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WHERE TO BUY OTC MEDICATIONS?

A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC analgesics.

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ABSTRACT

Objective: To examine consumers' confidence in their own, and also in other people's, over-the-counter (OTC) skills and to look too at their attitudes towards the availability of OTC analgesics. Moreover we examined the association between confidence in OTC skills and attitudes.

Design: Cross-sectional survey. Mixed-mode questionnaire.

Participants: Members of the Dutch Health Care Consumer Panel of whom 972 returned the questionnaire (response 68%).

Main outcome measures: Consumers' confidence in their own, and in other people's, OTC skills was examined. This is because, generally, people are roughly accurate when estimating peers' attitudes and behaviours. Confidence was measured by three questions regarding obtaining information on, choosing, and using OTC medication. Consumers' attitudes towards availability were assessed using six safety profiles. Respondents had to indicate which channel they prefer for each profile.

Results: Consumers feel confident about their own OTC skills (mean 3.74; 95% CI 3.69 to 3.79, on a 5-point Likert scale), but have less confidence in OTC skills of others (mean 2.92; 95% CI 2.88 to 2.96). Consumers are conservative in their attitudes towards the availability of OTC analgesics. Most consumers prefer analgesics to be available exclusively in pharmacies (41 to 71% per profile indicated pharmacy only). Moreover, there is an association between confidence in OTC skills and attitudes ($p=0.003$; $\beta=-0.115$). Consumers who are more confident about their own OTC skills prefer OTC analgesics to be more generally available.

Conclusions: Consumers feel confident about their own OTC skills. However, they would prefer analgesics with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively. Consumers' confidence in the OTC skills of others is more consistent with their attitudes towards availability of OTC analgesics. Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Article summary

Article focus

- Several studies have observed that consumers appear to be unaware of how to use OTC medications appropriately, which may entail health risks.
- Until now little is known about consumers' confidence in their own and other people's OTC skills and their attitudes towards the availability of OTC analgesics.
- This study aimed to examine consumers' confidence in their own, and also in other people's, OTC skills, to look too at their attitudes towards the availability of OTC analgesics, and to examine the association between confidence in OTC skills and attitudes.

Key messages

- Consumers feel confident about their own OTC skills. However, they would prefer that analgesics with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively.
- Consumers have less confidence in the OTC skills of others. This perception is more consistent with their attitudes towards availability of OTC analgesics.
- Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Strengths and limitations of this study

- Strengths include the large sample size and the response rate of almost 70% and the inclusion of an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC analgesics should be available.
- Limitations include not being able to make a comparison between a direct as well as indirect measurements and not being able to link our results to the actual self-medication behaviour of the respondents, since we do not know what they do and buy.

BACKGROUND

The need to save on health care spending has led to more emphasis on patients taking their own responsibility for the management of minor ailments, including the use of medication that is available without a prescription [1;2]. However, inappropriate use of OTC medications entails considerable health risks. Several studies demonstrated that inappropriate use results in drug intoxication, drug interactions, side effects and increased health care costs as a consequence of extra visits to a doctor and hospitalization [3-7]. Nevertheless, in many countries, increasingly more drugs that were previously only available on prescription are being switched to OTC status [2;8;9]. A study of the US Government Accountability Office conducted in the UK, the USA, the Netherlands, Italy and Australia, showed that since 1995 all these countries have increased OTC availability. This is due either to changes in the classification of non-prescription drugs or to the reclassification of medications into less restrictive classes [10].

In the Netherlands, the availability of OTC drugs increased when the Dutch government changed the system for OTC medications. Since the introduction of the Medicines Act on 1 July 2007, three categories of non-prescription drugs have been specified: 1) pharmacy only; 2) pharmacy only and chemist; and 3) general sales [11]. Before July 2007, the third category did not exist. In the Netherlands, there is a distinction between pharmacies and chemists. Pharmacies are run by a pharmacist and able to sell all prescription and non-prescription drugs, while chemists are run by a druggist, who requires less training than a pharmacist and is able to sell many but not all non-prescription drugs [10]. When introducing the new legislation, the Dutch government argued that consumers are well-informed and know how to use OTC drugs appropriately [11;12]. This assumption was not supported by international literature. Earlier research, mainly focused on analgesics, observed that consumers appear to be unaware of how to use OTC medications appropriately [4-6;13-16].

There has been little research conducted into how consumers themselves perceive their skills in using OTC medications appropriately. It is important to gain some insight into areas such as overestimating OTC skills as this may result in risks to health. The purpose of the present study was to examine consumers' confidence in OTC skills. We examined consumers' confidence, both in their own OTC skills, and in those of others. This is because previous research has shown that "people tend to think positively of themselves, often to unrealistic degrees" [17]. Moreover, the literature demonstrated that consumers' estimates of their peers' attitudes and behaviours tend to be roughly accurate [17]. Furthermore, we examined which channels consumers prefer with regard to the availability of OTC analgesics. Finally, we examined the association between consumers' confidence in OTC skills and their

attitudes towards the availability of OTC analgesics, as we expected that more confident consumers prefer them to be more generally available.

METHODS

Setting

Data were collected in the Dutch Health Care Consumer Panel [18-20]. This panel aims to measure opinions on and knowledge of health care as well as expectations and experiences with health care at a national level. The demographic characteristics of the panel members including their age, gender, level of education and self-reported general health were documented at the start of the panel membership and are updated annually. The protection of the data collected is registered with the Dutch Data Protection Authority (nr. 1262949).

Questionnaire

In June 2010, a questionnaire was sent to 1,422 panel members and returned by 972 members. According to their previously stated preference, 671 members received a questionnaire by post and 751 through the internet.

The use of OTC drugs

The respondents were asked how long it has been since they had used OTC medications. Based on their answers, we generated a dichotomous variable for the use of OTC drugs in the year prior to the questionnaire (1=yes; 0=no). In addition, the respondents who had used OTC drugs in the year prior to the questionnaire were asked what kind of OTC drugs they had used in that year. All questions had pre-defined categories of answers.

Confidence

Confidence was measured using three questions with regard to obtaining information on, choosing and using OTC medications. These were: 1) 'I am able to make a choice between different types and brands of OTC drugs'; 2) 'I know exactly how to use OTC drugs in a safe way'; and 3) 'When I try to get advice on OTC drugs, I can easily get the right information'. We used the same three items to examine consumers' confidence in the OTC skills of others, for example asking if: 'Others are able to make a choice between different types and brands of OTC drugs'. All items had a five-point Likert scale ranging from strongly disagrees to strongly agree. We evaluated for both scales whether the three items measured a single concept by calculating the internal consistency given by Cronbach's alpha. Only the respondents who filled out all three items were included (own: N=951; others:

N=949). The internal consistency was good (for both scales Cronbach's alpha 0.81). Subsequently, a mean score was calculated for the respondents who filled out all three items ranging from 1 to 5, in which higher scores indicated greater confidence.

Attitudes towards availability

We presented six safety profiles of analgesics in order to assess consumers' attitudes towards availability. Each profile described an analgesic having properties that resemble current available analgesics in the Netherlands (e.g. paracetamol and ibuprofen). The profiles were descriptions of possible adverse effects of their use, inappropriately or not, and were based on information reflected in patient information leaflets. They were constructed by one of the research members (MB), who is a pharmacist with special interest in OTC medication and author of a standard Dutch handbook of self-medication. We focused on OTC analgesics because analgesics are among the most commonly used medications [14;16;21], and their inappropriate use can cause serious side effects [5;6;13;21;22]. The following six safety profiles were included: 1) 'No side effects when used as directed, but taking too many tablets can cause serious damage'; 2) 'Mild side effects, such as stomach and intestinal problems, but never serious side effects'; 3) 'In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleeding'; 4) 'Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs'; 5) 'Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases'; and 6) 'Can be used safely by most people, but potentially serious side effects when used by children'. We asked respondents to indicate their preferences for where analgesics with the above described profiles should be available, with the following options: 1) general sales; 2) chemist; 3) pharmacy only; and 4) prescription only. It should be noted that in the questionnaire the options were used in a different order, namely: 1) pharmacy only; 2) chemist; 3) general sales; and 4) prescription only. The answer options were based on the Dutch Medicines Act. In addition, items scored as, 'I don't know', were recoded as missing (in total 115 times, 16 to 25 per profile). To evaluate whether the six items measured a single concept, we calculated the internal consistency given by Cronbach's alpha. Respondents who did not fill out all profiles were excluded from the analyses (excluded N=228, included N=744). The excluded respondents did not differ significantly from the respondents included with regard to their demographics. However, they were significantly more restrictive in their preferences for the safety profiles for which they did provide an answer. Factor analysis of the data identified one factor and the internal consistency was good (Cronbach's alpha 0.77).

Subsequently, a mean score was calculated for the items for the respondents who filled out all six profiles ranging from 1 to 4, whereby higher scores indicated a greater preference for restricting availability.

Statistical analyses

Firstly, we performed descriptive statistics. Then, by means of t-tests and one-way analyses of variance (ANOVA) ($p<0.01$), we tested the association between the outcomes (consumers' confidence in their own OTC skills and consumers' attitudes) and demographic characteristics (gender, age in three categories, level of education and self-reported general health) and the use of OTC medications. Finally, we conducted a regression analysis to investigate the association between the dependent variable, consumers' attitudes, and the independent variables, consumers' confidence in their own OTC skills, demographic characteristics and use of OTC medications ($p<0.05$). We repeated this association using the total number of times respondents scored the options 'pharmacy only' and 'prescription only' (ranging from 0 to 6), instead of their mean scores, as a dependent variable. In the regression analyses, categorical variables were recoded into dummy variables. All statistical analyses were done using STATA, version 12.1.

RESULTS

In total, 972 panel members returned the questionnaire (response rate 68%). The response to the online questionnaire was lower than to the written questionnaire (62% respectively 76%). More than half (56%) of the respondents were female (Table 1). The age category 40 to 64 years included 54% of the respondents. Almost half (47%) had a middle level of education. General health was self-reported as excellent/very good in 31% of the cases. Compared to the Dutch population aged 18 years and older [18], it was mainly young people (18 to 39 years) who were underrepresented in the group of respondents.

The use of OTC drugs

Among the respondents, 83% used OTC medications in the year prior to the questionnaire (see Table 1). OTC analgesics were predominantly used. Almost all (97%) respondents that had used OTC-drugs in the year prior to the questionnaire, indicated that they had used analgesics, followed by medicines for coughs, colds, flu and a sore throat (76%).

Confidence

The mean score for consumers' confidence in their own OTC skills was 3.74 (95% CI: 3.69 to 3.79, on a 5-point Likert scale), indicating that respondents feel quite confident about their own OTC skills. Respondents felt clearly less confident about the OTC skills of others (mean score 2.92 and 95% CI: 2.88 to 2.96).

As reflected in Figure 1, seven out of the ten respondents agreed, or strongly agreed, that they are able to make a choice between different types and brands of OTC drugs. Only 16% of them thought that others are able to make a choice. Furthermore, 65% of the respondents agreed, or strongly agreed, that they know exactly how to use OTC drugs in a safe way, while only 11% of them thought that others know how to apply OTC drugs safely. Lastly, 76% of the respondents agreed, or strongly agreed, that they can easily get the right information when trying to get advice on OTC drugs, compared to 30% of them who believed that others are able to get the right information. ANOVAs and t-tests showed significant but modest differences between consumers' confidence in their own OTC skills and gender, age and level of education. Women feel slightly more confident about their own OTC skills than men. Furthermore, the elderly (≥ 65 years) and people with a low level of education have slightly less confidence than younger people and people with a middle and high level of education. In addition, ANOVA showed that people who had used OTC medications in the year prior to the questionnaire were more confident about their own OTC skills than those who had not used OTC medications in the year prior to the questionnaire (mean 3.84 respectively 3.24, $p<0.001$).

Attitudes towards availability

Table 2 shows that the pharmacy is often mentioned as preferred channel where analgesics with the described profiles should be available (range 41% to 71%). For five out of the six profiles most respondents prefer that analgesics with such a profile should be available exclusively in pharmacies. Supermarkets or petrol stations were hardly mentioned as a preferred channel where analgesics with the described profiles should be available. ANOVAs and t-tests showed significant but modest differences between consumers' attitudes and age and level of education. Elderly (≥ 65 years) are more restrictive in their preferences for availability than younger people. Moreover, people with a low level of education are more restrictive in their preferences than people with a middle and high level of education.

The last research question focused on the association between consumers' confidence in their own OTC skills and their attitudes towards availability (see Table 3). The regression analysis showed that respondents who were more confident about their own OTC skills preferred OTC analgesics to be more generally available. This association was observed in addition to the effects of age and the level of education already mentioned. The same results were

shown when we performed an additional regression analysis, in which we used the total number of times respondents scored the options 'pharmacy only' and 'prescription only' as a dependent variable.

DISCUSSION

Principal findings

Our findings show that consumers feel confident about their own OTC skills, but that they have less confidence in the OTC skills of others. In other words, consumers presume that, compared to themselves, other people are less able to use self-medication appropriately. Although consumers are confident, they are conservative in their attitudes towards the availability of OTC analgesics. Most consumers prefer that analgesics with the described profiles should be available in pharmacies exclusively. Currently, analgesics with profiles similar to those described are available for general sale in most European countries, including the Netherlands. Finally, we observed that more confident consumers preferred OTC analgesics to be more generally available.

Comparisons with other studies

Earlier research examined the public awareness, perception and knowledge of OTC medications. According to the literature, consumers perceive OTC drugs as safe [14;15] and "too weak to cause any real harm" [6]. Moreover, they are unaware of the fact that OTC medications can cause adverse events when used with other medications [5;23] and also of the toxicities of OTC medications [4;14]. Neither do they know, or are concerned, about the potential side effects of OTC-analgesics [13;14] . In addition, a recent study in Australia observed that fewer people are using NSAIDs appropriately according to the label, since ibuprofen has become available outside the pharmacy [16]. Summarized, consumers seem to be unaware of how to use OTC medications appropriately. Our study investigated consumers' confidence in OTC skills, using two measurements. There appears to be a discrepancy between the literature and the public perception about their own OTC skills, since consumers are convinced they know how to use OTC medications appropriately. The confidence consumers have in the skills of others seems more consistent with the literature. It also probably better connects to reality, since, in general, the estimates of consumers regarding their peers' attitudes and behaviours tend to be roughly accurate [17]. Moreover, it is in line with their attitudes towards availability of OTC analgesics. It appears that consumers have taken into account in their attitudes the confidence, or lack of it, that they have in the OTC skills of others. The assumption of the Dutch government that consumers prefer a less restrictive availability is not supported by our findings when confronted with safety information on

medication. Nevertheless, in many countries an increasing number of drugs that were previously only available on prescription have been switched to OTC status [2;8;9].

Implications

As concluded by Hughes et al. (2001) [24], confidence and preference for self-medication does not imply that the use of OTC medications is always optimal or appropriate. This is supported by the fact that the public's estimation of others will probably be more accurate. As a result, a proportion of OTC users, are probably overconfident in their own behaviour, and this may entail health risks. For example, Leendertse et al. (2008) [25] observed that NSAIDs are one of the medicines associated most often with potentially preventable medication-related hospital admissions. Moreover, Pirmohamed (2004) [26] observed that, among others, NSAIDs were most commonly implicated in admissions related to adverse drug reactions. Moreover, a Dutch study showed that during the last decade there had been an increase in requests on paracetamol poisoning to the National Poisons Information Center [27] . In our study, we were not able to link our results to the actual self-medication behaviour of the respondents, since we do not know what they do and buy. Therefore, further research is recommended to examine this.

Previous research recommended to increase the risk awareness and knowledge among the public, and to educate them about OTC medications and their potential risks [6;13;14;16;28]. The question is whether people are either unable to understand and find the correct information, or whether they do not want, read, search or ask for this information. Therefore, it is not clear yet, how to inform the public and increase awareness among them. What seems clear is that consumers consider pharmacists to be a reliable source of information, since most of them prefer the analgesics described to be available in pharmacies exclusively. As a result, pharmacists could have an important role in questioning and informing patients about OTC medications.

The strengths and limitations of the study

An important strength of our study is the large sample size and the response rate of almost 70%. However, the respondents in our study are not fully representative of the adult Dutch population aged 18 plus. Therefore, we performed analyses to see whether there are differences between groups of consumers. We observed some significant differences. However, they do not appear to affect our conclusions since the differences were modest. We included an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead

of asking directly where certain specific OTC analgesics should be available. Earlier research in the Netherlands demonstrated that when trade names of analgesics are presented to consumers, they judge them as safe. More than 95%, respectively 70%, of the consumers considered paracetamol and ibuprofen as safe, or very safe [29]. It is a disadvantage that we did not include direct as well as indirect measurements in our questionnaire, as we are now not able to make a comparison between both measurements. Another possible limitation is that we excluded quite a considerable number of respondents (N=228), because they did not fill out all six safety profiles. The excluded respondents were more restrictive in their preferences, possibly implying a slight underestimation of the observed effects in our analyses.

Conclusions

This study aimed to examine consumers' confidence in OTC skills and their attitudes towards the availability of OTC analgesics. The Dutch government assumed that consumers are well-informed, know how to use OTC medications appropriately, and prefer a wider availability. It could be questioned whether these assumptions are true. Consumers feel confident about their own OTC skills; however, they would prefer analgesics with safety profiles resembling currently available OTC analgesics, to be available as OTC in pharmacies exclusively. Furthermore, the confidence consumers have in the OTC skills of others seems more consistent with their attitudes towards availability. Until consumers themselves realise they are also one of the others, they may overestimate their OTC skills, which may entail health risks.

Footnotes

We thank the panel members of the Dutch Health Care Consumer Panel who participated in this study.

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Contributors: The study was devised and designed by LVD and MB. JDJ was responsible for the data collection in the Dutch Health Care Consumer Panel. AB performed the statistical analyses and drafted the manuscript. All other authors critically revised it. All authors gave their final approval for the manuscript version to be published. All authors are responsible for the overall content as guarantors.

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Ethical approval: According to the Dutch law, no ethical approval was needed. The protection of the collected data is registered with the Dutch Data Protection Authority (nr. 1262949).

Data sharing: Data is available on request and subject to approval by the programme committee of the Dutch Health Care Consumer Panel.

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Tables and figures

Table 1: Demographic characteristics of the respondents

	N		%
Gender	**972**		
Male		424	43.6
Female		548	56.4
Age	**972**		
18-39 years		88	9.1
40-64 years		527	54.2
65 years and older		357	36.7
Education	**948**		
Low (none, primary school or pre-vocational education)		184	19.4
Middle (secondary or vocational education)		448	47.3
High (professional higher education or university)		316	33.3
Self-reported general health	**965**		
Poor/bad		175	18.1
Good		487	50.5
Excellent/very good		303	31.4
Use of OTC drugs in the year prior to the questionnaire	**960**		
No		160	16.7
Yes		800	83.3

Table 2: Percentage of respondents that prefer a specific channel with regards to the availability of OTC analgesics

		Percentage of respondents that prefer a channel				
Safety profiles*	**N**	*Supermarket/ petrol station*	*Chemist*	*Pharmacy only*	*Prescription only*	*Mean score ** (95% CI)*
Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs	**876**	1.1	7.4	70.8	20.7	**3.11** (3.07 to 3.15)
Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases	**875**	1.0	12.6	65.3	21.1	**3.07** (3.02 to 3.11)
Can be used safely by most people, but potentially serious side effects when used by children	**859**	2.2	18.6	59.6	19.6	**2.97** (2.92 to 3.01)
In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleedings	**848**	3.5	25.4	52.7	18.4	**2.86** (2.81 to 2.91)
No side effects when used as directed, but taking too many tablets can cause serious damage	**813**	8.1	34.0	46.0	11.9	**2.62** (2.56 to 2.67)
Mild side effects, such as stomach and intestinal problems, but never serious side effects	**841**	4.8	45.3	40.7	9.3	**2.54** (2.50 to 2.59)

* Safety profiles are ordered based on their mean score. In the questionnaire, they were ordered in another way.

** Ranging from 1 to 4 (1 = wide availability; 4 = restrictive availability).

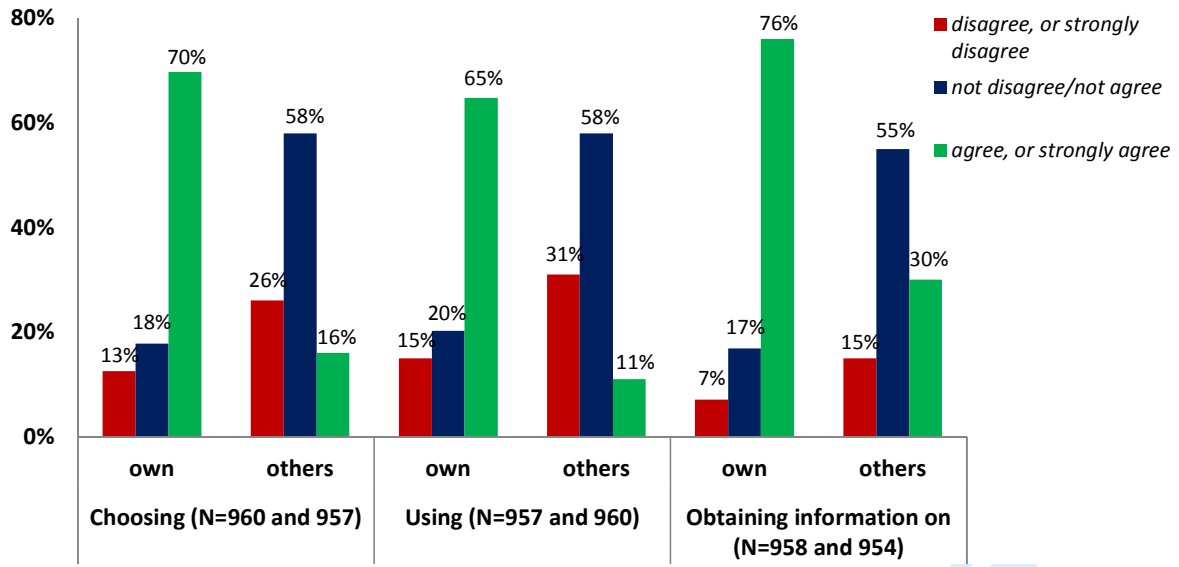
Table 3: Regression model for attitudes towards availability (N=703)

	Beta*	P-value
Availability (1= wide; 4 = restrictive)		
Confidence (1 = low; 5 = high)	-0.115	**0.003**
Gender (0 = man; 1 = woman)	0.016	0.688
Age	0.117	**0.003**
Level of education		
-Low	reference level	
-Middle	-0.131	**0.010**
-High	-0.254	**0.000**
Self-reported general health		
-Bad/poor	reference level	
-Good	0.021	0.688
-Excellent/very good	-0.020	0.705
Use of OTC drugs in year prior to questionnaire (0 = no; 1 = yes)	-0.013	0.743
Constant	.	**0.000**

Adjusted R-square: 0.07

* Standardized coefficients

Figure 1: Consumers' confidence in their own OTC skills and in the OTC skills of others



Choosing: I am / others are able to make a choice between different types and brands of OTC drugs

Using: I / others know exactly how to use OTC drugs in a safe way

Obtaining information on: When I / others try to get advice on OTC drugs, I / others can easily get the right information

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

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	page 1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	page 2 & 3 (Article Summary)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	page 4
Objectives	3	State specific objectives, including any prespecified hypotheses	page 4 & 5
Methods			
Study design	4	Present key elements of study design early in the paper	page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	page 5 (Data collection in June & July 2010)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	NA
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	page 5, 6 & 7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	page 5, 6 & 7
Bias	9	Describe any efforts to address potential sources of bias	NA
Study size	10	Explain how the study size was arrived at	page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	page 7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	page 7
		(*b*) Describe any methods used to examine subgroups and interactions	page 7
		(*c*) Explain how missing data were addressed	page 5, 6 & 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA

		(*e*) Describe any sensitivity analyses	page 7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	page 5
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	See table 1 (page 16) & page 7
		(b) Indicate number of participants with missing data for each variable of interest	See table 1 (page 16), table 2 (page 17), figure 1 (page 19) and page 5 & 6
Outcome data	15*	Report numbers of outcome events or summary measures	page 7, 8 & 9
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	See table 1 (page 16)
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	page 7, 8 & 9
Discussion			
Key results	18	Summarise key results with reference to study objectives	page 9
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	page 10 & 11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	page 9, 10 & 11
Generalisability	21	Discuss the generalisability (external validity) of the study results	page 10
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	page 12

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

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

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WHERE TO BUY OTC MEDICATIONS?
A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC painkillers.

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WHERE TO BUY OTC MEDICATIONS?

A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC painkillers.

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ABSTRACT

Objective: To examine consumers' confidence in their own, and also in other people's, over-the-counter (OTC) skills and to describe their attitudes towards the availability of OTC painkillers. Moreover we examined the association between confidence in OTC skills and attitudes.

Design: Cross-sectional survey. Mixed methods (postal and electronic) self-administered questionnaire.

Participants: Members of the Dutch Health Care Consumer Panel.

Main outcome measures: Consumers' confidence in their own, and in other people's, OTC skills was examined. Confidence was measured by three questions regarding obtaining information on, choosing, and using OTC medication. Consumers' attitudes towards availability were assessed using six safety profiles, by asking which channel consumers prefer for each profile

Results: The response rate was 68% (N=972). Consumers feel confident about their own OTC skills (mean 3.74; 95% CI 3.69 to 3.79, on a 5-point Likert scale), but have less confidence in OTC skills of others (mean 2.92; 95% CI 2.88 to 2.96). Consumers are conservative in their attitudes towards the availability of OTC painkillers. Most consumers prefer painkillers to be available exclusively in pharmacies (41 to 71% per profile indicated pharmacy only). Moreover, there is an association between confidence in OTC skills and attitudes ($p=0.005$; $\beta=-0.114$). Consumers who are more confident about their own OTC skills prefer OTC painkillers to be more generally available.

Conclusions: Consumers feel confident about their own OTC skills. However, they would prefer painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively. Consumers' confidence in the OTC skills of others is more consistent with their attitudes towards availability of OTC painkillers. Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Article summary

Article focus

- Several studies have observed that consumers appear to be unaware of how to use OTC medications appropriately, which may entail health risks.
- Until now little is known about consumers' confidence in their own and other people's OTC skills and their attitudes towards the availability of OTC painkillers.
- This study aimed to examine consumers' confidence in both their own, and in other people's, OTC skills, to look too at their attitudes towards the availability of OTC painkillers, and to examine the association between confidence in OTC skills and attitudes.

Key messages

- Consumers feel confident about their own OTC skills. However, they prefer that painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively.
- Consumers have less confidence in the OTC skills of others. This perception is more consistent with their attitudes towards availability of OTC painkillers.
- Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Strengths and limitations of this study

- Strengths include the large sample size and the response rate of almost 70% and the inclusion of an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC painkillers should be available. Another strength is that this study addresses a relatively unexplored area.
- Limitations include not being able to make a comparison between a direct as well as indirect measurements and not being able to link our results to the actual self-medication behaviour of the respondents. In addition, the study only relates to painkillers, the most used OTCs in the Netherlands.

BACKGROUND

The need to save on health care spending and the trend to enhance self care have led to more emphasis on patients taking their own responsibility for the management of minor ailments, including the use of medication that is available without a prescription [1;2]. Today, a wide range of conditions can be treated using medications that are available OTC. Some examples of categories of medicines that have been reclassified to non-prescription medication in many countries are NSAIDs, anti fungal creams and laxatives. However, inappropriate use of OTC medications entails considerable health risks. Several studies demonstrated that inappropriate use results in drug intoxication, drug interactions, side effects and increased health care costs as a consequence of extra visits to a doctor and hospitalization [3-7]. Nevertheless, in many countries, increasingly more drugs that were previously only available on prescription are being switched to OTC status [2;8;9]. A study of the US Government Accountability Office conducted in the UK, the USA, the Netherlands, Italy and Australia, showed that since 1995 all these countries have increased OTC availability. This is due either to changes in the classification of non-prescription drugs or to the reclassification of medications into less restrictive classes [10].

In the Netherlands, the availability of OTC drugs increased when the Dutch government changed the system for OTC medications. The Dutch healthcare policy is based on ideas that independent and critical consumers require an increased availability of OTC medication in order to select a particular drug themselves. Since the introduction of the Medicines Act on 1 July 2007, three categories of non-prescription drugs have been specified: 1) pharmacy only; 2) pharmacy or chemist only; and 3) general sales [11]. Before July 2007, the third category did not exist. In the Netherlands, there is a distinction between pharmacies and chemists. Pharmacies are run by a pharmacist and able to sell all prescription and non-prescription drugs, while chemists are run by a druggist, who requires less training than a pharmacist and is able to sell many but not all non-prescription drugs [10]. When introducing the new legislation, the Dutch government argued that consumers are well-informed and know how to use OTC drugs appropriately [11;12]. This assumption was not supported by international literature. Earlier research, mainly focused on analgesics, observed that consumers appear to be unaware of how to use OTC medications appropriately [4-6;13-16].

There has been little research conducted into how consumers themselves perceive their skills in using OTC medications appropriately. It is important to gain some insight into areas such as overestimating OTC skills as this may result in risks to health. The purpose of the present study was to examine consumers' confidence in OTC

skills. We examined consumers' confidence, both in their own OTC skills, and in those of others. This is because previous research has shown that "people tend to think positively of themselves, often to unrealistic degrees" [17]. Moreover, the literature demonstrated that consumers' estimates of their peers' attitudes and behaviours tend to be roughly accurate [17]. Furthermore, we examined which channels consumers prefer with regard to the availability of OTC painkillers. Finally, we examined the association between consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers, as we expected that more confident consumers prefer them to be more generally available.

METHODS

Setting

Data were collected in the Dutch Health Care Consumer Panel [18-20]. This panel aims to measure opinions on and knowledge of health care as well as expectations and experiences with health care at a national level. At the time of the study (June 2010), the Consumer Panel consisted of approximately 3,000 people aged 18 years and older. Each individual member of the panel receives a questionnaire approximately three times a year and can quite the panel any time. There is no possibility for consumers to sign up for the panel on their own initiative. The panel is renewed on regular base. Renewal is necessary to make sure that members do not develop specific knowledge of, and attention for, health care issues, and that no questionnaire-fatigue occurs. Moreover, renewal compensates for panel members who, for example, have died or moved without informing us about the new address. To recruit new panel members an address file is bought from an address supplier. As a result, possible new members are sampled at random from the general population in the Netherlands. Sampled people receive an information letter about the panel and are called within a week after receiving that letter. If they are interested, they receive a questionnaire on their demographic characteristics. When that questionnaire is returned, they are considered members of the panel. The demographic characteristics of the panel members including their age, gender, level of education, self-reported general health and whether they work(ed) or never worked in healthcare are documented at the start of the panel membership and are updated annually. Data are anonymously processed, and the protection of the data collected is registered with the Dutch Data Protection Authority (nr. 1262949).

Questionnaire

In June 2010, a self-administered questionnaire was sent to 1,422 panel members and returned by 972 members. According to their previously stated preference, 671 members received a questionnaire by post and 751 through

the internet. In total, the questionnaire included 36 questions focusing on different aspects of OTC medications. To increase the response from the onset, two electronic reminders and one postal reminder were sent to panel members who had not responded yet.

The use of OTC drugs

The respondents were asked how long it has been since they had used OTC medications. OTC medications were defined in the questionnaire as follows: "OTC medications are medicines that you can buy at pharmacies and chemists without a doctors' prescription. In addition, you can buy some of these medicines at supermarkets and petrol stations. Examples of OTC medications are painkillers, such as paracetamol or ibuprofen. Homeopathic medicines, nutritional supplements and contraceptives are not considered to be OTC medications". Based on their answers, we generated a dichotomous variable for the use of OTC drugs in the year prior to the questionnaire (1=yes; 0=no). In addition, the respondents who had used OTC drugs in the year prior to the questionnaire were asked what kind of categories (pre-defined) of OTC drugs they had used in that year. All questions had pre-defined categories of answers.

Confidence

Confidence was measured using three questions with regard to obtaining information on, choosing and using OTC medications. These were: 1) 'I am able to make an appropriate choice between different types and brands of OTC drugs'; 2) 'I know exactly how to use OTC drugs in a safe way'; and 3) 'When I try to get advice on OTC drugs, I can easily get the right information'. We used the same three items to examine consumers' confidence in the OTC skills of others, for example asking if: 'Others are able to make an appropriate choice between different types and brands of OTC drugs'. All items had a five-point Likert scale ranging from strongly disagrees to strongly agree. We evaluated for both scales whether the three items measured a single concept by calculating the internal consistency given by Cronbach's alpha. Only the respondents who filled out all three items were included (own: N=951; others: N=949). The internal consistency was good (for both scales Cronbach's alpha 0.81). Subsequently, a mean score was calculated for the respondents who filled out all three items ranging from 1 to 5, in which higher scores indicated greater confidence.

Attitudes towards availability

We presented six safety profiles of painkillers in order to assess consumers' attitudes towards availability. Each profile described a painkiller having properties that resemble current available painkillers in the Netherlands (e.g. paracetamol and ibuprofen). The profiles were descriptions of possible adverse effects of their use, inappropriately or not, and were based on information reflected in patient information leaflets and summaries of product characteristics. They were constructed by one of the research members (MB), who is a pharmacist with special interest in OTC medication and author of a standard Dutch handbook of self-medication. We focused on OTC painkillers because painkillers are among the most commonly used medications [14;16;21], and their inappropriate use can cause serious side effects [5;6;13;21;22]. The following six safety profiles were included: 1) 'No side effects when used as directed, but taking too many tablets can cause serious damage'; 2) 'Mild side effects, such as stomach and intestinal problems, but never serious side effects'; 3) 'In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleeding'; 4) 'Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs'; 5) 'Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases'; and 6) 'Can be used safely by most people, but potentially serious side effects when used by children'. We asked respondents to indicate their preferences for the availability of painkillers with the above described profiles, with the following options: general sales (defined in the questionnaire as supermarket / petrol station); chemist; pharmacy only; and prescription only. It should be noted that in the questionnaire the options were used in a different order, namely: pharmacy only; chemist; general sales; and prescription only. The answer options were based on the Dutch Medicines Act. The options were scored as 1 general sales; 2 chemist; 3 pharmacy only; and 4 prescription only. In addition, items scored as, 'I don't know', were recoded as missing (in total 115 times, 16 to 25 per profile). To evaluate whether the six items measured a single concept, we calculated the internal consistency given by Cronbach's alpha. Respondents who did not fill out all profiles were excluded from the analyses (excluded N=228, included N=744). The excluded respondents did not differ significantly from the respondents included with regard to their demographics. However, they were significantly more restrictive in their preferences for the safety profiles for which they did provide an answer. Factor analysis of the data identified one factor and the internal consistency was good (Cronbach's alpha 0.77). Subsequently, a mean score was calculated for the items for the respondents who filled out all six profiles ranging from 1 to 4, whereby higher scores indicated a greater preference for restricting availability.

Statistical analyses

Firstly, we performed descriptive statistics. Then, by means of t-tests and one-way analyses of variance (ANOVA) ($p<0.01$), we tested the association between the outcomes (consumers' confidence in their own OTC skills and consumers' attitudes) and demographic characteristics (gender, age in three categories, level of education, self-reported general health and whether they work(ed) or never worked in healthcare) and the use of OTC medications. Finally, we conducted a regression analysis to investigate the association between the dependent variable, consumers' attitudes, and the independent variables, consumers' confidence in their own OTC skills, demographic characteristics and use of OTC medications ($p<0.05$). We repeated this association using the total number of times respondents scored the options 'pharmacy only' and 'prescription only' (ranging from 0 to 6), instead of their mean scores, as a dependent variable. In the regression analyses, categorical variables were recoded into dummy variables. All statistical analyses were done using STATA, version 12.1.

RESULTS

In total, 972 panel members returned the questionnaire (response rate 68%). The response to the online questionnaire was lower than to the written questionnaire (62% respectively 76%). More than half (56%) of the respondents were female (Table 1). The age category 40 to 64 years included 54% of the respondents. Almost half (47%) had a middle level of education. General health was self-reported as excellent/very good in 31% of the cases. 72% of the respondents had never worked in healthcare. Compared to the Dutch population aged 18 years and older [18], it was mainly young people (18 to 39 years) who were underrepresented in the group of respondents (see Table 1).

The use of OTC drugs

Among the respondents, 83% used OTC medications in the year prior to the questionnaire (see Table 1). Almost all respondents that had used OTC-drugs in the year prior to the questionnaire, indicated that they had used pain and antipyretic medicines (97%). Furthermore, 76% of the respondents that had used OTC-drugs in the year prior to the questionnaire indicated that they had used medicines for coughs, colds, flu and a sore throat.

Confidence

The mean score for consumers' confidence in their own OTC skills was 3.74 (95% CI: 3.69 to 3.79, on a 5-point Likert scale), indicating that respondents felt quite confident about their own OTC skills. Clearly, the respondents felt less confident about the OTC skills of others (mean score 2.92 and 95% CI: 2.88 to 2.96).

As reflected in Figure 1, seven out of the ten respondents agreed, or strongly agreed, that they are able to make an appropriate choice between different types and brands of OTC drugs. Only 16% of them thought that others are able to make an appropriate choice. Furthermore, 65% of the respondents agreed, or strongly agreed, that they know exactly how to use OTC drugs in a safe way, while only 11% of them thought that others know how to use OTC drugs safely. Lastly, 76% of the respondents agreed, or strongly agreed, that they can easily get the right information when trying to get advice on OTC drugs, compared to 30% of them who believed that others are able to get the right information.

ANOVAs and t-tests showed significant but modest differences between consumers' confidence in their own OTC skills and gender, age, level of education and whether they work(ed) or never worked in healthcare. Women felt slightly more confident about their own OTC skills than men. Furthermore, the elderly (≥ 65 years) and people with a low level of education had slightly less confidence than younger people and people with a middle and high level of education. People that currently work in healthcare or have worked in healthcare in the past felt slightly more confident about their own OTC skills than people that never worked in healthcare. In addition, ANOVA showed that people who had used OTC medications in the year prior to the questionnaire were more confident about their own OTC skills than those who had not used OTC medications in the year prior to the questionnaire (mean 3.84 respectively 3.24, $p<0.001$).

Attitudes towards availability

Table 2 shows that the pharmacy is often mentioned as preferred channel where painkillers with the described profiles should be available (range 41% to 71%). For five out of the six profiles most respondents preferred that painkillers with such a profile should be available exclusively in pharmacies. Only 1% to 8% chose supermarkets or petrol stations as preferred option. ANOVAs and t-tests showed significant but modest differences between consumers' attitudes and age and level of education. Elderly (≥ 65 years) were more restrictive in their preferences for availability than younger people. Moreover, people with a low level of education were more restrictive in their preferences than people with a middle and high level of education.

The last research question focused on the association between consumers' confidence in their own OTC skills and their attitudes towards availability (see Table 3). The regression analysis showed that respondents who were more confident about their own OTC skills preferred OTC painkillers to be more generally available. This association was observed in addition to the effects of age and the level of education already mentioned. The association between own OTC skills and attitudes towards availability was also found when we performed an additional

regression analysis, in which we used the total number of times respondents scored the options 'pharmacy only' and 'prescription only' as a dependent variable.

DISCUSSION

Principal findings

Consumers feel confident about their own OTC skills, but they have less confidence in the OTC skills of others. In other words, consumers presume that, compared to themselves, other people are less able to use self-medication appropriately. Although consumers are confident, they are conservative in their attitudes towards the general availability of OTC painkillers. Most consumers prefer that painkillers with the described profiles (e.g. paracetamol and ibuprofen) should be available in pharmacies exclusively. Currently, painkillers with profiles similar to those described are available for general sale in most European countries, including the Netherlands. Finally, we observed that more confident consumers preferred OTC painkillers to be more generally available.

Comparisons with other studies

There appears to be a discrepancy between our findings on the public perception about their own OTC skills and earlier research on the public awareness, perception and knowledge of OTC medication. While our study showed that consumers have high confidence in their own skills, previous studies found that, consumers are unaware of the fact that OTC medications can cause adverse events when used with other medications [5;23] and also of the toxicities of OTC medications [4;14]. Neither do they know, or are concerned, about the potential side effects of OTC analgesics [13;14]. They perceive OTC drugs as safe [14;15] and "too weak to cause any real harm" [6]. In addition, a recent study in Australia observed that fewer people are using NSAIDs appropriately according to the label, since ibuprofen has become available outside the pharmacy [16]. Summarized, while previous studies show that consumers seem to be unaware of how to use OTC medications appropriately our study shows that consumers are convinced they know how to use OTC medications appropriately. Yet, the confidence consumers have in the skills of others seems more consistent with the literature. It also probably better connects to reality, since, in general, the estimates of consumers regarding their peers' attitudes and behaviours tend to be roughly accurate [17]. Moreover, the confidence consumers have in the skills of others is in line with their attitudes towards availability of OTC painkillers. It appears that consumers have taken into account in their attitudes the confidence, or lack of it, that they have in the OTC skills of others. The assumption of the Dutch government that consumers prefer a less restrictive availability is not supported by our findings when consumers are confronted with safety information on

medication. Nevertheless, in many countries an increasing number of drugs that were previously only available on prescription have been switched to OTC status [2;8;9].

Implications

Confidence in self-medication does not imply that the use of OTC medications is always optimal or appropriate [24]. The difference between consumers' confidence in their own skills compared to those of others indicate that some OTC users may be overconfident of their own OTC skills. This view is supported by the fact that consumers would like to limit the availability of OTC drugs with profiles that match currently widely available OTC drugs. This suggests that not all consumers are able to comprehend the proper use of OTC drugs which may entail health risks. For example, Leendertse et al. (2008) [25] observed that NSAIDs (amongst which also OTC drugs) are one of the medicines associated most often with potentially preventable medication-related hospital admissions. Moreover, Pirmohamed (2004) [26] observed that, among others, NSAIDs were most commonly implicated in admissions related to adverse drug reactions. Furthermore, a Dutch study showed that during the last decade there had been an increase in requests on paracetamol poisoning to the National Poisons Information Center [27] . There also have been some concerns regarding switching the status of prescription drugs to OTC availability. Examples of such concerns are an inaccurate diagnosis by patients and delay in obtaining medical assistance [28]. We were unable to link our results to the actual self-medication behaviour of the respondents. Therefore, further research is recommended to examine this.

The fact that inappropriate use of medication entails health risks led to recommendations to increase the risk awareness and knowledge among the public, and to educate them about OTC medication and its potential risks [6;13;14;16;29]. The question is whether people are either unable to understand and find the correct information, or whether they do not want, read, search or ask for this information. Therefore, it is not clear yet, how to increase public awareness. What seems clear is that consumers consider pharmacies as a safe environment, since most of them prefer the painkillers described to be available in pharmacies exclusively. This is confirmed in an earlier study where was found that Dutch consumers consider pharmacists as the most reliable source of information regarding OTC medication [30]. Although Dutch consumers expect to be provided with reliable information from pharmacies, it is possible that there are differences between pharmacies with regards to the quality of their advice. Furthermore, in 2010, 88% of the Dutch adult population put much or very much trust in pharmacists [31]. As a result, pharmacists can have an important role in questioning and informing patients about OTC medications.

The strengths and limitations of the study

This study addresses a relatively unexplored area. An important strength of our study is the large sample size and the response rate of almost 70%. However, the respondents in our study are not fully representative of the adult Dutch population aged 18 plus. Therefore, we performed analyses to see whether there are differences between groups of consumers. We observed some small but significant differences. However, they do not appear to affect our conclusions. We included an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC painkillers should be available. Earlier research in the Netherlands demonstrated that when trade names of painkillers are presented to consumers, they judge them as safe. More than 95%, respectively 70%, of the consumers considered paracetamol and ibuprofen as safe, or very safe [32]. Unfortunately, we did not include direct as well as indirect measurements in our questionnaire, as we are now not able to make a comparison between both measurements. We also did not provide information on the pack sizes/quantity in the questionnaire. Providing such information might influence the attitudes towards availability of the respondents. It could, for example, be assumed that consumers prefer a more restrictive availability for larger pack sizes of OTC medicines. Another possible limitation might be that the study only relates to painkillers, albeit those are the most used OTCs in the Netherlands. Furthermore, we did not include internet as a channel in our questionnaire, because this study was part of a policy evaluation in which only the official Dutch sales channels were evaluated. With the increasing growth of internet pharmacy, it would be interested to include this channel in further research. Another possible limitation is that we excluded quite a considerable number of respondents (N=228), because they did not fill out all six safety profiles. The excluded respondents were more restrictive in their preferences, possibly implying a slight underestimation of the observed effects in our analyses.

Conclusions

This study aimed to examine consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers. The Dutch government assumed that consumers are well-informed, know how to use OTC medications appropriately, and prefer a wider availability. It could be questioned whether these assumptions are true. Consumers feel confident about their own OTC skills; however, they would prefer painkillers with safety profiles resembling currently available OTC painkillers, to be available as OTC in pharmacies exclusively. Furthermore, the confidence consumers have in the OTC skills of others seems more consistent with their attitudes towards availability. Until consumers themselves realise they are also one of the others, they may

overestimate their OTC skills, which may entail health risks.

Footnotes

We thank the panel members of the Dutch Health Care Consumer Panel who participated in this study.

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Contributors: The study was devised and designed by LVD and MB. JDJ was responsible for the data collection in the Dutch Health Care Consumer Panel. AB performed the statistical analyses and drafted the manuscript. All other authors critically revised it. All authors gave their final approval for the manuscript version to be published. All authors are responsible for the overall content as guarantors.

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Competing interests: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: the authors received support for the data collection from the Dutch Ministry of Health, Welfare and Sport for the work submitted. AB and JDJ there was no financial relationship with any organisations that might have an interest in the submitted work in the previous three years. LVD received unrestricted grants from Bristol-Myers Squibb and Astra Zeneca for studies not related to this study in 2011 and 2012. MB performed occasional consultancy work for both organisations of pharmacists, druggists and government. And all authors that there was no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: According to the Dutch law, no ethical approval was needed. The protection of the collected data is registered with the Dutch Data Protection Authority (nr. 1262949).

Data sharing: Data is available on request and subject to approval by the programme committee of the Dutch Health Care Consumer Panel. The questionnaire (in Dutch) is available on request from the authors.

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Ref Type: Online Source

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Tables and figures

Table 1: Demographic characteristics of the respondents and the Dutch population aged 18 years and older

	Respondents		Dutch population aged 18 years and older*	
	N	%	%	
Gender	**972**			
Male	424	43.6	49.0	
Female	548	56.4	51.0	
Age	**972**			
18-39 years	88	9.1	35.3	
40-64 years	527	54.2	45.3	
65 years and older	357	36.7	19.5	
Education	**948**			
Low (none, primary school or pre-vocational education)	184	19.4	33.8	
Middle (secondary or vocational education)	448	47.3	40.5	
High (professional higher education or university)	316	33.3	25.7	
Self-reported general health	**965**			
Poor/bad	175	18.1	Less than good**	18.6
Good	487	50.5	Good	52.7
Excellent/very good	303	31.4	Very good	28.8
Working in healthcare	**919**			
No, never worked in healthcare	663	72.1	Not available	
Yes, I am currently working in healthcare	119	13.0	Not available	
Yes, I have worked in healthcare in the past	137	14.9	Not available	

Use of OTC drugs in the year prior to the questionnaire		**960**		
No		160	16.7	Not available
Yes		800	83.3	Not available

** Data of the Dutch population aged 18 years and older is based on information from Statistics Netherland.*

*** Statistics Netherlands has three categories of self-reported general health. The percentage of Statistics Netherlands relate to the overall health of the entire general population, including those under 18 years.*

Table 2: Percentage of respondents that prefer a specific channel with regards to the availability of OTC painkillers

		Percentage of respondents that prefer a channel				
Safety profiles*	**N**	*Supermarket/ petrol station*	*Chemist*	*Pharmacy only*	*Prescription only*	*Mean score ** (95% CI)*
Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs	**876**	1.1	7.4	70.8	20.7	**3.11** (3.07 to 3.15)
Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases	**875**	1.0	12.6	65.3	21.1	**3.07** (3.02 to 3.11)
Can be used safely by most people, but potentially serious side effects when used by children	**859**	2.2	18.6	59.6	19.6	**2.97** (2.92 to 3.01)
In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleedings	**848**	3.5	25.4	52.7	18.4	**2.86** (2.81 to 2.91)
No side effects when used as directed, but taking too many tablets can cause serious damage	**813**	8.1	34.0	46.0	11.9	**2.62** (2.56 to 2.67)
Mild side effects, such as stomach and intestinal problems, but never serious side effects	**841**	4.8	45.3	40.7	9.3	**2.54** (2.50 to 2.59)

* Safety profiles are ordered based on their mean score. In the questionnaire, they were ordered in another way.

** Ranging from 1 to 4 (1 = wide availability; 4 = restrictive availability).

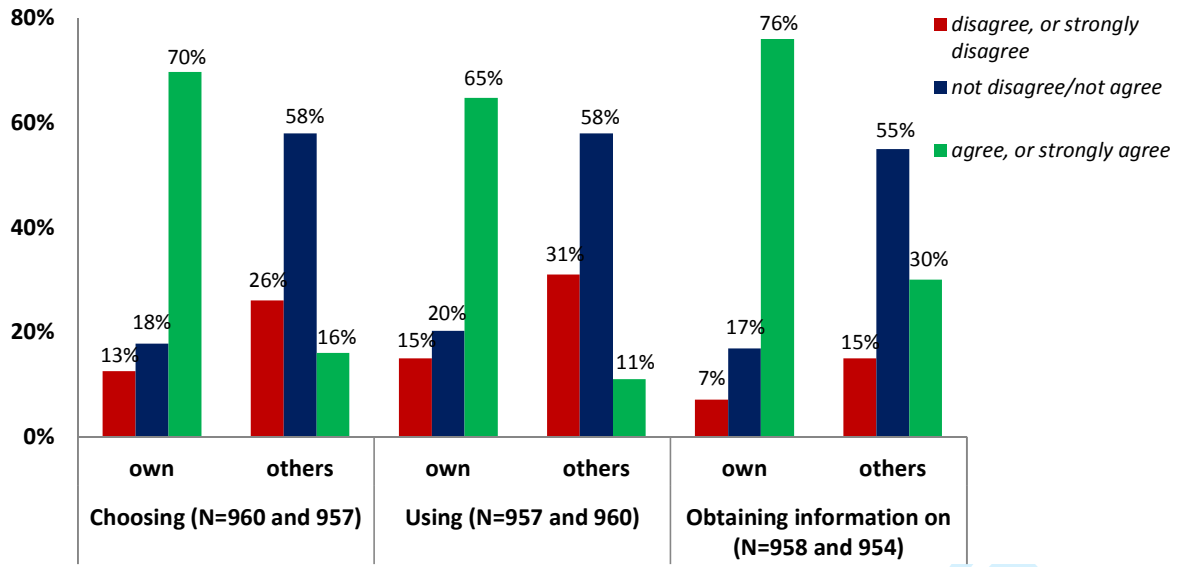
Table 3: Regression model for attitudes towards availability (N=672)

	Beta*	P-value
Availability (1= wide; 4 = restrictive)		
Confidence (1 = low; 5 = high)	-0.114	**0.005**
Gender (0 = man; 1 = woman)	0.010	0.807
Age	0.102	**0.012**
Level of education		
-Low	reference level	
-Middle	-0.118	**0.024**
-High	-0.242	**0.000**
Self-reported general health		
-Bad/poor	reference level	
-Good	0.028	0.599
-Excellent/very good	-0.011	0.838
Work in healthcare (0 = never worked in healthcare; 1 = currently working in healthcare/worked in healthcare in past)	-0.038	0.358
Use of OTC drugs in year prior to questionnaire (0 = no; 1 = yes)	-0.010	0.813
Constant	.	**0.000**

Adjusted R-square: 0.07

* Standardized coefficients

Figure 1: Consumers' confidence in their own OTC skills and in the OTC skills of others



Choosing: I am / others are able to make an appropriate choice between different types and brands of OTC drugs

Using: I / others know exactly how to use OTC drugs in a safe way

Obtaining information on: When I / others try to get advice on OTC drugs, I / others can easily get the right information

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

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	page 1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	page 2 & 3 (Article Summary)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	page 4
Objectives	3	State specific objectives, including any prespecified hypotheses	page 4 & 5
Methods			
Study design	4	Present key elements of study design early in the paper	page 5 & 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	page 5 & 6 (Data collection in June & July 2010)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	page 5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	page 6 & 7
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	page 6 & 7
Bias	9	Describe any efforts to address potential sources of bias	page 5
Study size	10	Explain how the study size was arrived at	page 5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	page 8
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	page 8
		(*b*) Describe any methods used to examine subgroups and interactions	page 8
		(*c*) Explain how missing data were addressed	page 6 & 7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA

		(*e*) Describe any sensitivity analyses	page 8
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	page 5
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	See table 1 (page 18 &19) & page 8
		(b) Indicate number of participants with missing data for each variable of interest	See table 1 (page 18 & 19), table 2 (page 20), figure 1 (page 22) and page 6 & 7
Outcome data	15*	Report numbers of outcome events or summary measures	page 8, 9 & 10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	See table 1 (page 18 & 19)
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	page 8, 9 & 10
Discussion			
Key results	18	Summarise key results with reference to study objectives	page 10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	page 11, 12 & 13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	page 10, 11, 12 & 13
Generalisability	21	Discuss the generalisability (external validity) of the study results	page 12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	page 14

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

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

WHERE TO BUY OTC MEDICATIONS?

A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC ~~analgesics~~painkillers.

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ABSTRACT

Objective: To examine consumers' confidence in their own, and also in other people's, over-the-counter (OTC) skills and to ~~look too at~~describe their attitudes towards the availability of OTC ~~analgesics~~painkillers. Moreover we examined the association between confidence in OTC skills and attitudes.

Design: Cross-sectional survey. ~~Mixed-mode questionnaire.~~ Mixed methods (postal and electronic) self-administered questionnaire.

Participants: Members of the Dutch Health Care Consumer Panel ~~of whom 972 returned the questionnaire (response 68%)~~.

Main outcome measures: Consumers' confidence in their own, and in other people's, OTC skills was examined. ~~This is because, generally, people are roughly accurate when estimating peers' attitudes and behaviours.~~ Confidence was measured by three questions regarding obtaining information on, choosing, and using OTC medication. Consumers' attitudes towards availability were assessed using six safety profiles, by asking which channel consumers prefer for each profile. ~~Respondents had to indicate which channel they prefer for each profile.~~

Results: The response rate was 68% (N=972). Consumers feel confident about their own OTC skills (mean 3.74; 95% CI 3.69 to 3.79, on a 5-point Likert scale), but have less confidence in OTC skills of others (mean 2.92; 95% CI 2.88 to 2.96). Consumers are conservative in their attitudes towards the availability of OTC ~~analgesics~~painkillers. Most consumers prefer ~~analgesics~~ painkillers to be available exclusively in pharmacies (41 to 71% per profile indicated pharmacy only). Moreover, there is an association between confidence in OTC skills and attitudes (p=0.00~~53~~; β=-0.11~~45~~). Consumers who are more confident about their own OTC skills prefer OTC ~~analgesics~~ painkillers to be more generally available.

Conclusions: Consumers feel confident about their own OTC skills. However, they would prefer ~~analgesics~~ painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively. Consumers' confidence in the OTC skills of others is more consistent with their attitudes towards availability of OTC ~~analgesics~~painkillers. Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Article summary

Article focus

- Several studies have observed that consumers appear to be unaware of how to use OTC medications appropriately, which may entail health risks.
- Until now little is known about consumers' confidence in their own and other people's OTC skills and their attitudes towards the availability of OTC ~~analgesics~~painkillers.
- This study aimed to examine consumers' confidence in both their own, and ~~also~~ in other people's, OTC skills, to look too at their attitudes towards the availability of OTC painkillers~~analgesics~~, and to examine the association between confidence in OTC skills and attitudes.

Key messages

- Consumers feel confident about their own OTC skills. However, they ~~would~~ prefer that painkillers~~analgesics~~ with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively.
- Consumers have less confidence in the OTC skills of others. This perception is more consistent with their attitudes towards availability of OTC painkillers~~analgesics~~.
- Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Strengths and limitations of this study

- Strengths include the large sample size and the response rate of almost 70% and the inclusion of an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC painkillers~~analgesics~~ should be available. Another strength is that this study addresses a relatively unexplored area.
- Limitations include not being able to make a comparison between a direct as well as indirect measurements and not being able to link our results to the actual self-medication behaviour of the respondents~~, since we do not know what they do and buy~~. In addition, the study only relates to painkillers, the most used OTCs in the Netherlands.

BACKGROUND

The need to save on health care spending and the trend to enhance self care have~~has~~ led to more emphasis on patients taking their own responsibility for the management of minor ailments, including the use of medication that is available without a prescription [1;2]. Today, a wide range of conditions can be treated using medications that are available OTC. Some examples of categories of medicines that have been reclassified to non-prescription medication in many countries are NSAIDs, anti fungal creams and laxatives. However, inappropriate use of OTC medications entails considerable health risks. Several studies demonstrated that inappropriate use results in drug intoxication, drug interactions, side effects and increased health care costs as a consequence of extra visits to a doctor and hospitalization [3-7]. Nevertheless, in many countries, increasingly more drugs that were previously only available on prescription are being switched to OTC status [2;8;9]. A study of the US Government Accountability Office conducted in the UK, the USA, the Netherlands, Italy and Australia, showed that since 1995 all these countries have increased OTC availability. This is due either to changes in the classification of non-prescription drugs or to the reclassification of medications into less restrictive classes [10].

In the Netherlands, the availability of OTC drugs increased when the Dutch government changed the system for OTC medications. The Dutch healthcare policy is based on ideas that independent and critical consumers require an increased availability of OTC medication in order to select a particular drug themselves. Since the introduction of the Medicines Act on 1 July 2007, three categories of non-prescription drugs have been specified: 1) pharmacy only; 2) pharmacy or chemist only ~~and chemist~~; and 3) general sales [11]. Before July 2007, the third category did not exist. In the Netherlands, there is a distinction between pharmacies and chemists. Pharmacies are run by a pharmacist and able to sell all prescription and non-prescription drugs, while chemists are run by a druggist, who requires less training than a pharmacist and is able to sell many but not all non-prescription drugs [10]. When introducing the new legislation, the Dutch government argued that consumers are well-informed and know how to use OTC drugs appropriately [11;12]. This assumption was not supported by international literature. Earlier research, mainly focused on analgesics, observed that consumers appear to be unaware of how to use OTC medications appropriately [4-6;13-16].

There has been little research conducted into how consumers themselves perceive their skills in using OTC medications appropriately. It is important to gain some insight into areas such as overestimating OTC skills as this may result in risks to health. The purpose of the present study was to examine consumers' confidence in OTC

skills. We examined consumers' confidence, both in their own OTC skills, and in those of others. This is because previous research has shown that "people tend to think positively of themselves, often to unrealistic degrees" [17]. Moreover, the literature demonstrated that consumers' estimates of their peers' attitudes and behaviours tend to be roughly accurate [17]. Furthermore, we examined which channels consumers prefer with regard to the availability of OTC painkillers~~analgesics~~. Finally, we examined the association between consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers~~analgesics~~, as we expected that more confident consumers prefer them to be more generally available.

METHODS

Setting

Data were collected in the Dutch Health Care Consumer Panel [18-20]. This panel aims to measure opinions on and knowledge of health care as well as expectations and experiences with health care at a national level. At the time of the study (June 2010), the Consumer Panel consisted of approximately 3,000 people aged 18 years and older. Each individual member of the panel receives a questionnaire approximately three times a year and can quite the panel any time. There is no possibility for consumers to sign up for the panel on their own initiative. The panel is renewed on regular base. Renewal is necessary to make sure that members do not develop specific knowledge of, and attention for, health care issues, and that no questionnaire-fatigue occurs. Moreover, renewal compensates for panel members who, for example, have died or moved without informing us about the new address. To recruit new panel members an address file is bought from an address supplier. As a result, possible new members are sampled at random from the general population in the Netherlands. Sampled people receive an information letter about the panel and are called within a week after receiving that letter. If they are interested, they receive a questionnaire on their demographic characteristics. When that questionnaire is returned, they are considered members of the panel. The demographic characteristics of the panel members including their age, gender, level of education, ~~and~~ self-reported general health and whether they work(ed) or never worked in healthcare are ~~were~~ documented at the start of the panel membership and are updated annually. Data are anonymously processed, and the~~The~~ protection of the data collected is registered with the Dutch Data Protection Authority (nr. 1262949).

Questionnaire

In June 2010, a self-administered questionnaire was sent to 1,422 panel members and returned by 972 members. According to their previously stated preference, 671 members received a questionnaire by post and 751 through

the internet. In total, the questionnaire included 36 questions focusing on different aspects of OTC medications. To increase the response from the onset, two electronic reminders and one postal reminder were sent to panel members who had not responded yet.

The use of OTC drugs

The respondents were asked how long it has been since they had used OTC medications. OTC medications were defined in the questionnaire as follows: "OTC medications are medicines that you can buy at pharmacies and chemists without a doctors' prescription. In addition, you can buy some of these medicines at supermarkets and petrol stations. Examples of OTC medications are painkillers, such as paracetamol or ibuprofen. Homeopathic medicines, nutritional supplements and contraceptives are not considered to be OTC medications". Based on their answers, we generated a dichotomous variable for the use of OTC drugs in the year prior to the questionnaire (1=yes; 0=no). In addition, the respondents who had used OTC drugs in the year prior to the questionnaire were asked what kind of categories (pre-defined) of OTC drugs they had used in that year. All questions had pre-defined categories of answers.

Confidence

Confidence was measured using three questions with regard to obtaining information on, choosing and using OTC medications. These were: 1) 'I am able to make an appropriate choice between different types and brands of OTC drugs'; 2) 'I know exactly how to use OTC drugs in a safe way'; and 3) 'When I try to get advice on OTC drugs, I can easily get the right information'. We used the same three items to examine consumers' confidence in the OTC skills of others, for example asking if: 'Others are able to make an appropriate choice between different types and brands of OTC drugs'. All items had a five-point Likert scale ranging from strongly disagrees to strongly agree. We evaluated for both scales whether the three items measured a single concept by calculating the internal consistency given by Cronbach's alpha. Only the respondents who filled out all three items were included (own: N=951; others: N=949). The internal consistency was good (for both scales Cronbach's alpha 0.81). Subsequently, a mean score was calculated for the respondents who filled out all three items ranging from 1 to 5, in which higher scores indicated greater confidence.

Attitudes towards availability

We presented six safety profiles of painkillers ~~analgesics~~ in order to assess consumers' attitudes towards availability. Each profile described a~~n~~ painkiller ~~analgesic~~ having properties that resemble current available painkillers~~analgesics~~ in the Netherlands (e.g. paracetamol and ibuprofen). The profiles were descriptions of possible adverse effects of their use, inappropriately or not, and were based on information reflected in patient information leaflets and summaries of product characteristics. They were constructed by one of the research members (MB), who is a pharmacist with special interest in OTC medication and author of a standard Dutch handbook of self-medication. We focused on OTC painkillers~~analgesics~~ because painkillers~~analgesics~~ are among the most commonly used medications [14;16;21], and their inappropriate use can cause serious side effects [5;6;13;21;22]. The following six safety profiles were included: 1) 'No side effects when used as directed, but taking too many tablets can cause serious damage'; 2) 'Mild side effects, such as stomach and intestinal problems, but never serious side effects'; 3) 'In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleeding'; 4) 'Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs'; 5) 'Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases'; and 6) 'Can be used safely by most people, but potentially serious side effects when used by children'. We asked respondents to indicate their preferences for the availability ~~where~~ of ~~analgesics~~ painkillers with the above described profiles ~~should be available~~, with the following options: ~~1)~~ general sales (defined in the questionnaire as supermarket / petrol station); ~~2)~~ chemist; ~~3)~~ pharmacy only; and ~~4)~~ prescription only. It should be noted that in the questionnaire the options were used in a different order, namely: ~~1)~~ pharmacy only; ~~2)~~ chemist; ~~3)~~ general sales; and ~~4)~~ prescription only. The answer options were based on the Dutch Medicines Act. The options were scored as 1 general sales; 2 chemist; 3 pharmacy only; and 4 prescription only. In addition, items scored as, 'I don't know', were recoded as missing (in total 115 times, 16 to 25 per profile). To evaluate whether the six items measured a single concept, we calculated the internal consistency given by Cronbach's alpha. Respondents who did not fill out all profiles were excluded from the analyses (excluded N=228, included N=744). The excluded respondents did not differ significantly from the respondents included with regard to their demographics. However, they were significantly more restrictive in their preferences for the safety profiles for which they did provide an answer. Factor analysis of the data identified one factor and the internal consistency was good (Cronbach's alpha 0.77). Subsequently, a mean score was calculated for the items for the respondents who filled out all six profiles ranging from 1 to 4, whereby higher scores indicated a greater preference for restricting availability.

Statistical analyses

Firstly, we performed descriptive statistics. Then, by means of t-tests and one-way analyses of variance (ANOVA) ($p<0.01$), we tested the association between the outcomes (consumers' confidence in their own OTC skills and consumers' attitudes) and demographic characteristics (gender, age in three categories, level of education, ~~and~~ self-reported general health and whether they work(ed) or never worked in healthcare) and the use of OTC medications. Finally, we conducted a regression analysis to investigate the association between the dependent variable, consumers' attitudes, and the independent variables, consumers' confidence in their own OTC skills, demographic characteristics and use of OTC medications ($p<0.05$). We repeated this association using the total number of times respondents scored the options 'pharmacy only' and 'prescription only' (ranging from 0 to 6), instead of their mean scores, as a dependent variable. In the regression analyses, categorical variables were recoded into dummy variables. All statistical analyses were done using STATA, version 12.1.

RESULTS

In total, 972 panel members returned the questionnaire (response rate 68%). The response to the online questionnaire was lower than to the written questionnaire (62% respectively 76%). More than half (56%) of the respondents were female (Table 1). The age category 40 to 64 years included 54% of the respondents. Almost half (47%) had a middle level of education. General health was self-reported as excellent/very good in 31% of the cases. 72% of the respondents had never worked in healthcare. Compared to the Dutch population aged 18 years and older [18], it was mainly young people (18 to 39 years) who were underrepresented in the group of respondents (see Table 1).

The use of OTC drugs

Among the respondents, 83% used OTC medications in the year prior to the questionnaire (see Table 1). ~~OTC analgesics were predominantly used.~~ Almost all ~~(97%)~~ respondents that had used OTC-drugs in the year prior to the questionnaire, indicated that they had used ~~analgesics~~pain and antipyretic medicines (97%). Furthermore, 76% of the respondents that had used OTC-drugs in the year prior to the questionnaire indicated that they had used~~,~~ ~~followed by~~ medicines for coughs, colds, flu and a sore throat ~~(76%)~~.

Confidence

The mean score for consumers' confidence in their own OTC skills was 3.74 (95% CI: 3.69 to 3.79, on a 5-point Likert scale), indicating that respondents ~~feel~~ felt quite confident about their own OTC skills. Clearly, ~~R~~ the respondents felt ~~clearly~~ less confident about the OTC skills of others (mean score 2.92 and 95% CI: 2.88 to 2.96). As reflected in Figure 1, seven out of the ten respondents agreed, or strongly agreed, that they are able to make an appropriate choice between different types and brands of OTC drugs. Only 16% of them thought that others are able to make an appropriate choice. Furthermore, 65% of the respondents agreed, or strongly agreed, that they know exactly how to use OTC drugs in a safe way, while only 11% of them thought that others know how to ~~apply~~ use OTC drugs safely. Lastly, 76% of the respondents agreed, or strongly agreed, that they can easily get the right information when trying to get advice on OTC drugs, compared to 30% of them who believed that others are able to get the right information.

ANOVAs and t-tests showed significant but modest differences between consumers' confidence in their own OTC skills and gender, age, ~~and~~ level of education and whether they work(ed) or never worked in healthcare. Women ~~feel~~ felt slightly more confident about their own OTC skills than men. Furthermore, the elderly (≥ 65 years) and people with a low level of education ~~have~~ had slightly less confidence than younger people and people with a middle and high level of education. People that currently work in healthcare or have worked in healthcare in the past felt slightly more confident about their own OTC skills than people that never worked in healthcare. In addition, ANOVA showed that people who had used OTC medications in the year prior to the questionnaire were more confident about their own OTC skills than those who had not used OTC medications in the year prior to the questionnaire (mean 3.84 respectively 3.24, $p<0.001$).

Attitudes towards availability

Table 2 shows that the pharmacy is often mentioned as preferred channel where ~~analgesics~~ painkillers with the described profiles should be available (range 41% to 71%). For five out of the six profiles most respondents preferred that ~~analgesics~~ painkillers with such a profile should be available exclusively in pharmacies. ~~Supermarkets or petrol stations were hardly mentioned as a preferred channel where analgesics with the described profiles should be available.~~ Only 1% to 8% chose supermarkets or petrol stations as preferred option. ANOVAs and t-tests showed significant but modest differences between consumers' attitudes and age and level of education. Elderly (≥ 65 years) ~~are~~ were more restrictive in their preferences for availability than younger people. Moreover, people with a low level of education ~~are~~ were more restrictive in their preferences than people with a middle and high level of education.

The last research question focused on the association between consumers' confidence in their own OTC skills and their attitudes towards availability (see Table 3). The regression analysis showed that respondents who were more confident about their own OTC skills preferred OTC ~~analgesics~~ painkillers to be more generally available. This association was observed in addition to the effects of age and the level of education already mentioned. The association between own OTC skills and attitudes towards availability was also found ~~same results were shown~~ when we performed an additional regression analysis, in which we used the total number of times respondents scored the options 'pharmacy only' and 'prescription only' as a dependent variable.

DISCUSSION

Principal findings

~~Our findings show that c~~Consumers feel confident about their own OTC skills, but ~~that~~ they have less confidence in the OTC skills of others. In other words, consumers presume that, compared to themselves, other people are less able to use self-medication appropriately. Although consumers are confident, they are conservative in their attitudes towards the general availability of OTC ~~analgesics~~painkillers. Most consumers prefer that ~~analgesics~~ painkillers with the described profiles (e.g. paracetamol and ibuprofen) should be available in pharmacies exclusively. Currently, ~~analgesics~~ painkillers with profiles similar to those described are available for general sale in most European countries, including the Netherlands. Finally, we observed that more confident consumers preferred OTC ~~analgesics~~ painkillers to be more generally available.

Comparisons with other studies

There appears to be a discrepancy between our findings on the public perception about their own OTC skills and earlier research on ~~Earlier research examined~~ the public awareness, perception and knowledge of OTC medication~~s~~. While our study showed that consumers have high confidence in their own skills, ~~According to the literature~~previous studies found that, consumers ~~perceive OTC drugs as safe [14;15] and "too weak to cause any real harm" [6]. Moreover, they a~~are unaware of the fact that OTC medications can cause adverse events when used with other medications [5;23] and also of the toxicities of OTC medications [4;14]. Neither do they know, or are concerned, about the potential side effects of OTC analgesics [13;14]. They perceive OTC drugs as safe [14;15] and "too weak to cause any real harm" [6]. ~~-~~In addition, a recent study in Australia observed that fewer people are using NSAIDs appropriately according to the label, since ibuprofen has become available outside the pharmacy [16]. Summarized, while previous studies show that consumers seem to be unaware of how to use OTC medications appropriately

our study shows that ~~Our study investigated consumers' confidence in OTC skills, using two measurements. There appears to be a discrepancy between the literature and the public perception about their own OTC skills, since~~ consumers are convinced they know how to use OTC medications appropriately. Yet, t~~T~~he confidence consumers have in the skills of others seems more consistent with the literature. It also probably better connects to reality, since, in general, the estimates of consumers regarding their peers' attitudes and behaviours tend to be roughly accurate [17]. Moreover, the confidence consumers have in the skills of others~~it~~ is in line with their attitudes towards availability of OTC ~~analgesics~~painkillers. It appears that consumers have taken into account in their attitudes the confidence, or lack of it, that they have in the OTC skills of others. The assumption of the Dutch government that consumers prefer a less restrictive availability is not supported by our findings when consumers are confronted with safety information on medication. Nevertheless, in many countries an increasing number of drugs that were previously only available on prescription have been switched to OTC status [2;8;9].

Implications

~~As concluded by Hughes et al. (2001) [24], c~~Confidence in ~~and preference for~~ self-medication does not imply that the use of OTC medications is always optimal or appropriate~~.~~ [24]. ~~This is supported by the fact that the public's estimation of others will probably be more accurate. As a result,~~ The difference between consumers' confidence in their own skills compared to those of others indicate that ~~a proportion of~~some OTC users~~, are probably~~ may be overconfident ~~in their own behaviour~~of their own OTC skills. This view is supported by the fact that consumers would like to limit the availability of OTC drugs with profiles that match currently widely available OTC drugs. This suggests that not all consumers are able to comprehend the proper use of OTC drugs which~~, and this~~ may entail health risks. For example, Leendertse et al. (2008) [25] observed that NSAIDs (amongst which also OTC drugs) are one of the medicines associated most often with potentially preventable medication-related hospital admissions. Moreover, Pirmohamed (2004) [26] observed that, among others, NSAIDs were most commonly implicated in admissions related to adverse drug reactions. ~~Moreover~~Furthermore, a Dutch study showed that during the last decade there had been an increase in requests on paracetamol poisoning to the National Poisons Information Center [27] . There also have been some concerns regarding switching the status of prescription drugs to OTC availability. Examples of such concerns are an inaccurate diagnosis by patients and delay in obtaining medical assistance [28]. ~~In our study, we~~We were ~~not able~~unable to link our results to the actual self-medication behaviour of the respondents~~, since we do not know what they do and buy~~. Therefore, further research is recommended to examine this.

~~Previous researcl~~ The fact that inappropriate use of medication entails health risks led to recommendations~~ed~~ to increase the risk awareness and knowledge among the public, and to educate them about OTC medication~~s~~ and ~~t~~its~~heir~~ potential risks [6;13;14;16;29~~6;13;14;16;28~~]. The question is whether people are either unable to understand and find the correct information, or whether they do not want, read, search or ask for this information. Therefore, it is not clear yet, how to ~~inform the public and increase awareness among them~~increase public awareness. What seems clear is that consumers consider pharmacies~~sts to be a reliable source of information~~ as a safe environment, since most of them prefer the ~~analgesics~~ painkillers described to be available in pharmacies exclusively. This is confirmed in an earlier study where was found that Dutch consumers consider pharmacists as the most reliable source of information regarding OTC medication [30]. Although Dutch consumers expect to be provided with reliable information from pharmacies, it is possible that there are differences between pharmacies with regards to the quality of their advice. Furthermore, in 2010, 88% of the Dutch adult population put much or very much trust in pharmacists [31]. As a result, pharmacists can~~ould~~ have an important role in questioning and informing patients about OTC medications.

The strengths and limitations of the study

This study addresses a relatively unexplored area. An important strength of our study is the large sample size and the response rate of almost 70%. However, the respondents in our study are not fully representative of the adult Dutch population aged 18 plus. Therefore, we performed analyses to see whether there are differences between groups of consumers. We observed some small but significant differences. However, they do not appear to affect our conclusions ~~since the differences were modest~~. We included an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC ~~analgesics~~ painkillers should be available. Earlier research in the Netherlands demonstrated that when trade names of ~~analgesics~~ painkillers are presented to consumers, they judge them as safe. More than 95%, respectively 70%, of the consumers considered paracetamol and ibuprofen as safe, or very safe [32~~29~~]. ~~It is a disadvantage that~~Unfortunately, we did not include direct as well as indirect measurements in our questionnaire, as we are now not able to make a comparison between both measurements. We also did not provide information on the pack sizes/quantity in the questionnaire. Providing such information might influence the attitudes towards availability of the respondents. It could, for example, be assumed that consumers prefer a more restrictive availability for larger pack sizes of OTC medicines. Another possible limitation might be that the study only relates to painkillers, albeit those are the most used OTCs in the Netherlands. Furthermore, we did not include internet as a channel in

our questionnaire, because this study was part of a policy evaluation in which only the official Dutch sales channels were evaluated. With the increasing growth of internet pharmacy, it would be interested to include this channel in further research. Another possible limitation is that we excluded quite a considerable number of respondents (N=228), because they did not fill out all six safety profiles. The excluded respondents were more restrictive in their preferences, possibly implying a slight underestimation of the observed effects in our analyses.

Conclusions

This study aimed to examine consumers' confidence in OTC skills and their attitudes towards the availability of OTC ~~analgesics~~painkillers. The Dutch government assumed that consumers are well-informed, know how to use OTC medications appropriately, and prefer a wider availability. It could be questioned whether these assumptions are true. Consumers feel confident about their own OTC skills; however, they would prefer ~~analgesics~~ painkillers with safety profiles resembling currently available OTC ~~analgesics~~painkillers, to be available as OTC in pharmacies exclusively. Furthermore, the confidence consumers have in the OTC skills of others seems more consistent with their attitudes towards availability. Until consumers themselves realise they are also one of the others, they may overestimate their OTC skills, which may entail health risks.

Footnotes

We thank the panel members of the Dutch Health Care Consumer Panel who participated in this study.

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Contributors: The study was devised and designed by LVD and MB. JDJ was responsible for the data collection in the Dutch Health Care Consumer Panel. AB performed the statistical analyses and drafted the manuscript. All other authors critically revised it. All authors gave their final approval for the manuscript version to be published. All authors are responsible for the overall content as guarantors.

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Competing interests: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: the authors received support for the data collection from the Dutch Ministry of Health, Welfare and Sport for the work submitted. AB~~, MB~~ and JDJ there was no financial relationship with any organisations that might have an interest in the submitted work in the previous three years. LVD received unrestricted grants from Bristol-Myers Squibb and Astra Zeneca for studies not related to this study in 2011 and 2012. MB performed occasional consultancy work for both organisations of pharmacists, druggists and government. And all authors that there was no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: According to the Dutch law, no ethical approval was needed. The protection of the collected data is registered with the Dutch Data Protection Authority (nr. 1262949).

Data sharing: Data is available on request and subject to approval by the programme committee of the Dutch Health Care Consumer Panel. The questionnaire (in Dutch) is available on request from the authors.

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Tables and figures

Table 1: Demographic characteristics of the respondents and the Dutch population aged 18 years and older

	Respondents		Dutch population aged 18 years and older*	
	N	%	%	
Gender	**972**			
Male	424	43.6	49.0	
Female	548	56.4	51.0	
Age	**972**			
18-39 years	88	9.1	35.3	
40-64 years	527	54.2	45.3	
65 years and older	357	36.7	19.5	
Education	**948**			
Low (none, primary school or pre-vocational education)	184	19.4	33.8	
Middle (secondary or vocational education)	448	47.3	40.5	
High (professional higher education or university)	316	33.3	25.7	
Self-reported general health	**965**			
Poor/bad	175	18.1	Less than good**	18.6
Good	487	50.5	Good	52.7
Excellent/very good	303	31.4	Very good	28.8
Working in healthcare	**919**			
No, never worked in healthcare	663	72.1	Not available	
Yes, I am currently working in healthcare	119	13.0	Not available	
Yes, I have worked in healthcare in the past	137	14.9	Not available	

Use of OTC drugs in the year prior to the questionnaire	**960**			
No		160	16.7	Not available
Yes		800	83.3	Not available

** Data of the Dutch population aged 18 years and older is based on information from Statistics Netherland.*

*** Statistics Netherlands has three categories of self-reported general health. The percentage of Statistics Netherlands relate to the overall health of the entire general population, including those under 18 years.*

Table 2: Percentage of respondents that prefer a specific channel with regards to the availability of OTC ~~analgesics~~painkillers

		Percentage of respondents that prefer a channel				
Safety profiles*	**N**	*Supermarket/ petrol station*	*Chemist*	*Pharmacy only*	*Prescription only*	*Mean score ** (95% CI)*
Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs	**876**	1.1	7.4	70.8	20.7	**3.11** (3.07 to 3.15)
Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases	**875**	1.0	12.6	65.3	21.1	**3.07** (3.02 to 3.11)
Can be used safely by most people, but potentially serious side effects when used by children	**859**	2.2	18.6	59.6	19.6	**2.97** (2.92 to 3.01)
In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleedings	**848**	3.5	25.4	52.7	18.4	**2.86** (2.81 to 2.91)
No side effects when used as directed, but taking too many tablets can cause serious damage	**813**	8.1	34.0	46.0	11.9	**2.62** (2.56 to 2.67)
Mild side effects, such as stomach and intestinal problems, but never serious side effects	**841**	4.8	45.3	40.7	9.3	**2.54** (2.50 to 2.59)

* Safety profiles are ordered based on their mean score. In the questionnaire, they were ordered in another way.

** Ranging from 1 to 4 (1 = wide availability; 4 = restrictive availability).

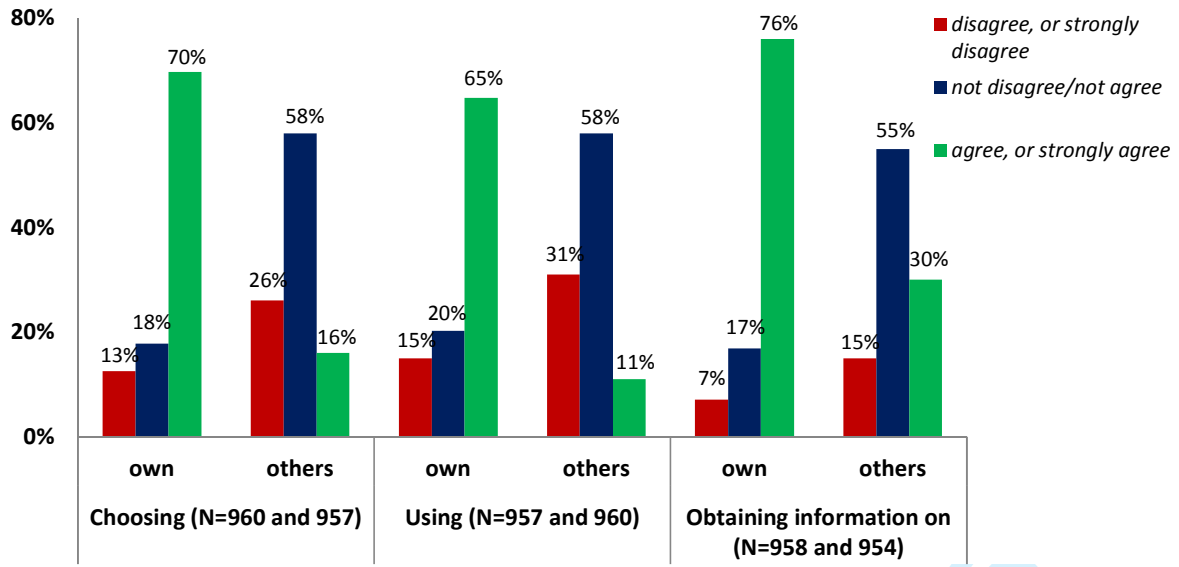
Table 3: Regression model for attitudes towards availability (N=~~703~~672)

	Beta*	P-value
Availability (1= wide; 4 = restrictive)		
Confidence (1 = low; 5 = high)	-0.11~~54~~	**0.~~00~~3005**
Gender (0 = man; 1 = woman)	0.~~01~~6010	0.807~~688~~
Age	0.~~11~~7102	**0.012~~003~~**
Level of education		
-Low	reference level	
-Middle	-0.~~13~~1118	**0.02~~410~~**
-High	-0.~~25~~4242	**0.000**
Self-reported general health		
-Bad/poor	reference level	
-Good	0.~~02~~1028	0.599~~688~~
-Excellent/very good	-0.~~02~~0011	0.838~~705~~
Work in healthcare (0 = never worked in healthcare; 1 = currently working in healthcare/worked in healthcare in past)	-0.038	0.358
Use of OTC drugs in year prior to questionnaire (0 = no; 1 = yes)	-0.~~01~~3010	0.813~~743~~
Constant	.	**0.000**

Adjusted R-square: 0.07

* Standardized coefficients

Figure 1: Consumers' confidence in their own OTC skills and in the OTC skills of others



Choosing: I am / others are able to make an appropriate choice between different types and brands of OTC drugs

Using: I / others know exactly how to use OTC drugs in a safe way

Obtaining information on: When I / others try to get advice on OTC drugs, I / others can easily get the right information

BMJ open

WHERE TO BUY OTC MEDICATIONS?
A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC painkillers.

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WHERE TO BUY OTC MEDICATIONS?

A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC painkillers.

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ABSTRACT

Objective: To examine consumers' confidence in their own, and also in other people's, over-the-counter (OTC) skills and to describe their attitudes towards the availability of OTC painkillers. Moreover we examined the association between confidence in OTC skills and attitudes.

Design: Cross-sectional survey. Mixed methods (postal and electronic) self-administered questionnaire.

Participants: Members of the Dutch Health Care Consumer Panel.

Main outcome measures: Consumers' confidence in their own, and in other people's, OTC skills was examined. Confidence was measured by three questions regarding obtaining information on, choosing, and using OTC medication. Consumers' attitudes towards availability were assessed using six safety profiles, by asking which channel consumers prefer for each profile.

Results: The response rate was 68% (N=972). Consumers feel confident about their own OTC skills (mean 3.74; 95% CI 3.69 to 3.79, on a 5-point Likert scale), but have less confidence in OTC skills of others (mean 2.92; 95% CI 2.88 to 2.96). Consumers are conservative in their attitudes towards the availability of OTC painkillers. Most consumers prefer painkillers to be available exclusively in pharmacies (41 to 71% per profile indicated pharmacy only). Moreover, there is an association between confidence in OTC skills and attitudes ($p=0.005$; $\beta=-0.114$). Consumers who are more confident about their own OTC skills prefer OTC painkillers to be more generally available.

Conclusions: Consumers feel confident about their own OTC skills. However, they would prefer painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively. Consumers' confidence in the OTC skills of others is more consistent with their attitudes towards availability of OTC painkillers. Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Article summary

Article focus

- Several studies have observed that consumers appear to be unaware of how to use OTC medications appropriately, which may entail health risks.
- Until now little is known about consumers' confidence in their own and other people's OTC skills and their attitudes towards the availability of OTC painkillers.
- This study aimed to examine consumers' confidence in both their own, and in other people's, OTC skills, to look too at their attitudes towards the availability of OTC painkillers, and to examine the association between confidence in OTC skills and attitudes.

Key messages

- Consumers feel confident about their own OTC skills. However, they prefer that painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively.
- Consumers have less confidence in the OTC skills of others. This perception is more consistent with their attitudes towards availability of OTC painkillers.
- Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Strengths and limitations of this study

- Strengths include the large sample size and the response rate of almost 70% and the inclusion of an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC painkillers should be available. Another strength is that this study addresses a relatively unexplored area.
- Limitations include not being able to make a comparison between a direct as well as indirect measurements and not being able to link our results to the actual self-medication behaviour of the respondents. In addition, the study only relates to painkillers, the most used OTCs in the Netherlands.

BACKGROUND

The need to save on health care spending and the trend to enhance self care have led to more emphasis on patients taking their own responsibility for the management of minor ailments, including the use of medication that is available without a prescription [1;2]. Today, a wide range of conditions can be treated using medications that are available OTC. Some examples of categories of medicines that have been reclassified to non-prescription medication in many countries are nonsteroidal anti-inflammatory drugs (NSAIDs), anti fungal creams and laxatives. However, inappropriate use of OTC medications entails considerable health risks. Several studies demonstrated that inappropriate use results in drug intoxication, drug interactions, side effects and increased health care costs as a consequence of extra visits to a doctor and hospitalization [3-7]. Nevertheless, in many countries, increasingly more drugs that were previously only available on prescription are being switched to OTC status [2;8;9]. The United States Government Accountability Office studied five countries (the UK, the USA, the Netherlands, Italy and Australia) and determined how medicines were classified in each. They found that since 1995 all these countries have increased OTC availability. This is due either to changes in the classification of non-prescription drugs or to the reclassification of medications into less restrictive classes [10].

In the Netherlands, the availability of OTC drugs increased when the Dutch government changed the system for OTC medications. The Dutch healthcare policy is based on ideas that independent and critical consumers require an increased availability of OTC medication in order to select a particular drug themselves. Since the introduction of the Medicines Act on 1 July 2007, three categories of non-prescription drugs have been specified: 1) pharmacy only; 2) pharmacy or chemist only; and 3) general sales [11]. Before July 2007, the third category did not exist. In the Netherlands, there is a distinction between pharmacies and chemists. Pharmacies are run by a pharmacist and able to sell all prescription (when a prescription is given) and non-prescription drugs, while chemists are run by a druggist, who requires less training than a pharmacist and is able to sell many but not all non-prescription drugs [10]. When introducing the new legislation, the Dutch government argued that consumers are well-informed and know how to use OTC drugs appropriately [11;12]. This assumption was not supported by international literature. Earlier research, mainly focused on analgesics, observed that consumers appear to be unaware of how to use OTC medications appropriately [4-6;13-16].

There has been little research conducted into how consumers themselves perceive their skills in using OTC medications appropriately. It is important to gain some insight into areas such as overestimating OTC skills as this may result in risks to health. The purpose of the present study was to examine consumers' confidence in OTC skills. We examined consumers' confidence, both in their own OTC skills, and in those of others. This is because previous research has shown that "people tend to think positively of themselves, often to unrealistic degrees" [17]. Moreover, the literature demonstrated that consumers' estimates of their peers' attitudes and behaviours tend to be roughly accurate [17]. Furthermore, we examined which channels consumers prefer with regard to the availability of OTC painkillers. Finally, we examined the association between consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers, as we expected that more confident consumers prefer them to be more generally available.

METHODS

Setting

Data were collected in the Dutch Health Care Consumer Panel [18-20]. This panel aims to measure opinions on and knowledge of health care as well as expectations and experiences with health care at a national level. At the time of the study (June 2010), the Consumer Panel consisted of approximately 3,000 people aged 18 years and older. Each individual member of the panel receives a questionnaire approximately three times a year and can quit the panel at any time. There is no possibility for consumers to sign up for the panel on their own initiative. The panel is renewed on regular base. Renewal is necessary to make sure that members do not develop specific knowledge of, and attention for, health care issues, and that no questionnaire-fatigue occurs. Moreover, renewal compensates for panel members who, for example, have died or moved without informing us about the new address. To recruit new panel members an address file is bought from an address supplier. As a result, possible new members are sampled at random from the general population in the Netherlands. Sampled people receive an information letter about the panel and are called within a week after receiving that letter. If they are interested, they receive a questionnaire on their demographic characteristics. When that questionnaire is returned, they are considered members of the panel. Data are anonymously processed, and the protection of the data collected is registered with the Dutch Data Protection Authority (nr. 1262949).

Questionnaire

The questionnaire was developed based on the wider literature and experiences of the research team. In total, the questionnaire included 36 questions (with largely pre-defined answer categories of responses) focusing on different aspects of OTC medications. While a pilot study was not conducted due to time constraints, face and content validity of the questionnaire were assessed by two senior researchers (LVD and MB). In June 2010, the self-administered questionnaire was sent to 1,422 panel members. According to their previously stated preference, 671 members received a questionnaire by post and 751 through the internet. Using a mixed methods approach helped to ensure that certain groups were not excluded from the study and may also have increased the response rate. Other methods used to increase the response rate included sending two electronic reminders and one postal reminder to panel members who had not responded yet. The closing date of the questionnaire was late July 2010.

Demographic characteristics

The demographic characteristics of the panel members including their age, gender, level of education, self-reported general health and whether they work(ed) or never worked in healthcare are documented at the start of the panel membership and are updated annually. Level of education reflected the highest level of education completed and was classified as low; middle; and high (see also Table 1). To measure self-reported general health one question from the SF-36 was used. In the SF-36 the answer categories (bad; fair; good; very good; excellent) are not defined, therefore we did not provide any explanation of these terms either.

The use of OTC drugs

The respondents were asked how long it has been since they had used OTC medications. We defined OTC medications in the questionnaire as follows: "OTC medications are medicines that you can buy at pharmacies and chemists without a doctors' prescription. In addition, you can buy some of these medicines at supermarkets and petrol stations. Examples of OTC medications are painkillers, such as paracetamol or ibuprofen. Homeopathic medicines, nutritional supplements and contraceptives are not considered to be OTC medications". Based on their answers, we generated a dichotomous variable for the use of OTC drugs in the year prior to the questionnaire (1=yes; 0=no). In addition, the respondents who had used OTC drugs in the year prior to the questionnaire were asked what kind of categories (pre-defined) of OTC drugs they had used in that year. All questions had pre-defined categories of answers.

Confidence

Confidence was measured using three questions with regard to obtaining information on, choosing and using OTC medications. These were: 1) 'I am able to make an appropriate choice between different types and brands of OTC drugs'; 2) 'I know exactly how to use OTC drugs in a safe way'; and 3) 'When I try to get advice on OTC drugs, I can easily get the right information'. We used the same three items to examine consumers' confidence in the OTC skills of others, for example asking if: 'Others are able to make an appropriate choice between different types and brands of OTC drugs'. All items had a five-point Likert scale ranging from strongly disagrees to strongly agree. We evaluated for both scales whether the three items measured a single concept by calculating the internal consistency given by Cronbach's alpha. Only the respondents who filled out all three items were included (own: N=951; others: N=949). The internal consistency was good (for both scales Cronbach's alpha 0.81). Subsequently, a mean score was calculated for the respondents who filled out all three items ranging from 1 to 5, in which higher scores indicated greater confidence.

Attitudes towards availability

We presented six safety profiles of painkillers in order to assess consumers' attitudes towards availability. Each profile described a painkiller having properties that resemble current available painkillers in the Netherlands (e.g. paracetamol and ibuprofen). In the Netherlands, paracetamol 500 mg; several combinations of paracetamol 500 mg with cafein and/or vitamin C; several combinations of paracetamol 250 mg with propyhenazon 250 mg or acetylsalicylic acid 250 mg; ibuprofen 200 mg and 400 mg; naproxen 220 and 275 mg; diclofenac 12,5 mg; ketoprofen 25 mg; acetylsalicyclic acid 500 mg; and carbasalate calcium 600 mg are all available OTC in oral formulations. In addition, diclofenac gel is registered OTC as topical preparation, however, only for pain due to arthrosis of finger and knees. The profiles were descriptions of possible adverse effects of their use, inappropriately or not, and were based on information reflected in patient information leaflets and summaries of product characteristics. They were constructed by one of the research members (MB), who is a pharmacist with special interest in OTC medication and author of a standard Dutch handbook of self-medication. We focused on OTC painkillers because painkillers are among the most commonly used medications [14;16;21], and their inappropriate use can cause serious side effects [5;6;13;21;22]. The following six safety profiles were included: 1) 'No side effects when used as directed, but taking too many tablets can cause serious damage'; 2) 'Mild side effects, such as stomach and intestinal problems, but never serious side effects'; 3) 'In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleeding'; 4) 'Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs'; 5) 'Can be used safely by most

people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases'; and 6) 'Can be used safely by most people, but potentially serious side effects when used by children'. We asked respondents to indicate their preferences for the availability of painkillers with the above described profiles, with the following options: general sales (defined in the questionnaire as supermarket / petrol station); chemist; pharmacy only; and prescription only. It should be noted that in the questionnaire the options were used in a different order, namely: pharmacy only; chemist; general sales; and prescription only. The answer options were based on the Dutch Medicines Act. The options were scored as 1 general sales; 2 chemist; 3 pharmacy only; and 4 prescription only. In addition, items scored as, 'I don't know', were recoded as missing (in total 115 times, 16 to 25 per profile). To evaluate whether the six items measured a single concept, we calculated the internal consistency given by Cronbach's alpha. Respondents who did not fill out all profiles were excluded from the analyses (excluded N=228, included N=744). The excluded respondents did not differ significantly from the respondents included with regard to their demographics. However, they were significantly more restrictive in their preferences for the safety profiles for which they did provide an answer. Factor analysis of the data identified one factor and the internal consistency was good (Cronbach's alpha 0.77). Subsequently, a mean score was calculated for the items for the respondents who filled out all six profiles ranging from 1 to 4, whereby higher scores indicated a greater preference for restricting availability.

Statistical analyses

Firstly, we performed descriptive statistics. Then, by means of t-tests and one-way analyses of variance (ANOVA) ($p<0.01$), we tested the association between the outcomes (consumers' confidence in their own OTC skills and consumers' attitudes) and demographic characteristics (gender, age in three categories, level of education, self-reported general health and whether they work(ed) or never worked in healthcare) and the use of OTC medications. Finally, we conducted a regression analysis to investigate the association between the dependent variable, consumers' attitudes, and the independent variables, consumers' confidence in their own OTC skills, demographic characteristics and use of OTC medications ($p<0.05$). We repeated this association using the total number of times respondents scored the options 'pharmacy only' and 'prescription only' (ranging from 0 to 6), instead of their mean scores, as a dependent variable. In the regression analyses, categorical variables were recoded into dummy variables. All statistical analyses were done using STATA, version 12.1.

RESULTS

In total, 972 panel members returned the questionnaire (response rate 68%). The response to the online questionnaire was lower than to the written questionnaire (62% respectively 76%). More than half (56%) of the respondents were female (Table 1). The age category 40 to 64 years included 54% of the respondents. Almost half (47%) had a middle level of education. General health was self-reported as excellent/very good in 31% of the cases. 72% of the respondents had never worked in healthcare. Compared to the Dutch population aged 18 years and older [18], it was mainly young people (18 to 39 years) who were underrepresented in the group of respondents (see Table 1).

The use of OTC drugs

Among the respondents, 83% used OTC medications in the year prior to the questionnaire (see Table 1). Almost all respondents that had used OTC drugs in the year prior to the questionnaire, indicated that they had used pain and antipyretic medicines (97%). Furthermore, 76% of the respondents that had used OTC drugs in the year prior to the questionnaire indicated that they had used medicines for coughs, colds, flu and a sore throat.

Confidence

The mean score for consumers' confidence in their own OTC skills was 3.74 (95% CI: 3.69 to 3.79, on a 5-point Likert scale), indicating that respondents felt quite confident about their own OTC skills. Clearly, the respondents felt less confident about the OTC skills of others (mean score 2.92 and 95% CI: 2.88 to 2.96).

As reflected in Figure 1, seven out of the ten respondents agreed, or strongly agreed, that they are able to make an appropriate choice between different types and brands of OTC drugs. Only 16% of them thought that others are able to make an appropriate choice. Furthermore, 65% of the respondents agreed, or strongly agreed, that they know exactly how to use OTC drugs in a safe way, while only 11% of them thought that others know how to use OTC drugs safely. Lastly, 76% of the respondents agreed, or strongly agreed, that they can easily get the right information when trying to get advice on OTC drugs, compared to 30% of them who believed that others are able to get the right information.

ANOVAs and t-tests showed significant but modest differences between consumers' confidence in their own OTC skills and gender, age, level of education and whether they work(ed) or never worked in healthcare. Women felt slightly more confident about their own OTC skills than men. Furthermore, the elderly (≥ 65 years) and people with a low level of education had slightly less confidence than younger people and people with a middle and high level of education. People that currently work in healthcare or have worked in healthcare in the past felt slightly

more confident about their own OTC skills than people that never worked in healthcare. In addition, ANOVA showed that people who had used OTC medications in the year prior to the questionnaire were more confident about their own OTC skills than those who had not used OTC medications in the year prior to the questionnaire (mean 3.84 respectively 3.24, $p<0.001$).

Attitudes towards availability

Table 2 shows that the pharmacy is often mentioned as preferred channel where painkillers with the described profiles should be available (range 41% to 71%). For five out of the six profiles most respondents preferred that painkillers with such a profile should be available exclusively in pharmacies. Only 1% to 8% chose supermarkets or petrol stations as their preferred option. ANOVAs and t-tests showed significant but modest differences between consumers' attitudes and age and level of education. Elderly (≥ 65 years) were more restrictive in their preferences for availability than younger people. Moreover, people with a low level of education were more restrictive in their preferences than people with a middle and high level of education.

The last research question focused on the association between consumers' confidence in their own OTC skills and their attitudes towards availability (see Table 3). The regression analysis showed that respondents who were more confident about their own OTC skills preferred OTC painkillers to be more generally available. This association was observed in addition to the effects of age and the level of education already mentioned. The association between own OTC skills and attitudes towards availability was also found when we performed an additional regression analysis, in which we used the total number of times respondents scored the options 'pharmacy only' and 'prescription only' as a dependent variable.

DISCUSSION

Principal findings

Consumers feel confident about their own OTC skills, but they have less confidence in the OTC skills of others. In other words, consumers presume that, compared to themselves, other people are less able to use self-medication appropriately. Although consumers are confident, they are conservative in their attitudes towards the general availability of OTC painkillers. Most consumers prefer that painkillers with the described profiles (e.g. paracetamol and ibuprofen) should be available in pharmacies exclusively. Currently, painkillers with profiles similar to those described are available for general sale in most European countries, including the Netherlands. Finally, we observed that more confident consumers preferred OTC painkillers to be more generally available.

Comparisons with other studies

There appears to be a discrepancy between our findings on the public perception about their own OTC skills and earlier research on the public awareness, perception and knowledge of OTC medication. While our study showed that consumers have high confidence in their own skills, previous studies found that, consumers are unaware of the fact that OTC medications can cause adverse events when used with other medications [5;23] and also of the toxicities of OTC medications [4;14]. Neither do they know, or are concerned, about the potential side effects of OTC analgesics [13;14]. They perceive OTC drugs as safe [14;15] and "too weak to cause any real harm" [6]. In addition, a recent study in Australia observed that fewer people are using NSAIDs appropriately according to the label, since ibuprofen has become available outside the pharmacy [16]. Summarized, while previous studies show that consumers seem to be unaware of how to use OTC medications appropriately our study shows that consumers are convinced they know how to use OTC medications appropriately. Yet, the confidence consumers have in the skills of others seems more consistent with the literature. It also probably better connects to reality, since, in general, the estimates of consumers regarding their peers' attitudes and behaviours tend to be roughly accurate [17]. Moreover, the confidence consumers have in the skills of others is in line with their attitudes towards availability of OTC painkillers. It appears that consumers have taken into account in their attitudes the confidence, or lack of it, that they have in the OTC skills of others. The assumption of the Dutch government that consumers prefer a less restrictive availability is not supported by our findings when consumers are confronted with safety information on medication. Nevertheless, in many countries an increasing number of drugs that were previously only available on prescription have been switched to OTC status [2;8;9].

Implications

Confidence in self-medication does not imply that the use of OTC medications is always optimal or appropriate [24]. The difference between consumers' confidence in their own skills compared to those of others indicate that some OTC users may be overconfident of their own OTC skills. This view is supported by the fact that consumers would like to limit the availability of OTC drugs with profiles that match currently widely available OTC drugs. This suggests that not all consumers are able to comprehend the proper use of OTC drugs which may entail health risks. For example, Leendertse et al. (2008) [25] observed that NSAIDs (amongst which also OTC drugs) are one of the medicines associated most often with potentially preventable medication-related hospital admissions. Moreover, Pirmohamed (2004) [26] observed that, among others, NSAIDs were most commonly implicated in

admissions related to adverse drug reactions. Furthermore, a Dutch study showed that during the last decade there had been an increase in requests on paracetamol poisoning to the National Poisons Information Center [27]. There also have been some concerns regarding switching the status of prescription drugs to OTC availability. Examples of such concerns are an inaccurate diagnosis by patients and delay in obtaining medical assistance [28]. We were unable to link our results to the actual self-medication behaviour of the respondents. Therefore, further research is recommended to examine this.

The fact that inappropriate use of medication entails health risks led to recommendations to increase the risk awareness and knowledge among the public, and to educate them about OTC medication and its potential risks [6;13;14;16;29]. The question is whether people are either unable to understand and find the correct information, or whether they do not want, read, search or ask for this information. Therefore, it is not clear yet, how to increase public awareness. What seems clear is that consumers consider pharmacies as a safe environment, since most of them prefer the painkillers described to be available in pharmacies exclusively. This is similar to findings of an earlier study where was found that Dutch consumers consider pharmacists as the most reliable source of information regarding OTC medication [30]. Although Dutch consumers expect to be provided with reliable information from pharmacies, it is possible that there are differences between pharmacies with regards to the quality of their advice. Furthermore, in 2010, 88% of the Dutch adult population put much or very much trust in pharmacists [31]. As a result, pharmacists can have an important role in questioning and informing patients about OTC medications.

The strengths and limitations of the study

This study addresses a relatively unexplored area. An important strength of our study is the large sample size and the response rate of almost 70%. However, the respondents in our study are not fully representative of the adult Dutch population aged 18 plus. Therefore, we performed analyses to see whether there are differences between groups of consumers. We observed some small but significant differences. However, they do not appear to affect our conclusions. We included an indirect measurement of the concept ‘attitudes towards availability’ in our questionnaire instead of asking directly where certain specific OTC painkillers should be available. Earlier research in the Netherlands demonstrated that when trade names of painkillers are presented to consumers, they judge them as safe. More than 95%, respectively 70%, of the consumers considered paracetamol and ibuprofen as safe, or very safe [32]. Unfortunately, we did not include direct as well as indirect measurements in our questionnaire, as we are now not able to make a comparison between both measurements. We also did not provide

information on the pack sizes/quantity in the questionnaire. Providing such information might influence the attitudes towards availability of the respondents. It could, for example, be assumed that consumers prefer a more restrictive availability for larger pack sizes of OTC medicines. Another possible limitation might be that the study only relates to painkillers, albeit those are the most used OTCs in the Netherlands. Furthermore, we did not include internet as a channel in our questionnaire, because this study was part of a policy evaluation in which only the official Dutch sales channels were evaluated. With the increasing growth of internet pharmacy, it would be interested to include this channel in further research. Another possible limitation is that we excluded quite a considerable number of respondents (N=228), because they did not fill out all six safety profiles. The excluded respondents were more restrictive in their preferences, possibly implying a slight underestimation of the observed effects in our analyses. Finally, a possible limitation is that we were not able to conduct a pilot study due to time constraints. By performing a pilot study some issues could have been identified and addressed from the onset to improve the questionnaire.

Conclusions

This study aimed to examine consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers. The Dutch government assumed that consumers are well-informed, know how to use OTC medications appropriately, and prefer a wider availability. It could be questioned whether these assumptions are true. Consumers feel confident about their own OTC skills; however, they would prefer painkillers with safety profiles resembling currently available OTC painkillers, to be available as OTC in pharmacies exclusively. Furthermore, the confidence consumers have in the OTC skills of others seems more consistent with their attitudes towards availability. Until consumers themselves realise they are also one of the others, they may overestimate their OTC skills, which may entail health risks.

Footnotes

We thank the panel members of the Dutch Health Care Consumer Panel who participated in this study.

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Contributors: The study was devised and designed by LVD and MB. JDJ was responsible for the data collection in the Dutch Health Care Consumer Panel. AB performed the statistical analyses and drafted the manuscript. All other authors critically revised it. All authors gave their final approval for the manuscript version to be published. All authors are responsible for the overall content as guarantors.

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Competing interests: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: the authors received support for the data collection from the Dutch Ministry of Health, Welfare and Sport for the work submitted. AB and JDJ there was no financial relationship with any organisations that might have an interest in the submitted work in the previous three years. LVD received unrestricted grants from Bristol-Myers Squibb and Astra Zeneca for studies not related to this study in 2011 and 2012. MB performed occasional consultancy work for both organisations of pharmacists, druggists and government. And all authors that there was no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: According to the Dutch law, no ethical approval was needed. The protection of the collected data is registered with the Dutch Data Protection Authority (nr. 1262949).

Data sharing: Data is available on request and subject to approval by the programme committee of the Dutch Health Care Consumer Panel. The questionnaire (in Dutch) is available on request from the authors.

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Tables and figures

Table 1: Demographic characteristics of the respondents and the Dutch population aged 18 years and older

	Respondents			Dutch population aged 18 years and older*	
	N		%	%	
Gender	**972**				
Male		424	43.6	49.0	
Female		548	56.4	51.0	
Age	**972**				
18-39 years		88	9.1	35.3	
40-64 years		527	54.2	45.3	
65 years and older		357	36.7	19.5	
Education	**948**				
Low (none, primary school or pre-vocational education)		184	19.4	33.8	
Middle (secondary or vocational education)		448	47.3	40.5	
High (professional higher education or university)		316	33.3	25.7	
Self-reported general health	**965**				
Poor/fair		175	18.1	Less than good**	18.6
Good		487	50.5	Good	52.7
Excellent/very good		303	31.4	Very good	28.8
Working in healthcare	**919**				
No, never worked in healthcare		663	72.1	Not available	
Yes, I am currently working in healthcare		119	13.0	Not available	
Yes, I have worked in healthcare in the past		137	14.9	Not available	

Use of OTC drugs in the year prior to the questionnaire		**960**		
No		160	16.7	Not available
Yes		800	83.3	Not available

** Data of the Dutch population aged 18 years and older is based on information from Statistics Netherland.*

*** Statistics Netherlands has three categories of self-reported general health. The percentage of Statistics Netherlands relate to the overall health of the entire general population, including those under 18 years.*

Table 2: Percentage of respondents that prefer a specific channel with regards to the availability of OTC painkillers

		Percentage of respondents that prefer a channel				
Safety profiles*	**N**	*Supermarket/ petrol station*	*Chemist*	*Pharmacy only*	*Prescription only*	*Mean score ** (95% CI)*
Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs	**876**	1.1	7.4	70.8	20.7	**3.11** (3.07 to 3.15)
Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases	**875**	1.0	12.6	65.3	21.1	**3.07** (3.02 to 3.11)
Can be used safely by most people, but potentially serious side effects when used by children	**859**	2.2	18.6	59.6	19.6	**2.97** (2.92 to 3.01)
In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleedings	**848**	3.5	25.4	52.7	18.4	**2.86** (2.81 to 2.91)
No side effects when used as directed, but taking too many tablets can cause serious damage	**813**	8.1	34.0	46.0	11.9	**2.62** (2.56 to 2.67)
Mild side effects, such as stomach and intestinal problems, but never serious side effects	**841**	4.8	45.3	40.7	9.3	**2.54** (2.50 to 2.59)

* Safety profiles are ordered based on their mean score. In the questionnaire, they were ordered in another way.

** Ranging from 1 to 4 (1 = wide availability; 4 = restrictive availability).

Table 3: Regression model for attitudes towards availability (N=672)

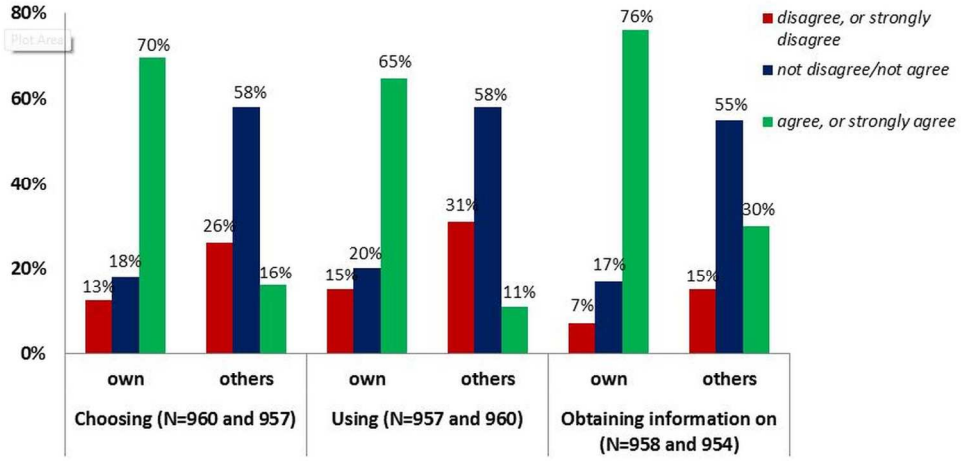
	Beta*	P-value
Availability (1= wide; 4 = restrictive)		
Confidence (1 = low; 5 = high)	-0.114	**0.005**
Gender (0 = man; 1 = woman)	0.010	0.807
Age	0.102	**0.012**
Level of education		
-Low	reference level	
-Middle	-0.118	**0.024**
-High	-0.242	**0.000**
Self-reported general health		
-Poor/fair	reference level	
-Good	0.028	0.599
-Excellent/very good	-0.011	0.838
Work in healthcare (0 = never worked in healthcare; 1 = currently working in healthcare/worked in healthcare in past)	-0.038	0.358
Use of OTC drugs in year prior to questionnaire (0 = no; 1 = yes)	-0.010	0.813
Constant	.	**0.000**

Adjusted R-square: 0.07

* Standardized coefficients

Figure 1: Consumers' confidence in their own OTC skills and in the OTC skills of others

Choosing:	I am / others are able to make an appropriate choice between different types and brands of OTC drugs
Using:	I / others know exactly how to use OTC drugs in a safe way
Obtaining information on:	When I / others try to get advice on OTC drugs, I / others can easily get the right information



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

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	page 1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	page 2 & 3 (Article Summary)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	page 4 & 5
Objectives	3	State specific objectives, including any prespecified hypotheses	page 4 & 5
Methods			
Study design	4	Present key elements of study design early in the paper	page 5 & 6
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	page 5 & 6 (Data collection in June & July 2010)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	page 5 & 6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	page 6, 7 & 8
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	page 6, 7 & 8
Bias	9	Describe any efforts to address potential sources of bias	page 5
Study size	10	Explain how the study size was arrived at	page 6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	page 8 & 9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	page 8 & 9
		(*b*) Describe any methods used to examine subgroups and interactions	page 8 & 9
		(*c*) Explain how missing data were addressed	page 6, 7 & 8
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	NA

		(*e*) Describe any sensitivity analyses	page 9
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	page 6
		(b) Give reasons for non-participation at each stage	NA
		(c) Consider use of a flow diagram	NA
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	See table 1 (page 18 & 19) & page 9
		(b) Indicate number of participants with missing data for each variable of interest	See table 1 (page 18 & 19), table 2 (page 20), figure 1 (page 22) and page 6, 7 & 8
Outcome data	15*	Report numbers of outcome events or summary measures	page 9 & 10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	NA
		(*b*) Report category boundaries when continuous variables were categorized	See table 1 (page 18 & 19)
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	NA
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	page 9 & 10
Discussion			
Key results	18	Summarise key results with reference to study objectives	page 11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	page 11, 12 & 13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	page 11, 12 & 13
Generalisability	21	Discuss the generalisability (external validity) of the study results	page 12 & 13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	page 14

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

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

WHERE TO BUY OTC MEDICATIONS?

A cross-sectional survey investigating consumers' confidence in over-the-counter (OTC) skills and their attitudes towards the availability of OTC painkillers.

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ABSTRACT

Objective: To examine consumers' confidence in their own, and also in other people's, over-the-counter (OTC) skills and to describe their attitudes towards the availability of OTC painkillers. Moreover we examined the association between confidence in OTC skills and attitudes.

Design: Cross-sectional survey. Mixed methods (postal and electronic) self-administered questionnaire.

Participants: Members of the Dutch Health Care Consumer Panel.

Main outcome measures: Consumers' confidence in their own, and in other people's, OTC skills was examined. Confidence was measured by three questions regarding obtaining information on, choosing, and using OTC medication. Consumers' attitudes towards availability were assessed using six safety profiles, by asking which channel consumers prefer for each profile.

Results: The response rate was 68% (N=972). Consumers feel confident about their own OTC skills (mean 3.74; 95% CI 3.69 to 3.79, on a 5-point Likert scale), but have less confidence in OTC skills of others (mean 2.92; 95% CI 2.88 to 2.96). Consumers are conservative in their attitudes towards the availability of OTC painkillers. Most consumers prefer painkillers to be available exclusively in pharmacies (41 to 71% per profile indicated pharmacy only). Moreover, there is an association between confidence in OTC skills and attitudes ($p=0.005$; $\beta=-0.114$). Consumers who are more confident about their own OTC skills prefer OTC painkillers to be more generally available.

Conclusions: Consumers feel confident about their own OTC skills. However, they would prefer painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively. Consumers' confidence in the OTC skills of others is more consistent with their attitudes towards availability of OTC painkillers. Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Article summary

Article focus

- Several studies have observed that consumers appear to be unaware of how to use OTC medications appropriately, which may entail health risks.
- Until now little is known about consumers' confidence in their own and other people's OTC skills and their attitudes towards the availability of OTC painkillers.
- This study aimed to examine consumers' confidence in both their own, and in other people's, OTC skills, to look too at their attitudes towards the availability of OTC painkillers, and to examine the association between confidence in OTC skills and attitudes.

Key messages

- Consumers feel confident about their own OTC skills. However, they prefer that painkillers with safety profiles resembling those currently available OTC, to be available as OTC in pharmacies exclusively.
- Consumers have less confidence in the OTC skills of others. This perception is more consistent with their attitudes towards availability of OTC painkillers.
- Until consumers themselves realise they are also one of the others, they may overestimate their own OTC skills, which may entail health risks.

Strengths and limitations of this study

- Strengths include the large sample size and the response rate of almost 70% and the inclusion of an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC painkillers should be available. Another strength is that this study addresses a relatively unexplored area.
- Limitations include not being able to make a comparison between a direct as well as indirect measurements and not being able to link our results to the actual self-medication behaviour of the respondents. In addition, the study only relates to painkillers, the most used OTCs in the Netherlands.

BACKGROUND

The need to save on health care spending and the trend to enhance self care have led to more emphasis on patients taking their own responsibility for the management of minor ailments, including the use of medication that is available without a prescription [1;2]. Today, a wide range of conditions can be treated using medications that are available OTC. Some examples of categories of medicines that have been reclassified to non-prescription medication in many countries are nonsteroidal anti-inflammatory drugs (NSAIDs), anti fungal creams and laxatives. However, inappropriate use of OTC medications entails considerable health risks. Several studies demonstrated that inappropriate use results in drug intoxication, drug interactions, side effects and increased health care costs as a consequence of extra visits to a doctor and hospitalization [3-7]. Nevertheless, in many countries, increasingly more drugs that were previously only available on prescription are being switched to OTC status [2;8;9]. The United States Government Accountability Office studied five countries ~~A study of the US Government Accountability Office conducted in~~ (the UK, the USA, the Netherlands, Italy and Australia) and determined how medicines were classified in each. They found~~, showed~~ that since 1995 all these countries have increased OTC availability. This is due either to changes in the classification of non-prescription drugs or to the reclassification of medications into less restrictive classes [10].

In the Netherlands, the availability of OTC drugs increased when the Dutch government changed the system for OTC medications. The Dutch healthcare policy is based on ideas that independent and critical consumers require an increased availability of OTC medication in order to select a particular drug themselves. Since the introduction of the Medicines Act on 1 July 2007, three categories of non-prescription drugs have been specified: 1) pharmacy only; 2) pharmacy or chemist only; and 3) general sales [11]. Before July 2007, the third category did not exist. In the Netherlands, there is a distinction between pharmacies and chemists. Pharmacies are run by a pharmacist and able to sell all prescription (when a prescription is given) and non-prescription drugs, while chemists are run by a druggist, who requires less training than a pharmacist and is able to sell many but not all non-prescription drugs [10]. When introducing the new legislation, the Dutch government argued that consumers are well-informed and know how to use OTC drugs appropriately [11;12]. This assumption was not supported by international literature. Earlier research, mainly focused on analgesics, observed that consumers appear to be unaware of how to use OTC medications appropriately [4-6;13-16].

There has been little research conducted into how consumers themselves perceive their skills in using OTC medications appropriately. It is important to gain some insight into areas such as overestimating OTC skills as this may result in risks to health. The purpose of the present study was to examine consumers' confidence in OTC skills. We examined consumers' confidence, both in their own OTC skills, and in those of others. This is because previous research has shown that "people tend to think positively of themselves, often to unrealistic degrees" [17]. Moreover, the literature demonstrated that consumers' estimates of their peers' attitudes and behaviours tend to be roughly accurate [17]. Furthermore, we examined which channels consumers prefer with regard to the availability of OTC painkillers. Finally, we examined the association between consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers, as we expected that more confident consumers prefer them to be more generally available.

METHODS

Setting

Data were collected in the Dutch Health Care Consumer Panel [18-20]. This panel aims to measure opinions on and knowledge of health care as well as expectations and experiences with health care at a national level. At the time of the study (June 2010), the Consumer Panel consisted of approximately 3,000 people aged 18 years and older. Each individual member of the panel receives a questionnaire approximately three times a year and can quite the panel at any time. There is no possibility for consumers to sign up for the panel on their own initiative. The panel is renewed on regular base. Renewal is necessary to make sure that members do not develop specific knowledge of, and attention for, health care issues, and that no questionnaire-fatigue occurs. Moreover, renewal compensates for panel members who, for example, have died or moved without informing us about the new address. To recruit new panel members an address file is bought from an address supplier. As a result, possible new members are sampled at random from the general population in the Netherlands. Sampled people receive an information letter about the panel and are called within a week after receiving that letter. If they are interested, they receive a questionnaire on their demographic characteristics. When that questionnaire is returned, they are considered members of the panel. ~~The demographic characteristics of the panel members including their age, gender, level of education, self-reported general health and whether they work(ed) or never worked in healthcare are documented at the start of the panel membership and are updated annually.~~ Data are anonymously processed, and the protection of the data collected is registered with the Dutch Data Protection Authority (nr. 1262949).

Questionnaire

The questionnaire was developed based on the wider literature and experiences of the research team. In total, the questionnaire included 36 questions (with largely pre-defined answer categories of responses) focusing on different aspects of OTC medications. While a pilot study was not conducted due to time constraints, face and content validity of the questionnaire were assessed by two senior researchers (LVD and MB). In June 2010, the self-administered questionnaire was sent to 1,422 panel members. According to their previously stated preference, 671 members received a questionnaire by post and 751 through the internet. Using a mixed methods approach helped to ensure that certain groups were not excluded from the study and may also have increased the response rate. Other methods used to increase the response rate included sending two electronic reminders and one postal reminder to panel members who had not responded yet. The closing date of the questionnaire was late July 2010.

~~In June 2010, a self-administered questionnaire was sent to 1,422 panel members and returned by 972 members. According to their previously stated preference, 671 members received a questionnaire by post and 751 through the internet. In total, the questionnaire included 36 questions focusing on different aspects of OTC medications. To increase the response from the onset, two electronic reminders and one postal reminder were sent to panel members who had not responded yet.~~

Demographic characteristics

The demographic characteristics of the panel members including their age, gender, level of education, self-reported general health and whether they work(ed) or never worked in healthcare are documented at the start of the panel membership and are updated annually. Level of education reflected the highest level of education completed and was classified as low; middle; and high (see also Table 1). To measure self-reported general health one question from the SF-36 was used. In the SF-36 the answer categories (bad; fair; good; very good; excellent) are not defined, therefore we did not provide any explanation of these terms either.

The use of OTC drugs

The respondents were asked how long it has been since they had used OTC medications. We defined OTC medications ~~were defined~~ in the questionnaire as follows: “OTC medications are medicines that you can buy at pharmacies and chemists without a doctors’ prescription. In addition, you can buy some of these medicines at supermarkets and petrol stations. Examples of OTC medications are painkillers, such as paracetamol or ibuprofen. Homeopathic medicines, nutritional supplements and contraceptives are not considered to be OTC medications”.

Based on their answers, we generated a dichotomous variable for the use of OTC drugs in the year prior to the questionnaire (1=yes; 0=no). In addition, the respondents who had used OTC drugs in the year prior to the questionnaire were asked what kind of categories (pre-defined) of OTC drugs they had used in that year. All questions had pre-defined categories of answers.

Confidence

Confidence was measured using three questions with regard to obtaining information on, choosing and using OTC medications. These were: 1) 'I am able to make an appropriate choice between different types and brands of OTC drugs'; 2) 'I know exactly how to use OTC drugs in a safe way'; and 3) 'When I try to get advice on OTC drugs, I can easily get the right information'. We used the same three items to examine consumers' confidence in the OTC skills of others, for example asking if: 'Others are able to make an appropriate choice between different types and brands of OTC drugs'. All items had a five-point Likert scale ranging from strongly disagrees to strongly agree. We evaluated for both scales whether the three items measured a single concept by calculating the internal consistency given by Cronbach's alpha. Only the respondents who filled out all three items were included (own: N=951; others: N=949). The internal consistency was good (for both scales Cronbach's alpha 0.81). Subsequently, a mean score was calculated for the respondents who filled out all three items ranging from 1 to 5, in which higher scores indicated greater confidence.

Attitudes towards availability

We presented six safety profiles of painkillers in order to assess consumers' attitudes towards availability. Each profile described a painkiller having properties that resemble current available painkillers in the Netherlands (e.g. paracetamol and ibuprofen). In the Netherlands, paracetamol 500 mg; several combinations of paracetamol 500 mg with cafein and/or vitamin C; several combinations of paracetamol 250 mg with propyhenazon 250 mg or acetylsalicylic acid 250 mg; ibuprofen 200 mg and 400 mg; naproxen 220 and 275 mg; diclofenac 12,5 mg; ketoprofen 25 mg; acetylsalicyclic acid 500 mg; and carbasalate calcium 600 mg are all available OTC in oral formulations. In addition, diclofenac gel is registered OTC as topical preparation, however, only for pain due to arthrosis of finger and knees. The profiles were descriptions of possible adverse effects of their use, inappropriately or not, and were based on information reflected in patient information leaflets and summaries of product characteristics. They were constructed by one of the research members (MB), who is a pharmacist with special interest in OTC medication and author of a standard Dutch handbook of self-medication. We focused on

OTC painkillers because painkillers are among the most commonly used medications [14;16;21], and their inappropriate use can cause serious side effects [5;6;13;21;22]. The following six safety profiles were included: 1) 'No side effects when used as directed, but taking too many tablets can cause serious damage'; 2) 'Mild side effects, such as stomach and intestinal problems, but never serious side effects'; 3) 'In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleeding'; 4) 'Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs'; 5) 'Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases'; and 6) 'Can be used safely by most people, but potentially serious side effects when used by children'. We asked respondents to indicate their preferences for the availability of painkillers with the above described profiles, with the following options: general sales (defined in the questionnaire as supermarket / petrol station); chemist; pharmacy only; and -prescription only. It should be noted that in the questionnaire the options were used in a different order, namely: -pharmacy only; -chemist; -general sales; and -prescription only. The answer options were based on the Dutch Medicines Act. The options were scored as 1 general sales; 2 chemist; 3 pharmacy only; and 4 prescription only. In addition, items scored as, 'I don't know', were recoded as missing (in total 115 times, 16 to 25 per profile). To evaluate whether the six items measured a single concept, we calculated the internal consistency given by Cronbach's alpha. Respondents who did not fill out all profiles were excluded from the analyses (excluded N=228, included N=744). The excluded respondents did not differ significantly from the respondents included with regard to their demographics. However, they were significantly more restrictive in their preferences for the safety profiles for which they did provide an answer. Factor analysis of the data identified one factor and the internal consistency was good (Cronbach's alpha 0.77). Subsequently, a mean score was calculated for the items for the respondents who filled out all six profiles ranging from 1 to 4, whereby higher scores indicated a greater preference for restricting availability.

Statistical analyses

Firstly, we performed descriptive statistics. Then, by means of t-tests and one-way analyses of variance (ANOVA) ($p<0.01$), we tested the association between the outcomes (consumers' confidence in their own OTC skills and consumers' attitudes) and demographic characteristics (gender, age in three categories, level of education, self-reported general health and whether they work(ed) or never worked in healthcare) and the use of OTC medications. Finally, we conducted a regression analysis to investigate the association between the dependent variable, consumers' attitudes, and the independent variables, consumers' confidence in their own OTC skills,

demographic characteristics and use of OTC medications ($p<0.05$). We repeated this association using the total number of times respondents scored the options 'pharmacy only' and 'prescription only' (ranging from 0 to 6), instead of their mean scores, as a dependent variable. In the regression analyses, categorical variables were recoded into dummy variables. All statistical analyses were done using STATA, version 12.1.

RESULTS

In total, 972 panel members returned the questionnaire (response rate 68%). The response to the online questionnaire was lower than to the written questionnaire (62% respectively 76%). More than half (56%) of the respondents were female (Table 1). The age category 40 to 64 years included 54% of the respondents. Almost half (47%) had a middle level of education. General health was self-reported as excellent/very good in 31% of the cases. 72% of the respondents had never worked in healthcare. Compared to the Dutch population aged 18 years and older [18], it was mainly young people (18 to 39 years) who were underrepresented in the group of respondents (see Table 1).

The use of OTC drugs

Among the respondents, 83% used OTC medications in the year prior to the questionnaire (see Table 1). Almost all respondents that had used OTC -drugs in the year prior to the questionnaire, indicated that they had used pain and antipyretic medicines (97%). Furthermore, 76% of the respondents that had used OTC -drugs in the year prior to the questionnaire indicated that they had used medicines for coughs, colds, flu and a sore throat.

Confidence

The mean score for consumers' confidence in their own OTC skills was 3.74 (95% CI: 3.69 to 3.79, on a 5-point Likert scale), indicating that respondents felt quite confident about their own OTC skills. Clearly, the respondents felt less confident about the OTC skills of others (mean score 2.92 and 95% CI: 2.88 to 2.96).

As reflected in Figure 1, seven out of the ten respondents agreed, or strongly agreed, that they are able to make an appropriate choice between different types and brands of OTC drugs. Only 16% of them thought that others are able to make an appropriate choice. Furthermore, 65% of the respondents agreed, or strongly agreed, that they know exactly how to use OTC drugs in a safe way, while only 11% of them thought that others know how to use OTC drugs safely. Lastly, 76% of the respondents agreed, or strongly agreed, that they can easily get the right

information when trying to get advice on OTC drugs, compared to 30% of them who believed that others are able to get the right information.

ANOVAs and t-tests showed significant but modest differences between consumers' confidence in their own OTC skills and gender, age, level of education and whether they work(ed) or never worked in healthcare. Women felt slightly more confident about their own OTC skills than men. Furthermore, the elderly (≥ 65 years) and people with a low level of education had slightly less confidence than younger people and people with a middle and high level of education. People that currently work in healthcare or have worked in healthcare in the past felt slightly more confident about their own OTC skills than people that never worked in healthcare. In addition, ANOVA showed that people who had used OTC medications in the year prior to the questionnaire were more confident about their own OTC skills than those who had not used OTC medications in the year prior to the questionnaire (mean 3.84 respectively 3.24, $p<0.001$).

Attitudes towards availability

Table 2 shows that the pharmacy is often mentioned as preferred channel where painkillers with the described profiles should be available (range 41% to 71%). For five out of the six profiles most respondents preferred that painkillers with such a profile should be available exclusively in pharmacies. Only 1% to 8% chose supermarkets or petrol stations as their preferred option. ANOVAs and t-tests showed significant but modest differences between consumers' attitudes and age and level of education. Elderly (≥ 65 years) were more restrictive in their preferences for availability than younger people. Moreover, people with a low level of education were more restrictive in their preferences than people with a middle and high level of education.

The last research question focused on the association between consumers' confidence in their own OTC skills and their attitudes towards availability (see Table 3). The regression analysis showed that respondents who were more confident about their own OTC skills preferred OTC painkillers to be more generally available. This association was observed in addition to the effects of age and the level of education already mentioned. The association between own OTC skills and attitudes towards availability was also found when we performed an additional regression analysis, in which we used the total number of times respondents scored the options 'pharmacy only' and 'prescription only' as a dependent variable.

DISCUSSION

Principal findings

Consumers feel confident about their own OTC skills, but they have less confidence in the OTC skills of others. In other words, consumers presume that, compared to themselves, other people are less able to use self-medication appropriately. Although consumers are confident, they are conservative in their attitudes towards the general availability of OTC painkillers. Most consumers prefer that painkillers with the described profiles (e.g. paracetamol and ibuprofen) should be available in pharmacies exclusively. Currently, painkillers with profiles similar to those described are available for general sale in most European countries, including the Netherlands. Finally, we observed that more confident consumers preferred OTC painkillers to be more generally available.

Comparisons with other studies

There appears to be a discrepancy between our findings on the public perception about their own OTC skills and earlier research on the public awareness, perception and knowledge of OTC medication. While our study showed that consumers have high confidence in their own skills, previous studies found that, consumers are unaware of the fact that OTC medications can cause adverse events when used with other medications [5;23] and also of the toxicities of OTC medications [4;14]. Neither do they know, or are concerned, about the potential side effects of OTC analgesics [13;14]. They perceive OTC drugs as safe [14;15] and "too weak to cause any real harm" [6]. In addition, a recent study in Australia observed that fewer people are using NSAIDs appropriately according to the label, since ibuprofen has become available outside the pharmacy [16]. Summarized, while previous studies show that consumers seem to be unaware of how to use OTC medications appropriately our study shows that consumers are convinced they know how to use OTC medications appropriately. Yet, the confidence consumers have in the skills of others seems more consistent with the literature. It also probably better connects to reality, since, in general, the estimates of consumers regarding their peers' attitudes and behaviours tend to be roughly accurate [17]. Moreover, the confidence consumers have in the skills of others is in line with their attitudes towards availability of OTC painkillers. It appears that consumers have taken into account in their attitudes the confidence, or lack of it, that they have in the OTC skills of others. The assumption of the Dutch government that consumers prefer a less restrictive availability is not supported by our findings when consumers are confronted with safety information on medication. Nevertheless, in many countries an increasing number of drugs that were previously only available on prescription have been switched to OTC status [2;8;9].

Implications

Confidence in self-medication does not imply that the use of OTC medications is always optimal or appropriate [24]. The difference between consumers' confidence in their own skills compared to those of others indicate that some OTC users may be overconfident of their own OTC skills. This view is supported by the fact that consumers would like to limit the availability of OTC drugs with profiles that match currently widely available OTC drugs. This suggests that not all consumers are able to comprehend the proper use of OTC drugs which may entail health risks. For example, Leendertse et al. (2008) [25] observed that NSAIDs (amongst which also OTC drugs) are one of the medicines associated most often with potentially preventable medication-related hospital admissions. Moreover, Pirmohamed (2004) [26] observed that, among others, NSAIDs were most commonly implicated in admissions related to adverse drug reactions. Furthermore, a Dutch study showed that during the last decade there had been an increase in requests on paracetamol poisoning to the National Poisons Information Center [27]. There also have been some concerns regarding switching the status of prescription drugs to OTC availability. Examples of such concerns are an inaccurate diagnosis by patients and delay in obtaining medical assistance [28]. We were unable to link our results to the actual self-medication behaviour of the respondents. Therefore, further research is recommended to examine this.

The fact that inappropriate use of medication entails health risks led to recommendations to increase the risk awareness and knowledge among the public, and to educate them about OTC medication and its potential risks [6;13;14;16;29]. The question is whether people are either unable to understand and find the correct information, or whether they do not want, read, search or ask for this information. Therefore, it is not clear yet, how to increase public awareness. What seems clear is that consumers consider pharmacies as a safe environment, since most of them prefer the painkillers described to be available in pharmacies exclusively. This is ~~confirmed~~ similar to findings of~~in~~ an earlier study where was found that Dutch consumers consider pharmacists as the most reliable source of information regarding OTC medication [30]. Although Dutch consumers expect to be provided with reliable information from pharmacies, it is possible that there are differences between pharmacies with regards to the quality of their advice. Furthermore, in 2010, 88% of the Dutch adult population put much or very much trust in pharmacists [31]. As a result, pharmacists can have an important role in questioning and informing patients about OTC medications.

The strengths and limitations of the study

This study addresses a relatively unexplored area. An important strength of our study is the large sample size and the response rate of almost 70%. However, the respondents in our study are not fully representative of the adult

Dutch population aged 18 plus. Therefore, we performed analyses to see whether there are differences between groups of consumers. We observed some small but significant differences. However, they do not appear to affect our conclusions. We included an indirect measurement of the concept 'attitudes towards availability' in our questionnaire instead of asking directly where certain specific OTC painkillers should be available. Earlier research in the Netherlands demonstrated that when trade names of painkillers are presented to consumers, they judge them as safe. More than 95%, respectively 70%, of the consumers considered paracetamol and ibuprofen as safe, or very safe [32]. Unfortunately, we did not include direct as well as indirect measurements in our questionnaire, as we are now not able to make a comparison between both measurements. We also did not provide information on the pack sizes/quantity in the questionnaire. Providing such information might influence the attitudes towards availability of the respondents. It could, for example, be assumed that consumers prefer a more restrictive availability for larger pack sizes of OTC medicines. Another possible limitation might be that the study only relates to painkillers, albeit those are the most used OTCs in the Netherlands. Furthermore, we did not include internet as a channel in our questionnaire, because this study was part of a policy evaluation in which only the official Dutch sales channels were evaluated. With the increasing growth of internet pharmacy, it would be interested to include this channel in further research. Another possible limitation is that we excluded quite a considerable number of respondents (N=228), because they did not fill out all six safety profiles. The excluded respondents were more restrictive in their preferences, possibly implying a slight underestimation of the observed effects in our analyses. Finally, a possible limitation is that we were not able to conduct a pilot study due to time constraints. By performing a pilot study some issues could have been identified and addressed from the onset to improve the questionnaire.

Conclusions

This study aimed to examine consumers' confidence in OTC skills and their attitudes towards the availability of OTC painkillers. The Dutch government assumed that consumers are well-informed, know how to use OTC medications appropriately, and prefer a wider availability. It could be questioned whether these assumptions are true. Consumers feel confident about their own OTC skills; however, they would prefer painkillers with safety profiles resembling currently available OTC painkillers, to be available as OTC in pharmacies exclusively. Furthermore, the confidence consumers have in the OTC skills of others seems more consistent with their attitudes towards availability. Until consumers themselves realise they are also one of the others, they may overestimate their OTC skills, which may entail health risks.

Footnotes

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Contributors: The study was devised and designed by LVD and MB. JDJ was responsible for the data collection in the Dutch Health Care Consumer Panel. AB performed the statistical analyses and drafted the manuscript. All other authors critically revised it. All authors gave their final approval for the manuscript version to be published. All authors are responsible for the overall content as guarantors.

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Competing interests: All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: the authors received support for the data collection from the Dutch Ministry of Health, Welfare and Sport for the work submitted. AB and JDJ there was no financial relationship with any organisations that might have an interest in the submitted work in the previous three years. LVD received unrestricted grants from Bristol-Myers Squibb and Astra Zeneca for studies not related to this study in 2011 and 2012. MB performed occasional consultancy work for both organisations of pharmacists, druggists and government. And all authors that there was no other relationships or activities that could appear to have influenced the submitted work.

Ethical approval: According to the Dutch law, no ethical approval was needed. The protection of the collected data is registered with the Dutch Data Protection Authority (nr. 1262949).

Data sharing: Data is available on request and subject to approval by the programme committee of the Dutch Health Care Consumer Panel. The questionnaire (in Dutch) is available on request from the authors.

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Tables and figures

Table 1: Demographic characteristics of the respondents and the Dutch population aged 18 years and older

	Respondents			Dutch population aged 18 years and older*	
	N		%	%	
Gender	**972**				
Male		424	43.6	49.0	
Female		548	56.4	51.0	
Age	**972**				
18-39 years		88	9.1	35.3	
40-64 years		527	54.2	45.3	
65 years and older		357	36.7	19.5	
Education	**948**				
Low (none, primary school or pre-vocational education)		184	19.4	33.8	
Middle (secondary or vocational education)		448	47.3	40.5	
High (professional higher education or university)		316	33.3	25.7	
Self-reported general health	**965**				
Poor/~~bad~~fair		175	18.1	Less than good**	18.6
Good		487	50.5	Good	52.7
Excellent/very good		303	31.4	Very good	28.8
Working in healthcare	**919**				
No, never worked in healthcare		663	72.1	Not available	
Yes, I am currently working in healthcare		119	13.0	Not available	
Yes, I have worked in healthcare in the past		137	14.9	Not available	

Use of OTC drugs in the year prior to the questionnaire		**960**		
No		160	16.7	Not available
Yes		800	83.3	Not available

** Data of the Dutch population aged 18 years and older is based on information from Statistics Netherland.*

*** Statistics Netherlands has three categories of self-reported general health. The percentage of Statistics Netherlands relate to the overall health of the entire general population, including those under 18 years.*

Table 2: Percentage of respondents that prefer a specific channel with regards to the availability of OTC painkillers

		Percentage of respondents that prefer a channel				
Safety profiles*	**N**	*Supermarket/ petrol station*	*Chemist*	*Pharmacy only*	*Prescription only*	*Mean score ** (95% CI)*
Safe when used normally, but potentially serious side effects when used in combination with certain prescription drugs	**876**	1.1	7.4	70.8	20.7	**3.11** (3.07 to 3.15)
Can be used safely by most people, but potentially serious side effects when used by elderly people and those with severe concomitant diseases	**875**	1.0	12.6	65.3	21.1	**3.07** (3.02 to 3.11)
Can be used safely by most people, but potentially serious side effects when used by children	**859**	2.2	18.6	59.6	19.6	**2.97** (2.92 to 3.01)
In rare cases (less than 1 per 1,000) people suffer serious side effects, like gastrointestinal bleedings	**848**	3.5	25.4	52.7	18.4	**2.86** (2.81 to 2.91)
No side effects when used as directed, but taking too many tablets can cause serious damage	**813**	8.1	34.0	46.0	11.9	**2.62** (2.56 to 2.67)
Mild side effects, such as stomach and intestinal problems, but never serious side effects	**841**	4.8	45.3	40.7	9.3	**2.54** (2.50 to 2.59)

* Safety profiles are ordered based on their mean score. In the questionnaire, they were ordered in another way.

** Ranging from 1 to 4 (1 = wide availability; 4 = restrictive availability).

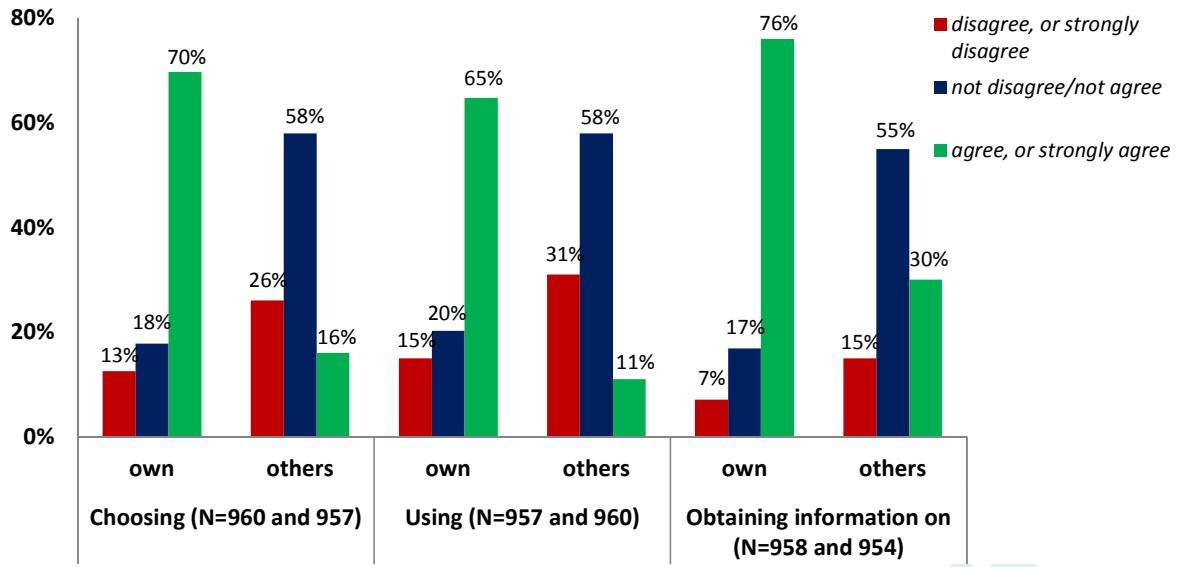
Table 3: Regression model for attitudes towards availability (N=672)

	Beta*	P-value
Availability (1= wide; 4 = restrictive)		
Confidence (1 = low; 5 = high)	-0.114	**0.005**
Gender (0 = man; 1 = woman)	0.010	0.807
Age	0.102	**0.012**
Level of education		
-Low	reference level	
-Middle	-0.118	**0.024**
-High	-0.242	**0.000**
Self-reported general health		
-~~Bad~~Poor/fair~~/poor~~	reference level	
-Good	0.028	0.599
-Excellent/very good	-0.011	0.838
Work in healthcare (0 = never worked in healthcare; 1 = currently working in healthcare/worked in healthcare in past)	-0.038	0.358
Use of OTC drugs in year prior to questionnaire (0 = no; 1 = yes)	-0.010	0.813
Constant	.	**0.000**

Adjusted R-square: 0.07

* Standardized coefficients

Figure 1: Consumers' confidence in their own OTC skills and in the OTC skills of others



Choosing: I am / others are able to make an appropriate choice between different types and brands of OTC drugs

Using: I / others know exactly how to use OTC drugs in a safe way

Obtaining information on: When I / others try to get advice on OTC drugs, I / others can easily get the right information