

UDC 339.133:665.57

DOI: 10.15587/2519-8025.2022.271043

## SOME BIOLOGICAL, BEHAVIORAL AND SOCIAL ASPECTS OF THE PERFUMERY USE IN THE UKRAINIAN POPULATION SAMPLE (PART 1. AGE ASSOCIATIONS)

**Olga Filiptsova, Olexander Bashura, Olga Naboka, Olexandra Kran, Maksym Almakaiev, Halina Kukhtenko, Tetiana Martyniuk, Yuliia Osypenko**

**The aim.** The study encompassed some aspects related to perfumes use, which can potentially influence the individual perfume choice, in particular, among different age groups of the Ukrainian population. Factors related to perfumes choice, the state of awareness of respondents regarding quality, safety, and existing stereotypes regarding the characteristics of perfumes and potential harmful effects on the human body were investigated.

**Materials and methods.** The analysis was performed on a sample of 124 residents of Ukraine. Respondents, who were randomly selected, were offered a questionnaire, developed by us, which included 15 items on the demographic characteristics of the subjects and questions related to the perfume use of and stereotypes about them. The Pearson chi-squared ( $\chi^2$ ) test was used to analyze the relationships between qualitative characteristics.

**Results and discussion.** About 98 % of surveyed persons in Ukraine use perfumery. Associations were found between age and the probability of purchase by the study participants of non-original perfume products and awareness of the safety of various perfume products. It has been established, that the determining factors when choosing a perfume is a certain scent, while the brand is given secondary importance. An increase in the effect of the brand in older age groups of the population has been demonstrated. Behavioral features of perfume use have been established: in younger women, it is associated with increased self-esteem and the influence of social networks, with age, the focus shifts to the desire for a positive effect on the mood from the use of a certain fragrance. However, in all age groups, the main purpose of perfume using was to improve the emotional state. Middle-aged women are more democratic in choosing perfumery with a specific gender orientation.

**Conclusions.** For the first time in Ukraine, a pilot study was conducted to find possible associations between some biological, behavioral and demographic characteristics and the perfume use. Such factors as age and education level are promising for further analysis of the selected issues

**Keywords:** perfumery, Ukraine, perfumery selection factors, non-original perfumery products, perfume aging, gender orientation of perfumery, synthetic and natural fragrance ingredients

### How to cite:

Filiptsova, O., Bashura, O., Naboka, O., Kran, O., Almakaiev, M., Kukhtenko, H., Martyniuk, T., Osypenko, Y. (2022). Some biological, behavioral and social aspects of the perfumery use in the Ukrainian population sample (part 1. age associations). ScienceRise: Biological Science, 4 (33), 18–26. doi: <http://doi.org/10.15587/2519-8025.2022.271043>

© The Author(s) 2022

This is an open access article under the Creative Commons CC BY license hydrate

### 1. Introduction

The first references to the art of perfumery belong to the culture of Mesopotamia. The perfumes formulation was carried out by a skilled person who learned over many years to complementarily combine fragrance ingredients, taking into account their characteristics, such as volatility and scent duration [1]. The earliest perfume products, which appeared around 4000 years ago, existed in the form of incense, and the term "perfume" itself comes from the Latin *per fumum*, meaning "through the smoke". Later, from Mesopotamia, the culture of perfumery spread to Ancient Egypt, and from there to the whole world [2]. Since ancient times, people have been surrounded by smells that serve as both a pleasure source and a potential danger signal. That is why perfumes, which include fragrance substances, are in great demand among the population and make up a large share of profits in the cosmetic market as a whole [3]. Perfume constitutes a special group of non-food products, without which it is difficult to imagine the life of a contemporary in any country of the world. Scientific studies pay particular atten-

tion to the perfume influence on a human physiological activity, the composition and potentially harmful ingredients of existing perfumes. There are also scarce national studies that consider the perfume market of Ukraine [4]. However, we did not find any systematic and large-scale studies, aimed at considering influencing factors on consumer behavior. The purpose of this pilot research is to study some aspects related to the perfume use, which can potentially influence the perfume choice by a person, in particular, among the population of Ukraine. Factors related to the choice of perfumes and the state of awareness of respondents regarding some characteristics of perfumes and their effects on the human body were studied.

### 2. Materials and methods

142 subjects participated in the study, among them 124 females and 18 males aged 10 to 60 years and older, all residents of the city of Kharkiv, who were randomly selected. Only females were selected for further analysis due to the small number of males in the sample. The gender representation is due to the

specifics of the study, namely the fact that females are traditionally more interested in perfumery products.

We developed a questionnaire (Table 1) in a Google form, which was sent to the respondents to their email inboxes. The questionnaire contained 15 questions related to the attitude to perfumes, the respondents' awareness of the perfume composition, the harmful substances content, the scent persistence, and the human

health impact. In addition, the questionnaire contained questions of a socio-demographic nature, namely: age, gender, place of residence, education. All respondents were familiarized with the objectives of the study and gave voluntary consent to participate in it in accordance with the requirements of the Declaration of Helsinki. Each of the following questions of the questionnaire provided only one possible answer option.

Table 1

## Questionnaire

<b>1. Age:</b> _____
<b>2. Gender:</b> (circle the appropriate)
1. Male. 2. Female
<b>3. Your profession</b> _____
<b>4. Your education level</b> (if there are several options, choose a higher education level):
1. Incomplete high school (still studying at school). 2. Secondary (graduated from school). 3. Secondary special (graduated from college/technical school). 4. Incomplete higher education (completed only 3 higher education courses). 5. Complete higher education (I have a full-fledged diploma of higher education).
<b>5. City/urban type town /village</b> (not forced migration) _____
<b>6. What factor mostly influences your perfumes choice?</b>
1. I choose branded perfumes
2. I pay attention to the price
3. Composition of perfumes
4. I choose a certain scent, regardless of the brand
5. Depends on where I plan to use the perfume in the future (for example, for everyday use, only for training, for a party, etc.)
6. I make a purchase under the advertising influence
7. I make a purchase because I liked when friends/acquaintances use this perfume
8. I make a spontaneous purchase in a store under the sellers influence
<b>7. In your opinion, what can the price of perfume mainly depend on?</b>
1. Product composition.
2. Brand
3. Packaging
4. All these specified factors
5. It is difficult to give an answer
<b>8. Is it true that the scent longevity is an indicator of the perfumes quality?</b>
1. Yes. 2. No. 3. I think that there are more "yes" than "no". 4. I don't know
<b>9. Do you think fake perfumes are more harmful than original ones?</b>
1. Yes. 2. No. 3. I think that there are more "yes" than "no". 4. I don't know
<b>10. In your opinion, perfumes with synthetic components are more harmful than perfumes with natural components?</b>
1. Yes. 2. No. 3. I don't know. 4. It is difficult to give an answer
<b>11. Do you think perfumes become more harmful when stored for a long time?</b>
1. Yes. 2. No. 3. I don't know. 4. This question is not so unambiguous.
<b>12. Is it appropriate and possible for males to use female's perfumes (or vice versa)?</b>
1. Yes, it is normal. 2. No, this is not normal. 3. I don't know
<b>13. Do you buy fake perfume by yourself?</b>
1. Yes, systematically, it is normal.
2. No, never.
3. From time to time.
4. In very rare cases.
<b>14. Do you think that perfumes are the kind of product that you should find money for in difficult times?</b>
1. Yes, you should allow yourself pleasant moments.
2. No, perfume is not an essential item, it is better to save this money for something more useful and important.
3. It is difficult to give an answer.
<b>15. What exactly do you mainly use perfume for?</b>
1. To increase self-esteem.
2. To improve mood.
3. I don't use it at all.
4. To mask the unpleasant smell

The Pearson chi-squared ( $\chi^2$ ) test was used to analyze the relationships between qualitative characteristics. The values of freedom degree  $df$ ,  $\chi^2$  and the p-value were calculated. If the p-value was  $\leq 0.05$ , a decision was made about the presence of statistical relationships between characteristics. The data, obtained from the questionnaire, were introduced into an Excel database. Data processing was carried out in the Statistica 6.0 program.

### 3. Results

The study participants, included in the analysis, were allocated into three age groups: "the youngest" (10 to 17 years old), "the middle-aged" (18 to 39 years old), and "the oldest" (40 years old and older). This distribution was due to the logical assumption that at a younger age a person still acquires a certain "perfume" experience, and her/his preferences are not stable. In middle age, individuals already have this experience, but may be less conservative than consumers in the older age group.

According to the education level, the respondents were conventionally allocated into 3 educational categories: the group with the lowest education level (incomplete secondary education), the group with the middle ed-

ucation level (secondary, secondary special and incomplete higher education) and the group with the highest education level (higher education). The logic of such distribution was important, in our opinion, to take into account the degree of possible awareness and erudition of the respondents regarding the medical, biological, and chemical issues that were present in the questionnaire. The percentage of people of a certain educational level in each age group is presented in Fig. 1. It can be seen from the given figure, that among the individuals of the middle age group there were approximately equal numbers of those who had a conventionally middle and a conventionally higher education level (46 % and 54 %, respectively). At the same time, there were almost twice as many persons with the conventionally highest education level among the older age group. Thus, it is possible to trace the obvious effect of the relationship between the age and the education level of the respondents: the older a person is, the more likely it is that she/he is more educated. Such an association may be somewhat prognostic when the various factors, included in the research, are analyzed and indicate that age associations may actually reflect the association of the characteristic with educational level.

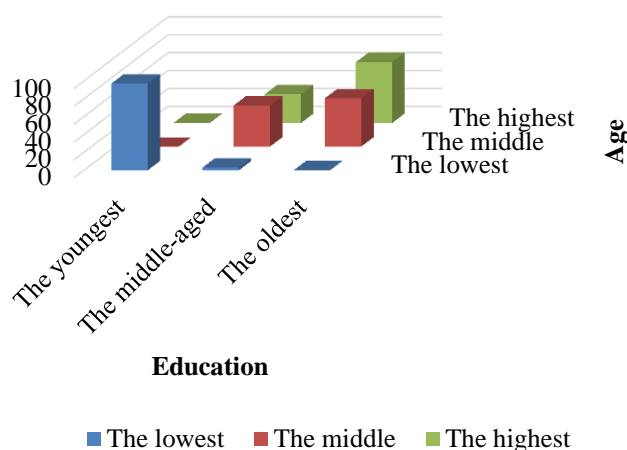


Fig. 1. Respondents' distribution by age and education level. Statistics.  $\chi^2=121.82$ ;  $df=4$ ;  $p<0.0001$

Data analysis showed that the majority of respondents live in the city, and a small minority lives in urban type towns and villages.

Regarding professional affiliation, this factor was not included in the analysis in the current study. This was due to a wide range of different professional groups that were identified during the formation of the database. So, the subjects belonged to the following professional groups: school students, university students, school teachers and university lecturers, kindergarten teachers, nurses and doctors, designers, lawyers, economists, managers, commodity experts, social service inspectors, tax officers, salespeople, seamstresses, hairdressers, stewards, cooks and other food workers, veterinarians, engineers, researchers, freelancers, private entrepreneurs, housewives, pensioners and people who temporarily did not have a job. Due to the small sample size, the division into several professional groups would make the analysis on this basis unlikely to be appropriate. In further research with an expanded sample, such an analysis will make sense.

Previously, a statistical analysis was conducted with the characteristics distribution providing according to their gradations (Table 1) of the entire female population without allocation into groups. When we found a small number of respondents according to certain categories of possible answers, we conducted an additional grouping of categories, which is discussed further in the analysis of specific items of the questionnaire.

Thus, all subsequent analyzes were conducted for age-adjusted females (the three groups indicated), depending on whether the previous analysis grouped or ungrouped certain response categories.

We included in the results only those relationships (associations) that demonstrated the effect of statistical significance or could be fixed at the level of stable trends.

### 3.1. Associations of age and studied factors related to the use of perfumes

#### 3.1.1. The factor that mainly affects the choice of perfumery

A preliminary analysis showed (data not shown) that most often the factors that mainly influenced the

perfume choice were a specific scent and brand. Therefore, all other factors (price, composition, purpose of use, advertising, experience of acquaintances and the

effect of spontaneity) were combined into one group and marked as "other" (Table 2).

Table 2

Distribution of respondents by groups depending on the factor that mainly affects the choice of perfumery

Age group	Factor			Total
	Brand effect	Certain scent	Other	
The youngest, n	2	24	11	37
%	5	65	30	100
The middle-aged, n	5	24	8	37
%	13	65	22	100
The oldest, n	15	20	15	50
%	30	40	30	100
Total, n	22	68	34	124
%	18	55	28	100

Statistics.  $\chi^2=11.79$ ;  $df=4$ ;  $p=0.02$

Thus, there is a certain relationship between the age group of the study persons and the factor that affects the perfume products choice. From the obtained data, it is clear, that the most important factor for people of all age groups was a certain scent, which they focused on when choosing a perfume. In the youngest and middle-aged groups there were the same percent of such persons (65 %), in the oldest age group they were less prevalent (40 %).

It can be seen, that the "attraction" for this factor decreases with age. At the same time, with age, the "attraction" to focus on branded products also increases. Such results can be explained by the fact that with age people become more financially independent and can afford to buy more expensive, high-quality or time-tested things.

**3. 1. 2. Awareness of the harmfulness/harmlessness of non-original perfumery products**

The perfume industry is very vulnerable to counterfeiting, especially in the designer perfume mar-

ket, which prompts further improvements in methods of differentiating between original and non-original perfumes. Counterfeits can not only result in lost profits for manufacturers, but also negatively impact consumers who pay inflated prices for substandard products, which can lead to health or safety issues. In particular, a spectroscopic method based on proton nuclear magnetic resonance ( $^1\text{H NMR}$ ) was recently proposed to verify the molecular composition of authentic brand fragrances for women and their cheap equivalents [5].

According to the preliminary results of the frequency distribution of respondents (data not shown), for the final analysis regarding the awareness of the effects of non-original perfumes on the human body, we formed the following groups: persons who unequivocally believe or are more inclined to believe that fake perfumes are more dangerous for humans, and persons who believe that the effect of originality has no influence on human health (Fig. 2). Individuals who did not have a definite opinion on this matter were excluded from further analysis due to their small number.

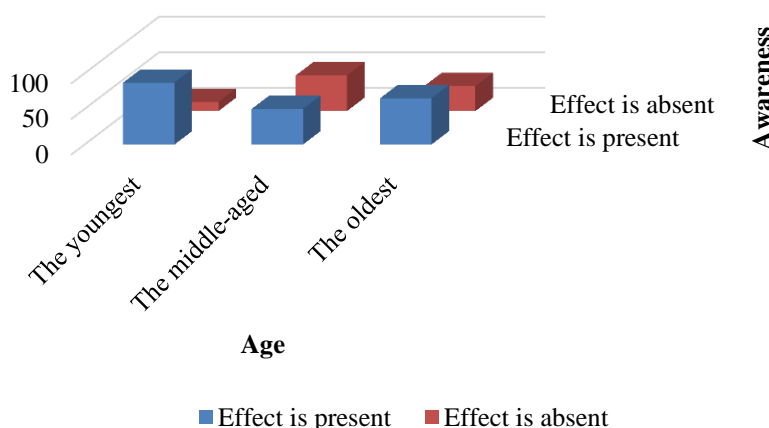


Fig. 2. Distribution of study participants depending on awareness of the non-original perfumery impact on the human body. Statistics.  $\chi^2=8.81$ ;  $df=2$ ;  $p=0.01$

The data of Fig. 2 indicate that the majority of people in the younger age group (87 %) believe that the use of fake perfumes has a negative effect on a person's health. With age the opinion of people changes. Thus,

50 % of people of the middle-aged group regard non-original perfumes as a health risk factor. However, in the oldest group, the percentage of such subjects increases again and amounts to 65 %.

The obtained results clearly indicate that, in general, with age, people's attitude towards non-original perfumes becomes more tolerant. We assume that this situation can be explained by the fact that at a younger age, strong stereotypic thinking is active and young people treat fake products as potentially dangerous in any case. In the middle-aged group, the percentage of people who believe that fake perfumes can negatively affect a person's health becomes smaller (50 %). We associate this with the fact that in middle age there is active experimentation with a large number of different perfumes with insufficient financial security, which leads to a somewhat reckless attitude to potential risk. That is, perhaps the desire to buy new perfume products exceeds the potential self-preservation instinct of consumers of the perfume market. However, already at an older age and in parallel with the increase in life experience and knowledge, a certain balance occurs: people begin to take into account other factors, such as the factor of competition between perfume products manufacturers, aggressive advertising or understanding the similarity of technological processes and ingredients characteristic of perfume products in general, and at the same time be more careful about your health

and understand the potential risks of non-original products. However, such stereotypical opinions are not always scientifically confirmed. Thus, it is possible to mention interesting data from a recent study on rats, where it was demonstrated, that both original and fake perfumes had the same effect on the induction of the inflammatory process, the marker of which was an increase in the number of mast cells in various organs and tissues after exposure to perfume products on the studied animals regardless of its origin (branded or fake) [6].

### 3. 1. 3. Awareness of the harmfulness/harmlessness of synthetic components of perfume products

Most of the study participants had their own subjective idea about the harmfulness or safety of synthetic perfumery components that is why the respondents who had doubts or had no opinion at all about this matter were excluded from the analysis of this factor impact. Thus, based on the analysis of two groups of respondents (Table 3), it can be seen, that there is a tendency ( $p = 0.06$ ) that study participants generally have a negative attitude towards synthetic perfumery ingredients.

Table 3

Distribution of study participants depending on awareness of the negative impact of synthetic perfumery ingredients on the human body

Age group	Subjective perception of the harmfulness of synthetic perfumery ingredients on the human body		
	Harmful	Safe	Total
The youngest, n	21	2	21
%	91	9	100
The middle-aged, n	18	6	24
%	75	25	100
The oldest, n	21	12	23
%	64	36	100
Total, n	60	20	80
%	75	25	100

Statistics.  $\chi^2=5.53$ ;  $df=2$ ;  $p=0.06$

As one can see, with age, people become more tolerant to the presence of synthetic substances in perfume compositions.

At the trend level, the following situation is observed: with age, the people attitude to synthetic substances, contained in perfumery products, becomes more neutral. Thus, if in the youngest age group only 9 % of the surveyed persons believed that synthetic compounds are quite safe, then the older respondents 4 times more often perceived synthetic compounds as a completely acceptable ingredient that is not harmful to the human body.

This situation can be explained by the fact that people's awareness of danger factors increases with age and some stereotypical ideas about the harmfulness of substances that people often encounter in everyday life disappear. So, for example, some earlier studies about the harmfulness of synthetic ingredients in cosmetic and perfume products in general have still not found confirmation. A classic example is parabens, which are widely used in products of this category. For some time, this group of synthetic compounds has been declared potentially dangerous and could may be associ-

ated with an increased risk of developing cancer. The use of parabens in cosmetic products of EU countries has become limited. It is believed, that parabens can modulate the activity of the estrogen-converting enzymes,  $17\beta$ -hydroxysteroid dehydrogenase 1 and 2, and increase local estrogen levels. However, the possibility of modulating the activity of these receptors in humans under *in vivo* conditions has not been conclusively proven [7]. Moreover, in 2019, parabens were declared "non-allergenic compound of the year" [8].

At the same time, natural ingredients, namely essential oils, can cause allergic reactions in sensitive persons, being in the composition of perfume products, namely allergic contact dermatitis, which is a delayed-type hypersensitivity reaction to allergens in sensitized persons [9]. It should be noted, that sensitivity reactions to perfumes are generally fixed at a fairly high level, especially in those countries where the culture of applying fragrances is quite widespread. For example, in a study, conducted in Saudi Arabia, perfume sensitivity reactions were observed in about 15 % of participants [10]. By the way, the study involving individuals

of various European countries (Sweden, Holland, and Germany) showed that with age, in particular, after 40 years, women in general use less products that give body odor and remain on it for some time, due to the increased risk of contact allergy and a more attentive attitude to one's health [11].

### 3. 1. 4. Study participants' awareness of the effect of perfume products "aging" on human health

We performed this fragment of the analysis taking into account all the studied females without combining and excluding the categories of possible options (Table 4).

Table 4

Respondents' subjective awareness of the "aging" effect of perfumes

Age group	Perceptions of the perfumes "aging" effect				Total
	They become more dangerous	The "aging" effect impact is absent	No opinion	The situation is not unequivocal	
The youngest, n	9	14	12	2	37
%	24	38	32	6	100
The middle-aged, n	5	14	9	9	37
%	14	38	24	24	100
The oldest, n	13	10	11	16	50
%	26	20	22	32	100
Total, n	27	38	32	27	124
%	22	30	26	22	100

Statistics.  $\chi^2=12.78$ ;  $df=6$ ;  $p=0.05$

Table 4 results indicate that there is a relationship between age and awareness of the perfume "aging" effect. The obtained results indicate the existence of associations between age and respondents' awareness of the possible perfume products "aging" effects on human health. For example, in the youngest and middle-aged groups, the largest number of people (38 % each) believes that perfume does not acquire harmful properties when stored. In contrast to these groups, in the oldest group, the majority of respondents (32 %) do not have an unequivocal opinion on this matter, and 26 % generally believe that when "aging" perfumes can be dangerous for a person. However, data from the literature are also not so clear-cut. For example, people can be quite negative about the "aging" effects of any chemical composition. But, specifically for perfume products, in some studies it was shown, that with "aging" perfume compositions become even less allergenic, which can be considered a positive effect of storage. This is due to the fact that the ingredients, which are sensitizers, enter into interactions with other components of the compositions and become hypoallergenic [12]. At the same time, it is known, that over time, and especially if the temperature and light conditions of storage are not observed in perfume compositions, the formation of acidic reaction products occurs, which is accelerated under the influence of air, temperature, sunlight and the presence of natural products in the composition. They, in turn, trigger other reactions, which as a result can lead to a change in the perfume scent [13].

### 3. 1. 5. Attitudes of study participants to the perfume "gender" factor

Since the preliminary analysis showed that the majority of research participants had a certain opinion about the possibility of using perfumes, declared for a certain gender by opposite sex individuals, in the analysis of the distribution of attitudes (Table 5), we took into account only unambiguous categories of answers ("yes or "no").

From the results of the Table 5, it can be seen, that middle-aged people are the most democratic. Almost  $\frac{3}{4}$  of them believe that the use of perfumes, declared by the manufacturer as intended only for women or only for men, is not restrictive. In the younger and older age groups, on the contrary, more respondents consider such non-gender-related use of perfumery inappropriate.

It is known, that currently perfumes can be marked "for women", "for men" or "unisex". If earlier people followed this division more, now the observance of the "gender" affiliation of perfumery is not strict enough, allowing buyers to experiment with atypical, traditionally not characteristic of a certain gender, scents. Perhaps such a tolerant position in our study is more common among middle-aged people, whose preferences are in the stage of formation. As for the gendered nature of fragrances, the results of some studies that deal with similar issues can be found in the literature. Thus, in one of the recent studies it was shown, that the labeling of perfumes can influence the perception of perfumery as products that are more characteristic of a certain gender. This study examined how associations between scent and gender influence scent and texture evaluations. In particular, the labels "feminine" and "masculine" were applied to neutral smells. Participants rated a female or male odor, applied to soft and rough paper. The results showed that participants who rated a fragrance, labeled as "feminine" (rather than masculine), perceived it as more feminine. Similar attitudes of potential buyers can have practical implications of sensory marketing [14]. It has also been shown, that certain fragrances, associated with masculine or feminine, can influence the perception of a particular person who uses certain perfumes. For example, the smell of ambergris, which is associated with a traditional male fragrance, can influence the formation of the first impression of a person. At the same time, the scent of lily, which is inherent in women's perfumery, can be neutral in terms of forming a judgment about a subject by outsiders [15].

Table 5

Attitude of research participants to the fact of gender-oriented perfume products use by opposite sex individuals

Age group	The possibility of using perfumes intended for a certain gender by opposite sex people		
	Admitted and appropriate	Not admitted and not appropriate	Total
The youngest, n	17	13	30
%	57	43	100
The middle-aged, n	22	7	29
%	76	24	100
The oldest, n	15	20	35
%	43	57	100
Total, n	54	40	94
%	57	43	100

Statistics.  $\chi^2=7.08$ ;  $df=2$ ;  $p=0.03$

### 3. 1. 6. The importance of perfume products originality for respondents

The analysis of associations of the perfumery originality and the possibility of its purchase in different age groups of the population was carried out in a reduced sample, where the categories of impossibility and extremely low probability of purchasing fake perfumery were grouped (Table 6).

The data in the given table indicate that only a small part of the population buys non-original perfumery products in all age groups. In general, 70 % of girls in the youngest group and 68 % of females in the oldest group show a negative attitude towards the purchase. People of the middle-aged group use fake perfumes more often than other females, as evidenced by the fact that almost half of them buy non-original perfume products.

Despite the fact that the purchase of non-original perfumery products takes place among the population of Ukraine, it should be noted, that in general, a minority of people in the youngest and oldest age groups consciously do this. By the way, the obtained data are consistent with our other data, obtained in this study, regarding subjects of the middle-aged group, among whom also the most persons (50 %) do not believe that fake perfumes can

harm the human body. It can be assumed, that at this age females try a lot of perfumes, looking for their perfume style, while they cannot afford to buy more expensive original products.

At the same time, it should be noted, that both original and non-original perfume products may contain synthetic substances that have dangerous properties. For example, it has been proven, that aromatic compounds belonging to the three most common groups can have a certain neurotoxic effect: phthalates, synthetic musk, and chemical sensitizers [16]. In an earlier study, which measured the content of phthalates in branded perfume products, it was shown, in particular, that out of 47 perfumes from European manufacturers, the content of benzyl butyl phthalate (a substance, banned by the European Union in cosmetics and perfumes) was found in products from 27 brands, which was higher threshold value, which is 0.1 ppm. As it is well known, phthalates are chemical compounds that disrupt the function of the endocrine system and can have varying degrees of estrogenic action. Theoretically, although it has not been conclusively proven, such effects can also be manifested when used in the composition of perfumery and cosmetic products *in vivo* [17].

Table 6

Frequencies of study participants who admit/not admit the possibility of purchasing fake perfume products

Age group	The possibility to buy non-original perfumes is admitted			
	Yes	No or extremely infrequently	Occasionally	Total
The youngest, n	6	26	5	37
%	16	70	14	100
The middle-aged, n	3	18	16	37
%	8	49	43	100
The oldest, n	2	34	14	50
%	4	68	28	100
Total, n	11	78	35	124
%	9	63	28	100

Statistics.  $\chi^2=11.13$ ;  $df=4$ ;  $p=0.03$

### 3. 1. 7. The primary purpose of the perfumery use by the study participants

A reduced sample was used to analyze the respondents' distribution according to their primary purpose of perfumery. Females who did not use perfume (approximately 2 %) and females who used perfume to

mask unpleasant odor (2 %) were excluded from the further analysis due to small number (data not shown). The results of the analysis are given in Table 7.

It can be observed, that in people of different age groups, the primary purpose of perfumes using is the potential effect on behavior, namely on mood im-

provement. With age, the dynamics of the increase in the percentage of people who use perfumes for this very purpose is clearly visible: 75 %, 86 % and 94 % among the youngest, middle-aged and oldest groups, respectively. At the same time, the dynamics of the decrease in the percentage of people who use perfume products to increase self-esteem is also stable. When moving from each age group to the next, the percentage of such subjects becomes approximately half as small. This situation can be explained by the fact that

at a very young age, any material things, including perfume, can serve as a means of increasing self-esteem and self-confidence. In addition, the influence of social networks should be taken into account. Thus, applying fragrances can not only increase a person's self-esteem, but also contribute to the subjective perception of this person as more attractive to others [18]. With age, values are reassessed, and the perfumery use is mainly perceived as a tool of positive influence on the emotional state.

Table 7

Distribution of respondents according to the purpose of perfumery use

Age group	The primary purpose of using perfumes		
	To improve self-esteem	To improve mood	Total
The youngest, n	8	24	32
%	25	75	100
The middle-aged, n	5	32	37
%	14	86	100
The oldest, n	3	47	50
%	6	94	100
Total, n	16	103	119
%	13	87	100

Statistics.  $\chi^2=6.05$ ;  $df=2$ ;  $p=0.05$

Other interesting effects have been demonstrated in various studies in other cultures regarding the purpose of human perfumery use. Thus, in contrast to our study, where almost no one thought of masking unpleasant body odor with perfume, other authors confirm the popular opinion that fragrances mask the odor of a person's body and improve its pleasantness. In particular, in one of the studies, where individuals from the Czech Republic and Austria took part, a positive effect of perfumes on the perception of body odor was revealed. There is an assumption that scents interact with body odor, creating an individually specific mixture of smells. A mixture of a person's body odor and a favorite perfume was perceived as more pleasant than a mixture of the same body odor with randomly distributed perfumes. This indicates that the fragrances use goes beyond a simple masking effect, and that people choose perfumes that interact well with their own smell. Such results can explain the purely individual nature of perfume selection [19]. In other studies, in confirmation of our results, it is said about the significant role of olfactory stimulation in changing cognitive activity, mood, social behavior, stress and work capacity. Electrophysiological studies have shown that different fragrances affect spontaneous brain activity and cognitive functions, which can be measured using an electroencephalogram [20].

**Limitations of the study.** The study is of a pilot nature, some results have the nature of trends, and not statistically proven hypotheses.

**Prospects for further research.** In our future research, we plan to expand the sample to include males, as well as conduct an analysis taking into account other demographic and social factors, not just age.

#### 4. Conclusions

For the first time in Ukraine, a pilot study was conducted to find possible associations between some biological, behavioral and demographic characteristics and the perfumes use. About 98 % of study subjects in Ukraine use perfumery. Associations were found between age and the probability of purchase of non-original perfume products by the study participants and awareness of the safety of various perfume products. It has been established, that the determining factors when choosing a perfume is the fragrance, and the brand comes second. An increase in the effect of the brand in older age groups of the population has been demonstrated. Behavioral characteristics of perfume use have been established: in younger females, it is associated with increased self-esteem, with age, the focus shifts to the desire for a positive effect on the mood from the certain fragrance use. However, in all age groups, the primary purpose of perfumes using was to improve the emotional state. Middle-aged females are more democratic in choosing perfumery with a specific gender orientation. Such factors as age and level of education are promising for further analysis of the selected issues.

#### Conflict of interests

The authors declare that they have no conflict of interest in relation to this research, whether financial, personal, authorship or otherwise, that could affect the research and its results, presented in this article.

#### Funding

The study was performed without financial support.

#### References

1. Vasiliauskaite, V., Evans, T. S. (2019). Social success of perfumes. PLOS ONE, 14 (7), e0218664. doi: <https://doi.org/10.1371/journal.pone.0218664>
2. Herz, R. S.; Gottfried, J. (Ed.) (2011). Perfume. Neurobiology of Sensation and Reward. Boca Raton: CRC Press/Taylor & Francis. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK92802/>



3. Kliszcz, A., Danel, A., Puła, J., Barabasz-Krasny, B., Możdżeń, K. (2021). Fleeting Beauty – The World of Plant Fragrances and Their Application. *Molecules*, 26 (9), 2473. doi: <https://doi.org/10.3390/molecules26092473>
4. Kazakova, I., Lebedynets, V., Kovalenko, S., Kazakova, V. (2021). Research of the activities of the enterprises of the perfume and cosmetic industry of Ukraine. *EUREKA: Health Sciences*, 2, 44–55. doi: <https://doi.org/10.21303/2504-5679.2021.001700>
5. Pacholczyk-Sienicka, B., Ciepiewski, G., Albrecht, Ł. (2021). The First Application of <sup>1</sup>H NMR Spectroscopy for the Assessment of the Authenticity of Perfumes. *Molecules*, 26 (11), 3098. doi: <https://doi.org/10.3390/molecules26113098>
6. Hananeh, W., Ghabri, F., Rukibat, R., Zghoul, M., Ismail, Z. (2021). Effects of fake and original perfumes on the presence, numbers, and distribution of mast cells in selected tissues in rats. *Open Veterinary Journal*, 11 (2), 277–282. doi: <https://doi.org/10.5455/ovj.2021.v11.i2.11>
7. Hager, E., Chen, J., Zhao, L. (2022). Minireview: Parabens Exposure and Breast Cancer. *International Journal of Environmental Research and Public Health*, 19 (3), 1873. doi: <https://doi.org/10.3390/ijerph19031873>
8. Fransway, A. F., Fransway, P. J., Belsito, D. V., Warshaw, E. M., Sasseville, D., Fowler, J. F. et al. (2019). Parabens. *Dermatitis*, 30 (1), 3–31. doi: <https://doi.org/10.1097/der.0000000000000429>
9. Sindle, A., Martin, K. (2021). Art of Prevention: Essential Oils – Natural Products Not Necessarily Safe. *International Journal of Women's Dermatology*, 7 (3), 304–308. doi: <https://doi.org/10.1016/j.ijwd.2020.10.013>
10. Alrasheed, M., Albalawi, O., Aljallal, M., Alqahtani, A. S. (2021). Prevalence and Risk Factors of Self-Reported Perfume Sensitivity in Saudi Arabia. *Healthcare*, 9 (10), 1248. doi: <https://doi.org/10.3390/healthcare9101248>
11. Amerongen, C. C. A., Ofenloch, R. F., Cazzaniga, S., Elsner, P., Gonçalo, M., Naldi, L., Svensson, Å. et al. (2021). Skin exposure to scented products used in daily life and fragrance contact allergy in the European general population - The EDEN Fragrance Study. *Contact Dermatitis*, 84 (6), 385–394. doi: <https://doi.org/10.1111/cod.13807>
12. Fisher, A. A., Dooms-Goossens, A. (1976). The effect of perfume “ageing” on the allergenicity of individual perfume ingredients. *Contact Dermatitis*, 2 (3), 155–159. doi: <https://doi.org/10.1111/j.1600-0536.1976.tb03016.x>
13. Blakeway, J. M., Frey, M. L., Lacroix, S., Salerno, M. S. (1987). Chemical reactions in perfume ageing. *International Journal of Cosmetic Science*, 9 (5), 203–214. doi: <https://doi.org/10.1111/j.1467-2494.1987.tb00475.x>
14. Iseki, S., Motoki, K., Sakata, R., Kitagami, S. (2021). How Semantically Labeled Scent-Gender Associations Influence the Evaluations of Scent and Texture. *Frontiers in Psychology*, 12. doi: <https://doi.org/10.3389/fpsyg.2021.713329>
15. Hovis, N., Sheehe, P., White, T. (2021). Scent of a Woman – Or Man: Odors Influence Person Knowledge. *Brain Sciences*, 11 (7), 955. doi: <https://doi.org/10.3390/brainsci11070955>
16. Pinkas, A., Gonçalves, C. L., Aschner, M. (2017). Neurotoxicity of fragrance compounds: A review. *Environmental Research*, 158, 342–349. doi: <https://doi.org/10.1016/j.envres.2017.06.035>
17. Al-Saleh, I., Elkhatib, R. (2015). Screening of phthalate esters in 47 branded perfumes. *Environmental Science and Pollution Research*, 23 (1), 455–468. doi: <https://doi.org/10.1007/s11356-015-5267-z>
18. Croijmans, I., Beetsma, D., Aarts, H., Gortemaker, I., Smeets, M. (2021). The role of fragrance and self-esteem in perception of body odors and impressions of others. *PLOS ONE*, 16 (11), e0258773. doi: <https://doi.org/10.1371/journal.pone.0258773>
19. Lenochová, P., Vohnoutová, P., Roberts, S. C., Oberzaucher, E., Grammer, K., Havlíček, J. (2012). Psychology of Fragrance Use: Perception of Individual Odor and Perfume Blends Reveals a Mechanism for Idiosyncratic Effects on Fragrance Choice. *PLoS ONE*, 7 (3), e33810. doi: <https://doi.org/10.1371/journal.pone.0033810>
20. Sowndhararajan, K., Kim, S. (2016). Influence of Fragrances on Human Psychophysiological Activity: With Special Reference to Human Electroencephalographic Response. *Scientia Pharmaceutica*, 84 (4), 724–751. doi: <https://doi.org/10.3390/scipharm84040724>

Received date 06.10.2022

Accepted date 17.11.2022

Published date 30.12.2022

**Olga Filiptsova\***, Doctor of Biological Sciences, Professor, Department of Cosmetology and Aromology, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Olexander Bashura**, Doctor of Pharmaceutical Sciences, Professor, Head of Department, Department of Cosmetology and Aromology, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Olga Naboka**, Doctor of Biological Sciences, Professor, Department of Biochemistry, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Oleksandra Kran**, Doctor of Philosophy, Associate Professor, Department of Cosmetology and Aromology, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Maksym Almakaiev**, PhD, Department of Cosmetology and Aromology, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Halyna Kukhtenko**, PhD, Associate Professor, Department of Cosmetology and Aromology, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Tetiana Martyniuk**, PhD, Associate professor, Department of Cosmetology and Aromology, National University of Pharmacy, Pushkinska str., 53, Kharkiv, Ukraine, 61002

**Yuliia Osypenko**, Department of Security of Information Systems and Technologies, V. N. Karazin Kharkiv National University, Svobody sq., 4, Kharkiv, Ukraine, 61022

\*Corresponding author: Olga Filiptsova, e-mail: [philiptsova@yahoo.com](mailto:philiptsova@yahoo.com)