




RESEARCH ARTICLE



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Attitudes and expectations toward medication review among community pharmacy customers in Germany: a cross-sectional study

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ABSTRACT

Background: Since knowledge about customers' attitudes towards medication reviews in community pharmacies is limited, the objective of this study was to gain insight into customers' perceived facilitators and barriers to participate in this service, with the aim of identifying areas to facilitate the implementation process.

Methods: In spring 2024, we conducted a prospective, questionnaire-based survey for a total of 58 days. All customers (≥ 18 years) in 3 pharmacies in Germany, regardless of whether they were eligible for medication reviews or not, were approached during their pharmacy visit in person and invited to complete the tablet-based questionnaire on-site. The pilot-tested, multilingual questionnaire covered socio-demographic data and customers' attitudes towards medication reviews. Potential benefits of medication reviews were rated regarding their perceived importance on a 3-point-Likert-scale (0 = not important, 1 = important, 2 = very important). A mean score was calculated for each benefit. Data were analyzed descriptively and binary logistic regression analyses were applied to explore associations of selected predictors with awareness of medication reviews or expected benefits.

Results: A total of 1561 pharmacy customers participated, with 59.2% (interquartile range (IQR): 17.9%) of patients being approached daily. Awareness of medication reviews was low (18.0%, $n = 281/1561$), whereby

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/20523211.2025.2490572>.

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female participants (odds ratio (OR): 1.211 (0.914–1.603)) and those who request pharmacies' consultation services (OR: 1.020 (1.012–1.029)) were more likely to know it. Key expectations towards benefits included better knowledge of medicines (mean score: 1.4 ± 0.7), fewer side-effects (1.4 ± 0.7) and fewer problems with their medication (e.g. interactions; 1.3 ± 0.7). No difference was found for prior awareness of medication reviews in terms of benefit expectations.

Conclusion: Gaining knowledge and improving medication safety through a medication review is most valuable to customers. By clearly explaining the purpose and expected benefits of medication reviews, the outreach and impact could be increased.

Trial registration: German Clinical Trials Register identifier: DRKS00032446.

ARTICLE HISTORY Received 13 January 2025; Accepted 2 April 2025

KEYWORDS Medication review; community pharmacy; pharmacy services; customer perspective

Background

Medication reviews have been shown to improve medication safety (Al-Babtain et al., 2022). Over the past two decades, various countries have implemented medication reviews in community pharmacies (Costa et al., 2017). However, significant variability exists across countries in terms of procedures, implementation, and remuneration (Imfeld-Isenegger et al., 2020). In Germany, 5 pharmacy services, including medication reviews, have been reimbursed by health insurance funds since June 2022. Medication reviews are eligible for all patients on more than 5 or more systematic/inhaled drugs as long-term medicines (Schulz et al., 2023). Despite these advancements, challenges remain in upscaling and ensuring the long-term sustainability of this service. For example, in the first half of 2024, only about 5% of the budget was used (about 7800 pharmacies provided at least one pharmacy service; Association of the German Pharmacists' Emergency and Night Fund, 2024).

Internationally, barriers to the implementation of medication reviews in community pharmacies have been identified at the system, organizational, or individual level (Hossain et al., 2017; Michel et al., 2022; Shoemaker et al., 2017). At an individual level, mostly the pharmacist perspective was evaluated, identifying a lack of self-confidence and feeling unprepared to conduct medication reviews as the main barriers (Brandt et al., 2020; Michel et al., 2022). With regard to patients, pharmacists also report challenges due to limited awareness and acceptance of the service (Latif et al., 2013), for instance, patients indicated that they do not need the service or that they could manage their medication on their own (Lelubre et al., 2019).

Yet, compared to the thorough evaluation of the pharmacists' perspective, surprisingly few studies have assessed the patients' point of view (Brandt et al., 2020; Michel et al., 2022) – although patients play an important role in the implementation of medication reviews, both as recipients of the intervention and as potential demand drivers. Moreover, when patients were surveyed they had already participated in a medication review or had prior awareness of the service (Cardosi et al., 2018; Garcia et al., 2009; Latif et al., 2013). Patients appreciated the time and expertise of pharmacists during a medication review (Latif et al., 2013; McCahon et al., 2022) and generally found the service to be helpful (Robberechts et al., 2023) and satisfying (Cardosi et al., 2018; Robberechts et al., 2023). However, they were often unaware of the rationale and structure of it (Michel et al., 2022; Robberechts et al., 2023). When patients were aware of the potential for drug interactions (Uhl et al., 2018) and understood the purpose of a medication review (Hall et al., 2018), they perceived a benefit – which implies that patients needed to have some awareness of the service in order to perceive it as beneficial.

So far, there is limited knowledge of what patients expect from medication reviews, including those who are unaware of its existence or those who are not yet eligible for it, even though they could potentially benefit from it in the future. It is also unclear how expectations vary according to socio-demographic factors. By gathering customers' insights, it is deemed that the service can be adapted to better align with customers' actual needs and preferences, enhancing engagement and usability of medication reviews. Understanding perceived barriers, could also help to refine recruitment and communication strategies. As other studies have been limited by surveying only those patients who have already taken part in a medication review and may therefore have been influenced by their experiences, the aim of this study was to avoid a pre-selection and therefore to approach all customers who visited a community pharmacy, regardless of whether they were eligible for this service or not.

Methods

Study design

To explore the attitudes and expectations of pharmacy customers towards a community pharmacy-based medication review, a prospective questionnaire-based survey was conducted. This study is reported according to the Consensus-Based Checklist for Reporting of Survey Studies (CROSS; [Supplement A](#)) and the STROBE Reporting guideline for cross-sectional studies (STROBE Statement, [Supplement B](#)).

Ethical considerations

The study was approved by the responsible Ethic Committee of the Medical Faculty of Heidelberg University (S-478/2023) and registered in the German Clinical Trials Register, with the reference ID DRKS00032446.

Questionnaire development

The initial set of items was generated based on an extensive review of the literature. The questionnaire was subjected to an internal quality assurance process to check comprehensibility, clarity and unambiguity (Faulbaum F, 2023). Then, it was piloted with a small sample of 16 participants who were recruited from the customer base of two of the participating pharmacies. Time was taken while participants completed the questionnaire and then comprehension questions were asked, e.g. about the structure or wording of the questionnaire. In addition, 5 of the 16 participants were exposed to cognitive tests, including think-aloud and paraphrasing, to gain further insights. Based on participants' feedback, iterative adjustments were made to the questionnaire, so that some questions were removed, while most changes involved rephrasing questions or changing response scales (Supplement C).

Afterwards, the questionnaire was translated into English, Russian and Turkish by a professional translation agency and adapted for digital use on a tablet using the Vue.JS framework with HTML, CSS, JavaScript for front-end development and PHP for back-end development.

As the purpose of this study was to summarize observed responses and to explore potential patterns within the data, rather than to confirm underlying latent constructs (Kishore et al., 2021), factor analysis was not conducted. Moreover, also the pre-test sample was not considered suitable for factor analysis, due to the typically small sample size (Kishore et al., 2021; Knekta et al., 2019).

Questionnaire design

The questionnaire was divided into a mandatory and an optional in-depth section. This design ensured the collection of key data from all participants while allowing for additional insights from those who wished to elaborate. The mandatory section included socio-demographic and general information (e.g. age, gender, living situation, number of and satisfaction with medication), customers' request of pharmacies' consultation service, awareness of and previous participation in a medication review, motivators for participation and the perceived importance of potential benefits. To ensure a consistent understanding among participants of a medication review, the

questionnaire contained a definition. The in-depth section included further socio-demographics (e.g. education, medical background/training, complexity of their medication regime, experience of side-effects, their level of agreement with statements regarding acquisition and adherence to medication-related information), reasons not to participate, preference for how they would like to be informed about pharmacy services in the future and which setting they prefer for participating in a medication review. They were also asked to agree or disagree with four statements about how well they feel informed about their medicines, how easy it is to get new medication-related information, and how easy it is to follow the recommendations of pharmacists or doctors. Response scales in the questionnaire mainly comprised Likert scales or single/multiple response options.

Setting

The survey was conducted at 3 German community pharmacies between March 4th and April 27th, 2024; one pharmacy conducted the survey for 6 weeks and 2 pharmacies for 3 weeks (total of 58 study days). Posters and flyers distributed in the pharmacy were used to promote the study.

Participants

All customers who visited the pharmacy during the study period and were aged 18 years or older, were invited to participate, regardless of whether they were eligible for a medication review. Persons who were cognitively impaired to fill out the survey were excluded.

No sample size calculation was performed as the goal was to invite all customers to provide a representative (in terms of completeness) descriptive evaluation. The number of participants was derived from the expected customer contacts per pharmacy, with an estimated target of at least 1500 participants.

Data collection

The questionnaire was completed by the participants on-site using a tablet. For those who had difficulties, a study team member read out the questions aloud and entered the answers on the tablet. No personal identifiers were collected, ensuring participant anonymity. All participants received a selection of dissolvable hot beverages as a thank you.

Study members recorded the number of participants invited to participate in the study and the reasons why some customers were not approached. In addition, the total number of customers was retrieved from the pharmacy management systems. This allowed for a comprehensive analysis of the study's reach. After the study was conducted, a short questionnaire was

sent to the pharmacies asking for general information (e.g. location, the average number of customers, experience with conducting medication reviews) and what the reasons for customers' non-participation might have been.

Data analysis

The data was summarized using descriptive statistics (e.g. frequencies, percentages, medians) and presented separately for participants with and without prior awareness of medication reviews. Group comparisons were conducted by using chi-squared tests for categorical variables and t-tests for metric variables.

For each benefit item a mean score was calculated, weighing 'not important' to the value of 0, 'important' to 1 and 'very important' to 2. A higher mean score implied more importance.

In addition, binary logistic regression analyses were run to explore associations between pre-defined predictors and the awareness or the rating of expected benefits:

- Potential factors influencing knowledge of medication reviews (dependent variable): participating pharmacies, age, number of medicines, gender, living situation, requesting pharmacies' consultation in general.
- Potential factors influencing the rating of expected benefits as 'very important' (dependent variable): participating pharmacies, age, number of medicines, gender, living situation, previous awareness of medication reviews.

Due to an unclassifiable living situation, 3 responses were excluded from the regression analyses. Statistical significance was set at $p < 0.05$; however, because of the exploratory character of the study p -values were only used as descriptive measures.

All analyses were performed using IBM SPSS Statistics Version 28.0 (Armonk, New York, USA) and Microsoft® Excel 2019 (Redmond, Washington, USA).

Results

Approach rate

Of 9276 registered pharmacy customers in the study period, 5812 were invited to participate in the survey which corresponds to a median of 59.2% of all customers (interquartile range (IQR): 17.9% [pharmacy 1: 59.0% (IQR: 12.2%), pharmacy 2: 53.8% (IQR: 28.9%), pharmacy 3: 64.8% (IQR: 26.5%)]) being approached daily. A maximum daily approach rate of 98.1%

($n = 102/104$) was achieved. The daily approach rates for each pharmacy are shown in [Supplement D](#) (Figure D1–D3).

Exemplarily, language barriers, very frail customers and parents with crying children made it difficult for study staff to indeed approach all customers. Additionally, logistical challenges prevented a 100% approach rate, e.g. customers exiting through a different door than where the study staff was positioned and study staff being too busy during peak times to attend to all customers.

Socio-demographic data and participants' attitudes regarding their medication and pharmacy consultation

In total, 1561 customers completed the questionnaire, of which 437 also answered the in-depth questions. Participants' characteristics are shown in [Table 1](#).

About three-quarters of participants (75.8%; $n = 1184/1561$) said that they requested consultation about their medication at the pharmacy. As reasons for not requesting consultation services participants said that they had no problems with their medication (44.6%, $n = 168/377$), had already clarified all medication-related questions with their doctors (50.9%; $n = 192/377$) or had no questions specifically addressed to their pharmacists (22.8%, $n = 86/377$).

Participants who answered the in-depth questions and administered at least one medicine estimated their medication therapy mainly as slightly complex (33.0%; $n = 109/330$) or not complex (45.5%, $n = 150/330$), and almost two-thirds reported to have had experienced at least one adverse drug reaction (64.8%; $n = 214/330$). Additionally, the majority of those participants fully or partially agreed to know the purpose of each medicine (96.1%, $n = 317/330$), that it is easy to obtain all relevant information about their medication (86.1%, $n = 284/330$), and were willing to readily accept recommendations about their medication from doctors (87.3%, $n = 288/330$) and pharmacists (90.9%; $n = 300/330$).

Customers' awareness of and attitudes towards medication reviews

Only one in five participants (18.0%, $n = 281/1561$) had prior awareness of medication reviews, of which 22.3% ($n = 68/281$) would have been eligible for the service (i.e. administered at least 5 long-term medicines). By contrast, 18.5% of participants without prior awareness ($n = 237/1280$) were eligible. Awareness of the service increased slightly with age (odds ratio (OR): 1.020, 95% confidence interval (95% CI): 1.012–1.029) and request of pharmacies' consultation (OR: 1.760, 95% CI: 1.249–2.481). There were also differences between participating pharmacies ([Table 2](#)). Additionally, 88 participants declared to have already participated in a medication review; however,

Table 1. Socio-demographic data from the mandatory (N = 1561) and in-depth section (N = 437), comparing customers with and without prior awareness of medication reviews. IQR: interquartile range. * $p < 0.05$ is considered statistically significant.

Mandatory section	Prior awareness of medication reviews (N = 281)			No prior awareness of medication reviews (N = 1280)			Difference p-value
	Median (IQR)	Number, n	Frequency, %	Median (IQR)	Number, n	Frequency, %	
Age, years	59 (24)			51 (31)			< 0.001*
Gender							
Female		188	66.9		808	63.1	0.436
Male		93	33.1		465	36.3	
Non-binary		0	0		4	0.3	
Do not want to specify		0	0		3	0.2	
Living situation							
Living alone		75	26.7		366	28.6	0.648
Living together, e.g. with family/partner		205	73.0		912	71.3	
Others		1	0.4		2	0.2	
Number of medicines							
0 medicines		47	16.7		273	21.3	0.079
1–4 medicines		166	59.1		770	60.2	
5–9 medicines		57	20.3		190	14.8	
≥ 10 medicines		11	3.9		47	3.7	
		233	82.9		951	74.3	0.002*
Request of pharmacy consultations							
<i>In depth-section</i>							
	Prior awareness of medication reviews (N = 66)			No prior awareness of medication reviews (N = 371)			Difference p-value
	Median (IQR)	Number, n	Frequency, %	Median (IQR)	Number, n	Frequency, %	
Education							
< 11 years		30	45.5		109	29.4	0.010*
≥ 11 years		33	50.0		255	68.7	
Others/not specified		3	4.5		7	1.9	
Medical background/ training		21	31.8		57	15.4	0.008*

Table 2. Potential factors influencing participants' awareness of medication reviews in community pharmacies. * $p < 0.05$ is considered statistically significant.

	Odds ratio (95% confidence interval)	<i>p</i> -values
Pharmacy		
Pharmacy 1 (ref)		
Pharmacy 2	0.761 (0.529–1.096)	0.143
Pharmacy 3	0.692 (0.506–0.945)	0.021*
Age	1.020 (1.012–1.029)	< 0.001*
Number of medicines	1.055 (0.864–1.287)	0.601
Gender		
Male (ref)		
Female	1.211 (0.914–1.603)	0.182
Others	0.000 (0.000–)	0.999
Living situation		
Living alone (ref)		
Living together, e.g. with family/partner	1.139 (0.838–1.550)	0.406
Request of pharmacy consultations	1.760 (1.249–2.481)	0.001*

according to their own report, 14 of those participants were not taking any medicines. As it is not possible to verify with hindsight whether this is true, and participants may have received a medication review and are now taking fewer medicines, this number is reported but not further inferred.

Participants who were unfamiliar with medication reviews were slightly more likely to be persuaded to participate than those who were familiar, if they were aware of the benefits of a medication review (60.5% ($n = 774/1280$) vs. 51.6% ($n = 145/281$); $p = 0.006$, Cramer-V = 0.069), because of recommendations by relatives and acquaintances (18.3% ($n = 234/1280$) vs. 12.1% ($n = 34/281$); $p = 0.013$, Cramer-V = 0.063) or if the costs would be covered by health insurance (44.8% ($n = 573/1280$) vs. 27.4% ($n = 77/281$); $p < 0.001$, Cramer-V = 0.135). Figure 1 shows further group comparisons of the reasons that would motivate participants to take part in a medication review.

The participants who also completed the in-depth questions chose as main reasons against participating in a medication review that they had no prior awareness of the service (37.1%, $n = 162/437$), that they feared they would be recommended additional medicines, they do not need (20.6%; $n = 90/437$), or that they had no need for a medication review because they had no problems with their medication (19.5% each, $n = 85/437$). Especially, participants who were familiar with the service were less willing to participate, when they already discussed all medication-related questions with their doctors (28.8% ($n = 19/66$) vs. 17.3% ($n = 64/371$); $p = 0.028$, Cramer-V = 0.105) or preferred to do the research themselves (21.2% ($n = 14/66$) vs. 12.1% ($n = 45/371$); $p = 0.047$, Cramer-V = 0.095). On the other hand, customers who were unfamiliar with the service were more likely to be concerned that they would be recommended medication they did not need (22.6% ($n = 84/371$) vs. 9.1% ($n = 6/66$); $p = 0.012$, Cramer-V = 0.120). However, for almost 40% ($n = 172/437$) there was no reason not to participate in a medication review.

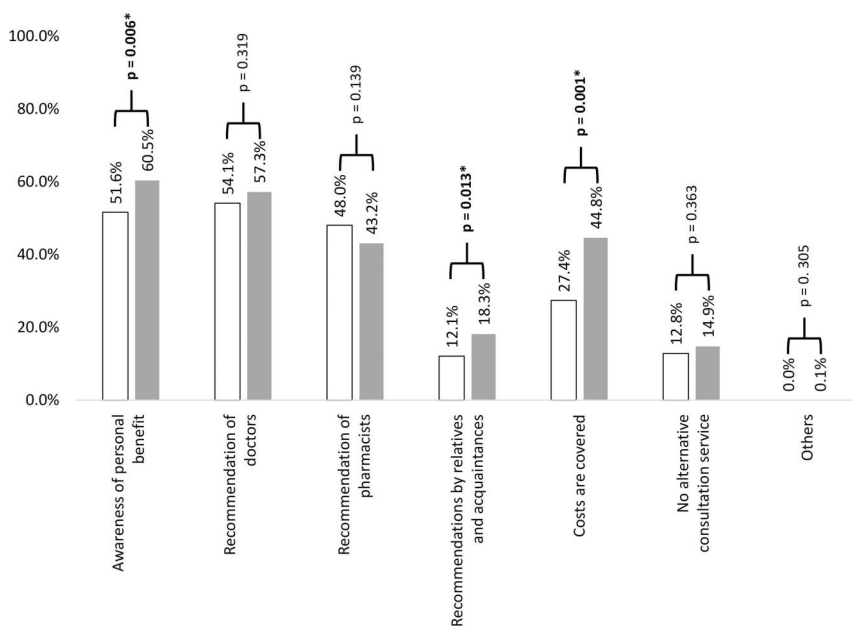


Figure 1. Reasons for participation, depending on whether participants had prior awareness of medication reviews (N = 281; white columns) or not (N = 1280; grey columns). * $p < 0.05$ is considered statistically significant.

Participants' top preference for how they would like to be informed about medication reviews was face-to-face contact at the pharmacy (78.9%; $n = 345/437$), followed by information from their doctors (59.7%; $n = 261/437$) or via the internet or social media (45.8%; $n = 200/437$). Comparing participants with or without prior awareness of medication reviews, those without would rather like to be informed via the internet / social media (41.4% ($n = 181/371$) vs. 28.8% ($n = 47/66$); $p = 0.003$, Cramer-V = 0.114), via information leaflets distributed by the pharmacy (30.2% ($n = 112/371$) vs. 10.6% ($n = 7/66$); $p < 0.001$, Cramer-V = 0.158) or through their health insurance (41.8% ($n = 155/371$) vs. 25.8% ($n = 17/66$); $p = 0.014$, Cramer-V = 0.117).

The vast majority (87.9%; $n = 384/437$) believed that the service should take place on-site in the pharmacy (e.g. in a consultation room), followed by video (22.2%, $n = 97/437$) or phone call (18.5%, $n = 81/437$). Participants without prior awareness of medication reviews preferred the service to be conducted without any personal contact, e.g. via an app (29.1% ($n = 108/371$) vs. 15.2% ($n = 10/66$); $p = 0.019$, Cramer-V = 0.113).

Expectations of customers of the benefits of a medication review

The participants expected from participating in a medication review, particularly, to gain a better knowledge of their medication (mean score: 1.4 ± 0.7) as

well as to reduce problems with their medication (e.g. drug–drug-interactions; 1.3 ± 0.7) and side-effects (1.4 ± 0.7). The participants' rating of the expected benefits is shown in Figure 2.

The prior awareness of the service, did not influence participants' rating of the expected benefits as 'very important'. However, requests for pharmacy consultations and the female gender (except for the benefits of 'fewer medicines' and 'simplified medication regime') were positively associated with the benefit rating as 'very important'. With increasing age, the benefit was slightly rated lower (i.e. more often as 'important' or 'not important'). The results of the binary logistic regression analyses are shown in Supplement E.

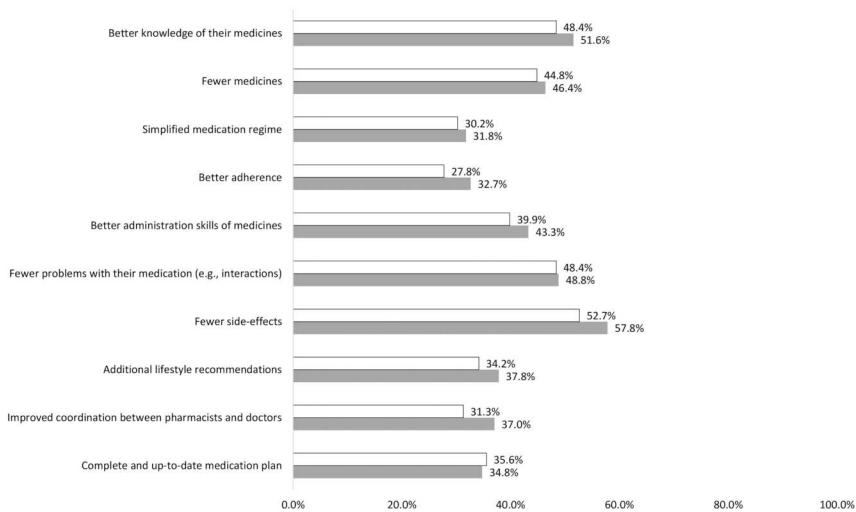


Figure 2. Frequencies (%) of participants rating an expected benefit of a medication review as 'very important', comparing participants with prior awareness of the service (N = 281; white columns) or not (N = 1280; grey columns).

Discussion

This study gathering the opinions and expectations of over 1500 pharmacy customers on medication review indicates that there are differences between those customers who were aware of the service and those who do not. While previous studies mainly focused on customers who had already participated in the service (Cardosi et al., 2018; Garcia et al., 2009; Latif et al., 2013), this study adds new insights into what might motivate customers who are not even aware that such a service exists. In the end, these data will help to foster strategies to address patients as potential recipients of these services better. This is even more important as low awareness of medication review services in community pharmacies has also been

previously reported in other studies (Ekenga et al., 2018; Latif, 2018) and was also in our assessment with only one in five participants (18.0%, $n = 281/1561$) declaring to have prior awareness of such services.

Participants with prior awareness of medication reviews were older and reported more often to request pharmacies' consultation services. However, awareness of the service had no effect on the patient's expectations of the perceived benefits of a medication review. Predictors that were associated with participants rating the expected benefits as 'very important' were female gender and requesting pharmacies' consultation; factors that previous studies also witnessed as motivators for participation in similar pharmacy services (Brown et al., 2017; Farris et al., 2016). Noteworthy are the unexpected findings that the number of chronic medicines and age were not positively associated with customers' perception of potential benefits. Instead, age was related to a slight negative decrease. Brown and colleagues also found that the number of prescriptions was not associated with the willingness to request a pharmacy service; instead, they reported that the number of health issues motivated patients. This leads to the assumption that the health status would have been a better predictor than the number of medicines (Brown et al., 2017). Another study found that also the type(s) of chronic condition(s) may influence customers' perceptions about a medication review. Persons, e.g. with hypertension and dyslipidemia were less willing to pay for or engage in similar pharmacy services compared to those with chronic pain, arthritis, or heart failure, suggesting that patients with conditions that affect their daily lives have a higher perceived need for such services (Friedrich et al., 2010). Consequently, patients' willingness to engage in medication reviews will be determined by their subjective evaluation of the perceived value, usefulness and appropriateness of such services.

Overall, by participating in a medication review, the majority of participants hope to reduce risks or problems with their medication and gain a better understanding of them. This is also in line with the findings of previous studies, which have shown that the educational and medication safety aspects are most valuable to pharmacy customers (Brown et al., 2017; Huet et al., 2015; Schumacher et al., 2020). This emphasizes the fact that in the future it is likely more important to raise customer awareness of the service than to convince them of its potential benefits.

Implications for practice

Based on the results of this study, 3 implications for how to increase pharmacy customers' willingness to participate in medication reviews may be postulated: First, it is necessary to increase the general awareness of medication reviews. Some studies have proposed national engaging strategies to

improve awareness among potential customers (Lelubre et al., 2019; Makovec et al., 2018). However, encouraging customers to request a medication review themselves may be ineffective. This study instead emphasizes the importance of pharmacists taking the initiative to encourage customers' participation. Participants indicated that they would prefer to be personally informed about medication reviews during their pharmacy visits. It can be assumed that personal interaction allows pharmacists to better address each customer's specific needs, making the service more relevant and easier to understand. This is supported by a study by Mailloux and colleagues in which face-to-face customer education proved to be more effective in the recruitment of patients than distributing written brochures (Mailloux et al., 2018). Second, the content and level of detail of information shared with customers might influence their willingness to participate. What appears to be most important is ensuring that patients clearly understand the personal benefits they can gain from medication reviews, as awareness of these benefits was a strong motivator for engagement in our study. Another study found that customers who received an enhanced recruitment script, i.e. one that focused on explaining the benefits and barriers of medication reviews from the customer's perspective and addressed potential concerns, were 1.5 times more likely to participate than those who received only basic information (Miguel et al., 2017). To this end, it might be beneficial to develop standardized communication protocols to ensure that customers are adequately informed (Denvir et al., 2018). Last, trusting relationships appear to be crucial for pharmacists to effectively address customers' needs (Hall et al., 2018) and encourage participation in medication review services (Latif et al., 2013). In this study, participants who had requested advice from pharmacists in the past and thus likely had greater confidence in pharmacists' abilities already, also held higher expectations about the benefits of a medication review. This underlines the fact that besides an informal process, good non-verbal, interpersonal communication can be decisive for the success of the approach. Proactive communication training for pharmacists may be deemed to generate demand for services and improve acceptance (Denvir et al., 2018).

Limitations

Some limitations of this study include sample size and generalizability. Although the sample size is considerably high, we could not approach all customers who visited the pharmacy during the data collection period, especially when the pharmacy was very crowded. However, it is possible that the total number of customers is overestimated as the data was retrieved from the pharmacies' management systems which did not consider when the same customer made several purchases per day or visited the pharmacy

multiple times during the data collection period. Language barriers were also a common reason that hindered the approach of customers, however, we have tried to address this in advance by translating the survey into the languages most commonly spoken in the regions where the participating pharmacies were settled. Another limitation is that this research was conducted in only 3 discrete geographical locations. It is unknown to which extent the findings from the study sites are transferable to other pharmacies. Although the participating pharmacies were diverse in terms of the number of daily customers, location, or length of time they had offered medication reviews, no differences were observed in participants' expectations; therefore, it may be assumed that the results are generalizable to other pharmacies.

Conclusion

Pharmacy customers expect medication reviews to enhance the safety of their medication therapy and increase their understanding of it, regardless of whether they were previously aware of the service or not. To raise awareness about medication reviews, this study points out that one success factor might be that pharmacists engage with customers directly and comprehensively inform them about their personal benefits. In addition, a good relationship between pharmacists and customers must be established, as customers are likely to be more trusting and encouraged to share problems with their medication if they have confidence in their pharmacist.

Author contributions

Cathrin J. Vogt: Conceptualisation of the content, methodology, investigation, writing – original draft, visualisation. **Annika Wiegand:** Investigation. Writing – review & editing. **Kire Trajkov:** Software. Conceptualisation of the software. Writing – review & editing. **Michael Metzner:** Software. Conceptualisation of the software. Writing – review & editing. **Viktoria S. Wurmbach:** Conceptualisation, methodology, supervision, validation, writing – review & editing. **Anja Braem:** Funding acquisition, conceptualisation, methodology; writing – review & editing. **Hanna M. Seidling:** Funding acquisition, conceptualisation, methodology, supervision, validation, writing – review & editing.

Acknowledgements

We sincerely thank Luna Brehm, Laura Lepenies, Sofia Obersteiner, Emilia Picker and Gabriel Rediker who supported the data collection and the participating pharmacies Herzog Apotheke, Pelikan Apotheke and Post Apotheke with their teams that generously welcomed us and facilitated the study. Your cooperation and efforts were invaluable. We are also grateful to the customers who participated, sharing their experiences and insights.

Disclosure statement

This work was financially supported by the Förderinitiative Pharmazeutische Betreuung e.V. There is no further conflict of interest with regard to this work. However, other potential conflict of interest (grants, honoraria, support for attending meetings, participation on a data safety monitoring board or advisory board, leadership or fiduciary roles) are provided separate Declaration of Interest forms. All other authors declare no relevant conflicts of interest or financial relationships.

Funding

This work was supported by the Förderinitiative Pharmazeutische Betreuung e.V.

Ethics approval and consent to participate

The study was approved by the responsible Ethic Committee of the Medical Faculty of Heidelberg University (S-478/2023).

Data availability of data and materials

Ethics approval has not foreseen the sharing of data. However, in case of a reasonable request with regard to data integrity, data will obviously be made available.

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