

Non-prescription medicine misuse, abuse and dependence: a cross-sectional survey of the UK general population

Niamh A Fingleton, Margaret C Watson, Eilidh M Duncan, Catriona Matheson

Niamh A Fingleton, PhD Student, Academic Primary Care, University of Aberdeen, Polwarth Building, Foresterhill, Aberdeen, AB25 2ZD, UK

Margaret C Watson, Health Foundation Improvement Science Fellow, Health Services Research Unit, Health Sciences Building, University of Aberdeen, Foresterhill, Aberdeen, AB25 2ZD

Eilidh M Duncan, Research Fellow, Health Services Research Unit, Health Sciences Building, University of Aberdeen, Foresterhill, Aberdeen, AB25 2ZD

Catriona Matheson, Senior Research Fellow, Academic Primary Care, University of Aberdeen, Polwarth Building, Foresterhill, Aberdeen, AB25 2ZD

Correspondence to: Niamh Fingleton n.fingleton@abdn.ac.uk

Abstract

Background

Non-prescription medicines can be misused, abused or lead to dependence but the prevalence of these problems within the UK general population was unknown. The aim of this study was to estimate the prevalence of self-reported misuse, abuse and dependence to non-prescription medicines (NPMs).

Methods

A cross-sectional postal survey was sent to 1000 individuals aged ≥ 18 years randomly drawn from the UK Edited Electoral Register.

Results

A response rate of 43.4% was achieved. The lifetime prevalence of NPM misuse was 19.3%. Lifetime prevalence of abuse was 4.1%. Younger age, having a long-standing illness requiring regular NPM use and ever having used illicit drugs or legal highs were predictive of misuse/abuse of NPMs. In terms of dependence, lifetime prevalence was 2% with 0.8% currently dependent and 1.3% dependent in the past. Dependence was reported with analgesics (with and without codeine), sleep aids and nicotine products.

Conclusion

Given the increasing emphasis on self-care and empowering the public to manage their health with NPMs, the findings highlight the need for improved pharmacovigilance of these medicines to maximise benefits with minimal risk. Health care providers need to be aware of the potential for misuse, abuse and dependence, particularly in patients with long-term illness.

INTRODUCTION

Non-prescription medicines (NPMs), also known as over-the-counter (OTC) medicines, are used for the management of minor ailments. They are convenient for consumers and can be obtained from community pharmacies and other retail outlets e.g. petrol stations and supermarkets. NPMs facilitate self-care which brings about benefits for both the individual and the National Health System (NHS) by reducing the burden on other healthcare settings.^{1,2} A recent study estimated that 13% and 5% of general practice and emergency department (ED) consultations, respectively, were for minor ailments suitable for management in community pharmacies.³ Symptom resolution was shown to be similar for minor ailments irrespective of setting whilst overall costs are significantly lower for pharmacy consultations compared with general practice and ED consultations.⁴ In 2007, there were an estimated 57 million GP consultations per year for minor ailments at a total cost of £2 billion to the NHS.⁵

Whilst NPMs are often perceived by the public as being safer than prescription medicines,⁶ they can cause harm. NPMs have the potential to be misused, abused and lead to dependence.⁷ Specific NPMs most frequently associated with dependence are those capable of causing tolerance and withdrawal e.g. codeine-containing analgesics and smoking cessation products containing nicotine.⁸⁻¹⁰ However, the psychological aspects of addiction may occur with any substance, including NPMs.¹¹ There are other harms associated with NPM including direct physiological or psychological harm, harm from another ingredient and associated social and economic problems.⁷ Codeine-containing analgesics are commonly associated with abuse and dependence due to the properties of codeine with studies highlighting the morbidity caused by their additional ingredients, i.e. paracetamol or ibuprofen.¹² In response to these harms, regulation has been applied in the UK to minimise the risk of harm. This includes restricted indications, limits on pack size, and warnings on packets, patient information leaflets and advertisements.¹³ Codeine containing products contain an additional specific warning about the risk of addiction.

Despite the drive to encourage and enable self-care in the UK,^{1, 2, 14-16} there is minimal information about the prevalence of NPM misuse, abuse and dependence in the general population. Much of the existing research focuses on pharmacists' perceptions of prevalence.¹⁷⁻²¹ Patient reported behaviour tends to be highly specific in terms of the population or the outcome measured e.g. misuse of NPMs in community dwelling older adults and in people with HIV.^{22, 23} Interviews with members of the general public in Northern Ireland found that almost a third of respondents (n=298) had personally encountered OTC

abuse, although this included personal experience, knowledge or observation, and was solely in relation to abuse.²⁴

The current study was designed to estimate the prevalence of and factors associated with self-reported NPM misuse, abuse and dependence in the general UK population. For the purpose of this study, NPM misuse was defined as the use of an NPM for a legitimate medical purpose, but in an incorrect manner, e.g. in terms of dosage or duration of use.^{18, 25, 26} Abuse was defined as use for a non-medical purpose, e.g. to achieve mind-altering effects or weight loss.^{18, 25, 26} Dependence and addiction were defined as “the repeated use of a non-prescription medicine in which the person has a need or desire to use the non-prescription medicine and has difficulty in voluntarily stopping or altering their use”.²⁷

METHODS

Study design and participants

This was a cross-sectional postal survey of a random sample of 1000 individuals aged 18 years and older drawn from the UK Edited Electoral Register.

Questionnaire Development

Questionnaire development was informed by the literature, including previous surveys,^{28, 29} and discussion with researchers with expertise in this area. The terms “misuse” and “abuse” were not used in the questionnaire to avoid potential stigmatisation and to reduce the likelihood of social desirability and responder bias. Instead, respondents were asked to indicate if they had ever knowingly used NPMs in specific ways e.g. “for a reason that was not recommended by the manufacturer e.g. for the feeling or effect it caused” (i.e. abuse) or “at a higher dose than recommended by the manufacturer” (i.e. misuse). The definition of dependence and addiction (above) was provided at the beginning of the relevant section.

Pre-piloting and piloting

Pre-piloting was conducted with an opportunistic sample of 23 academic staff and students. All were asked to complete the questionnaire and provide feedback on clarity and ease of completion. The questionnaire was also reviewed by the Project Director of Over-Count Drugs Information Agency (<http://over-count.weebly.com/>), a voluntary organisation which provides a telephone helpline and online discussion forum for people dependent on NPMs.

Formal piloting tested both the distribution process and phrasing of the questionnaire. A cover letter, questionnaire, feedback form and reply-paid envelope were posted to a random sample of 100 individuals from the Edited Electoral Register. A pre-notification letter and

reminder were used. Questionnaires were returned by 42 of the 100 addressees. Completed questionnaires were examined to identify problems. A list was compiled of feedback from participants and problems identified by examining the completed questionnaires; this informed the refinement of the final questionnaire.

Procedures

In August 2013, a pre-notification letter (to enhance response rate³⁰) was sent to a random sample of 1000 individuals aged ≥ 18 years from the UK Edited Electoral Register (provided by an independent commercial marketing company) to notify them of the survey. Two weeks later, addressees were sent a cover letter, questionnaire and reply paid envelope.

Reminders were sent to non-responders at two and four weeks. Reminder letters included a questionnaire and reply-paid envelope.

Data management and analysis

Data were entered and analysed using SPSS (Version 22). An independent quality assurance check was conducted on data entry by a research secretary for 10% of questionnaires; these were selected using a random sequence generator.

Sample size

An estimated prevalence of 15% for misuse and abuse, and 5% for dependence, was used for the sample size calculation for the current study based on earlier estimates^{8, 10, 22, 23, 31}; however these studies were restrictive in terms of their populations, the NPMs of interest and the type of inappropriate use measured. A respondent group of 300 was required to detect a 5% prevalence of dependence with 2.5% precision (95% Confidence Interval (CI) 2.5% to 7.5%) and a 15% prevalence of misuse with 4% precision (95% CI 11.0% to 19.0%). A minimum expected response rate of 30% ($n=300$) implied this needed to be inflated to an overall sample of 1000.

Statistical methods

Chi-squared tests compared respondents' sex and country of residence with those of non-respondents. A Mann-Whitney *U* test was used to compare the distribution of year of birth as the data for this variable were not normally distributed. Chi-squared tests compared respondents' age, sex, ethnicity, partnership status and general health with data from the 2011 UK Census to determine the representativeness of respondents compared to the general population.

Chi-squared tests were used to examine univariate associations between categorical characteristics and misuse/abuse status. An independent samples t-test was used for age as the data were roughly normally distributed. Significant associations ($p < 0.05$) were entered into a binary logistic regression model using the enter method to produce unadjusted ORs and 95% CIs to determine which characteristics were independently related to self-reported misuse/abuse of NPMs.

Preliminary basic descriptive analysis was undertaken on the full dataset. Where possible and logical and without distortion of findings, aggregations were made in order to ensure sufficient numbers for analysis and allow comparison with national data.

RESULTS

Participants

The overall response rate was 43.4% (411/946) (Figure 1 for electronic version). The pre-notification letter was sent to 1000 addressees. Fifty-four addressees were excluded from the denominator due to death, change of address or asking to be excluded from the research prior to receiving the questionnaire.

(Figure 1 for electronic version)

Descriptive data

Respondents' age ranged from 19 to 92 years (mean=60, SD=15.5). Respondents were similar to national data in terms of gender ($\chi^2=0.026$, $df=1$, $p=0.87$) but not age, country, partnership status, ethnicity or general health (all $p < 0.001$) (Table 1).³²

(Table 1 Characteristics of survey respondents)

No association was found between response status and country of residence (i.e. England, N. Ireland, Scotland or Wales) ($\chi^2=5.3$, $df=3$, $p=0.15$) or gender ($\chi^2=0.002$, $df=1$, $p=0.96$). Respondents were significantly older than non-respondents by 10 years (Mann-Whitney $U = 86244.0$, $p < 0.001$).

The majority of respondents who used NPMs indicated that they always read the directions for use when using a NPM that they have never used before (214/343) and follow the directions for use (243/349) (Table 2).

(Table 2 Prevalence of self-reported non-prescription medicine abuse and misuse)

Non-prescription medicine misuse

The lifetime prevalence of any type of self-reported NPM misuse was 19.3% (n=76, 95% CI 15.7 to 23.5%): 11.9% (n=47, 95% CI 9.1 to 15.5%) for using a higher dose than recommended, 10.6% (n=42, 95% CI 8.0 to 14.1%) for using more often than recommended and 10.6% (n=42, 95% CI 7.9 to 14.0%) for using for a longer time than recommended (Table 2). Analgesics, with and without codeine, were the most frequently misused products (Table 1 for electronic version).

(Table 1 for electronic version - Categories of non-prescription medicines misused/abused and frequency of misuse/abuse)

Non-prescription medicine abuse

The lifetime prevalence of self-reported abuse was 4.1% (n=16, 95% CI 2.5 to 6.5%) (Table 2). The most common reason for abusing a NPM was for sleep or relaxation purposes. Medicines used for these purposes were: cold and flu products containing sedative antihistamines (n=3), cough remedies (n=2), codeine-containing analgesics (n=2), analgesics without codeine (n=1) and an antihistamine (n=1). A cough remedy was also used by one respondent for another reason: "*When trying to conceive, I read that Benylin help make women more likely to conceive as it made secretions more receptive to sperm*". Haemorrhoid products were reportedly used for facial skin-care purposes (n=2), and sore throat products were used for the pleasant taste (n=1) (Table 1 for electronic version).

Characteristics associated with self-reported misuse/abuse

Respondent characteristics associated ($p < 0.05$) with misuse/abuse were: age; partnership status; level of education; employment status; presence of a long-standing illness, disability or infirmity which requires the regular use of a NPM; and ever having used illegal drugs or legal highs (hereinafter referred to as illicit drug use) (Table 3). When entered into a logistic regression model, these characteristics correctly predicted 18.1% (15/83) of individuals who had abused/misused NPMs and 95.3% (264/277) who had not abused/missed NPMs. Characteristics that remained significant independent predictors of misuse/abuse were age, presence of a long-standing illness requiring regular NPM use and illicit drug use status (Table 3).

(Table 3 Characteristics associated with non-prescription medicine misuse/abuse and summary of logistic regression model analysis for variables predicting misuse/abuse)

Non-prescription medicine dependence

Most respondents (71.3%, 281/394) were aware of the potential for NPMs to cause dependence or addiction (Table 4). In total, 12% (47/396) of respondents indicated that they personally knew at least one person (including family members, friends and colleagues) who had been dependent on or addicted to a NPM. The NPMs associated with dependency or addiction in these people were: analgesics (without codeine (n=14), with codeine (n=13), unspecified (n=7)), smoking cessation products (n=4), laxatives (n=3), sleep aids (n=3), cough remedies (n=2), caffeine tablets (n=2), and decongestants (n=1).

(Table 4 Dependence to non-prescription medicines)

The lifetime prevalence of NPM dependence was 2% (n=8, 95% CI 1.0 to 3.9%); 0.8% (n=3, 95% CI 0.3 to 2.2%) were currently dependent whilst 1.3% (n=5, 95% CI 0.5 to 2.9%) had been dependent in the past. For those who had ever been dependent, analgesics containing codeine (n=4), analgesics without codeine (n=1), a herbal sleep aid (n=1) and nicotine gum (n=1) were the NPMs of dependence. One individual did not provide a response but their other data implied dependence associated with analgesic use.

Of the eight respondents ever dependent, six obtained their NPM of dependence from a pharmacy: five used multiple pharmacies and one used one pharmacy. No respondents obtained the NPM of dependence via the internet. Most dependent individuals were rarely or never questioned by pharmacy staff about their medicine needs or health condition when purchasing the NPM of dependence (Table 4). The individual indicating that they were 'usually' questioned by pharmacy staff was dependent on a codeine-containing analgesic. Those 'rarely' questioned were dependent on a codeine-containing analgesic (n=1), a smoking cessation product (n=1) and an herbal sleep aid (n=1). The two respondents who were 'never' questioned were dependent on codeine-containing analgesics. No respondents had ever been refused the sale of the NPM of dependence, or had ever been referred to a GP or substance misuse clinic, by a member of pharmacy staff.

The eight respondents who reported ever being dependent on or addicted to a NPM were asked where they had sought help for their dependence or addiction. The three individuals currently dependent selected 'Nowhere – I haven't sought help'. Of the five whose dependence was in the past, two had not sought help, two sought help from a GP, and one from family and friends.

DISCUSSION

Main findings of this study

This is the first study to estimate the prevalence of NPM misuse, abuse and dependence in the UK general population. Lifetime prevalence of any type of misuse was 19.3%. Lifetime prevalence of abuse and dependence was 4.1% and 2%, respectively. The products most commonly misused and abused were codeine containing analgesics, and cough and cold remedies. Dependence was reported with analgesics (with and without codeine), sleep aids and nicotine products. Being younger, having a long-standing illness requiring regular use of NPMs and ever having used illicit drugs were predictive of misuse or abuse of NPMs.

What is already known on this topic

There is a drive to encourage and enable self-care in the UK through the use of NPMs for minor ailments. Pharmacy customers who make direct product requests by name are less likely to be questioned by pharmacy staff than customers/patients seeking advice regarding the management of conditions or symptoms.³³ Furthermore, pharmacy users generally report low rates of information disclosure to pharmacy personnel during consultations for NPMs.²⁸ From a pharmacy perspective, pharmacists suspect that NPMs are sometimes misused.²⁰ Research has also demonstrated that NPMs can be misused, abused or lead to dependence for some people.⁷

The prevalence of these problems within the UK general population was unknown. Previous surveys have been conducted but these were limited in either the population studied or type of NPM studied.

What this study adds

This study identified potential predictors of misuse/abuse as: being of younger age, having a long-standing illness which requires regular NPM use, and use of illicit drugs. Having a long-standing illness is clinically relevant as it reinforces the need for clinicians to be aware of concurrent use of NPMs by their patients, particularly those with pain, and to be mindful of the potential for misuse, abuse and dependence.

Most individuals ever dependent on an NPM had not sought formal help for their dependence. The reasons for this are unknown. Previous qualitative research involving individuals with non-prescription codeine dependence found that attempts at self-treatment were often ineffective⁹; consequently there is a need for future research to identify the barriers and enablers to seeking treatment for NPM dependence. A qualitative study is ongoing by the research team to address this. There may be a need to clarify sources of treatment/support for NPM dependence and raise awareness of these treatment options.

In our study, individuals who were or had been dependent, were generally rarely or never questioned by pharmacy staff about their purchase. More active engagement may be needed by both pharmacy personnel and patients/customers during these consultations, particularly when requests are made for NPMs associated with misuse, abuse and dependence, to explore the need for referral to an appropriate source of support/treatment. However, previous research indicates that there may be difficulties with this due to the difficulty some pharmacists have in challenging customers or raising their concerns with customers, as well as their lack of confidence about signposting customers to potential sources of support.³⁴

Respondents' acknowledgement of the potential for NPMs to lead to dependence was high and suggests that there is public awareness that NPMs are associated with risks. However, a considerable proportion of individuals do not always read the directions for use and therefore alternative, or additional, methods of providing important information on medicine risk should be considered, e.g. by pharmacy staff at the time of purchase, through product advertisements or mass media campaigns.

The survey achieved a higher than anticipated response compared with recent studies using the same sampling method.^{28, 35} The survey was inclusive with regard to NPMs and was not restricted to a limited selection of NPMs as in previous research. Furthermore it was conducted on a large, national sample, unlike previous research.

Limitations of this study

There may be some response bias given that respondents differed from non-respondents in various ways; they were older and more likely to be: white, married, in a civil partnership or widowed; rate their general health as poorer and reside in Scotland or Wales.³² A US study indicated that the lifetime prevalence of abuse of non-prescription cough and cold medicines is higher in younger individuals therefore the prevalence of lifetime abuse may be underestimated.³⁶ The same US study reported that lifetime use of a non-prescription cough or cold medicine "to get high" was 3.0% and 6.6% amongst those aged 12-17 and 18-25 years, respectively, whilst the lowest prevalence rates were among those aged 50-64 years and 65 years and older, respectively. Consequently, the older age of respondents in our study and the exclusion of individuals less than 18 years of age may have underestimated the prevalence of abuse in our study. Similarly, groups that are less likely to have registered to vote or to have opted out of the Edited Electoral Register will be under-represented which may have affected the results in unknown ways. Other factors may also serve to under- or over-estimate the prevalence of misuse, abuse and dependence. Social desirability bias and recall bias may result in under-reporting. The explicit use of the terms "dependence" and

“addiction” may have resulted in under-reporting of dependence due to social desirability bias, although the researchers attempted to minimise the likelihood of this for misuse and abuse by avoiding the use of these terms in the questionnaire. The finding that younger age was predictive of lifetime misuse or abuse of NPMs may be due to recency; it may be that older individuals had simply forgotten about previous use. People may have unknowingly misused NPMs. Our study found that 38% of respondents who used NPMs did not always read the directions for use when using a NPM that they have never used before, which was higher than shown previously.³⁷

Funding

This study was supported by the Society for the Study of Addiction in the form of a PhD studentship awarded to NF.

Acknowledgements

We thank the survey participants. We would also like to thank Lorna Aucott and Megala Thiruvothiyur (Medical Statistics, University of Aberdeen) for statistical support.

Contributors

All authors conceived and designed the work. NF collected, analysed and interpreted the data. All authors drafted the work or revised it critically for important intellectual content, gave final approval of the version to be published, and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. NF and CM are the guarantors. NF had access to all of the study data and can take responsibility for the integrity of the data and the accuracy of the data analysis.

Conflict of interest

NF has received financial support for the current work in the form of a PhD studentship from the Society for the Study of Addiction; NF is in receipt of funding in the form of a PhD studentship from the Society for the Study of Addiction and CM is a member of the Society for the Study of Addiction’s executive committee.

Ethical approval

Ethical approval was obtained from University of Aberdeen College Ethics Review Board (reference number CERB/2013/3/874).

REFERENCES

1. Scottish Executive. *Partnership for care*. Edinburgh: The Stationery Office; 2003.
2. Proprietary Association of Great Britain. *OTC Directory 2013/2014*. London: Communications International Group; 2013.
3. Fielding S, Porteous T, Ferguson J, Maskrey V, Blyth A, Paudyal V, et al. Estimating the burden of minor ailment consultations in general practices and emergency departments through retrospective review of routine data in North East Scotland. *Fam Pract* 2015;32(2):165-72.
4. Watson MC, Ferguson J, Barton GR, Maskrey V, Blyth A, Paudyal V, et al. A cohort study of influences, health outcomes and costs of patients' health-seeking behaviour for minor ailments from primary and emergency care settings. *BMJ Open* 2015;5(2).
5. Pillay N, Tisman A, Kent T, Gregson J. The economic burden of minor ailments on the National Health Service (NHS) in the UK. *Self-Care* 2010;1:105-16.
6. Bissell P, Ward PR, Noyce PR. The dependent consumer: reflections on accounts of the risks of non-prescription medicines. *Health* 2001;5(1):5-30.
7. Cooper RJ. Over-the-counter medicine abuse-A review of the literature. *J Subst use* Apr 2013;18(2):82-107.
8. Nielsen S, Cameron J, Pahoki S. *Final report 2010: Over the counter codeine dependence*. Victoria: Turning Point Alcohol and Drug Centre; 2010.
9. Cooper RJ. 'I can't be an addict. I am.' Over-the-counter medicine abuse: a qualitative study. *BMJ Open* 2013;3(6):1-9.

10. Hughes JR, Pillitteri JL, Callas PW, Callahan R, Kenny M. Misuse of and dependence on over-the-counter nicotine gum in a volunteer sample. *Nicotine Tobacco Res* 2004;6(1):79-84.
11. Gossop M, Darke S, Griffiths P, Hando J, Powis B, Hall W, et al. The Severity of Dependence Scale (SDS): psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users. *Addiction* 1995;90(5):607-14.
12. Frei MY, Nielsen S, Dobbin M, Tobin CL. Serious morbidity associated with misuse of over-the-counter codeine-ibuprofen analgesics: a series of 27 cases. *Med J Aust* 2010;193(5):294-6.
13. Medicines and Healthcare products Regulatory Agency. *MHRA public assessment report. Codeine and dihydrocodeine-containing medicines: minimising the risk of addiction*. London: MHRA; 2009.
14. Department of Health. *Pharmacy in the Future - Implementing the New NHS Plan*. London: The Stationery Office; 2000.
15. Scottish Executive. *Our National Health. A plan for action, a plan for change*. Edinburgh: The Stationery Office; 2000.
16. Self Care Campaign group. *Self care: An ethical imperative (white paper)*. Self Care Forum; 2010.
17. Paxton R, Chapple P. Misuse of over-the-counter medicines: a survey in one English county. *Pharm J* 1996;256:313-5.
18. Hughes GF, McElnay JC, Hughes CM, McKenna P. Abuse/misuse of non-prescription drugs. *Pharm World Sci* 1999;21(6):251-5.

19. MacFadyen L, Eadie D, McGowan T. Community pharmacists' experience of over-the-counter medicine misuse in Scotland. *J Roy Soc Promot Health* 2001;121(3):185-92.
20. Matheson C, Bond C, Pitcairn J. Misuse of over-the-counter medicines from community pharmacies: a population survey of Scottish pharmacies. *Pharm J* 2002;269:66-8.
21. Pates R, McBride AJ, Li S, Ramadan R. Misuse of over-the-counter medicines: a survey of community pharmacies in a South Wales health authority. *Pharm J* 2002;268:179-82.
22. Sansgiry SS, Nadkarni A, Doan T. Misuse of over-the-counter medications among community-dwelling older adults and associated adverse drug events. *J Pharm Health Serv Res* 2010;1(4):175-9.
23. Ajuoga E, Sansgiry SS, Ngo C, Yeh RF. Use/misuse of over-the-counter medications and associated adverse drug events among HIV-infected patients. *Res Social Adm Pharm* 2008; Sep;4(3):292-301.
24. Wazaify M, Hughes CM, McElnay JC. The implementation of a harm minimisation model for the identification and treatment of over-the-counter drug misuse and abuse in community pharmacies in Northern Ireland. *Patient Educ Couns* 2006;64(1):136-41.
25. Fleming GF, McElnay JC, Hughes CM. Development of a community pharmacy-based model to identify and treat OTC drug abuse/misuse: a pilot study. *Pharm World Sci* 2004;26(5):282-8.
26. Albsoul-Younes A, Wazaify M, Yousef A, Tahaine L. Abuse and misuse of prescription and nonprescription drugs sold in community pharmacies in Jordan. *Subst use Misuse* 2010;45(9):1319-29.
27. World Health Organization. Lexicon of alcohol and drug terms published by the World Health Organization. Geneva: World Health Organization; 1994.

28. Watson MC, Johnston M, Entwistle V, Lee AJ, Bond CM, Fielding S. Using the theory of planned behaviour to develop targets for interventions to enhance patient communication during pharmacy consultations for non-prescription medicines. *Int J Pharm Pract* 2014;22(6):386-96.
29. Wazaify M, Shields E, Hughes CM, McElnay JC. Societal perspectives on over-the-counter (OTC) medicines. *Fam Pract* 2005;22(2):170-6.
30. Edwards PJ, Roberts I, Clarke MJ, DiGuseppi C, Wentz R, Kwan I, et al. Increasing response rates to postal questionnaires: systematic review. *Cochrane Database Syst Rev* 2009;(3):MR000008.
31. Colliver J. Misuse of OTC Cold and Cough Medications: New Data from the National Survey on Drug Use and Health. Presented at the annual meeting of the American Public Health Association; 2007 November; Washington: .
32. 2011 Census (dataset). Available at: <http://www.ons.gov.uk/ons/datasets-and-tables/index.html>. Accessed May 16, 2014.
33. Watson MC, Bond CM, Grimshaw J, Johnston M. Factors predicting the guideline compliant supply (or non-supply) of non-prescription medicines in the community pharmacy setting. *Qual Saf Health Care* 2006;15(1):53-7.
34. Cooper R. Surveillance and uncertainty: Community pharmacy responses to over the counter medicine abuse. *Health & Social Care in the Community* May 2013;21(3):254-62.
35. Matheson C, Jaffray M, Ryan M, Bond CM, Fraser K, Kirk M, et al. Public opinion of drug treatment policy: Exploring the public's attitudes, knowledge, experience and willingness to pay for drug treatment strategies. *Int J Drug Policy* 2014; 5;25(3):407-15.

36. National Survey on Drug Use and Health, 2012. Available at:

<http://doi.org/10.3886/ICPSR34933.v1>. Accessed Aug 22, 2014.

37. Major C, Vincze Z. Consumer habits and interests regarding non-prescription medications in Hungary. *Fam Pract* 2010;27(3):333-8.

Table 1 Characteristics of respondents

		Survey respondents ^a		National data ^b	*
		%	(n)	%	
Country (N=411)	England	78.6	(323)	83.9	*
	Northern Ireland	1.0	(4)	2.9	
	Scotland	13.4	(55)	8.4	
	Wales	7.1	(29)	4.8	
Sex (N=405)	Female	50.4	(204)	50.9	
	Male	49.6	(201)	49.1	
Age range (in years) (N=398 ^c)	20-29	6.5	(26)	17.9	*
	30-39	4.3	(17)	17.3	
	40-49	10.6	(42)	19.3	
	50-59	19.8	(79)	16.0	
	60-69	29.9	(119)	14.2	
	70-79	20.4	(81)	9.3	
	80+	8.5	(34)	6.0	
Ethnicity (N=401)	White	97.3	(390)	87.2	*
	Other	2.7	(11)	12.8	
Partnership status (N=400)	Never married or in civil partnership	19.0	(76)	34.7	*
	Married or in civil partnership	61.5	(264)	46.7	
	Separated or divorced	8.3	(33)	11.6	
	Widowed	11.3	(45)	7.0	
General health (N=404)	Very good/Good	70.8	(286)	81.2	*
	Fair	23.3	(94)	13.2	
	Bad/Very Bad	5.9	(24)	5.6	
Long-standing illness requiring regular use of NPMs (N=397)	Yes	17.4	(69)		
	No	82.6	(328)		
Education (highest level completed) (N=401)	No formal qualification	14.0	(56)		
	High school or secondary school	42.6	(171)		
	College	28.7	(115)		
	University degree	14.7	(59)		
Employment status (N=397)	Employed	38.3	(152)		
	Self-employed	7.6	(30)		
	Retired	43.8	(174)		
	Other ^d	10.3	(41)		
Alcohol drinker (N=400)	Yes	74.3	(297)		
	No	25.8	(103)		
Smoking status (N=402)	Smoker	11.4	(46)		
	Ex-smoker	39.6	(159)		
	Never smoked	49.0	(197)		
Ever used drugs or legal highs (N=402)	Yes	7.7	(31)		
	No	92.3	(371)		

NPMs: non-prescription medicines.

^a Not all of the 411 respondents gave a valid response to every question. Actual numbers of respondents are shown next to the individual questions. Results show valid percentages.

^b Office for National Statistics 2011.

^c One respondent under 20 years of age was excluded to allow direct comparison between survey data and national data.

^d Comprises: full-time student, looking after home/family, long-term sick or disabled, unemployed and available for work, and other.

* p<0.001.

Table 2 Prevalence of self-reported non-prescription medicine abuse and misuse

	%	(n)
Have you ever knowingly used a non-prescription medicine:		
For a reason that was not recommended by the manufacturer e.g. for the feeling or effect it caused?^a		
<i>(N=394)</i>	Yes – in the past month	0.8 (3)
	Yes – more than a month ago	3.3 (13)
	No – never	95.9 (378)
At a higher dose than recommended by the manufacturer?^b		
<i>(N=394)</i>	Yes – in the past month	2.5 (10)
	Yes – more than a month ago	9.4 (37)
	No – never	88.1 (347)
More often than recommended by the manufacturer?^b		
<i>(N=395)</i>	Yes – in the past month	2.8 (11)
	Yes – more than a month ago	7.8 (31)
	No – never	89.4 (353)
For a longer time than recommended by the manufacturer?^b		
<i>(N=396)</i>	Yes – in the past month	2.3 (9)
	Yes – more than a month ago	8.3 (33)
	No – never	89.4 (354)
Any type of misuse		
<i>(N=393)</i>	Yes – in the past month	4.6 (19)
	Yes – more than a month ago	13.9 (57)
	No – never	77.1 (317)
When using a non-prescription medicine that I have never used before, I read the directions for use.		
<i>(N=343)*</i>	Never	0.9 (3)
	Rarely	4.4 (15)
	Sometimes	7.6 (26)
	Usually	24.8 (85)
	Always	62.4 (214)
When using non-prescription medicines myself, I follow the directions for use.		
<i>(N=349)*</i>	Never	0.9 (3)
	Rarely	0.9 (3)
	Sometimes	4.9 (17)
	Usually	23.8 (83)
	Always	69.6 (243)

*Respondents who indicated earlier in the questionnaire that they never use non-prescription medicines (n=28) were instructed to skip this question.

^a abuse; ^b misuse.

Table 3 Characteristics associated with non-prescription medicine misuse/abuse and summary of logistic regression model analysis for variables predicting misuse/abuse

		Ever misused or abused %	Never misused or abused %	<i>p</i> -value	OR	95% CI
Sex (<i>N</i> =388)				0.27		
	Female	55.8	48.3		-	-
	Male	44.2	51.7		n/a	n/a
Age (in years) (<i>N</i> =383)	Mean (SD)	51.2 (14.8)	62.1 (14.6)	<0.001	1.05	1.02-1.08
Ethnicity (<i>N</i> =386)				1.0		
	White	97.6	97.3		-	-
	Other	2.4	2.7		n/a	n/a
Partnership status (<i>N</i> =383)				0.001		
	Never married or in civil partnership	30.6	15.8		-	-
	Married or in civil partnership	51.8	65.8		1.52	0.36-6.40
	Separated or divorced	12.9	6.7		1.04	0.31-3.43
	Widowed	4.7	1.7		0.52	0.12-2.15
General health (<i>N</i> =387)				0.84		
	Very good	24.4	24.3		-	-
	Good	45.3	47.5		n/a	n/a
	Fair, bad or very Bad	30.2	28.2		n/a	n/a
Long-standing illness requiring regular use of NPMs (<i>N</i> =381)				<0.001		
	Yes	30.6	13.5		-	-
	No	69.4	86.5		0.33	0.18-0.62
Education (highest level completed) (<i>N</i> =385)				0.014		
	No formal qualification	7.0	15.1		-	-
	High school or secondary school	36.0	45.2		0.80	0.25-2.61
	College	40.7	25.4		0.84	0.37-1.91
	University degree	16.3	14.4		0.52	0.23-1.18
Employment (<i>N</i> =381)				0.002		
	Employed or self-employed	61.2	43.2		-	-
	Retired	25.9	47.6		0.83	0.36-1.92
	Other	12.9	9.1		0.78	0.27-2.26
Alcohol drinker (<i>N</i> =384)				0.28		
	Yes	80.2	73.8		-	-
	No	19.8	26.2		n/a	n/a
Smoking status (<i>N</i> =386)				0.25		
	Smoker	15.1	10.0		-	-
	Ex-smoker	33.7	41.7		n/a	n/a
	Never smoked	51.2	48.3		n/a	n/a
Ever used drugs or legal highs (<i>N</i> =385)				<0.001		
	Yes	18.6	4.7		-	-
	No	81.4	95.3		0.35	0.15-0.85

NPMs: non-prescription medicines.

n/a = Not significant at the univariate level, hence not included in the model.

Table 4 Dependence to non-prescription medicines

	%	(n)
Some NPMs may cause dependence or addiction		
<i>(N=394)</i>		
Strongly disagree	4.1	(16)
Disagree	6.1	(24)
Neither	18.5	(73)
Agree	26.9	(106)
Strongly agree	44.4	(175)
Do you personally know someone who has been dependent on or addicted to any NPMs?		
<i>(N=396)</i>		
Yes	11.9	(47)
No	88.1	(349)
Have you ever considered yourself to be dependent on or addicted to any NPMs?		
<i>(N=397)</i>		
Yes – in the past month	0.8	(3)
Yes – more than a month ago	1.3	(5)
No - never	98.0	(389)
From where have you obtained the NPM?*		
<i>(N=8)</i>		
A pharmacy		(6)
A shop without a pharmacy		(2)
Friends or family		(1)
Other		(2)
Were you asked about your medicine needs or health condition by a member of pharmacy staff when buying the NPM?		
<i>(N=6)</i>		
Always		(0)
Usually		(1)
Sometimes		(0)
Rarely		(3)
Never		(2)
What were you asked about when buying the NPM?*		
<i>(N=4)</i>		
Whether you had used it before?		(3)
Who was it for?		(3)
How often were you using it?		(2)
Whether you were using any other medicines?		(2)

NPM: non-prescription medicine.

*Frequencies total more than denominator as multiple response options were allowed.