

**Fragranced Consumer Products and Effects on Asthmatics:
An International Population-Based Study**

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Fragranced Consumer Products and Effects on Asthmatics: An International Population-Based Study

Abstract

Asthma is an international concern, with risks linked to air pollutants. Fragranced consumer products, such as air fresheners and cleaning supplies, have been associated with health problems such as asthma attacks and breathing difficulties. This study investigates the health and societal effects of fragranced products on asthmatics in four countries: United States, Australia, United Kingdom, and Sweden. Nationally representative population surveys (n=1,137; 1,098; 1,100; 1,100) found that, across the four countries, 26.0% of adults (n=1,151) are asthmatic, reporting medically diagnosed asthma (15.8%), an asthma-like condition (11.1%), or both. Among these asthmatics, 57.8% report adverse health effects, including asthma attacks (25.0%), respiratory problems (37.7%), and migraine headaches (22.6%), from exposure to fragranced products. In particular, 36.7% of asthmatics report health problems from air fresheners or deodorizers, 18.1% from the scent of laundry products coming from a dryer vent, 32.9% from being in a room cleaned with scented products, 38.7% from being near someone wearing a fragranced product, and 37.5% from other types of fragranced products. For 24.1% of asthmatics, health problems from fragranced products are potentially disabling. Further, 20.6% of asthmatics have lost workdays or lost a job, in the past year, due to fragranced product exposure in the workplace. Fragrance-free environments received widespread support. More than twice as many individuals, both asthmatics as well as non-asthmatics, would prefer that workplaces, health care facilities and professionals, airplanes, and hotels were fragrance-free rather than fragranced. This study provides evidence that asthmatics can be profoundly, adversely, and disproportionately affected by exposure to fragranced consumer products. Moreover, the study points to a relatively straightforward and cost-effective approach to reduce risks; namely, to reduce exposure to fragranced products.

Keywords: asthma, asthma-like condition, asthmatic, fragranced consumer products, indoor air quality, fragrance, health effects, volatile organic compounds

Introduction

Fragranced consumer products—such as air fresheners, cleaning supplies, laundry detergents, scented candles, essential oils, colognes, soaps, and personal care products—are widely used throughout society (Steinemann 2016). Fragranced products emit numerous volatile organic compounds (VOCs) including asthmagens (Weinberg et al. 2017) and hazardous air pollutants (e.g., Nazaroff and Weschler 2004). Fragranced products have been implicated as an important source of human exposure to VOCs (e.g., Hoang et al. 2017, Gokhale et al. 2008, Wallace 2001), as well as indoor air pollution (e.g., Geiss et al. 2011, Edwards et al. 2001, Goodman et al. 2017) and urban outdoor air pollution (McDonald et al. 2018).

A "fragranced consumer product" (or "fragranced product") is a product that contains an added fragrance or that is largely comprised of fragrance (Steinemann 2016). A single "fragrance" in a product is typically a complex mixture of dozens of compounds (Steinemann 2015), many derived from petrochemicals (Sell 2006). However, no law in any country requires full disclosure of all ingredients in a fragrance. Further, no law requires full disclosure of all ingredients in a consumer product (other than for foods, drugs, and cosmetics). Thus, consumers have limited information on fragrance ingredients as well as whether a product even contains a fragrance (Lunny et al. 2017; Steinemann 2009).

Exposure to fragranced products has been associated with adverse health effects in the general population and in vulnerable sub-populations. Studies in the United States (US), Australia (AU), United Kingdom (UK), and Sweden (SE) found that, on average, 32.2% of the general population (34.7%, 33.0%, 27.8%, and 33.1%, respectively) report health problems when exposed to fragranced products such as air fresheners, laundry supplies, cleaning products,

personal care products, and household items (Steinemann 2016, 2017a, 2018a, 2018b). Health problems include respiratory difficulties, migraine headaches, asthma attacks, mucosal symptoms, skin rashes, and neurological problems, among others. Among vulnerable sub-populations, 75.8% of individuals with autism (83.7% 82.9% 84.6% 51.8%, respectively) and 81.3% with chemical sensitivity (78.9% 82.1% 77.3% 86.9%, respectively) report adverse health effects from exposure to fragranced products (Steinemann 2018d, 2019).

Relatively little prior population-based research has investigated links between fragranced products and asthma. In two national studies, upon which this international study builds, 64.3% and 55.6% of asthmatics in the US and AU, respectively, report adverse health effects from fragranced products (Steinemann 2018c, Steinemann et al. 2018). Two studies in the US, conducted in 2002-2003 and 2005-2006, found that 29.7% and 37.2%, respectively, of asthmatics report adverse health effects from air fresheners or deodorizers (Caress and Steinemann 2009). A study of workers in California found that 3.8% of 7,163 confirmed work-related asthma cases from 1993-2012 were associated with fragranced product exposure (Weinberg et al. 2017).

This present study investigates the effects of exposure to fragranced products on asthmatic adults in four countries (US, AU, UK, SE). It assesses the types and severity of health effects associated with different types of fragranced product exposures; societal effects such as access to public places, lost workdays and lost jobs; and preferences for fragrance-free environments. It extends the prior national studies of asthmatics in the US and AU with results from studies in the UK and SE, offering greater breadth and depth of analysis. Results from this study reveal important and under-explored associations between fragranced products and asthmatics, and suggest a relatively straightforward way to reduce adverse effects by reducing exposure.

Methods

Nationally representative population-based cross-sectional studies, using the same survey instrument, were conducted of adults ages 18-65 in the United States, Australia, United Kingdom, and Sweden. Sample populations were representative of the general populations according to age, gender, and region (n=1,137; 1,098; 1,100; 1,100; respectively; confidence limit=95%, margin of error=3% for all studies). The surveys drew upon large web-based panels (with over 5,000,000; 200,000; 900,000; 60,000 people, respectively) held by Survey Sampling International (SSI). For the panels, SSI uses multi-source samples to develop a blend that reflects the heterogeneity of the study population. For the surveys, recruitment followed a three-step randomization process to identify potential participants [See SSI (2019), and Electronic Supplementary Materials (ESM-Survey Methods and ESM-SSI Methodologies)]. The survey instrument, a questionnaire in each country's native language, was developed and tested over a two-year period before full implementation in June 2016 (US, AU, UK) and June 2017 (SE). The survey response rate was 94%, 93%, 97%, 92% (respectively), and all responses were anonymous. The research study received ethics approval from the University of Melbourne. Survey methods are detailed in the Electronic Supplementary Material (ESM-Survey Methods).

Descriptive statistics and cross-tabulations determined percentages according to each response and sub-population; see Electronic Supplementary Material (ESM-Data). Prevalence odds ratios (PORs) measured the strength of associations to determine whether one sub-population is proportionally more affected than another. Chi-squared analyses compared proportions among countries to determine whether a statistically significant difference exists. All POR and Chi-squared analyses were performed using a 95% confidence interval (CI) or a 95% confidence level, respectively.

To promote comparability, the survey replicated questions from previous studies of asthma/asthma-like conditions and fragrance sensitivity (Steinemann 2016, 2017a, 2018a, b, c, 2019; Steinemann et al. 2018; Caress and Steinemann 2009), as follows.

For asthma/asthma-like conditions, the survey asked, "Has a doctor or health care professional ever told you that you have asthma or an asthma-like condition?" If the respondent answered yes, the survey then asked to specify whether "asthma" or an "asthma-like condition" or both.

For fragrance sensitivity, defined as adverse effects from exposure to fragranced consumer products (Caress and Steinemann 2009), the survey asked, "Do you experience any health problems when exposed to (fragranced product)?" If the respondent answered yes, the survey then asked the respondent to specify which health problems they experienced. An individual was considered to characterize fragrance sensitivity if they reported one or more types of health problems from exposure to one or more types of fragranced consumer products.

Fragranced products were categorized as follows: (a) Air fresheners and deodorizers (e.g., sprays, solids, oils, disks); (b) Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos); (c) Cleaning supplies (e.g., all-purpose cleaners, disinfectants, dishwashing soap); (d) Laundry products (e.g., detergents, fabric softeners, dryer sheets); (e) Household products (e.g., scented candles, restroom paper, trash bags, baby products); (f) Fragrance (e.g., perfume, cologne, after-shave, essential oils); and (g) Other.

Exposure contexts included the following: air fresheners or deodorizers used within indoor environments; scented laundry products coming from a dryer vent; being in a room after it was

cleaned with scented cleaning products; being near someone wearing a fragranced product; and exposure to other types of fragranced consumer products.

Health effects were categorized as follows: (a) Migraine headaches; (b) Asthma attacks; (c) Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination); (d) Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath); (e) Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis); (f) Cognitive problems (e.g., difficulties thinking, concentrating, or remembering); (g) Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing); (h) Immune system problems (e.g., swollen lymph glands, fever, fatigue); (i) Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea); (j) Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort); (k) Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness); and (l) Other.

Societal effects included the following: ability to access restrooms, businesses, and other locations that use air fresheners or other fragranced products; loss of workdays or lost jobs due to illness from fragranced product exposure in the workplace; disabling health effects from exposure to fragranced products; and preferences for fragrance-free workplaces, health care facilities, health care professionals, airplanes, and hotels.

Results

Main findings are provided in this section, with summaries in Tables 1-3. Complete data and statistical analyses for each country individually, and across the four countries, are provided as Electronic Supplementary Material (ESM-Data).

Study Populations, Prevalence, and Fragranced Products Use and Exposure:

Of the general population surveyed in four countries, 26.0% of adults (n=1,151) are asthmatic (26.8% US; 28.5% AU; 25.3% UK; 23.2% SE), reporting medically diagnosed asthma (15.8%), an asthma-like condition (11.1%), or both (Table 1). Across the four countries, no statistically significant difference was found in the prevalence of asthma/asthma-like conditions (p=0.087, Chi-square test).

Among asthmatics, 99.8% are exposed to fragranced products at least once a week from their own use (99.1%), others' use (93.2%), or both (see ESM-Data). Among non-asthmatics, 98.9% are exposed to fragranced products at least once a week from their own use (98.0%), others' use (89.7%), or both. Across the four countries, no statistically significant difference was found in the use and exposure to fragranced products among asthmatics (p=0.99, Chi-square test) or between asthmatics and non-asthmatics (p=0.92, Chi-square test).

Health Problems Reported from Fragranced Consumer Products:

Among asthmatics, 57.8% report fragrance sensitivity (64.3% US, 55.6% AU, 54.0% UK, 57.3% SE); that is, adverse health effects from exposure to fragranced products. The most common adverse health effects were respiratory problems (37.7%), mucosal symptoms (25.4%), asthma attacks (25.0%), migraine headaches (22.6%), and skin problems (17.1%) (Table 2). Among non-asthmatics, 23.1% report fragrance sensitivity (Table 2). Across all types of health effects, asthmatics are proportionally more affected than non-asthmatics (POR 4.56; 95% CI 3.96–5.26).

Severity of health effects from exposure to fragranced products was investigated using criteria for disability according to each country's legislation (ADAAA 2008; DDA 1992; EA 2010; DA 2008). Among all asthmatics, 24.1% across the four countries (40.3% US, 15.0% AU, 20.1% UK, 20.8% SE) report that effects from fragranced products are potentially disabling, which represents 40.9% of fragrance sensitive asthmatics (Table 2 and ESM-Data). Among non-asthmatics, 6.4% report potentially disabling effects (Table 2). While both asthmatics and non-asthmatics can be severely affected by fragranced products, asthmatics are proportionally more affected (POR 4.72; 95% CI 4.09–5.45).

Fragranced Product Exposures, Societal Access, and Workplace Effects:

Among asthmatics, 36.7% report health problems from air fresheners and deodorizers, 18.1% from the scent of laundry products coming from a dryer vent, 32.9% from being in a room recently cleaned with scented products, 38.7% from being near someone wearing a fragranced product, and 37.5% from other types of fragranced consumer products. (See Table 3.)

Fragranced product exposures are associated with loss of societal access: 26.4% of asthmatics are unable or reluctant to use the restrooms in a public place if it has an air freshener, deodorizer, or scented product; 21.9% are unable or reluctant to wash their hands with soap in a public place if the soap is fragranced; 31.6% enter a business and then want to leave as quickly as possible if they smell air fresheners or a fragranced product; and 32.9% have been prevented from going someplace because they would be exposed to a fragranced product that would make them sick. (See Table 3.)

Exposures are also associated with lost workdays and lost jobs: 20.6% of asthmatics have lost workdays or lost a job, in the past year, due to illness from fragranced product exposure in the

workplace. Accordingly, fragrance-free workplaces and other indoor environments receive a strong majority of support among both asthmatic and non-asthmatics, as detailed below. (See Table 3.)

For fragrance-free workplace policies: Among asthmatics, 56.7% would support a fragrance-free policy in the workplace (compared to 17.7% that would not). Among non-asthmatics, 44.7% would support a fragrance-free workplace (compared with 21.4% that would not). Thus, over three times as many asthmatics, and two times as many non-asthmatics, would support fragrance-free workplace policies (than not).

For health care facilities and health care professionals: Among asthmatics, 62.3% would prefer that health care facilities and professionals were fragrance-free (compared to 18.3% that would not). Among non-asthmatics, 47.5% would prefer that health care facilities and professionals were fragrance-free (compared to 23.4% that would not). Thus, over three times as many asthmatics, and two times as many non-asthmatics, would prefer fragrance-free health care facilities and health care professionals (than not).

For airplane travel: Among asthmatics, if given a choice between flying on an airplane with or without fragranced air pumped throughout the passenger cabin, 68.8% would choose an airplane without fragranced air (compared to 17.3% with fragranced air). Among non-asthmatics, 63.3% would choose an airplane without fragranced air (compared to 15.7% with fragranced air). Thus, nearly four times as many asthmatics as well as non-asthmatics would choose an airplane without fragranced air (than with fragranced air).

For hotels: Among asthmatics, if given a choice between staying in a hotel with or without fragranced air, 65.8% would choose a hotel without fragranced air (compared to 22.7% with

fragranced air). Among non-asthmatics, 58.9% would choose a hotel without fragranced air (compared to 21.9% with fragranced air). Thus, nearly three times as many asthmatics as well as non-asthmatics would choose a hotel without fragranced air (than with fragranced air).

Study strengths include the following: (a) sample populations in each country were statistically representative of age, gender, and region; (b) respondents were randomly recruited from large web-based panels developed from multiple sources to reflect population characteristics; and (c) the survey employed questions from large national studies previously conducted and published to promote replicability and comparability.

Study limitations include the following: (a) only adults ages 18–65 were included in the survey, which excludes other age groups; (b) the survey relied on self-reported data; however, self-report is a widely accepted method for survey research; (c) the cross-sectional design of the survey represents data from only one point in time, and (d) all possible fragranced products and health effects were not included, although the relatively low percentages of responses in the "other" categories indicate the survey captured the primary products and effects.

Discussion

This study adds to the growing scientific evidence that exposure to fragranced consumer products is associated with adverse health and societal effects, especially in vulnerable populations such as asthmatics.

For instance, as estimated across the four countries (USCB 2016, ABS, 2016, ONS 2016, SCB 2017), over 10 million adults experience asthma attacks from exposure to air fresheners. In addition, for over 20 million asthmatics, illness from exposure to fragranced products in the

workplace was associated with lost workdays and lost jobs. Further, for over 24 million asthmatics, health problems from exposure were reported as potentially disabling.

Given that fragranced products are reported to trigger asthma attacks in an estimated 25% of asthmatics, and additional types of health problems in more than 50% of asthmatics, reducing exposure would appear to be a logical, cost-effective, and medically effective approach to asthma control.

To that end, fragrance-free products offer practical alternatives, and can reduce fragrance compound emissions (Goodman et al. 2018). Further, as this study demonstrated, fragrance-free policies and fragrance-free environments are preferred by a majority of the population, both asthmatics and non-asthmatics.

To assist in reducing exposure, an important step would be the required listing of "fragrance" on the label for all types of consumer products (not only for foods, drugs, and cosmetics). Analysis of fragranced consumer products found that 2/3 did not disclose that the product contained fragrance (Steinemann 2015). Further, an "unscented" product may not be "fragrance-free"; it may still contain fragrance but with a masking fragrance to cover the scent (Steinemann 2015).

A further step would be the disclosure of fragrance ingredients. Analysis of fragranced consumer products found that most ingredients (over 90%), even potentially hazardous compounds, were not listed on the product label, safety data sheet, or elsewhere (Nematollahi et al. 2018a, b; Steinemann 2015, 2017b). One approach is the listing of certain fragrance ingredients such as allergens (e.g., EU 2009). However, allergens may not address all major

health effects of concern associated with fragranced consumer products, as this study demonstrates.

It should not be surprising that fragranced consumer products can be associated with asthmatic exacerbations and respiratory difficulties, as noted by Weinberg et al. (2017). What is surprising, however, is that a seemingly obvious and effective approach—reducing exposure to reduce adverse effects—is not more widely recognized and implemented. However, results from this study may provide the foundations for more effective approaches to reduce the burden of asthma.

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Table 1: Study Populations: Asthmatic and Non-Asthmatic Adults in the United States (US), Australia (AU), United Kingdom (UK), and Sweden (SE).

	US	AU	UK	SE	Total / Average %
Total (n) General Population	1,137	1,098	1,100	1,100	4,435
Asthmatic (asthma/asthma-like condition)	305 26.8%	313 28.5%	278 25.3%	255 23.2%	1,151 26.0%
Asthma	173 15.2%	176 16.0%	188 17.1%	164 14.9%	701 15.8%
Asthma-like condition	142 12.5%	151 13.8%	99 9.0%	100 9.1%	492 11.1%
Non-asthmatic	832 73.2%	785 71.5%	822 74.7%	845 76.8%	3,284 74.1%
Not asthma/ asthma-like condition	811 97.5%	740 94.3%	791 96.2%	804 95.1%	3,146 95.8%
Don't know/not sure	19 2.3%	43 5.5%	30 3.6%	36 4.3%	128 3.9%
Decline to answer	2 0.2%	2 0.3%	1 0.1%	5 0.6%	10 0.3%

Table 2: Types of Health Problems from Exposure to Fragranced Consumer Products for Asthmatics and Non-Asthmatics

	Asthmatics	Non-Asthmatics
Total (n) Asthmatic/Non-Asthmatic Individuals	1,151	3,284
<u>Health Problems from Fragranced Products (n, %)</u>	666	760
(Fragrance Sensitivity)	57.8%	23.1%
Asthmatic Individuals: US (64.3%); AU (55.6%); UK (54.0%); SE (57.3%)		
Non-Asthmatic Individuals: US (23.8%); AU (23.9%); UK (19.0%); SE (25.8%)		
<u>Types of health problems from exposure to fragranced consumer products:</u>		
* <i>Migraine headaches</i>	22.6%	9.1%
* <i>Asthma attacks</i>	25.0%	0.7%
* <i>Neurological problems</i> (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	10.2%	3.3%
* <i>Respiratory problems</i> (e.g., difficulty breathing, coughing, shortness of breath)	37.7%	9.4%
* <i>Skin problems</i> (e.g., rashes, hives, red skin, tingling skin, dermatitis)	17.1%	6.3%
* <i>Cognitive problems</i> (e.g., difficulties thinking, concentrating, or remembering)	9.8%	2.4%
* <i>Mucosal symptoms</i> (e.g., watery or red eyes, nasal congestion, sneezing)	25.4%	9.0%
* <i>Immune system problems</i> (e.g., swollen lymph glands, fever, fatigue)	6.5%	1.2%
* <i>Gastrointestinal problems</i> (e.g., nausea, bloating, cramping, diarrhea)	8.6%	2.2%
* <i>Cardiovascular problems</i> (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	7.9%	1.5%
* <i>Musculoskeletal problems</i> (e.g., muscle or joint pain, cramps, weakness)	6.5%	1.1%
* <i>Other</i>	1.6%	2.1%
* Health Problems from Fragranced Consumer Products are Potentially Disabling	24.1%	6.4%
Asthmatics: US (40.3%), AU (15.0%), UK (20.1%), SE (20.8%)		
Non-asthmatics: US (8.7%), AU (6.0%), UK (6.8%), SE (41%)		

Table 3: Health Problems, Societal Access, and Workplace Effects from Exposure to Fragranced Consumer Products for Asthmatics and Non-Asthmatics

	Asthmatics	Non-Asthmatics
Total (n) Asthmatic/Non-Asthmatic Individuals	1,151	3,284
Health Problems from Fragranced Products (n, %) (Fragrance Sensitivity)	666 57.8%	760 23.1%
<i><u>Health Problems from Exposure to:</u></i>		
Air fresheners or deodorizers	36.7%	10.6%
Scent of laundry products from a dryer vent	18.1%	3.9%
Room cleaned with scented products	32.9%	9.6%
Someone wearing a fragranced product	38.7%	13.6%
Any other type of fragranced consumer product	37.5%	11.9%
<i><u>Societal Access and Workplace Effects:</u></i>		
* Unable to use restrooms in public place because of air freshener, deodorizer, or scented product	26.4%	8.7%
* Unable to wash hands in public place because of fragranced soap	21.9%	6.3%
* Enter but then leave a business quickly because of fragranced product	31.6%	11.8%
* Prevented from going to some place because of fragranced product	32.9%	9.9%
* Lost workdays or lost a job ,in the past year, due to fragranced product exposure in workplace	20.6%	4.8%
* Supportive of fragrance-free policy in the workplace	56.7%	44.7%
* Prefer fragrance-free health care facilities and professionals	62.3%	47.5%
* Prefer airplane without fragranced air	68.8%	63.3%
* Prefer hotel without fragranced air	65.8%	58.9%

Asthmatic (Asthma or Asthma-Like Condition)

Table 1

	USA	AUS	UK	Sweden	Sum/Ave%
General population (n)	1137	1098	1100	1100	4435
Total -asthmatic prevalence - asthmatic	305 26.8%	313 28.5%	278 25.3%	255 23.2%	1151 25.9%
USA	305 100.0%	-	-	-	
AUS	-	313 100.0%	-	-	
UK	-	-	278 100.0%	-	
Sweden	-	-	-	255 100.0%	

NOT Asthmatic (NOT Asthma or Asthma-Like Condition)

Table 1

	USA	AUS	UK	Sweden	Sum/Ave%
General population (n)	1137	1098	1100	1100	4435
Total - not asthmatic prevalence - not asthmatic	832 73.2%	785 71.5%	822 74.7%	845 76.8%	3284 74.1%
USA	832 100.0%	-	-	-	
AUS	-	785 100.0%	-	-	
UK	-	-	822 100.0%	-	
Sweden	-	-	-	845 100.0%	

Table 2

Q1. Which fragranced products are you exposed to, at least once a week, from your own use?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes (net)	302	310	276	253	1141
	99.0%	99.0%	99.3%	99.2%	99.1%
Air fresheners and deodorizers (e.g., sprays, solids, oils, disks)	217	220	195	147	779
	71.1%	70.3%	70.1%	57.6%	67.3%
Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos)	262	293	250	229	1034
	85.9%	93.6%	89.9%	89.8%	89.8%
Cleaning supplies (e.g., all-purpose cleaners, disinfectants, and dishwashing soap)	239	263	223	210	935
	78.4%	84.0%	80.2%	82.4%	81.3%
Laundry products (e.g., detergents, fabric softeners, dryer sheets)	248	273	229	205	955
	81.3%	87.2%	82.4%	80.4%	82.8%
Household products (e.g., scented candles, toilet paper, trash bags, baby products)	234	247	216	179	876
	76.7%	78.9%	77.7%	70.2%	75.9%
Fragrance (e.g., perfume, cologne, after-shave)	206	223	207	166	802
	67.5%	71.2%	74.5%	65.1%	69.6%
Other	11	5	5	12	33
	3.6%	1.6%	1.8%	4.7%	2.9%
None	3	3	2	2	10
	1.0%	1.0%	0.7%	0.8%	0.9%

Table 2

Q1. Which fragranced products are you exposed to, at least once a week, from your own use?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes (net)	816	766	807	830	3219
	98.1%	97.6%	98.2%	98.2%	98.0%
Air fresheners and deodorizers (e.g., sprays, solids, oils, disks)	611	513	590	451	2165
	73.4%	65.4%	71.8%	53.4%	66.0%
Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos)	748	713	754	763	2978
	89.9%	90.8%	91.7%	90.3%	90.7%
Cleaning supplies (e.g., all-purpose cleaners, disinfectants, and dishwashing soap)	670	650	665	667	2652
	80.5%	82.8%	80.9%	78.9%	80.8%
Laundry products (e.g., detergents, fabric softeners, dryer sheets)	708	653	692	635	2688
	85.1%	83.2%	84.2%	75.1%	81.9%
Household products (e.g., scented candles, toilet paper, trash bags, baby products)	642	600	634	569	2445
	77.2%	76.4%	77.1%	67.3%	74.5%
Fragrance (e.g., perfume, cologne, after-shave)	592	541	626	530	2289
	71.2%	68.9%	76.2%	62.7%	69.8%
Other	23	20	17	22	82
	2.8%	2.5%	2.1%	2.6%	2.5%
None	16	19	15	15	65
	1.9%	2.4%	1.8%	1.8%	2.0%

Table 3

Q1a. Which fragranced products are you exposed to, at least once a week, from others' use?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes (net)	289	289	256	239	1073
	94.8%	92.3%	92.1%	93.7%	93.2%
Air fresheners and deodorizers (e.g., sprays, solids, oils, disks)	176	174	167	126	643
	57.7%	55.6%	60.1%	49.4%	55.7%
Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos)	212	206	175	180	773
	69.5%	65.8%	62.9%	70.6%	67.2%
Cleaning supplies (e.g., all-purpose cleaners, disinfectants, and dishwashing soap)	163	169	147	123	602
	53.4%	54.0%	52.9%	48.2%	52.1%
Laundry products (e.g., detergents, fabric softeners, dryer sheets)	145	140	121	131	537
	47.5%	44.7%	43.5%	51.4%	46.8%
Household products (e.g., scented candles, toilet paper, trash bags, baby products)	156	162	142	103	563
	51.1%	51.8%	51.1%	40.4%	48.6%
Fragrance (e.g., perfume, cologne, after-shave)	217	237	183	194	831
	71.1%	75.7%	65.8%	76.1%	72.2%
Other	14	6	7	10	37
	4.6%	1.9%	2.5%	3.9%	3.2%
None	16	24	22	16	78
	5.2%	7.7%	7.9%	6.3%	6.8%

Table 3

Q1a. Which fragranced products are you exposed to, at least once a week, from others' use?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes (net)	758	678	723	787	2946
	91.1%	86.4%	88.0%	93.1%	89.7%
Air fresheners and deodorizers (e.g., sprays, solids, oils, disks)	482	384	419	371	1656
	57.9%	48.9%	51.0%	43.9%	50.4%
Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos)	539	469	485	546	2039
	64.8%	59.7%	59.0%	64.6%	62.0%
Cleaning supplies (e.g., all-purpose cleaners, disinfectants, and dishwashing soap)	459	388	396	360	1603
	55.2%	49.4%	48.2%	42.6%	48.9%
Laundry products (e.g., detergents, fabric softeners, dryer sheets)	394	346	349	371	1460
	47.4%	44.1%	42.5%	43.9%	44.5%
Household products (e.g., scented candles, toilet paper, trash bags, baby products)	438	383	374	285	1480
	52.6%	48.8%	45.5%	33.7%	45.2%
Fragrance (e.g., perfume, cologne, after-shave)	564	507	542	642	2255
	67.8%	64.6%	65.9%	76.0%	68.6%
Other	22	14	14	17	67
	2.6%	1.8%	1.7%	2.0%	2.0%
None	74	107	99	58	338
	8.9%	13.6%	12.0%	6.9%	10.4%

Table 4

Q1/Q1a. Who Answer "Yes" To One Or More Of These Options For Q1/Q1A (own use, other's use).

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes (Net)	303	312	278	255	1148
	99.3%	99.7%	100.0%	100.0%	99.8%
Air fresheners and deodorizers (e.g., sprays, solids, oils, disks)	238	250	219	180	887
	78.0%	79.9%	78.8%	70.6%	76.8%
Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos)	276	302	260	238	1076
	90.5%	96.5%	93.5%	93.3%	93.5%
Cleaning supplies (e.g., all-purpose cleaners, disinfectants, and dishwashing soap)	259	280	239	226	1004
	84.9%	89.5%	86.0%	88.6%	87.3%
Laundry products (e.g., detergents, fabric softeners, dryer sheets)	263	286	239	221	1009
	86.2%	91.4%	86.0%	86.7%	87.6%
Household products (e.g., scented candles, toilet paper, trash bags, baby products)	248	265	224	192	929
	81.3%	84.7%	80.6%	75.3%	80.5%
Fragrance (e.g., perfume, cologne, after-shave)	245	275	228	222	970
	80.3%	87.9%	82.0%	87.1%	84.3%
Other	18	8	9	16	51
	5.9%	2.6%	3.2%	6.3%	4.5%
None	17	26	24	18	85
	5.6%	8.3%	8.6%	7.1%	7.4%

Table 4

Q1/Q1a. Who Answer "Yes" To One Or More Of These Options For Q1/Q1A (own use, other's use).

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes (Net)	823	770	814	840	3247
	98.9%	98.1%	99.0%	99.4%	98.9%
Air fresheners and deodorizers (e.g., sprays, solids, oils, disks)	661	576	649	543	2429
	79.4%	73.4%	79.0%	64.3%	74.0%
Personal care products (e.g., soaps, hand sanitizer, lotions, deodorant, sunscreen, shampoos)	772	730	774	780	3056
	92.8%	93.0%	94.2%	92.3%	93.1%
Cleaning supplies (e.g., all-purpose cleaners, disinfectants, and dishwashing soap)	721	684	715	698	2818
	86.7%	87.1%	87.0%	82.6%	85.9%
Laundry products (e.g., detergents, fabric softeners, dryer sheets)	742	695	729	689	2855
	89.2%	88.5%	88.7%	81.5%	87.0%
Household products (e.g., scented candles, toilet paper, trash bags, baby products)	688	635	668	590	2581
	82.7%	80.9%	81.3%	69.8%	78.7%
Fragrance (e.g., perfume, cologne, after-shave)	681	628	684	709	2702
	81.9%	80.0%	83.2%	83.9%	82.3%
Other	32	26	22	34	114
	3.8%	3.3%	2.7%	4.0%	3.5%
None	81	111	106	68	366
	9.7%	14.1%	12.9%	8.0%	11.2%

Table 5

Q2. Do you experience any health problems when exposed to air fresheners or deodorizers?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	125	106	108	84	423
	41.0%	33.9%	38.8%	32.9%	36.7%
No	148	164	129	137	578
	48.5%	52.4%	46.4%	53.7%	50.3%
Don't know/not sure	29	43	41	34	147
	9.5%	13.7%	14.7%	13.3%	12.8%
Decline to answer	3	-	-	-	3
	1.0%	-	-	-	1.0%

Table 5

Q2. Do you experience any health problems when exposed to air fresheners or deodorizers?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	107	74	62	106	349
	12.9%	9.4%	7.5%	12.5%	10.6%
No	643	596	669	643	2551
	77.3%	75.9%	81.4%	76.1%	77.7%
Don't know/not sure	80	114	89	89	372
	9.6%	14.5%	10.8%	10.5%	11.4%
Decline to answer	2	1	2	7	12
	0.2%	0.1%	0.2%	0.8%	0.3%

Table 6

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems when exposed to air fresheners or deodorizers

	USA	AUS	UK	Sweden	Sum/Ave%
Total	125	106	108	84	423
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	46	31	27	28	132
	36.8%	29.2%	25.0%	33.3%	31.1%
Asthma attacks	49	44	43	34	170
	39.2%	41.5%	39.8%	40.5%	40.3%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	19	18	8	13	58
	15.2%	17.0%	7.4%	15.5%	13.8%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	68	65	51	58	242
	54.4%	61.3%	47.2%	69.0%	58.0%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	33	29	33	16	111
	26.4%	27.4%	30.6%	19.0%	25.9%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	15	14	9	11	49
	12.0%	13.2%	8.3%	13.1%	11.7%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	37	43	29	36	145
	29.6%	40.6%	26.9%	42.9%	35.0%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	16	13	7	3	39
	12.8%	12.3%	6.5%	3.6%	8.8%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	18	12	14	8	52
	14.4%	11.3%	13.0%	9.5%	12.1%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	18	13	20	5	56
	14.4%	12.3%	18.5%	6.0%	12.8%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	19	11	9	1	40
	15.2%	10.4%	8.3%	1.2%	8.8%
Other	2	-	1	-	3
	1.6%	-	0.9%	-	1.3%

Table 6

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems when exposed to air fresheners or deodorizers

	USA	AUS	UK	Sweden	Sum/Ave%
Total	107	74	62	106	349
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	36	15	13	46	110
	33.6%	20.3%	21.0%	43.4%	29.6%
Asthma attacks	4	5	1	2	12
	3.7%	6.8%	1.6%	1.9%	3.5%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	17	6	7	19	49
	15.9%	8.1%	11.3%	17.9%	13.3%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	40	35	25	47	147
	37.4%	47.3%	40.3%	44.3%	42.3%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	32	24	17	18	91
	29.9%	32.4%	27.4%	17.0%	26.7%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	16	7	5	10	38
	15.0%	9.5%	8.1%	9.4%	10.5%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	49	25	20	39	133
	45.8%	33.8%	32.3%	36.8%	37.2%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	5	7	3	4	19
	4.7%	9.5%	4.8%	3.8%	5.7%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	13	4	3	6	26
	12.1%	5.4%	4.8%	5.7%	7.0%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	12	8	3	5	28
	11.2%	10.8%	4.8%	4.7%	7.9%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	8	7	2	4	21
	7.5%	9.5%	3.2%	3.8%	6.0%
Other	6	6	6	11	29
	5.6%	8.1%	9.7%	10.4%	8.5%

Table 7

Q3. Do you experience any health problems from the scent of laundry products coming from a dryer vent?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305 100.0%	313 100.0%	278 100.0%	255 100.0%	1151 100.0%
Yes	88 28.9%	38 12.1%	52 18.7%	32 12.5%	210 18.1%
No	193 63.3%	231 73.8%	191 68.7%	184 72.2%	799 69.5%
Don't know/not sure	24 7.9%	44 14.1%	35 12.6%	37 14.5%	140 12.3%
Decline to answer	- -	- -	- -	2 0.8%	2 0.8%
SUM	305 100.0%	313 100.0%	278 100.0%	255 100.0%	1151 100.0%

Table 7

Q3. Do you experience any health problems from the scent of laundry products coming from a dryer vent?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832 100.0%	785 100.0%	822 100.0%	845 100.0%	3284 100.0%
Yes	54 6.5%	29 3.7%	14 1.7%	30 3.6%	127 3.9%
No	713 85.7%	678 86.4%	735 89.4%	750 88.8%	2876 87.6%
Don't know/not sure	64 7.7%	76 9.7%	72 8.8%	59 7.0%	271 8.3%
Decline to answer	1 0.1%	2 0.3%	1 0.1%	6 0.7%	10 0.3%
SUM	832 100.0%	785 100.0%	822 100.0%	845 100.0%	3284 100.0%

Table 8

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from the scent of laundry products coming from a dryer vent

	USA	AUS	UK	Sweden	Sum/Ave%
Total	88	38	52	32	210
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	24	7	12	10	53
	27.3%	18.4%	23.1%	31.3%	25.0%
Asthma attacks	27	14	22	12	75
	30.7%	36.8%	42.3%	37.5%	36.8%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	16	8	7	4	35
	18.2%	21.1%	13.5%	12.5%	16.3%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	34	16	21	12	83
	38.6%	42.1%	40.4%	37.5%	39.7%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	22	15	10	7	54
	25.0%	39.5%	19.2%	21.9%	26.4%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	9	8	8	6	31
	10.2%	21.1%	15.4%	18.8%	16.4%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	27	13	10	13	63
	30.7%	34.2%	19.2%	40.6%	31.2%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	16	16	6	4	42
	18.2%	42.1%	11.5%	12.5%	21.1%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	20	10	6	3	39
	22.7%	26.3%	11.5%	9.4%	17.5%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	11	13	6	5	35
	12.5%	34.2%	11.5%	15.6%	18.5%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	21	9	7	3	40
	23.9%	23.7%	13.5%	9.4%	17.6%
Other	1	-	1	1	3
	1.1%	-	1.9%	3.1%	2.0%

Table 8

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from the scent of laundry products coming from a dryer vent

	USA	AUS	UK	Sweden	Sum/Ave%
Total	54	29	14	30	127
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	13	7	3	8	31
	24.1%	24.1%	21.4%	26.7%	24.1%
Asthma attacks	1	1	1	-	3
	1.9%	3.4%	7.1%	-	4.1%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	8	-	1	2	11
	14.8%	-	7.1%	6.7%	9.5%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	12	12	-	7	31
	22.2%	41.4%	-	23.3%	29.0%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	19	8	7	13	47
	35.2%	27.6%	50.0%	43.3%	39.0%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	6	3	3	1	13
	11.1%	10.3%	21.4%	3.3%	11.5%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	21	4	2	4	31
	38.9%	13.8%	14.3%	13.3%	20.1%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	3	4	3	-	10
	5.6%	13.8%	21.4%	-	13.6%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	9	3	1	-	13
	16.7%	10.3%	7.1%	-	11.4%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	4	2	-	1	7
	7.4%	6.9%	-	3.3%	5.9%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	2	1	1	2	6
	3.7%	3.4%	7.1%	6.7%	5.2%
Other	3	2	-	4	9
	5.6%	6.9%	-	13.3%	8.6%

Table 9

Q4. Do you experience any health problems from being in a room after it has been cleaned with scented products?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	129	96	89	68	382
	42.3%	30.7%	32.0%	26.7%	32.9%
No	157	192	149	156	654
	51.5%	61.3%	53.6%	61.2%	56.9%
Don't know/not sure	19	25	39	31	114
	6.2%	8.0%	14.0%	12.2%	10.1%
Decline to answer	-	-	1	-	1
	-	-	0.40%	-	0.4%

Table 9

Q4. Do you experience any health problems from being in a room after it has been cleaned with scented products?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	95	72	65	84	316
	11.4%	9.2%	7.9%	9.9%	9.6%
No	682	625	690	682	2679
	82.0%	79.6%	83.9%	80.7%	81.6%
Don't know/not sure	54	85	66	75	280
	6.5%	10.8%	8.0%	8.9%	8.6%
Decline to answer	1	3	1	4	9
	0.1%	0.4%	0.1%	0.5%	0.3%

Table 10

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from being in a room after it has been cleaned with scented products

	USA	AUS	UK	Sweden	Sum/Ave%
Total	129	96	89	68	382
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	42	22	20	30	114
	32.6%	22.9%	22.5%	44.1%	30.5%
Asthma attacks	42	26	31	19	118
	32.6%	27.1%	34.8%	27.9%	30.6%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	28	13	12	7	60
	21.7%	13.5%	13.5%	10.3%	14.8%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	67	52	42	41	202
	51.9%	54.2%	47.2%	60.3%	53.4%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	25	16	21	8	70
	19.4%	16.7%	23.6%	11.8%	17.9%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	21	13	11	9	54
	16.3%	13.5%	12.4%	13.2%	13.9%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	35	41	22	28	126
	27.1%	42.7%	24.7%	41.2%	33.9%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	18	13	5	2	38
	14.0%	13.5%	5.6%	2.9%	9.0%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	17	13	10	6	46
	13.2%	13.5%	11.2%	8.8%	11.7%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	16	12	10	4	42
	12.4%	12.5%	11.2%	5.9%	10.5%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	13	8	7	2	30
	10.1%	8.3%	7.9%	2.9%	7.3%
Other	2	2	1	1	6
	1.6%	2.1%	1.1%	1.5%	1.6%

Table 10

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from being in a room after it has been cleaned with scented products

	USA	AUS	UK	Sweden	Sum/Ave%
Total	95	72	65	84	316
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	33	16	21	38	108
	34.7%	22.2%	32.3%	45.2%	33.6%
Asthma attacks	4	1	2	2	9
	4.2%	1.4%	3.1%	2.4%	2.8%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	19	4	6	10	39
	20.0%	5.6%	9.2%	11.9%	11.7%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	42	30	24	40	136
	44.2%	41.7%	36.9%	47.6%	42.6%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	20	15	15	7	57
	21.1%	20.8%	23.1%	8.3%	18.3%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	10	7	5	9	31
	10.5%	9.7%	7.7%	10.7%	9.7%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	48	25	19	37	129
	50.5%	34.7%	29.2%	44.0%	39.6%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	5	5	4	2	16
	5.3%	6.9%	6.2%	2.4%	5.2%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	15	3	1	5	24
	15.8%	4.2%	1.5%	6.0%	6.9%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	10	2	1	1	14
	10.5%	2.8%	1.5%	1.2%	4.0%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	10	3	-	1	14
	10.5%	4.2%	-	1.2%	5.3%
Other	2	5	8	3	18
	2.1%	6.9%	12.3%	3.6%	6.2%

Table 11

Q5. Do you experience any health problems from being near someone who is wearing a fragranced product?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305 100.0%	313 100.0%	278 100.0%	255 100.0%	1151 100.0%
Yes	141 46.2%	113 36.1%	79 28.4%	112 43.9%	445 38.7%
No	145 47.5%	171 54.6%	168 60.4%	117 45.9%	601 52.1%
Don't know/not sure	19 6.2%	28 8.9%	31 11.2%	25 9.8%	103 9.0%
Decline to answer	- -	1 0.3%	- -	1 0.4%	2 0.4%

Table 11

Q5. Do you experience any health problems from being near someone who is wearing a fragranced product?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832 100.0%	785 100.0%	822 100.0%	845 100.0%	3284 100.0%
Yes	127 15.3%	100 12.7%	72 8.8%	147 17.4%	446 13.6%
No	654 78.6%	622 79.2%	704 85.6%	606 71.7%	2586 78.8%
Don't know/not sure	49 5.9%	62 7.9%	45 5.5%	87 10.3%	243 7.4%
Decline to answer	2 0.2%	1 0.1%	1 0.1%	5 0.6%	9 0.3%

Table 12

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from being near someone who is wearing a fragranced product

	USA	AUS	UK	Sweden	Sum/Ave%
Total	141	113	79	112	445
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	45	23	17	50	135
	31.9%	20.4%	21.5%	44.6%	29.6%
Asthma attacks	41	33	24	34	132
	29.1%	29.2%	30.4%	30.4%	29.8%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	27	15	9	13	64
	19.1%	13.3%	11.4%	11.6%	13.9%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	77	57	31	78	243
	54.6%	50.4%	39.2%	69.6%	53.5%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	24	13	14	9	60
	17.0%	11.5%	17.7%	8.0%	13.6%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	21	11	9	9	50
	14.9%	9.7%	11.4%	8.0%	11.0%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	40	49	23	46	158
	28.4%	43.4%	29.1%	41.1%	35.5%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	17	12	3	1	33
	12.1%	10.6%	3.8%	0.9%	6.9%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	21	7	6	13	47
	14.9%	6.2%	7.6%	11.6%	10.1%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	15	9	7	4	35
	10.6%	8.0%	8.9%	3.6%	7.8%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	15	11	11	6	43
	10.6%	9.7%	13.9%	5.4%	9.9%
Other	2	2	1	2	7
	1.4%	1.8%	1.3%	1.8%	1.6%

Table 12

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from being near someone who is wearing a fragranced product

	USA	AUS	UK	Sweden	Sum/Ave%
Total	127	100	72	147	446
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	51	31	20	77	179
	40.2%	31.0%	27.8%	52.4%	37.9%
Asthma attacks	3	4	1	2	10
	2.4%	4.0%	1.4%	1.4%	2.3%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	14	11	4	15	44
	11.0%	11.0%	5.6%	10.2%	9.5%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	41	34	15	76	166
	32.3%	34.0%	20.8%	51.7%	34.7%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	15	6	12	9	42
	11.8%	6.0%	16.7%	6.1%	10.2%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	9	6	3	20	38
	7.1%	6.0%	4.2%	13.6%	7.7%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	58	38	28	40	164
	45.7%	38.0%	38.9%	27.2%	37.5%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	2	2	2	4	10
	1.6%	2.0%	2.8%	2.7%	2.3%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	10	9	6	12	37
	7.9%	9.0%	8.3%	8.2%	8.4%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	5	4	6	4	19
	3.9%	4.0%	8.3%	2.7%	4.7%
Musculoskeletal problems (e.g., muscle pain, cramps, weakness)	2	2	-	-	4
	1.6%	2.0%	-	-	1.8%
Other	5	7	5	7	24
	3.9%	7.0%	6.9%	4.8%	5.7%

Table 13

Q6. In general, do you experience any health problems from exposure to any type of fragranced product?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	145	124	81	86	436
	47.5%	39.6%	29.1%	33.7%	37.5%
No	133	163	155	129	580
	43.6%	52.1%	55.8%	50.6%	50.5%
Don't know/not sure	27	26	42	40	135
	8.9%	8.3%	15.1%	15.7%	12.0%
Decline to answer	-	-	-	-	-
	-	-	-	-	-

Table 13

Q6. In general, do you experience any health problems from exposure to any type of fragranced product?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	108	99	72	111	390
	13.0%	12.6%	8.8%	13.1%	11.9%
No	663	615	675	646	2599
	79.7%	78.3%	82.1%	76.4%	79.1%
Don't know/not sure	60	70	74	83	287
	7.2%	8.9%	9.0%	9.8%	8.7%
Decline to answer	1	1	1	5	8
	0.1%	0.1%	0.1%	0.6%	0.2%

Table 14

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from exposure to any type of fragranced product

	USA	AUS	UK	Sweden	Sum/Ave%
Total	145	124	81	86	436
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	44	27	18	36	125
	30.3%	21.8%	22.2%	41.9%	29.1%
Asthma attacks	53	39	29	22	143
	36.6%	31.5%	35.8%	25.6%	32.4%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	26	14	9	9	58
	17.9%	11.3%	11.1%	10.5%	12.7%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	79	72	33	59	243
	54.5%	58.1%	40.7%	68.6%	55.5%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	38	30	18	9	95
	26.2%	24.2%	22.2%	10.5%	20.8%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	21	11	9	8	49
	14.5%	8.9%	11.1%	9.3%	11.0%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	49	48	22	37	156
	33.8%	38.7%	27.2%	43.0%	35.7%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	20	9	5	2	36
	13.8%	7.3%	6.2%	2.3%	7.4%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	21	8	9	6	44
	14.5%	6.5%	11.1%	7.0%	9.8%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	13	10	10	8	41
	9.0%	8.1%	12.3%	9.3%	9.7%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	15	9	10	3	37
	10.3%	7.3%	12.3%	3.5%	8.4%
Other	2	3	2	2	9
	1.4%	2.4%	2.5%	2.3%	2.2%

Table 14

BA. Which of the following health problems do you experience?

Base: Respondents who experienced below health problems from exposure to any type of fragranced product

	USA	AUS	UK	Sweden	Sum/Ave%
Total	108	99	72	111	390
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	54	24	15	45	138
	50.0%	24.2%	20.8%	40.5%	33.9%
Asthma attacks	2	1	1	2	6
	1.9%	1.0%	1.4%	1.8%	1.5%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	16	8	6	14	44
	14.8%	8.1%	8.3%	12.6%	11.0%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	40	38	18	50	146
	37.0%	38.4%	25.0%	45.0%	36.4%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	20	24	27	12	83
	18.5%	24.2%	37.5%	10.8%	22.8%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	10	8	4	8	30
	9.3%	8.1%	5.6%	7.2%	7.6%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	53	35	26	40	154
	49.1%	35.4%	36.1%	36.0%	39.2%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	4	4	6	1	15
	3.7%	4.0%	8.3%	0.9%	4.2%
Gastrointestinal problems (e.g., nausea, bloating,	12	6	2	11	31
	11.1%	6.1%	2.8%	9.9%	7.5%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	5	3	3	2	13
	4.6%	3.0%	4.2%	1.8%	3.4%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	5	2	-	1	8
	4.6%	2.0%	-	0.9%	2.5%
Other	1	5	8	4	18
	0.9%	5.1%	11.1%	3.6%	5.2%

Table 15

Health effects so severe that they meet criteria of disability (per each country's disability legislation)

Base: fragrance sensitive asthmatics / asthmatics / general population

USA: Do any of these health problems substantially limit one or more major life activities, such as seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, communicating, or working, for you personally?

AU: Do any of these health problems mean a total or partial loss of bodily or mental functions, for you personally?

UK: Do any of these health problems cause a substantial, likely to recur, and adverse effect on your ability to carry out normal day-to-day activities?

SE: Do any of these health problems cause any physical, psychological or intellectual limitations on your functional ability?

References: ADA 2008, DDA 1992, EA 2010, DA 2008

	USA	AUS	UK	Sweden	Sum/Ave%
Total	196	174	150	146	666
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	123	47	56	53	279
fragrance sensitive asthmatics	62.8%	27.0%	37.3%	36.3%	40.9%
asthmatics	40.3%	15.0%	20.1%	20.8%	24.1%
gen pop	10.8%	4.3%	5.1%	4.8%	6.3%
No	61	113	78	78	330
	31.1%	64.9%	52.0%	53.4%	50.4%
Don't know/not sure	11	14	16	15	56
	5.6%	8.0%	10.7%	10.3%	8.7%
Decline to answer	1	-	-	-	1
	0.5%	-	-	-	0.5%

Table 15

Health effects so severe that they meet criteria of disability (per each country's disability legislation)

Base: fragrance sensitive asthmatics / asthmatics / general population

USA: Do any of these health problems substantially limit one or more major life activities, such as seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, communicating, or working, for you personally?

AU: Do any of these health problems mean a total or partial loss of bodily or mental functions, for you personally?

UK: Do any of these health problems cause a substantial, likely to recur, and adverse effect on your ability to carry out normal day-to-day activities?

SE: Do any of these health problems cause any physical, psychological or intellectual limitations on your functional ability?

References: ADA 2008, DDA 1992, EA 2010, DA 2008

	USA	AUS	UK	Sweden	Sum/Ave%
Total	198	174	150	218	740
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	72	47	56	35	210
	36.4%	27.0%	37.3%	16.1%	29.2%
	8.7%	6.0%	6.8%	4.1%	6.4%
	6.3%	4.3%	5.1%	3.2%	4.7%
No	114	113	78	139	444
	57.6%	64.9%	52.0%	63.8%	59.6%
Don't know/not sure	11	14	16	43	84
	5.6%	8.0%	10.7%	19.7%	11.0%
Decline to answer	1	-	-	1	2
	0.5%	-	-	0.5%	0.5%

Table 16

Has a doctor or health care professional ever told you that you have asthma or an asthma-like condition?

General population (n)	1137	1098	1100	1100	4435
	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes - asthma	173	176	188	164	701
general population	15.2%	16.0%	17.1%	14.9%	15.8%
sub-population	56.7%	56.2%	67.6%	64.3%	61.2%
Yes - asthma-like condition	142	151	99	100	492
general population	12.5%	13.8%	9.0%	9.1%	11.1%
sub-population	46.6%	48.2%	35.6%	39.2%	42.4%
*Yes - asthma/asthma-like condition	305	313	278	255	1151
general population	26.8%	28.5%	25.3%	23.2%	26.0%
sub-population	46.6%	48.2%	35.6%	39.2%	42.4%
No	-	-	-	-	-
	-	-	-	-	-
Don't know/not sure	-	-	-	-	-
	-	-	-	-	-
Decline to answer	-	-	-	-	-
	-	-	-	-	-

Table 16

Has a doctor or health care professional ever told you that you have asthma or an asthma-like condition?

General population (n)	1137	1098	1100	1100	4435
	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	73.2%	71.5%	74.7%	76.8%	74.1%
Yes - asthma	-	-	-	-	-
	-	-	-	-	-
Yes - asthma-like condition	-	-	-	-	-
	-	-	-	-	-
*Yes - asthma/asthma-like condition	-	-	-	-	-
	-	-	-	-	-
No	811	740	791	804	3146
	97.5%	94.3%	96.2%	95.1%	95.8%
Don't know/not sure	19	43	30	36	128
	2.3%	5.5%	3.6%	4.3%	3.9%
Decline to answer	2	2	1	5	10
	0.2%	0.3%	0.1%	0.6%	0.3%

Table 17

Have you ever been unable or reluctant to use the toilets in a public place, because of the presence of an air freshener, deodorizer, or scented product?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	112	67	76	51	306
	36.7%	21.4%	27.3%	20.0%	26.4%
No	178	235	177	183	773
	58.4%	75.1%	63.7%	71.8%	67.3%
Neutral/not sure	15	11	24	20	70
	4.9%	3.5%	8.6%	7.8%	6.2%
Decline to answer	-	-	1	1	2
	-	-	0.4%	0.4%	0.4%

Table 17

Have you ever been unable or reluctant to use the toilets in a public place, because of the presence of an air freshener, deodorizer, or scented product?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	87	60	57	81	285
	10.5%	7.6%	6.9%	9.6%	8.7%
No	719	685	714	697	2815
	86.4%	87.3%	86.9%	82.5%	85.8%
Neutral/not sure	25	38	48	59	170
	3.0%	4.8%	5.8%	7.0%	5.2%
Decline to answer	1	2	3	8	14
	0.1%	0.3%	0.4%	0.9%	0.4%

Table 18

Have you ever been unable or reluctant to wash your hands with soap in a public place, because you know or suspect that the soap is fragranced?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305 100.0%	313 100.0%	278 100.0%	255 100.0%	1151 100.0%
Yes	88 28.9%	65 20.8%	72 25.9%	30 11.8%	255 21.9%
No	200 65.6%	232 74.1%	184 66.2%	209 82.0%	825 72.0%
Neutral/not sure	16 5.2%	16 5.1%	21 7.6%	16 6.3%	69 6.1%
Decline to answer	1 0.3%	- -	1 0.4%	- -	2 0.4%

Table 18

Have you ever been unable or reluctant to wash your hands with soap in a public place, because you know or suspect that the soap is fragranced?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832 100.0%	785 100.0%	822 100.0%	845 100.0%	3284 100.0%
Yes	72 8.7%	48 6.1%	41 5.0%	44 5.2%	205 6.3%
No	724 87.0%	679 86.5%	715 87.0%	745 88.2%	2863 87.2%
Neutral/not sure	34 4.1%	56 7.1%	61 7.4%	50 5.9%	201 6.1%
Decline to answer	2 0.2%	2 0.3%	5 0.6%	6 0.7%	15 0.5%

Table 19

If you enter a business, and you smell air fresheners or some fragranced product, do you want to leave as quickly as possible?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305 100.0%	313 100.0%	278 100.0%	255 100.0%	1151 100.0%
Yes	121 39.7%	97 31.0%	74 26.6%	74 29.0%	366 31.6%
No	147 48.2%	167 53.4%	163 58.6%	139 54.5%	616 53.7%
Neutral/not sure	37 12.1%	49 15.7%	40 14.4%	41 16.1%	167 14.6%
Decline to answer	- -	- -	1 0.4%	1 0.4%	2 0.4%

Table 19

If you enter a business, and you smell air fresheners or some fragranced product, do you want to leave as quickly as possible?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832 100.0%	785 100.0%	822 100.0%	845 100.0%	3284 100.0%
Yes	108 13.0%	86 11.0%	70 8.5%	125 14.8%	389 11.8%
No	640 76.9%	606 77.2%	664 80.8%	612 72.4%	2522 76.8%
Neutral/not sure	83 10.0%	92 11.7%	85 10.3%	103 12.2%	363 11.1%
Decline to answer	1 0.1%	1 0.1%	3 0.4%	5 0.6%	10 0.3%

Table 20

Have you ever been prevented from going to some place because you would be exposed to a fragrance product that would make you sick?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	134	100	77	72	383
	43.9%	31.9%	27.7%	28.2%	32.9%
No	156	188	183	158	685
	51.1%	60.1%	65.8%	62.0%	59.8%
Don't know/not sure	15	25	17	25	82
	4.9%	8.0%	6.1%	9.8%	7.2%
Decline to answer	-	-	1	-	1
	-	-	0.4%	-	0.4%

Table 20

Have you ever been prevented from going to some place because you would be exposed to a fragrance product that would make you sick?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	124	65	71	67	327
	14.9%	8.3%	8.6%	7.9%	9.9%
No	663	644	690	694	2691
	79.7%	82.0%	83.9%	82.1%	81.9%
Don't know/not sure	43	74	59	78	254
	5.2%	9.4%	7.2%	9.2%	7.8%
Decline to answer	2	2	2	6	12
	0.2%	0.3%	0.2%	0.7%	0.4%

Table 21

Has any exposure to fragranced products in your work environment, in the past year, caused you to lose work days or lose a job?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	108	57	39	38	242
	35.4%	18.2%	14.0%	14.9%	20.6%
No	178	233	217	194	822
	58.4%	74.4%	78.1%	76.1%	71.8%
Don't know/not sure	19	23	21	21	84
	6.2%	7.3%	7.6%	8.2%	7.3%
Decline to answer	-	-	1	2	3
	-	-	0.4%	0.8%	0.6%

Table 21

Has any exposure to fragranced products in your work environment, in the past year, caused you to lose work days or lose a job?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	64	28	30	36	158
	7.7%	3.6%	3.6%	4.3%	4.8%
No	732	696	736	758	2922
	88.0%	88.7%	89.5%	89.7%	89.0%
Don't know/not sure	35	58	53	47	193
	4.2%	7.4%	6.4%	5.6%	5.9%
Decline to answer	1	3	3	4	11
	0.1%	0.4%	0.4%	0.5%	0.4%

Table 22

Would you be supportive of a fragrance-free policy in the workplace?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305 100.0%	313 100.0%	278 100.0%	255 100.0%	1151 100.0%
Yes	202 66.2%	158 50.5%	152 54.7%	141 55.3%	653 56.7%
No	49 16.1%	58 18.5%	50 18.0%	46 18.0%	203 17.7%
Neutral/not sure	53 17.4%	97 31.0%	74 26.6%	66 25.9%	290 25.2%
Decline to answer	1 0.3%	- -	2 0.7%	2 0.8%	5 0.6%

Table 22

Would you be supportive of a fragrance-free policy in the workplace?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832 100.0%	785 100.0%	822 100.0%	845 100.0%	3284 100.0%
Yes	402 48.3%	312 39.7%	340 41.4%	417 49.3%	1471 44.7%
No	175 21.0%	186 23.7%	206 25.1%	134 15.9%	701 21.4%
Neutral/not sure	251 30.2%	284 36.2%	270 32.8%	287 34.0%	1092 33.3%
Decline to answer	4 0.5%	3 0.4%	6 0.7%	7 0.8%	20 0.6%

Table 23

Would you prefer that health care facilities and health care professionals were fragrance-free?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	220	157	153	183	713
	72.1%	50.2%	55.0%	71.8%	62.3%
No	45	78	61	29	213
	14.8%	24.9%	21.9%	11.4%	18.3%
Neutral/not sure	39	77	64	41	221
	12.8%	24.6%	23.0%	16.1%	19.1%
Decline to answer	1	1	-	2	4
	0.3%	0.3%	-	0.8%	0.5%

Table 23

Would you prefer that health care facilities and health care professionals were fragrance-free?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	403	317	323	522	1565
	48.4%	40.4%	39.3%	61.8%	47.5%
No	210	199	233	125	767
	25.2%	25.4%	28.3%	14.8%	23.4%
Neutral/not sure	215	265	260	193	933
	25.8%	33.8%	31.6%	22.8%	28.5%
Decline to answer	4	4	6	5	19
	0.5%	0.5%	0.7%	0.6%	0.6%

Table 24

Flying On An Airplane That Pumped / Did Not Pump Scented Air Throughout The Passenger Cabin, Which Would You Choose?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Airplane with scented air	76	58	45	24	203
	24.9%	18.5%	16.2%	9.4%	17.3%
Airplane without scented air	194	196	190	206	786
	63.6%	62.6%	68.3%	80.8%	68.8%
Neutral/not sure	35	59	42	24	160
	11.5%	18.8%	15.1%	9.4%	13.7%
Decline to answer	-	-	1	1	2
	-	-	0.4%	0.4%	0.4%

Table 24

Flying On An Airplane That Pumped / Did Not Pump Scented Air Throughout The Passenger Cabin, Which Would You Choose?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Airplane with scented air	192	121	157	42	512
	23.1%	15.4%	19.1%	5.0%	15.7%
Airplane without scented air	479	438	491	676	2084
	57.6%	55.8%	59.7%	80.0%	63.3%
Neutral/not sure	154	224	172	122	672
	18.5%	28.5%	20.9%	14.4%	20.6%
Decline to answer	7	2	2	5	16
	0.8%	0.3%	0.2%	0.6%	0.5%

Table 25

Staying In A Hotel With / Without Fragranced Air, Which Would You Choose?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Hotel with fragranced air	87	73	76	30	266
	28.5%	23.3%	27.3%	11.8%	22.7%
Hotel without fragranced air	192	188	170	201	751
	63.0%	60.1%	61.2%	78.8%	65.8%
Neutral/not sure	26	52	32	24	134
	8.5%	16.6%	11.5%	9.4%	11.5%
Decline to answer	-	-	-	-	-
	-	-	-	-	-

Table 25

Staying In A Hotel With / Without Fragranced Air, Which Would You Choose?

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Hotel with fragranced air	229	176	233	78	716
	27.5%	22.4%	28.3%	9.2%	21.9%
Hotel without fragranced air	440	422	422	654	1938
	52.9%	53.8%	51.3%	77.4%	58.9%
Neutral/not sure	159	185	165	108	617
	19.1%	23.6%	20.1%	12.8%	18.9%
Decline to answer	4	2	2	5	13
	0.50%	0.30%	0.20%	0.60%	0.4%

Table 26

People Who Answer "Yes" To One Or More Of These Questions: Q2/Q3/Q4/Q5/Q6 .

Fragrance Sensitive Group

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	196	174	150	146	666
	64.3%	55.6%	54.0%	57.3%	57.8%

Table 26

People Who Answer "Yes" To One Or More Of These Questions: Q2/Q3/Q4/Q5/Q6.

Fragrance Sensitive Group

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Yes	198	188	156	218	760
	23.8%	23.9%	19.0%	25.8%	23.1%

Table 27

People who answer "Yes" to each type of health problem under BA for each of these questions Q2/Q3/Q4/Q5/Q6.

Fragrance Sensitive Group

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	86	53	47	72	258
	28.2%	16.9%	16.9%	28.2%	22.6%
Asthma attacks	85	75	71	57	288
	27.9%	24.0%	25.5%	22.4%	25.0%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	46	28	24	21	119
	15.1%	8.9%	8.6%	8.2%	10.2%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	132	106	83	111	432
	43.3%	33.9%	29.9%	43.5%	37.7%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	58	52	54	34	198
	19.0%	16.6%	19.4%	13.3%	17.1%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	43	27	22	22	114
	14.1%	8.6%	7.9%	8.6%	9.8%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	83	83	52	74	292
	27.2%	26.5%	18.7%	29.0%	25.4%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	34	24	11	8	77
	11.1%	7.7%	4.0%	3.1%	6.5%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	37	21	22	19	99
	12.1%	6.7%	7.9%	7.5%	8.6%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	30	21	27	14	92
	9.8%	6.7%	9.7%	5.5%	7.9%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	29	18	20	9	76
	9.5%	5.8%	7.2%	3.5%	6.5%
Other	4	5	5	4	18
	1.3%	1.6%	1.8%	1.6%	1.6%

Table 27

People who answer "Yes" to each type of health problem under BA for each of these questions Q2/Q3/Q4/Q5/Q6.

Fragrance Sensitive Group

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Migraine headaches	93	57	45	105	300
	11.2%	7.3%	5.5%	12.4%	9.1%
Asthma attacks	6	8	4	4	22
	0.7%	1.0%	0.5%	0.5%	0.7%
Neurological problems (e.g., dizziness, seizures, head pain, fainting, loss of coordination)	36	21	17	34	108
	4.3%	2.7%	2.1%	4.0%	3.3%
Respiratory problems (e.g., difficulty breathing, coughing, shortness of breath)	79	77	45	109	310
	9.5%	9.8%	5.5%	12.9%	9.4%
Skin problems (e.g., rashes, hives, red skin, tingling skin, dermatitis)	63	52	54	37	206
	7.6%	6.6%	6.6%	4.4%	6.3%
Cognitive problems (e.g., difficulties thinking, concentrating, or remembering)	23	18	9	28	78
	2.8%	2.3%	1.1%	3.3%	2.4%
Mucosal symptoms (e.g., watery or red eyes, nasal congestion, sneezing)	101	71	49	75	296
	12.1%	9.0%	6.0%	8.9%	9.0%
Immune system problems (e.g., swollen lymph glands, fever, fatigue)	11	12	10	8	41
	1.3%	1.5%	1.2%	0.9%	1.2%
Gastrointestinal problems (e.g., nausea, bloating, cramping, diarrhea)	26	15	11	20	72
	3.1%	1.9%	1.3%	2.4%	2.2%
Cardiovascular problems (e.g., fast or irregular heartbeat, jitteriness, chest discomfort)	20	12	8	9	49
	2.4%	1.5%	1.0%	1.1%	1.5%
Musculoskeletal problems (e.g., muscle or joint pain, cramps, weakness)	14	11	2	8	35
	1.7%	1.4%	0.2%	0.9%	1.1%
Other	15	16	18	20	69
	1.8%	2.0%	2.2%	2.4%	2.1%

Table 28

Demographics - Asthmatics

	USA	AUS	UK	Sweden	Sum/Ave%
Total	305	313	278	255	1151
	100.0%	100.0%	100.0%	100.0%	100.0%
Male/Female					
All Males	136	143	131	105	515
	44.6%	45.7%	47.1%	41.2%	44.7%
All Females	169	170	147	150	636
	55.4%	54.3%	52.9%	58.8%	55.4%
Gender vs Age					
Male 18-24	16	16	22	14	68
	5.2%	5.1%	7.9%	5.5%	5.9%
Male 25-34	36	34	33	26	129
	11.8%	10.9%	11.9%	10.2%	11.2%
Male 35-44	42	33	28	24	127
	13.8%	10.5%	10.1%	9.4%	11.0%
Male 45-54	30	34	29	20	113
	9.8%	10.9%	10.4%	7.8%	9.7%
Male 55-65	12	26	19	21	78
	3.9%	8.3%	6.8%	8.2%	6.8%
Female 18-24	26	26	27	28	107
	8.5%	8.3%	9.7%	11.0%	9.4%
Female 25-34	40	35	38	24	137
	13.1%	11.2%	13.7%	9.4%	11.9%
Female 35-44	43	42	27	28	140
	14.1%	13.4%	9.7%	11.0%	12.1%
Female 45-54	41	41	28	38	148
	13.4%	13.1%	10.1%	14.9%	12.9%
Female 55-65	19	26	27	32	104
	6.2%	8.3%	9.7%	12.5%	9.2%

Table 28

Demographics - NOT Asthmatics

	USA	AUS	UK	Sweden	Sum/Ave%
Total	832	785	822	845	3284
	100.0%	100.0%	100.0%	100.0%	100.0%
Male/Female					
All Males	389	400	419	451	1659
	46.8%	51.0%	51.0%	53.4%	50.6%
All Females	443	385	403	394	1625
	53.2%	49.0%	49.0%	46.6%	49.5%
Gender vs Age					
Male 18-24	31	54	61	75	221
	3.7%	6.9%	7.4%	8.9%	6.7%
Male 25-34	94	75	69	84	322
	11.3%	9.6%	8.4%	9.9%	9.8%
Male 35-44	94	86	79	110	369
	11.3%	11.0%	9.6%	13.0%	11.2%
Male 45-54	78	92	106	93	369
	9.4%	11.7%	12.9%	11.0%	11.3%
Male 55-65	92	93	104	89	378
	11.1%	11.8%	12.7%	10.5%	11.5%
Female 18-24	52	60	54	40	206
	6.3%	7.6%	6.6%	4.7%	6.3%
Female 25-34	95	95	91	92	373
	11.4%	12.1%	11.1%	10.9%	11.4%
Female 35-44	112	95	108	84	399
	13.5%	12.1%	13.1%	9.9%	12.2%
Female 45-54	103	74	80	95	352
	12.4%	9.4%	9.7%	11.2%	10.7%
Female 55-65	81	61	70	83	295
	9.7%	7.8%	8.5%	9.8%	9.0%

Table 29**Demographics - General Population**

	USA	AUS	UK	Sweden	Sum/Ave%
Total	1137	1098	1100	1100	4435
	100.0%	100.0%	100.0%	100.0%	100.0%
Male/Female					
All Males	525	543	550	550	2168
	46.2%	49.5%	50.0%	50.0%	48.9%
All Females	612	555	550	550	2267
	53.8%	50.5%	50.0%	50.0%	51.1%
Gender vs Age					
Male 18-24	47	70	83	83	283
	4.1%	6.4%	7.5%	7.5%	6.4%
Male 25-34	130	109	102	102	443
	11.4%	9.9%	9.3%	9.3%	10.0%
Male 35-44	136	119	107	107	469
	12.0%	10.8%	9.7%	9.7%	10.6%
Male 45-54	108	126	135	135	504
	9.5%	11.5%	12.3%	12.3%	11.4%
Male 55-65	104	119	123	123	469
	9.1%	10.8%	11.2%	11.2%	10.6%
Female 18-24	78	86	81	81	326
	6.9%	7.8%	7.4%	7.4%	7.4%
Female 25-34	135	130	129	129	523
	11.9%	11.8%	11.7%	11.7%	11.8%
Female 35-44	155	137	135	135	562
	13.6%	12.5%	12.3%	12.3%	12.7%
Female 45-54	144	115	108	108	475
	12.7%	10.5%	9.8%	9.8%	10.7%
Female 55-65	100	87	97	97	381
	8.8%	7.9%	8.8%	8.8%	8.6%

Table 30

Demographics - Asthmatics who are also Fragrance Sensitive

	USA	AUS	UK	Sweden	Sum/Ave%
Total	196	174	150	146	666
	100.00%	100.00%	100.00%	100.00%	100.0%
Male/Female					
All Males	94	65	70	49	278
	48.0%	37.4%	46.7%	33.6%	41.4%
All Females	102	109	80	97	388
	52.0%	62.6%	53.3%	66.4%	58.6%
Gender vs Age					
Male 18-24	8	5	12	6	31
	4.1%	2.9%	8.0%	4.1%	4.8%
Male 25-34	30	20	23	13	86
	15.3%	11.5%	15.3%	8.9%	12.8%
Male 35-44	31	15	18	11	75
	15.8%	8.6%	12.0%	7.5%	11.0%
Male 45-54	17	18	10	11	56
	8.7%	10.3%	6.7%	7.5%	8.3%
Male 55-65	8	7	7	8	30
	4.1%	4.0%	4.7%	5.5%	4.6%
Female 18-24	12	12	11	13	48
	6.1%	6.9%	7.3%	8.9%	7.3%
Female 25-34	23	24	22	16	85
	11.7%	13.8%	14.7%	11.0%	12.8%
Female 35-44	28	27	17	16	88
	14.3%	15.5%	11.3%	11.0%	13.0%
Female 45-54	27	28	16	29	100
	13.8%	16.1%	10.7%	19.9%	15.1%
Female 55-65	12	18	14	23	67
	6.10%	10.30%	9.30%	15.80%	10.4%

Survey Methodology

Following Eysenbach G, 2004, Improving the Quality of Web Surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES), Journal of Medical Internet Research, Jul-Sep; 6(3): e34.

Checklist for Reporting Results of Internet E-Surveys (CHERRIES)		
Item Category	Checklist Item	Explanation
Design	Describe survey design	Target population: national random samples of adults (ages 18-65) in each country, the United States (US), Australia (AU), United Kingdom (UK), and Sweden (SE) (n=1,137; n=1,097; n=1,100; n=1,100; respectively), representative of age, gender, and region in each country (confidence limit=95%, margin of error=3%). The survey drew upon participants from large web-based panels in each country (> 5,000,000; >200,000; >900,000; >60,000; respectively) held by Survey Sampling International (SSI). Participant recruitment followed a three-stage randomization process: first, participants are randomly selected from SSI panels and invited to take a survey; second, participants are combined with others into SSI's Dynamix sampling platform and respond to randomly selected profiling questions; and third, prospective participants are then randomly assigned to a survey. All responses were anonymous.
	IRB (Institutional Review Board) approval and informed consent process	
	IRB approval	Ethics approval was obtained by the University of Melbourne, School of Engineering Human Ethics Advisory Group, application 1646894, on May 9, 2016.
	Informed consent	Participants had already provided informed consent as part of the SSI web-based panel. For this survey, participants were given the following introduction: aims of the study; principal researcher name, affiliation, and contact information; human ethics approval; length of survey (less than 15 minutes to complete); assurance that participation is completely voluntary and that all data provided are confidential; assurance that participants can withdraw at any time; outputs of research (findings will be provided through journal articles and website, free of charge); university human ethics contact information; and a specific question to indicate consent: "If you would like to participate in this project, please click the next button to proceed ('Go To Survey')."
	Data protection	Selected survey software and servers were used to ensure data protection. No personal information was linked to the survey results. The dataset (without any identifying information) is kept on password protected computers.

Development and pre-testing

Development and testing

The survey instrument was a 35-item questionnaire, developed and tested over a two-year period, including cognitive testing with 10 individuals and piloting with over 100 individuals, in each country, before full implementation in June 2016 (US, AU, UK) and June 2017 (SE). The survey was implemented in each country's native language. This article reports results from the sub-populations of asthmatic individuals. Steinemann (2016, 2017a, 2018a, 2018b) reports results from the general population surveys in the US, AU, UK, and SE.

Recruitment process and description of the sample having access to the questionnaire

Open survey versus closed survey
Contact mode

The survey invitation is an open invitation, rather than a direct invite, to the pool of panelists available at the time. The pool is filtered to achieve a representative sample through a set of initial questions for basic demographic characteristics. SSI uses multiple sources to achieve a sample blend that is characteristic of the population, and response quotas for specific variables (e.g., age, gender, and region) ensure proportions that are representative of the population. Closed survey (only SSI participants), general population, random sample nationally representative of demographics. The survey provider, SSI, provided an open invitation to potential participants. The survey targeted the general population rather than a specific cohort.

Advertising the survey

An open invitation was issued to randomly selected members of the web-based panel. The survey was not advertised.

Survey administration

Web/E-mail

The survey was web-based, with multiple choice and open format answers. All responses were anonymous, and collected through the online survey platform and stored on local password protected servers.

Context

SSI is a survey research company and online panel provider.

Mandatory/voluntary

Voluntary. Prospective participants were randomly invited to the survey.

Incentives

Respondents were provided incentives for their participation by the panel provider, SSI, with points that can be redeemed for money or reward programs.

Time/Date

Data were collected within one week in June 2016 (US, AU, UK) and June 2017 (SE).

Randomization of items or questionnaires

To prevent biases in response, five sets of questions were randomized for their multiple-choice items.

Adaptive questioning

Eight questions were conditionally displayed based on responses to other items.

Number of Items

The survey contained 35 questions. Each page contained one question with multiple choice and open format response categories.

Number of screens (pages)

Overall, 36 to 44 pages were presented (including the introductory page), depending on responses to conditional items.

Completeness check

All questions were required to be completed. All questions provided non-response options such as "don't know/not sure" and "decline to answer." Only completed surveys were included for analysis.

Response rates	Review step	<p>Respondents were allowed one attempt per question, once they click "next" to review the next question; they are not allowed to go back to the previous questions or answers.</p> <p>US, AU, UK, SE: Number of initial responses: 1201, 1183, 1139, 1197; Survey response rate: 95%, 93%, 97%, 92%; Number of drop outs: 46, 53, 18, 78; Number of screen outs: 18, 32, 21, 19; Number of completes: 1137, 1098, 1100, 1100; Panel size, over 5,000,000; over 200,000; over 900,000; over 60,000.</p>
	Unique site visitor	<p>Each respondent goes through stringent verification of identity upon signing up on SSI panel (including name, contact details, and IP). Once opt-in process is completed, each respondent is tagged with unique panel ID.</p>
	Participation rate (Ratio of unique visitors who agreed to participate/unique first survey page visitors)	<p>SSI respondents are invited to survey through general population random selection. Unique clicks or visitors to the first page of the survey can be those who complete survey, drop out, or screen out.</p>
	Completion rate (Ratio of users who finished the survey/users who agreed to participate)	<p>US 95% (1,201 initial, 46 drop out, 18 screen out, 1,137 complete). AU 93% (1,183 initial, 53 drop out, 32 screen out, 1,098 complete). UK 97% (1,139 initial, 18 drop out, 21 screen out, 1,100 complete). SE 92% (1,197 initial; 78 drop outs; 19 screen out; 1,100 complete).</p>
Preventing multiple entries from the same individual	IP check	<p>SSI programming software and sampling tool, Dynamix, controls the traffic and ensures unique entries. Using unique Panel ID and IP, each respondent can attempt the survey only once.</p>
	Registration	<p>This is a closed survey for SSI respondents only. Survey invite is mailed specifically to the e-mail address used upon joining survey and verified.</p>
Analysis	Handling of incomplete questionnaires	<p>Only completed questionnaires were included in the final dataset for analysis.</p>
	Questionnaires submitted with an atypical timestamp	<p>Minimum survey completion time was 5 minutes; average was 10 minutes. A small number of respondents were omitted for completing the items too quickly.</p>
	Statistical correction	<p>All demographic subgroups obtained statistically valid numbers to ensure a national representativeness.</p>