.003
History of smoking, n (%)	238	28 (48%)	110 (61%)	0.094	376	145 (58%)	83 (65%)	0.22
Alcohol use, unis/ month, Mean (SD)	165	17 (27)	15 (33)	0.79	219	20 (33)	21 (36)	0.85
Frailty, n (%)	0	0 (NA%)	0 (NA%)		575	177 (44%)	71 (42%)	0.71
Bone fracture, n (%)	365	18 (18%)	49 (18%)	>0.99	654	53 (12%)	33 (16%)	0.22
Hypertension, n (%)	365	32 (32%)	68 (26%)	0.23	654	205 (46%)	102 (48%)	0.68
Myocardial infarction, n (%)	365	4 (4.0%)	2 (0.8%)	0.048	654	12 (2.7%)	8 (3.8%)	0.47
Heart failure, n (%)	365	1 (1.0%)	0 (0%)	0.27	654	13 (2.9%)	8 (3.8%)	0.64
COPD, n (%)	365	1 (1.0%)	6 (2.3%)	0.68	654	22 (5.0%)	19 (9.0%)	0.057
Diabetes type 1, n (%)	365	5 (5.1%)	5 (1.9%)	0.14	654	3 (0.7%)	3 (1.4%)	0.39
Diabetes type 2, n (%)	365	23 (23%)	36 (14%)	0.037	654	72 (16%)	30 (14%)	0.56
Chronic kidney disease, n (%)	365	2 (2.0%)	8 (3.0%)	>0.99	654	58 (13%)	23 (11%)	0.45
Dementia, n (%)	365	0 (0%)	1 (0.4%)	>0.99	654	1 (0.2%)	1 (0.5%)	0.54
Count of currently prescribed medications, Mean (SD)	365	6.8 (4.1)	7.7 (4.5)	0.069	654	6.1 (3.4)	8.6 (4.4)	<0.001
Polypharmacy, n (%)	365	65 (66%)	197 (74%)	0.12	654	282 (64%)	174 (82%)	<0.001
Antihypertensive medications, n (%)	365	60 (61%)	150 (56%)	0.48	654	344 (78%)	155 (73%)	0.24
Antipsychotic medications, n (%)	365	0 (0%)	28 (11%)	<0.001	654	3 (0.7%)	2 (0.9%)	0.66
High anticholinergic burden, n (%)	343	43 (55%)	221 (83%)	<0.001	530	155 (48%)	187 (89%)	<0.001
Anticholinergic burden, Mean (SD)	343	3.3 (2.4)	7.9 (5.9)	<0.001	530	3.0 (2.4)	6.4 (4.0)	<0.001
Overall, I am satisfied with my current medicines, n (%)	362			0.088	639			<0.001
Strongly agree		26 (27%)	43 (16%)			99 (23%)	31 (15%)	
Agree		49 (50%)	135 (51%)			237 (55%)	108 (53%)	

Table 3. *Continued*

	Antidepressants: <65 years				Antidepressants: ≥65 years			
Characteristic	**N**	**No n = 99**	**Yes n = 266**	**p**	**N**	**No n = 443**	**Yes n = 211**	**p**
Unsure		15 (15%)	61 (23%)			91 (21%)	51 (25%)	
Disagree		8 (8.2%)	19 (7.2%)			3 (0.7%)	13 (6.3%)	
Strongly disagree		0 (0%)	6 (2.3%)			4 (0.9%)	2 (1.0%)	
If my doctor said it was possible I would be willing to stop one or more of my regular medicines, n (%)	287			0.15	578			0.39
Strongly agree		30 (38%)	60 (29%)			134 (35%)	66 (35%)	
Agree		33 (41%)	74 (36%)			186 (48%)	83 (44%)	
Unsure		14 (18%)	47 (23%)			52 (13%)	28 (15%)	
Disagree		2 (2.5%)	16 (7.7%)			12 (3.1%)	7 (3.7%)	
Strongly disagree		1 (1.3%)	10 (4.8%)			4 (1.0%)	6 (3.2%)	
Total involvement score, Mean (SD)	344	4.42 (0.53)	4.38 (0.50)	0.52	627	4.32 (0.51)	4.30 (0.46)	0.63
Total burden score, Mean (SD)	287	2.55 (0.77)	2.70 (0.86)	0.17	582	2.34 (0.75)	2.56 (0.82)	0.002
Total appropriateness score, Mean (SD)	277	3.62 (0.80)	3.40 (0.84)	0.041	565	3.40 (0.79)	3.24 (0.80)	0.024
Total concerns about stopping score, Mean (SD)	268	2.57 (0.78)	3.10 (0.81)	<0.001	544	2.51 (0.68)	2.73 (0.69)	<0.001

concerns of worsening mental health in case of medication discontinuation), reflecting challenges in making a decision and antihypertensive being perceived as a lower priority medication. This may reflect risk of relapse, but also confidence around their ability to manage without medication, lack of easy access to appropriate alternatives to medication (such as talking therapies), and their confidence around the competence of their general practitioner or pharmacist conducting a structured medication review to stop these safely, especially if these were initiated by a secondary care consultant psychiatrist or they have limited or no continuity of care within their GP practice.[15] Qualitative studies show that fear of symptoms returning is a barrier to deprescribing in older patients.[16] Given the high prevalence of antidepressant use reported in populations with polypharmacy, understanding how best to engage these patients in discussions to achieve shared decision making to achieve deprescribing is needed in future studies.

Of interest, there was no significant difference in attitudes to deprescribing in people with and without frailty. This is important, as it sends the message the patients may not perceive the stigma of frailty as a factor justifying stopping their medications, which would be seen as equally important regardless of frailty status. This contrasts with the willingness to stop medication being highest among those aged ≥65 if receiving antihypertensive drugs, indicating that side effects affecting quality of life (which is typical of these drugs), rather than stigma of frailty are more important in attitudes for treatment choices. Living with multiple medical conditions is associated with poorer psychological well-being.[17] Such patients benefit from structured medication reviews to avoid overprescribing, particularly in the presence of cognitive impairment, when medication risks are more likely to outweigh the benefits.[8,18] and reduced risk of hospitalization with falls or delirium, risk of functional decline and dementia and even death.[19,20]

Our study demonstrates that patients who are satisfied with current medications are those who are involved in their prescribing. However, their satisfaction with treatments does not preclude their willingness to stop medications when appropriate. This should be considered during medication reviews.

Table 4. Characteristics of being satisfied/very satisfied with current medications vs lower satisfaction score.

	Satisfied with current medications			
Characteristic	**N**	**No n = 205**	**Yes n = 476**	**p**
Age, years, Mean (SD)	681	64 (13)	66 (13)	0.15
Male sex, n (%), n (%)	681	89 (43%)	228 (48%)	0.32
White ethnicity, n (%)	427	122 (92%)	281 (95%)	0.26
Frailty, n (%)	368	41 (37%)	111 (43%)	0.36
Bone fracture, n (%)	681	34 (17%)	63 (13%)	0.28
Count of currently prescribed medications, Mean (SD)	681	8.3 (4.1)	7.4 (4.0)	0.007
Polypharmacy, n (%)	681	175 (85%)	359 (75%)	0.004
High anticholinergic burden, n (%)	681	156 (76%)	311 (65%)	0.005
Antihypertensive medications, n (%)	681	143 (70%)	329 (69%)	0.93
Antidepressants, n (%)	681	122 (60%)	237 (50%)	0.024
Antipsychotic medications, n (%)	681	7 (3.4%)	18 (3.8%)	0.99
Total involvement score, Mean (SD)	681	4.22 (0.51)	4.42 (0.46)	<0.001
Total burden score, Mean (SD)	681	2.96 (0.81)	2.34 (0.73)	<0.001
Total appropriateness score, Mean (SD)	681	2.82 (0.74)	3.61 (0.72)	<0.001
Total concerns about stopping score, Mean (SD)	681	2.81 (0.76)	2.73 (0.75)	0.18

Table 5. Predictors for measures of satisfaction with current medications.

Outcome (metric of satisfaction)	**Being satisfied with current medications***		**If my doctor said it was possible I would be willing to stop one or more of my regular medicines***	
	n = 681		**n = 684**	
Characteristic	**Odds Ratio (95% CI)**	**p-value**	**Odds Ratio (95% CI)**	**p-value**
Total involvement score	1.93 (1.27–2.95)	0.002	1.71 (1.09–2.70)	0.020
Total burden score	0.69 (0.50–0.96)	0.028	1.88 (1.29–2.79)	0.001
Total appropriateness score	3.74 (2.67–5.32)	<0.001	0.36 (0.25–0.51)	<0.001
Total concerns about stopping score	0.95 (0.70–1.28)	0.73	0.34 (0.25–0.47)	<0.001
Age 65 years or more	1.11 (0.70–1.75)	0.66	1.16 (0.72–1.87)	0.53
Male sex	1.35 (0.89–2.05)	0.16	1.80 (1.14–2.88)	0.013
Count of currently prescribed medications	1.02 (0.97–1.08)	0.44	0.96 (0.90–1.02)	0.14
Antihypertensive medications	1.29 (0.82–2.03)	0.27	1.27 (0.81–1.99)	0.30
Antidepressants	0.87 (0.56–1.36)	0.55	0.70 (0.42–1.15)	0.16
Antipsychotic medications	2.03 (0.74–6.10)	0.18	1.28 (0.42–4.09)	0.67
High anticholinergic burden	0.75 (0.46–1.20)	0.23	1.52 (0.90–2.55)	0.11

*Dichotomised as agree or strongly agree vs unsure, disagree or strongly disagree; Multivariable models were built using key demographic variables (age, sex), use of the study drugs, high anticholinergic burden, and RAPD scores. The same predictors were used for all three models (total appropriateness score was not used in the model where it was an outcome).

Limitations: The study has several limitations. It is restricted to Evergreen Life PHR App users, which must be considered when generalizing the findings, including patients with lesser digital literacy and previous experience of systematic medications reviews. The antidepressant drug use was relatively high in the survey response, likely reflecting the multimorbid state of the study population, but might differ from populations in other regions. While the participation response rate is in keeping with typical response rates for other questionnaire surveys, there may be selection biases. For example, the participants included fewer patients receiving antipsychotic drugs than expected in a population with

multimorbidity. When considering specific medication groups, the analysis cannot attribute the findings directly to specific drugs but rather to their presence among other drugs a patient uses. The reported views on deprescribing may differ from those when deprescribing is offered. In a small study of older patients' or caregivers' attitudes towards deprescribing in hospitals, a marked reluctance was observed towards trying deprescribing and a limited desire to be involved in shared decision-making.[21] This has been observed in deprescribing trials in other nations in the community, care home, or hospital setting for older patients.[22–25] Attempts to determine factors which may influence reluctance or refusal to participate in deprescribing potentially inappropriate medications have proven difficult to establish so far.[25]

Conclusions

These findings suggest that patients taking multiple medications are generally satisfied with their medication but are willing to stop if recommended to do so, suggesting clinicians should consider proactively initiating de-prescribing discussions in patients with multimorbidity and polypharmacy. The presence of frailty does not increase likelihood of people wanting to stop medications; clinicians should proactively initiate deprescribing discussions and involve patients in the decision-making process.

Ethical approval

Ethical approval was granted by the Newcastle North Tyneside Research Ethics Committee (REC reference: 22/NE/0088).

Supplementary data

Zenodo. A quantitative exploration of attitudes towards deprescribing in patients with multimorbidity and polypharmacy in primary care. zenodo.org/doi/10.5281/zenodo.20053306.[26]

This project contains the following underlying data:

- Supplementary table 1.pdf. (Demographic and clinical characteristics of study participants).
- Supplementary table 2.pdf. (Effect of frailty on attitudes to deprescribing).

Data is available under the terms of the Creative Commons Attribution 4.0 International.

Pre-print: The pre-print of this article can be found online (https://www.medrxiv.org/content/10.1101/2024.12.19.24319303v1).[11]

Data availability

Study data cannot be shared due to restrictions of the ethical approvals and the data governance framework governing the Evergreen Life Personal Health Record. The ethics committee approved the study on the condition that raw data remain confidential, and the Evergreen Life governance framework does not permit any external sharing or controlled access to information contained within the Personal Health Record. As a result, there is no mechanism through which external researchers can request or obtain access to the dataset.

Extended data

The Revised Patients' Attitudes Towards Deprescribing (rPATD) questionnaire is free to use for non-commercial purposes and not licensed for open redistribution. For this reason, we are unable to upload of link the full questionnaire. Researchers may access it by contacting the original authors (Reeve et al., 2016).[10]

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Great to see this work exploring the patient voice in de-prescribing, it is sorely needed as a balance to a very clinician focused research corpus. A purpose-built questionnaire (rPATD) is very appropriately applied. General Practice is a unique trusted environment for getting de-prescribing going.

Introduction
Greater justification of the definition of polypharmacy as 5 or more items is required, some evidence that this is now outdated as a measure, why not use 8 or more?
Check your inappropriate prescribing reference (number 8) does not relate to acute items, if it does then I would say its not relevant to chronic polypharmacy.
I appreciate standard MM definition has been used but is <65 with depression and an anti-hypertensive really MM?

Methods
Because Evergreen life is a private company it would be helpful to understand more about the relationship with the research team. Did payments change hands for access to the app population? Were the company involved in the analysis of data?
In my work in primary care records, I have often struggled to get good eFI data. How is eFI calculated within Evergreen life or does the number come from the GP record? What percentage of the population have an eFI score recorded and how up to date are these? I note more of your over 65s are frail than are not – what cut off level in eFI do you consider significant?

Results
Response rate of 8.7% - how does this compare with recruitment through health apps (it seems low for traditional survey recruitment).
If Evergreen's demographic is ethnically diverse why are non-white ethnicity recruitment rates low? You say invited vs participate profiles are similar.
What is the rate of willingness to stop meds in the 26-30% who are not satisfied with their meds?

Discussion
Ultimately, engaged patients with inappropriate meds/burden who are not afraid to change the status quo say they are happy for changes. Your findings could be interpreted that patients would like prescribers to initiate deprescribing conversations because they themselves lack knowledge of when there is an opportunity.
There is some overstatement of the findings/conjecture in relation to antihypertensive/antidepressant meds – other work may explain these trends but the survey reported here does not.
Further information is needed on the degree of frailty in the dataset before authors' should conclude that there is no difference between frailty/not frailty. It is also possible/likely that patients' do not understand the import of frailty or even know their eFI score.
Patients were asked if they would stop antihypertensives based on doctors' advice (this may represent less perceived personal control over antihypertensives than antidepressants) e.g. "why would I take a bp drug if my doc told me I didn't need to" vs "my doc says I can stop my anti-depressant but I don't feel I'm ready"
I expected to see some discussion of continuity in GP in the development of trust required for de-prescribing, does rPATD measure

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: patient safety, prescribing safety, care transitions, general practice, complex interventions, co-design

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 17 September 2026

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Richard Bodington
Hull-York Medical School, Heslington, UK

This article presents the results of a relatively large quantitative survey of patient attitudes towards their drugs in UK primary care. The article presents novel insights around the correlation between different medication classes and medication burden, appropriateness and attitudes toward deprescribing. An important, and acknowledged limitation of this study is that participants were recruited entirely as users of a single privately owned healthcare app.

The article warrants indexing as it addresses a clear priority in healthcare research by adding to our understanding of culture and attitudes around medicines optimisation and deprescribing. However, it would benefit from several revisions in order to provide maximal usefulness for readers. I'll address these in the order that they appear in the reviewer form.

The introduction of the paper does not adequately present the current literature. The third sentence in the introduction uses an out-of-date reference to justify the claim that polypharmacy is increasing. The introduction also includes no discussion of the extensive realist and other work which has been undertaken in the field to support deprescribing (for example, the NIHR TAILOR report and the MEMORABLE study). The first line of the discussion also states that the current paper is the first study to look at patient attitudes towards deprescribing in the UK. I do not believe that this is the case and have linked one paper at least which contradicts this statement in addition to MEMORABLE. The authors also do not acknowledge the extensive work by Australian authors such as Emily Reeve in assessing patient attitudes towards deprescribing, albeit in a different context. As a result, the discussion in the limitation section about patients' opinions opposing deprescribing seems unbalanced. Finally, the authors suggest in their discussion that there is limited support to guide deprescribing and do not acknowledge the work of the PrescQIPP group and their IMPACT tool, amongst others.

In terms of technical soundness, I have no major comments although I'm not a statistician. I do have some comments in regard to how the results are presented in order to help them be more useful to the reader. You, at several points, present total mean medication burden scores or medication appropriateness scores, which are significantly statistically different, but I am unsure if these differences equate to a meaningful clinical difference. For example, you give a total mean burden score in the polypharmacy group of 2.74 versus 2.41 in the non-polypharmacy group but do not discuss the clinical meaningfulness of this at any point. Similarly, when you're discussing polypharmacy, antihypertensive drugs, and antidepressants, you only state the p-value when you are explaining the differences between scores for medication burden, medication appropriateness, etc. Again, this inhibits the reader from being able to judge the clinical significance of these differences over the statistical significance. You also fail to define some of your scores/scales used. For example, how was medication appropriateness assessed? You don't detail a scale on which this was assessed (e.g. MAI). You also refer to high anticholinergic burden but do not define on which scale this was scored and what constitutes high burden.

In regards to your conclusions I'm slightly unclear how the final sentence after the semicolon is supported by your study, although I agree with the principle.

I also have several other miscellaneous comments that will need addressing in the manuscript.

- The last sentence of your abstract does not appear to be a complete sentence.
- References 8 and 18 are improperly formatted.
- Figure 1 includes 4 panels but the two on the left-hand side appear to be duplicated in error.
- The third paragraph of your discussion has several very long sentences which would benefit from review.
- I note that 91% and 96% of your survey population were of white ethnic origin compared to roughly 81% in the general UK population. This difference is not discussed at any point in the paper.
- The date that the study was conducted is not presented in your article and it appears that the article has been available as a preprint on MedRxiv for 2 years.

References

1. Okeowo D, Fylan B, Zaidi S, Alldred D: The patient's perspectives of safe and routine proactive deprescribing in primary care for older people living with polypharmacy: a qualitative study. *BMC Geriatrics*. 2024; **24** (1). Publisher Full Text

Is the work clearly and accurately presented and does it cite the current literature?

No

Is the study design appropriate and is the work technically sound?

Yes

Are sufficient details of methods and analysis provided to allow replication by others?

Partly

If applicable, is the statistical analysis and its interpretation appropriate?

I cannot comment. A qualified statistician is required.

Are all the source data underlying the results available to ensure full reproducibility?

No

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medicines optimisation, health professions education, realist research

I confirm that I have read this submission and believe that I have an appropriate level of

expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.