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The revised patient attitudes to deprescribing (rPATD) questionnaire: an investigation using a large anonymized database

Marjorie Weiss, Rhian Deslandes[*] [ID]**, Louise Hughes**

Cardiff School of Pharmacy & Pharmaceutical Sciences, Redwood Building, Cardiff University, King Edward VII Avenue, Cardiff CF10 3NB, United Kingdom

[*]Correspondence: Cardiff School of Pharmacy & Pharmaceutical Sciences, Redwood Building, Cardiff University, King Edward VII Avenue, Cardiff CF10 3NB, United Kingdom. Email: deslandesre@cardiff.ac.uk

Abstract

Objectives: Stopping or "deprescribing" one or more of a patient's medications is a growing focus for clinical practice and health service research. A deprescribing questionnaire survey, the revised Patient's Attitudes Towards Deprescribing (rPATD), has been developed and validated in Australia. The aim of this study was to explore the use of the rPATD in a large Welsh population.

Methods: The rPATD was made available through HealthWise Wales, a platform that enables people in Wales to volunteer to participate in research. Questionnaire data were explored descriptively and using a confirmatory factor analysis (CFA) on the original four factors in the rPATD (Burden, Appropriateness, Concern, and Involvement).

Key findings: A total of 1759 patients completed questionnaires. The mean age was 58.6, each prescribed on average 3.69 medicines (range 1–34). In total 75.1% (1303/1735) agreed or strongly agreed that they would be willing to have a medicine deprescribed, if suggested by a doctor, and 19.0% (333/1749) would like to try stopping a medicine. A CFA was performed using maximum likelihood and showed a mediocre fit (RMSEA = 0.083). A Mann–Whitney U test revealed an association between feeling the burden of medicine taking or expressing a belief in the inappropriateness of their medication and a greater willingness to stop medicine if suggested by a doctor (BURDEN $Z = -5.6$, $P \leq .0001$; appropriateness $Z = -9.6$, $P \leq .0001$).

Conclusions: Willingness to have a medicine deprescribed was lower than in previous research, likely due to a range of reported factors. The potential value of rPATD has been demonstrated for future UK-wide applications.

Keywords: deprescribing; patient views; questionnaire

Introduction

Polypharmacy (prescribing multiple medications for a patient) is becoming increasingly common as the population ages and has multiple clinical conditions in which prescribed medications are used [1]. Polypharmacy can be appropriate, or inappropriate, depending on whether the risks of medication outweigh their potential benefit. Risks from polypharmacy are particularly important as a patient ages, when age-related physiological changes can affect pharmacokinetics, putting patients at increased risk of adverse drug reactions [1, 2]. Nevertheless, polypharmacy is an issue that affects adults of all ages, and from all backgrounds [3] and research should therefore not be limited to the 'typical' older polypharmacy patient. In inappropriate polypharmacy, stopping or "deprescribing" one or more of the patient's medications has become a growing focus for clinical practice and research [4]. However, patients may be reluctant to stop medication, e.g., they may believe it shows the clinician has given up on them or they have become attached to regularly taking particular medicines [5]. However, if their doctor thought it possible, more than 90% of patients may be willing to stop a medication [6]. Regardless of the clinical appropriateness

of deprescribing, the views of patients are fundamental to ensuring patient-centred care: an understanding of factors that impact on these views is essential to meet patients' needs.

A patient deprescribing questionnaire, the revised Patient Attitudes to Deprescribing (rPATD) has been developed and validated in Australia [7, 8]. The rPATD has been widely used internationally and research has highlighted its benefits across a range of cultural, linguistic, and geographical settings [9–14], including a recent UK-context revision [15].

The ability to quantify patient attitudinal barriers to/enablers of deprescribing, and explore what may influence these beliefs, will help inform interventions and educate healthcare professionals to improve outcomes of patient-centred deprescribing. This research is a first step in designing a UK patient-centred deprescribing intervention by exploring use of the Australian questionnaire in Wales. The overall aim of this research was to investigate the properties of the rPATD and its applicability within the context of a Welsh population. Study objectives were to test the reliability of the instrument, the association of participant views with different population parameters, and how data from this study fits the hypothesized measurement model.

Method

Cross-sectional survey data were collected using a questionnaire hosted on the HealthWise Wales (HWW) platform, funded by the Welsh Government. Any members of the general public over the age of 16 in Wales can voluntarily register with HWW which collects anonymized medical, social, and environmental data about the participant and, via email, gives them opportunities to participate in approved research studies [16, 17]. Researchers can apply to HWW to conduct studies using HWW anonymized medical data or to post research studies on the platform. HWW registrants are then informed of the study and invited to participate. To be posted on HWW, researchers must submit an application to the HWW Research Manager; the research is reviewed and submitted for ethical approval. This study received approval on 18 December 2018 from Health and Care Research Wales Research Ethics Service (Ref 15/WA/076). The anonymous questionnaire was available on the HWW platform from July 2019 (30 153 registrants in the HWW database) until December 2019 (by which time there were 40 055 registrants). For context, the mid-year population of Wales in 2019 was 3 153 000 [18]. Participants were self-selecting, using nonprobability sampling, and only one survey response was permitted per participant.

The research was based on the version of the questionnaire recently adapted to reflect the UK health system [15]. The 23-item questionnaire used statements with five-category Likert responses (strongly disagree to strongly agree) or yes/no responses related to the four main factors of: belief in appropriateness of withdrawal (hereafter referred to as "Appropriateness"), perceived burden of their medication ("Burden"), concerns about stopping ("Concern") and level of involvement in medication management ("Involvement"). There were five statements per factor except for "Concern" which had four. In the Reeve paper [8] the fifth Concern statement (C5) asked respondents to rate (via Likert scale) their agreement with "I have had a bad experience when stopping a medicine before". Due to a transcribing error, for this study, only two responses were offered (yes/no) (S2, Table 1).

The questionnaire also included two "global" items (G1, G2) exploring participants' willingness to stop one or more medicines and their satisfaction with their current medication (Likert responses). Finally, respondents were asked (S1) if they had ever had any of their medicines stopped before (yes/no). Demographic information was also collected, including age, sex, and working status. The final questionnaire and codes for each question are provided in supplementary information for ease of interpretation.

Analysis

Data were explored descriptively with IBM SPSS v25 [19] using frequencies, means, medians, ranges, and measures of dispersion (e.g. inter-quartile ranges). Missing data were dealt with using pairwise deletion. Several deprescribing Likert variables were dichotomized to enable chi-square and Mann–Whitney analyses with demographic data. In common with previous work [15], to explore patients' willingness to have a medicine deprescribed, three statements were recoded into dichotomous variables. In line with previous researchers exploring the rPATD [10, 12, 15], A2 ("I would like to try stopping one of my medicines to see how I feel without it") was recoded with strongly agree and agree coded as "Agree"

and neutral, disagree and strongly disagree coded as "Not Agree". This re-coding was similarly done for G1 ("If my doctor said it was possible I would be willing to stop one or more of my regular medicines") and G2 ("Overall, I am satisfied with my current medicines"). To enable further analyses and comparison between groups, age was also recoded (using visual binning to create data groups with approximately equal numbers of respondents per group) into three groups: under 55, age 56–67, and over 68. Willingness to have a medicine deprescribed (A2, G1) and satisfaction with current medicines (G2) were related to the independent variables: number of medicines prescribed, age, sex, and the level of deprivation of the area in which the respondent lived. Relationships were examined using chi-square, Mann–Whitney *U*-test, and correlations as appropriate.

To explore the four latent factors further, individual items within each factor were summed to create four new factor variables, as grouped on the original questionnaire (Burden, Appropriateness, Concern, and Involvement) [8]. The questionnaire items under each factor were summed to create: BURDEN (B1+B2+B3+B4+B5), APPROPRIATENESS (A1+A2+A3+A4+A5), CONCERN (C1+C2+C3+C4) and INVOLVEMENT (I1+I2+I3+I4+I5). Number of medicines prescribed was explored in relation to these new summary variables. In addition, these new variables were explored, as independent variables, in relation to a respondent's attitude to having a medicine deprescribed (A2, G1) and their satisfaction with their current medication (G2). Based upon previous work with the rPATD [6, 8, 15], five *a priori* hypotheses were formulated regarding likely relationships between these summary variables and views on deprescribing. These were: 1: Those who felt the burden of medicine taking (agreed with B1–B5, Table 1) would be more willing to have a medicine deprescribed (A2 and G1). 2: Those who felt their medicines were inappropriate (agreed with A1–A5, Table 1) would be more willing to have a medicine deprescribed (A2 and G1). 3: Those with concerns about stopping their medicines (agreed with C1–C4) would be less willing to have a medicine deprescribed (A2 and G1). 4: Those who were more knowledgeable about their medicines or who liked to be involved in decisions about their medicines (agreed with I1-I5, Table 1) would be more likely to be satisfied with their medicines (G2) [20, 21]. 5: Those who (a) felt the burden of medicine taking or (b) felt their medicines were inappropriate may be less satisfied with their medicines (G2). Relationships were examined using chi-square, Mann–Whitney *U* test, and correlations (Kendall's tau).

A confirmatory factor analysis (CFA) was run on the data based upon the four latent factors in the rPATD identified by Reeve et al. [8] The CFA was performed using lavaan (latent variable analysis), a statistical package for structural equation modeling in the R system [22] available from the Comprehensive R Archive Network (cran.r-project.org). This first-order CFA tests the multidimensionality of the rPATD questionnaire which had previously been shown to be composed of four factors: Burden, Appropriateness, Concern, and Involvement [8].

The CFA aimed to test whether the data from the current study fit the hypothesized measurement model (rPATD). Output included goodness of fit indices, parameter estimates for each statement under the four factors, and modification indices (e.g. how the model would change if you added new parameters to the model). The CFA was performed using

Table 1. Patient questionnaire responses.

Statement	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total (N)
B1. The NHS spends a lot on my medicines	439 (25.3%)	671 (38.6%)	463 (26.7%)	137 (7.9%)	27 (1.6%)	1737
B2. Taking my medicines every day is very inconvenient	52 (3%)	94 (5.4%)	253 (14.6%)	621 (35.8%)	716 (41.2%)	1736
B3. I am taking a large number of medicines	88 (5.1%)	286 (16.5%)	340 (19.6%)	557 (32.1%)	465 (26.8%)	1736
B4. My medicines are a burden to me	32 (1.8%)	109 (6.3%)	244 (14.1%)	633 (36.5%)	717 (41.3%)	1735
B5. Sometimes I think I take too many medicines	45 (2.6%)	216 (12.5%)	295 (17%)	582 (33.6%)	595 (34.3%)	1733
A1. I feel I may be taking some medicines I no longer need	57 (3.3%)	165 (9.5%)	204 (11.7%)	649 (37.3%)	664 (38.2%)	1739
A2. I would like to try stopping one of my medicines to see how I feel without it	45 (2.6%)	288 (16.6%)	249 (14.4%)	580 (33.5%)	568 (32.8%)	1730
A3. I would like my doctor to reduce the dose of one or more of my medicines	34 (2%)	233 (13.4%)	333 (19.2%)	582 (33.6%)	552 (31.8%)	1734
A4. I think one or more of my medicines may not be working	31 (1.8%)	120 (6.9%)	310 (17.9%)	675 (38.9%)	598 (34.5%)	1734
A5. I believe one or more of my medicines may be currently giving me side effects	121 (7%)	386 (22.3%)	235 (13.6%)	538 (31%)	453 (26.1%)	1733
C1. I would be reluctant to stop a medicine that I had been taking for a long time	251 (14.5%)	459 (26.4%)	500 (28.8%)	405 (23.3%)	121 (7%)	1736
C2. If one of my medicines was stopped, I would be worried about missing out on future benefits.	254 (14.6%)	443 (25.5%)	466 (26.9%)	396 (22.8%)	176 (10.1%)	1735
C3. I get stressed whenever changes are made to my medicines.	88 (5.1%)	204 (11.8%)	444 (25.6%)	618 (35.6%)	382 (22%)	1736
C4. If my doctor wanted to stop a medicine, I would feel that he/she was giving up on me.	68 (3.9%)	99 (5.7%)	300 (17.3%)	770 (44.4%)	499 (28.7%)	1736
I1. I have a good understanding of the reasons I was prescribed each of my medicines.	996 (57.2%)	661 (38%)	46 (2.6%)	28 (1.6%)	9 (0.5%)	1740
I2. I know exactly what medicines I am currently taking, and/or I keep an up-to-date list of my medicines.	1181 (68.1%)	519 (29.9%)	23 (1.3%)	9 (0.5%)	2 (0.1%)	1734
I3. I like to know as much as possible about my medicines.	946 (54.5%)	672 (38.7%)	95 (5.5%)	18 (1%)	4 (0.2%)	1735
I4. I like to be involved in making decisions about my medicines with my doctors.	932 (53.6%)	699 (40.2%)	86 (4.9%)	22 (1.3%)	0	1739
I5. I always ask my doctor, pharmacist, or other healthcare professional if there is something I don't understand about my medicines.	746 (42.9%)	771 (44.3%)	146 (8.4%)	71 (4.1%)	5 (0.3%)	1739
G1. If my doctor said it was possible I would be willing to stop one or more of my regular medicines.	361 (20.8%)	942 (54.3%)	245 (14.1%)	124 (7.1%)	63 (3.6%)	1735
G2. Overall, I am satisfied with my current medicines.	653 (37.5%)	870 (50%)	153 (8.8%)	51 (2.9%)	13 (0.7%)	1740

Statement	No	Yes	N
S1. Have you ever had any of your medicines stopped?	1105 (64.9%)	618 (35.9%)	1723
S2. Have you had a bad experience when stopping a prescribed medicine before?	359 (58.4%)	256 (41.6%)	615

maximum likelihood. Goodness of fit statistics (comparative fit index and Tucker–Lewis Index) compare the model (the four factors in the rPATD) with a baseline model (the complete independence of all variables in the model: where correlations among variables are zero). The root mean square error of approximation (RMSEA) is considered relatively sensitive to model misspecification [23]. Values less than 0.05 are a close fit, with values from 0.08 to 0.10 representing mediocre fit [23].

The regression coefficients were determined using the equation:

$$y_1 = b_0 + b_1 X + \epsilon_1$$

where y_1 = the questionnaire item

b_0 = the intercept or mean (equals 0 when standardized)

b_1 = the loading or correlation between the item and the factor

X = the latent predictor or factor (in the model rPATD)

ϵ_1 = the residual (what is left over after accounting for the factor)

Standardized beta coefficients (b_1) show how much of the dependent variable (y_1) for each item is expected to increase when the independent variable (the factor in the rPATD) increases by 1. High beta values indicate a high level of covariance and a strong relationship between the factor and the questionnaire item. The final part of the CFA included determining modification indices that reflect the extent to which the model is appropriately described. Large modification indices suggest misspecification.

Reliability, or the internal consistency of the statements within each factor, was determined using Cronbach's alpha. A high Cronbach's alpha (0.7 is acceptable, 0.8 preferable) [24] indicates a high level of consistency.

The Checklist for Reporting of Survey Studies (CROSS) was used to guide the reporting of the study (Supplementray Material).

Results

Although 2496 individuals responded to the questionnaire, only 1759 stated that they were taking one or more prescription medications and were therefore eligible.

Frequencies and bivariate relationships

The mean respondent age was 58.6 (median = 62, range 16–89), and 1146 (65.0%) were female. Respondents were overwhelmingly Welsh/other British (1680/1750, 96.0%). Just over half (904/1704, 53.1%) were retired or out of the labour force, with 448 (26.3%) in full-time work and 205 (12.0%) in part-time work. Respondents lived in predominantly urban settings (965/1726, 56.0%), with 25.4% living in villages and 18.0% in towns. There were fewer respondents from deprived areas compared with more affluent areas, as measured on the 5-point Welsh Index of Multiple Deprivation (10.0%, 172/1726 from category "1" most deprived, to 25.5%, 440/1726 from category "5") [25]. All seven Health Boards in Wales were represented (range 168–428 respondents per Board). Respondents took on average 3.69 prescription medicines (SD = 3.01, range 1–34) with the number of medicines prescribed increasing with age ($P < .0001$, Pearson's $r = 0.118$).

Questionnaire responses are shown in Table 1. Three-quarters, 75.1% (1303/1735), of respondents agreed or

strongly agreed they would be willing to have a medicine deprescribed, if the doctor said it was possible (G1). However, only 19.0% (333/1749) would like to try stopping a medicine (A2). The majority of respondents, 87.5% (1523/1740) were satisfied with their current medicines (G2).

A Mann–Whitney U test revealed an association between a greater willingness to stop a medicine (A2) and an increasing number of medicines ($Z = -3.67$, $P \leq .0001$). Similar results were found when having a medicine deprescribed was deemed to be possible by the doctor (G1) with those prescribed more medicines more willing to have a medicine deprescribed ($Z = -2.5$, $P = 0.012$). Patients prescribed more medicines also tended to be less satisfied with their current medicines (G2) ($Z = -4.84$, $P \leq .0001$). A chi-square test examined the relationship between sex and willingness to have a medicine deprescribed with A2 and G1. More men than women indicated that they would be more willing to have a medicine deprescribed (A2: χ^2 (2, $N=1730$) = 14.47, $P = .001$, phi = 0.091; G1: χ^2 (2, $N=1735$) = 25.74, $P \leq .0001$, phi = 0.122). There was no relationship between sex and satisfaction (G2). There was also no relationship between a desire or willingness to have a medicine deprescribed (A2 or G1) and level of deprivation. Age was not related to level of satisfaction (G2) or a desire to have a medicine deprescribed (A2). However, there was a borderline relationship between age and willingness to have a medicine deprescribed (G1), with older people more willing to have a medicine deprescribed if suggested by the doctor χ^2 (2, $N = 1735$) = 6.02, $P = .049$, phi = 0.059).

CFA findings

The CFA included 1639 observations with listwise deletion. All the goodness of fit indices indicated there was a mediocre fit of the model (comparative fit index = 0.849 and Tucker–Lewis Index = 0.823; better-fitting models have values close to 1.0) [26]. The RMSEA was 0.083 (confidence interval 0.08 – 0.087).

The standardized beta coefficients (b_1) are shown in Table 2. The item B1 (I feel the National Health Service spends a lot of money on my medicines) has the lowest value indicating a lower level of covariance of 0.261; this item was changed from the original Australian version of the questionnaire [8]. The item with the second lowest level of covariance (at 0.323) is item A5 (I believe one or more of my medicines may be currently giving me side effects) which features in the modification indices below.

Items that appeared to cross-load with other factors include A5 with BURDEN (MI = 177), C3 with BURDEN (MI = 104), I1 with BURDEN (MI=96), I1 with APPROPRIATENESS (MI = 84), A5 with CONCERN (MI = 78), C3 with APPROPRIATENESS (MI = 75) and A4 with BURDEN (MI = 72). Taking the example of the finding with the highest MI of 177 suggests that A5, while loading on the appropriateness of medication factor, may also load (either additionally or in preference to) the BURDEN factor.

Factor Relationships

The Cronbach's alpha values for each of the four factors are shown in Table 3, along with the change in Cronbach's alpha if a particular item is deleted: most were acceptable although Cronbach's alpha would improve if B1 or A5 were deleted.

The relationship between number of medicines prescribed and the summary variables was explored using correlations and the Mann–Whitney U-test. There was an association between those who took more medicines, an increased burden of

Table 2: Confirmatory Factor Analysis Regression Coefficients

Statement	Standardised Regression Coefficient
B1 (spend/NHS)	0.261
B2 (inconvenient)	0.492
B3 (large number medicines)	0.698
B4 (burden)	0.746
B5 (too many medicines)	0.837
A1 (no longer need)	0.662
A2 (try stopping)	0.880
A3 (reduce dose)	0.865
A4 (not working)	0.642
A5 (side effects)	0.323
C1 (reluctant to stop)	0.709
C2 (missing out)	0.695
C3 (stressed)	0.584
C4 (giving up)	0.544
I1 (good understand)	0.587
I2 (know/keep list)	0.711
I3 (know as much)	0.710
I4 (involved)	0.636
I5 (ask HCP)	0.589

medicine taking (BURDEN), a perception that their medicines may be inappropriate (APPROPRIATENESS) and more concerns about stopping a medicine (CONCERN) (BURDEN, Kendall's tau −0.41, $P \le .0001$; APPROPRIATENESS, Kendall's tau −0.19, $P \le .0001$; CONCERN Kendall's tau −0.062, $P = 0.001$). The effect size for APPROPRIATENESS and CONCERN is small. INVOLVEMENT was not significantly related to the number of medicines prescribed.

These new summary variables were also explored in relation to a respondent's attitude to having a medicine deprescribed (A2 and G1) and their satisfaction with their current medication (G2), with A2, G1, and G2 as dichotomized variables. A Mann–Whitney U-test revealed an association between those who felt the burden of medicine taking (BURDEN) and a greater willingness to stop a medicine if suggested by a doctor (G1) ($Z = −5.6$, $P \le .0001$). This was similarly true regarding a belief in the inappropriateness (APPROPRIATENESS) of their medication ($Z = −9.6$, $P \le .0001$). An association was also seen between fewer concerns about stopping a medicine (CONCERN) and an increased willingness to stop a medicine if suggested by a doctor (G1) ($Z = −17.2$, $P \le .0001$). There was no significant relationship between INVOLVEMENT and G1. The same relationships were evident in relation to A2, where there was an association found between willingness to stop taking a medication and: the burden of medicine

Table 3: Reliability of Items within each Factor

Statement	Factor	Cronbach's Alpha	Cronbach's Alpha if item deleted
B1. The NHS spends a lot on my medicines	BURDEN	0.749	0.786
B2. Taking my medicines every day is very inconvenient			0.738
B3. I am taking a large number of medicines			0.657
B4. My medicines are a burden to me			0.658
B5. Sometimes I think I take too many medicines			0.655
A1. I feel I may be taking some medicines I no longer need	APPROPRIATENESS	0.795	0.754
A2. I would like to try stopping one of my medicines to see how I feel without it			0.705
A3. I would like my doctor to reduce the dose of one or more of my medicines			0.712
A4. I think one or more of my medicines may not be working			0.745
A5. I believe one or more of my medicines may be currently giving me side effects			0.847
C1. I would be reluctant to stop a medicine that I had been taking for a long time	CONCERN	0.736	0.667
C2. If one of my medicines was stopped, I would be worried about missing out on future benefits.			0.670
C3. I get stressed whenever changes are made to my medicines.			0.673
C4. If my doctor wanted to stop a medicine, I would feel that he/she was giving up on me.			0.692
I1. I have a good understanding of the reasons I was prescribed each of my medicines.	INVOLVEMENT	0.774	0.760
I2. I know exactly what medicines I am currently taking, and/or I keep an up-to-date list of my medicines.			0.720
I3. I like to know as much as possible about my medicines.			0.713
I4. I like to be involved in making decisions about my medicines with my doctors.			0.726
I5. I always ask my doctor, pharmacist or other healthcare professional if there is something I don't understand about my medicines.			0.745

taking, a belief that their medicines were inappropriate, and fewer concerns about stopping (BURDEN, $Z = -11.9$, $P \leq .0001$, APPROPRIATENESS, $Z = -24.723$, $P \leq .0001$, CONCERN, $Z = 8.9$, $P \leq .0001$). However, unlike G1, those who felt less involved or knowledgeable about their medicines (INVOLVEMENT) were also more willing to have a medicine stopped ($Z = -5.9$, $P \leq .0001$).

In relation to satisfaction with their medicines (G2), all four summary variables were significant. For example, those who did not feel burdened with their medicines (BURDEN) and who believed in the appropriateness of their medication (APPROPRIATENESS) were also more satisfied with their medicines (BURDEN, $Z = -12.3$, $P \leq .0001$; APPROPRIATENESS, $Z = -15.9$, $P \leq .0001$). Further, those with concerns about stopping their medicines and those who were more involved/knowledgeable about their medicines were also more satisfied with their medicines (CONCERN, $Z = -4.6$, $P \leq .0001$; INVOLVEMENT, $Z = -7.0$, $P \leq .0001$).

Discussion

This study successfully demonstrated the use and applicability of the rPATD in a Welsh population. The findings highlight the potential application of the tool to patients within Wales and the wider UK. It could be used to facilitate deprescribing discussions between patients and healthcare professionals, help in the design of deprescribing interventions to target specific attitudes, or could identify changes in patient attitudes to deprescribing before and after an intervention.

To date, the only other UK study using rPATD [15] found that 97.1%, 29.3%, and 92% of respondents were, respectively, willing to have a medicine deprescribed if deemed possible by a doctor (G1), expressed a desire to stop a medicine (A2) and were satisfied with their medicines (G2). This compares with the analogous values of 75.1%, 19.2%, and 87.5% in this study. Researchers outside the UK have similarly found a high level of willingness to have a medicine deprescribed, as reported in Denmark (85%), Italy (89%), The Netherlands (88%), and French-speaking countries (87.5%) [9–12]. A review and meta-analysis of studies investigating willingness to deprescribe if suggested by the doctor found an overall level of 87.6% across 29 studies [27]. A more recent review of 40 studies investigated, as a primary outcome, whether patients agree they would be willing to stop one of their medicines if the doctor said it was possible [13]. They concluded that 84% of patients agreed, although the heterogeneity of the data suggests results need to be interpreted with caution.

The age group of the cohort in this study was younger than in others. Regardless, no definitive association was seen between age and willingness to deprescribe, also reported in other studies [6, 10, 11, 27]. Willingness to deprescribe may be due to other confounding factors, the nature of which warrants future research. This study found a relationship between number of medicines and willingness to deprescribe. Gillespie *et al.* also saw an association [28], but this concept has not been widely evidenced elsewhere [6, 10, 11, 27]. Interestingly, male respondents in this study were also more willing to have a medicine deprescribed: this result has not been reported in the wider literature [10, 11]. The recruitment approach may have also influenced patient characteristics as the sample came from the general population, as opposed to through hospital (discharges or outpatient appointments) or pharmacy records. This could impact how comparable the cohort is to other studies investigating the same field, although Chock *et al.* did not identify any differences in their study [27] regarding willingness to deprescribe, regardless of the method or location of recruitment.

Using the factor variables, evidence was found to support the *a priori* hypotheses. A greater willingness to have a medicine deprescribed was associated with a perceived higher medication burden, a greater belief that medicines were inappropriate and fewer concerns about stopping. In line with the findings of Reeve *et al.*, no relationship was reported between the involvement factor and a willingness to have a medicine deprescribed [8]. However, other authors have identified a relationship between a high level of involvement and a willingness to have a medicine deprescribed [12]. Greater satisfaction was associated with lower levels of medication burden, a belief in the appropriateness of medicines, concerns about stopping and greater knowledge/involvement in medicines. Other authors have found only the belief in the appropriateness of medicines to be associated with greater satisfaction [12].

Findings revealed that the substituted question (B1) regarding NHS costs had the lowest level of covariance between the questionnaire item and the BURDEN factor, indicating a lack of fit. Both the modification indices and the small regression coefficient for A5 (experiencing side effects) similarly indicated a poor fit with the model. For both B1 and A5, Cronbach's alpha improved if that item was removed from that factor, also indicating a poor fit with their respective factors. Regarding medication costs, while it may appear logical to substitute an NHS cost question for the original question about personal medicines expenditure, this new question (B1) appears not to fit within the rPATD framework. Finally, while Scott *et al.* found items B5, A1, and A3 to be good predictors of a willingness to have a medicine deprescribed [15], this research found, not too dissimilarly, that items B5, A2, and A3 had the highest level of covariances with their respective factors (>0.8), all of which related to desire or willingness to have a medicine deprescribed.

Limitations

The CFA provided an interesting exploration regarding patient views' on deprescribing. With this large dataset, a CFA of the existing rPATD appeared an appropriate next step whereas previous work has repeated the exploratory factor analysis as conducted by Reeve [29, 30]. However, these findings yielded only a mediocre fit. It is known that, because CFAs are based on the covariances among variances, they can be affected by violations of the assumption of normality in the dataset. There was a degree of non-normality of some variables in the dataset which could have distorted parameter estimates and goodness of fit statistics [26]. The only other CFA of the rPATD was using a Spanish version, which yielded a better fit than was achieved here (RMSEA 0.031, a good fit) [31]. Yet the findings in this research offered a level of face validity, with other elements of the analysis conforming to expected hypotheses. In addition, the imperfect fit of the CFA model could also be partly explained by the difference in wording between item C5 in the Reeve paper, where the original factor analysis was done, and the reworded item S2 used in this study. While it is not possible to fully understand the impact of the transcribing error, inevitably this will affect interpretation of the findings and therefore results pertaining to this should be viewed with caution.

The study did not seek feedback from participants on their experience of responding to the adapted questionnaire. In hindsight, this would have been helpful to test its practicability. Due to the size of the dataset, there was the possibility of detecting statistically significant ($P <= .05$) but empirically non-significant relationships. The sample also comprised individuals keen to participate in research, perhaps to a greater degree than if the sample had been randomly selected. This could have led to social desirability bias in the data. The characteristics of the sample were closely matched to the wider Welsh population regarding age and country of origin. However, females and non-workers were overrepresented based on the 2021 census [32, 33]. Also, the 'Appropriateness' factor explores only patient perceptions of the suitability of their medication rather than being based on clinical appropriateness.

Conclusion

This research sought to investigate the relevance and application of the rPATD in a Welsh population. The use of HealthWise Wales database enabled a large sample of individuals' views to be explored. Willingness to have a medicine deprescribed was lower in this population than in previous research, likely due to a number of confounding factors, some of which have been reported in the wider literature. The research also explored the use of a CFA with the rPATD, a statistical approach that has not been attempted in previous UK research. While the CFA was only a mediocre fit for the rPATD, an exploration of the factors, identified in the original Australian research, showed associations between a greater willingness to have a medicine deprescribed and a perception of a higher medication burden, perception of more inappropriate medicines and fewer concerns about stopping. Greater satisfaction with medicines was associated with lower levels of medication burden, a belief in the appropriateness of medicines, more concerns about stopping medication, and greater knowledge about medicines. The applicability and use of the rPATD in a Welsh population has been demonstrated and offers an opportunity for patients to benefit from its use in practice.

Supplementary material

Supplementary data are available at *Journal of Pharmaceutical Health Services Research* online.

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Conflict of Interest

The authors declare that there are no conflicts of interest.

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Data availability

The data remains the property of HealthWise Wales. Application for access to the data can be made directly to HealthWise Wales.

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