

EFFECTS OF LONG-TERM EXPOSURE TO SCENTS AND ROOM FRAGRANCE ON WELLBEING: A CROSS-SECTIONAL STUDY

Ma. Levy Anne S. Amosin

Graduate School, Mapua University, Metro Manila
Department of Psychology, School of Health Sciences

PHILIPPINES

Email: mlasamosin@mymail.mapua.edu.ph, hugginghorizons@gmail.com

ABSTRACT

Benefits of scents and room fragrance in forms like scented candles, reed or car diffusers, room and linen spray, fragrance oil, humidifier, essential oil, incense and alike have been proven true to promote well-being over the last decades. Studies suggest the vital role of olfactory stimulation or inhaling an aroma in delivering a message to the brain, changing mood, cognition, and social behavior. Scents and room fragrance businesses have blossomed over the years, which enticed consumers to purchase products proven to ease down anxiety, relax the mind and improve well-being. Despite several research about health benefits of scents and fragrance, none have investigated on the effectiveness of long-term exposure to scents and room fragrance on well-being. Growing interest of the public to use scents around the world have also been cited, from luxury hotels, spas even to our own homes. 105 household users and employees of establishments with long-term exposure to scents and room fragrance are the respondents of this study. Two surveys were used to gather data, one designed to check respondent's long-term exposure to scents, and well-being scale to measure respondent's well-being. Results revealed that long-term exposure to scents and room fragrance have a significant effect on total well-being (t statistics = 2.882539, p value = 0.047614). Findings revealed that long-term exposure to scents results to high total mean well-being score ($M= 90.76145$, $SD: 28.56249$). This research maybe useful to the following institutions: study hubs, special schools, nursing homes, rehabilitation centers, addiction home, social centers and alike. Results extend the important role of scents and room fragrance beyond consumer awareness and further taps to medical benefits, improve positive psychology in mental health institutions and rehabilitation centers, as there is a significant effect of long-term exposure to scents and room fragrance on promoting well-being.

Keywords: Scents, Room Fragrance, Well-being, Positive Psychology.

INTRODUCTION

Scents and room fragrances have been an important topic recently due to the growth of knowledge pertaining to its mental health benefits such as improving sleep, reducing stress and anxiety along with relaxation and many more factors. A previous study conducted by Harvard university stated that smells are handled by the olfactory bulb this is the structure of the brain that forward details or information to various parts of our body's central command that requires further processing (Walsh, 2020). Moreover, in a Harvard University a panel discussion on "Olfaction in Science and Society" Murthy (2020) also mentioned that odors directly travels to the limbic system, pass through amygdala, hippocampus, which are the regions connected to emotion and memory. This has brought the topic in a higher level and has recently been a hot topic. Scents and room fragrances are found in many forms like scented candles, essential oils, reed diffusers, room and linen spray, fragrance oil, car diffuser, humidifier, and incense. Whitten (2021) mentioned that scented candles improve relaxation due to essential oils present in it. Numerous scented candles contain essential oils

which comes from plants and is proven to have lots of medicinal benefits. Moreover, some essential oils known to promote sleep, reduce stress and anxiety are the following: lavender, jasmine, chamomile, and sandalwood. Studies have contributed to the knowledge that scents and room fragrance have improved into an ally of promoting well-being given the proper raw materials used to create it. Masahiro (2011) stated in a research that positive emotions can be elicited by certain fragrances and have been effective to lower stress levels and promote mental outlook. Stephen Warrenburg of Oxford University stated that aroma has a huge significant in stress reduction and improving a person's mood. Previous studies have proven the power of scents and fragrance to activate our sensory nerves and improve our emotional well-being. However, there are no other studies found investigating on the effects of long-term exposure to scents and room fragrance to a person's well-being, particularly to those in the professional field such as Massage therapists, scented candle manufacturers, hotel staff – housekeeping department, spa, sales and marketing staff assigned in scents and home fragrance brands. Very few existing studies can be found investigating on the effect of years of exposure to room fragrance and scents conducted in a quantitative design as mostly are experimental, this entails the gap between the growing interest of the public in the topic. Some studies are found about the entrepreneurship, marketing, health benefits, hazards, and safety protocols, yet so little information is provided about long-term exposure to scents of professionals that are actually in an everyday setting of an enclosed environment with scents and room fragrance.

Holistic and wellness employees such as the hotel staff (housekeeping, room, area, laundry attendants), scented candle manufacturers, massage therapists in spas, salesclerk assigned in room fragrance are people in the professional world are exposed almost every day to scents and room fragrance, may be in the form of a scented candle, room and linen spray, humidifiers diffusers and alike. Revealing the effects of long-term exposure to scents and room fragrance on well-being of the respondents in this quantitative study will play a huge role not just in luxury hotels, spas scent and fragrance brand but also to hospitals, nursing homes, rehabilitation centers, special schools, community centers and addiction home centers. Results will provide a reliable reference not just for the consumer product awareness of the business industry but more on the purpose of the scents and room fragrances to nursing homes, rehabilitation centers and alike. This study aims to give emphasis on the effects of long-term exposure to scents and room fragrance on one's well-being, this study hopes that knowledge found here can create a wider array of use to scents on institutions that may benefit for medical use and could help promote well-being to many.

REVIEW OF RELATED LITERATURE

Olfactory Stimulation

Olfactory stimulation has been proven to be an effective way to quickly deliver a message to the brain resulting to alter mood, reduce stress, anxiety and promote well-being. A recent finding published in the Journal of environmental psychology led by Madzharov et al. (2018) highlighted the power of coffee scent and the cognitive boost it provides plus student's expectations to perform better on analytical tasks. Scents and room fragrances have long been studied which even gave birth to the *Proustian Phenomena* which states that odors are powerful in reminding us about a distant memory or autobiographic memories (Chu and Downes, 2000). Moreover, in previous research conducted by Matsunaga et al. (2011), people who are exposed to a nostalgic odor (A personal scent that is unique to each person) has experienced autobiographic memory. The study conducted was compared against a control odor which is same to all respondents and did not evoke any nostalgic memory.

Meanwhile after sniffing the nostalgic scent, the mood of the respondents changed and promoted the feelings of comfort and a decrease in stress and anxiety. Indeed, previous research entails a good point for this study to go this present direction.

PERMA model of well-being

Studies suggests the connection of scents on well-being, this brings us to investigate further if indeed exposure to scents does influence well-being. A recent article about PERMA model as primary source of self-care during stressful times suggested that to elicit positive emotions one should pay attention to the tactile sensations around us such as sounds, sights, tastes, and scents (Moore, 2020). PERMA model is defined as a solid research-based approach to improve the feeling of happiness. The model consists of five vital pillars: Positive emotions, engagement, relationships, meaning and accomplishment. It is important to refer to PERMA model of well-being when discussing the well-being scores and findings in this research. This will aid in the understanding of the relationship of scents and room fragrance on promoting well-being.

Medical benefits of scent inhalation

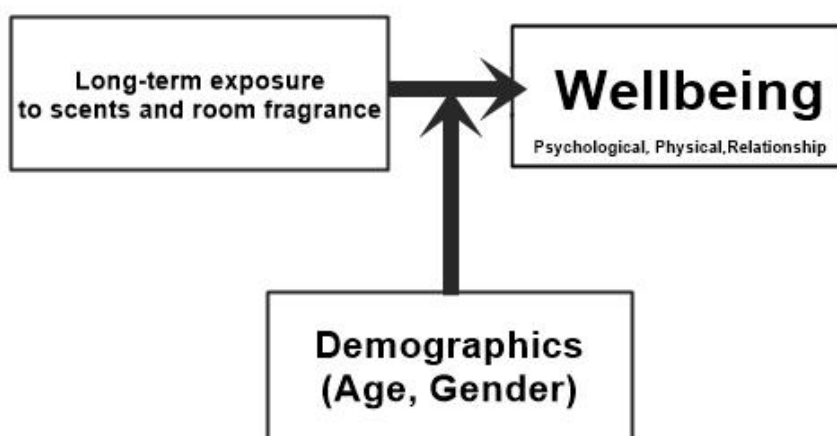
The power of scents and its healing components have also been strongly reiterated in a study named Percutaneous Coronary Intervention (PCI) by Cho et. al (2013), measuring the effects of aroma therapy on anxiety, vital signs, and sleep quality of patients in a hospital. In comparison to the control group conducted in the study, results have revealed that the groups of the participants with aromatherapy showed reduction in levels of anxiety, increased in feelings of calmness and sleep, and has a stabilized blood pressure. The study concluded that aromatherapy has a huge benefit on emotional well-being via the olfactory senses directly signaling to the limbic system of the brain. A recent study conducted in South Korea found that there is a stabilizing effect on the prefrontal cortex, brain activity and even a decrease in systolic blood pressure with olfactory stimulation, specifically with the inhalation of aroma oil said Choi et al. (2022). Previous studies have also used electroencephalography (EEG) a test used to measure electrical activity in the brain to explain the relation of brain activity through olfactory stimulation and a person's nervous system. Jung et al. (2012) have discovered that there is a positive effect of the scent *Lavandula angustifolia* on women with sleeping disorders. Moreover, a neurological study published in Indian Journal of Pharmacology founded that vanilla scent is highly effective in treating obsessive-compulsive disorder (OCD) and depression because of its primary component vanillin. Researchers have revealed that through mood mapping, they were able to measure that a single whiff of vanilla bean increased feelings of relaxation and joy to participants. Scientist studying *Psycho-neuro-endocrine-immunology (P.N.E.I)* a study between the connection between the psychological processes, nervous, endocrine, and immune systems of the body. In simple terms this is the study focusing on the mind and body connection. Researchers of P.N.E.I established the essence of scent inhalation as an integral part that impacts our positive emotions, mental, hormonal, nervous and our immune system.

Synthesis and Research Gap

Several studies have been done to investigate on the health benefits of the use of scents and room fragrance in relation to promoting overall well-being, but no research was made and published that focused on the effects of long-term exposure to scents and room fragrance on well-being. Although, there are some studies published discussing the use of aromatherapy on

hospital patients with anxiety and deprived sleep, no other studies delved into investigating the idea of the effects of months or years of exposure to scents and room fragrance on well-being.

Conceptual Framework



IV: Long-term exposure to scents and room fragrance (months vs. years), age (young vs. old), Gender (Male vs. female)

DV: Well-being

Statement of the problem

Does long-term exposure to scents and room fragrance have an effect on wellbeing?

Research Questions

1. Will respondent's age, gender and long-term exposure to scents and room fragrance significantly affect total well-being?
2. Would age, gender and length of exposure to scents or room fragrance independently affect total wellbeing?
3. Would age, gender and length of exposure to scents or room fragrance interactively affect respondent's total wellbeing?

H1

Ha: Respondent's age, gender and long-term exposure to scents and room fragrance will significantly affect total well-being.

Ho: Respondent's age, gender and long-term exposure to scents and room fragrance will not significantly affect total well-being.

H2

Ha: Participant's age, gender, and length of exposure to scents or room fragrance independently affect respondent's total wellbeing.

Ho: Participant's age, gender, and length of exposure to scents or room fragrance does not independently affect respondent's total wellbeing.

H3

Ha: Participant's age, gender, and length of exposure to scents or room fragrance interactively affect respondent's total wellbeing.

Ho: Participant's age, gender, and length of exposure to scents or room fragrance does not interactively affect respondent's total wellbeing.

METHODS

Research Design

A cross-sectional research design is used in this study to collect data from various individuals that has been exposed to the holistic and wellness industry.

Setting, participants and sampling technique

105 household users and employees from the Philippines exposed to scents and room fragrance such as: Hotel staff (housekeeping, room, lobby, and laundry attendants), scented candle manufacturers, massage therapists in spas. Respondent qualifications for this research are as follows, the participant have to be a.) must be exposed in an environment with the presence of scents or room fragrance either in work or home setting not less than a month b.) have either been using room fragrance and scents or working as a hotel housekeeping attendant, scented candle production employee, massage therapist in spa or sales clerk for scents and home fragrances c.) available to participate in the study.

Data Gathering tools

Two gathering tools were used in the study to check respondent's long-term exposure to scents and room fragrance. Another instrument was used to measure respondent's well-being.

The BBC Well-being Scale

The BBC Subjective Well-being scale is a new measure of well-being scale, it is recommended for research and clinical purposes. It is a 24-item scale with good internal consistency y ($\alpha = 0.935$) and correlated significantly with key demographic variables and measures of concurrent validity. A self-report questionnaire designed to measure an individual's subjective experiences on quality of life. Item number four is set for a reversed score. Moreover, the scale assesses "the psychological well-being, physical health and well-being and relationship well-being" (Kinderman et al., 2011).

Effects of Long-term exposure to scents and room fragrance on well-being

Name : (optional)
Civil status: (single / married)
Gender:
Age:
Years of working in the industry (Long-term exposure to scents):

The BBC Well-being scale

This questionnaire attempts to measure how happy you feel generally in most parts of your life. Select the response that best describes your experience.

	<i>Not at all</i>	<i>A little</i>	<i>Moderately</i>	<i>Very much</i>	<i>Extremely</i>
1. Are you happy with your physical health					
2. Are you happy with the quality of your sleep					
3. Are you happy with your ability to perform daily living activities					
4. Do you feel depressed or anxious*					
5. Do you feel able to enjoy life					
6. Do you feel you have a purpose in life					
7. Do you feel optimistic about the future					
8. Do you feel in control of your life					
9. Do you feel happy with yourself as a person					
10. Are you happy with your looks and appearance					
11. Do you feel able to live your life the way you want					
12. Are you confident in your own opinions and beliefs					
13. Do you feel able to do the things you choose to do					
14. Do you feel able to grow and develop as a person					
15. Are you happy with yourself and your achievements					
16. Are you happy with your personal and family life					
17. Are you happy with your friendships and personal relationships					
18. Are you comfortable about way you relate connect with others					
19. Are you happy with your sex life					
20. Are you able to ask someone for help with a problem					
21. Are you happy that you have enough money to meet your needs					
22. Are you happy with your opportunity for exercise/leisure					
23. Are you happy with access to health services					
24. Are you happy with your ability to work					

Scoring:

	<i>Not at all</i>	<i>A little</i>	<i>Moderately</i>	<i>Very much</i>	<i>Extremely</i>
<i>Item 4</i>	5	4	3	2	1
<i>All other items</i>	1	2	3	4	5

Psychological Well-being scale – items 4 (reversed score), 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Physical Health and Well-being scale – items 1, 2, 3, 21, 22, 23, 24

Relationships scale – items 16, 17, 18, 19, 20

Total well-being score is each sub-scale added up. The higher the score indicates better levels of well-being in each domain and for the total subjective well-being.

Fig.1 BBC Well-being scale survey

Survey on effects of long-term exposure to scents and room fragrance on wellbeing

A simple 10 item survey derived from a Fragrance consumer survey (Global Data, 2021) focusing on scent preferences and exposure. A multiple-choice response format with statements asking about the long-term exposure to scents and room fragrance in connection to well-being. Survey gathers reliable data on the length of respondent's exposure to scents and room fragrance in months or in years.

SURVEY ON EFFECTS OF LONG-TERM EXPOSURE TO
SCENTS AND ROOM FRAGRANCE ON WELLBEING

QUESTIONNAIRE

Dear respondent, I am approaching you with this questionnaire to know your long-term exposure to scents and room fragrance, please answer honestly and completely. Your responses and information will be kept anonymous and will not be used for any other purposes. I extend my sincere thanks for your valuable time and participation in the research.

REQUIRED

Name: (Optional)

Age:

Gender: Male / Female

Occupation:

Status:

Months/ years exposed to Scents / Room Fragrance
(Work Setting: ____, Home use: ____)

1. If you have used home fragrance products which of the ff. below have you used? (Tick as many as you want)

- Candles
- Aroma/Essential Oils
- Car Diffusers
- Incense Sticks
- Room and Linen Spray
- Others, please specify: _____

2. Which fragrance products are you most exposed to?

- Odor Neutralizer
- Room and Linen Spray
- Air Purifier
- Insect Repellent
- Humidifier
- Others, please specify: _____

3. What is the common effect you get when you are exposed to scent or room fragrance?

- Relaxed
- Positive Energy
- Mood Enhancement
- Therapeutic
- Improved Concentration
- Others, please specify: _____

4. Which scent or room fragrance product(s) are you often exposed to?

- Organic
- Natural
- Vegan
- Eco-friendly
- Ethical
- Handmade
- Others, please specify: _____

5. Have you used scented candles, if you have what would be your preferred type of candles?

- Paraffin candles
- Beeswax candles
- Soy wax candles
- Palm wax candles
- Never used candles
- Others, please specify: _____

6. Which Fragrance are you commonly exposed to?

- Floral
- Fruity
- Fresh

- Citrus
- Marine/ Ocean
- Musky
- Herbal
- Sweet
- Spice
- Woody
- Others, please specify: _____

7. Which of these eco-friendly, natural products have you been exposed to:

- Perfumed Beeswax/ soy wax candles
- Aroma or Fragrance Oils
- Reed Diffuser
- Incense Sticks
- Incense Cones
- Water-based humidifiers
- Other (please specify) _____

8. Which of the following benefits do you know that comes from using scents and fragrances?

- Relieves anxiety
- Improves sleep
- Decrease blood pressure
- Increase focus
- Odor neutralizer
- Insect repellent
- Therapeutic reasons such as anti-depressant / anti-spasmodic, etc.
- Not aware of these benefits
- Other (please specify) _____

9. How many hours a day are you usually exposed to scents and room fragrances?

- 1- 3 hours
- 4-8 hours
- 9-12 hours
- 12 hours and up

10. Which of the following fragrance concept are you often exposed to?

- Scents that are refreshing/revitalizing
- Scents that smell clean
- Scents that are comforting
- Scents that help me relax
- Scents developed with natural ingredients
- Scents that boost my energy
- Scents that smell luxurious and expensive
- Scents that help me concentrate
- Scents inspired by the seasons
- Scents inspired by locations
- Scents inspired by food or drinks
- Others, Please Specify _____

Thank you for your precious time and effort upon answering the survey.

-END-

Fig 2. Survey on effects of long-term exposure to scents and room fragrance on well-being

Data Gathering and Ethical Considerations

The researcher used *survey monkey* and had respondents answer it online via email, Facebook messenger and linked to Instagram. Follow up messages on social media were sent to participants to complete data collection. The researcher also, conducted traditional data gathering. Printed surveys were handed out in companies and had participants answer it manually. A short introduction about the study was cited on top of the survey forms. 150 questionnaires were handed out. Fortunately, 105 respondents were able to forward their answers on time. Participants received a handmade angel scented candle and a 10% off discount in an artisan candle manufacturing company was offered as an incentive to complete the study. Ample data revealed necessary results for this research.

Data Analysis

Raw data was extensively checked to make sure it is reliable to get correct results. T-test is used to identify the significant effects of participant's age, gender and long-term exposure to scents and room fragrance on well-being. To find out whether length of exposure to scents and room fragrance (months vs. years), demographics age (young vs. old) and gender (male vs. female) independently and interactively affects participant's total well-being, main effect ANOVA and factorial analysis of variance was used. The level of statistical significance in this research was set as $p < 0.05$.

RESULTS

Demographic Information

There are a total of 105 respondents in the study, equally distributed in gender: 53 male, 52 female. Age: 51 young (18 to 35 years old) and 54 old (36 years old and up) and long-term exposure to scents and room fragrance 54 said months and 51 were exposed for years. As for the settings of long-term exposure, 48 were exposed in work setting, 35 home use and 22 answered both as seen on table 1.

Table 1

Total number of respondents by demographics and variable long-term exposure to scents and room fragrance

Characteristic	n
Gender	
Male	53
Female	52
Age	
Young	51
Old	54
Long-term Exposure to scents and room fragrance	
Months	54
Years	51
Setting	
Hotel staff – housekeeping department	12
Lobby Attendant	10
Room Fragrance Salesclerk	5
Scented Manufacturing production staff	11
Spa Massage Therapist	10
Household users (Home setting)	35
Both	22

Table 2

Descriptive statistics and significance across well-being subscales in demographic subsets and long-term exposure to scents of participants

n =105	Gender		Age		Long-term exposure to scents	
	Male	Female	Young	Old	Months	Years
	53	52	51	54	54	51
Psychological wellbeing subscale						
Mean	46.81132	45.30769	45.98039	46.14815	44.92593	47.27451
SD	6.21430	6.86720	6.21125	6.92659	7.35579	5.403993
T	1.176868		-0.130390		1.855562	
Statistics						
p value	0.475244		0.439022		0.029622	
Physical wellbeing subscale						
Mean	25.98113	24.92308	25.35294	25.55556	24.50000	26.47059
SD	4.13471	4.42296	3.80433	4.74110	4.51308	3.833291
T	1.266553		-0.240655		2.404687	
statistics						
p value	0.629733		0.118962		0.246733	
Relationship wellbeing subscale						
Mean	19.49057	18.90385	18.9411765	19.44444	18.11111	20.35294
SD	3.46201	3.19472	3.42001	3.25441	3.13632	3.161161
T	0.902041		-0.772651		3.646699	
statistics						
p value	0.567035		0.721006		0.952915	
Total Wellbeing (WBS)						
Mean	92.28302	89.13462	90.27451	91.14815	87.53704	94.09804
SD	11.77249	12.25390	11.04550	13.03465	13.10151	9.897989
T	1.342685		-0.369469		2.882539	
statistics						
p value	0.774023		0.240075		0.047614	

Table 2 presents the variables that are significantly affecting well-being. The conducted independent T-test by group showed that there is no significant difference between variables demographics: age (young vs. old) and gender (male/female) that affects respondents well-being. The variable long-term exposure to scents and room fragrance (months vs. years) showed no significance on psychological well-being subscale yet has significant effects on Physical health well-being subscale and relationship well-being subscale. T-test further showed that there is a significant effect in long-term exposure to scents and room fragrance on total well-being. Long-term exposure to scents and room fragrance revealed to be the only significant variable that influences well-being. Figures 3, 4, 5 shows the box and whisker plot of respective variables in relation to respondent's well-being scores. This will further be discussed on the discussion part of this study.

T-test (Independent by groups)

T-tests: Grouping: Age (RAW DATA EFFECTS OF LONG-TERM EXPOSURE TO SCENTS AND ROOM FRAGRANCE ON WELL-BEING)												
Group 1: young												
Group 2: old												
Variable	Mean young	Mean old	t-value	df	p	Valid N young	Valid N old	Std.Dev. young	Std.Dev. old	F-ratio Variances	p Variances	
Psychological	45.98039	46.14815	-0.130390	103	0.896512	51	54	6.21125	6.92659	1.243601	0.439022	
Physical	25.35294	25.55556	-0.240655	103	0.810301	51	54	3.80433	4.74110	1.553104	0.118962	
Relationship	18.94118	19.44444	-0.772651	103	0.441499	51	54	3.42001	3.25441	1.104358	0.721006	
Total Wellbeing	90.27451	91.14815	-0.369469	103	0.712537	51	54	11.04550	13.03465	1.392605	0.240075	

T-tests; Grouping: Gender (RAW DATA EFFECTS OF LONG-TERM EXPOSURE TO SCENTS AND ROOM FRAGRANCE ON WELL-BEING)											
Group 1: male											
Group 2: female											
Variable	Mean male	Mean female	t-value	df	p	Valid N male	Valid N female	Std.Dev. male	Std.Dev. female	F-ratio Variances	p Variances
Psychological	46.81132	45.30769	1.176868	103	0.241961	53	52	6.21430	6.86720	1.221164	0.475244
Physical	25.98113	24.92308	1.266553	103	0.208172	53	52	4.13471	4.42296	1.144293	0.629733
Relationship	19.49057	18.90385	0.902041	103	0.369140	53	52	3.46201	3.19472	1.174327	0.567035
Total Wellbeing	92.28302	89.13462	1.342685	103	0.182325	53	52	11.77249	12.25390	1.083458	0.774023

T-tests; Grouping: Long-term exposure (RAW DATA EFFECTS OF LONG-TERM EXPOSURE TO SCENTS AND ROOM FRAGRANCE ON WELL-BEING)											
Group 1: years											
Group 2: months											
Variable	Mean years	Mean months	t-value	df	p	Valid N years	Valid N months	Std.Dev. years	Std.Dev. months	F-ratio Variances	p Variances
Psychological	47.27451	44.92593	1.855562	103	0.066375	51	54	5.403993	7.35579	1.852802	0.029622
Physical	26.47059	24.50000	2.404687	103	0.017972	51	54	3.833291	4.51308	1.386128	0.246733
Relationship	20.35294	18.11111	3.646699	103	0.000419	51	54	3.161161	3.13632	1.015906	0.952915
Total Wellbeing	94.09804	87.53704	2.882539	103	0.004802	51	54	9.897989	13.10151	1.752059	0.047614

Box and Whisker Plot:

Age | Young vs. old

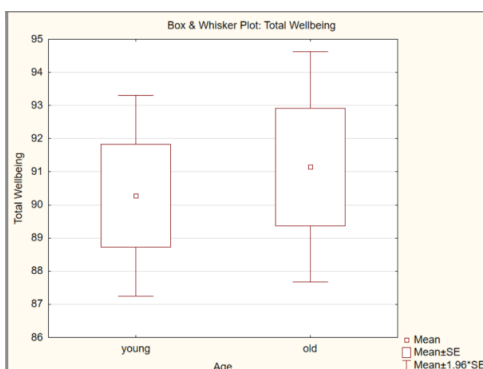


Fig. 3 Age and WB Box and Whisker plot

Gender | Male vs. Female

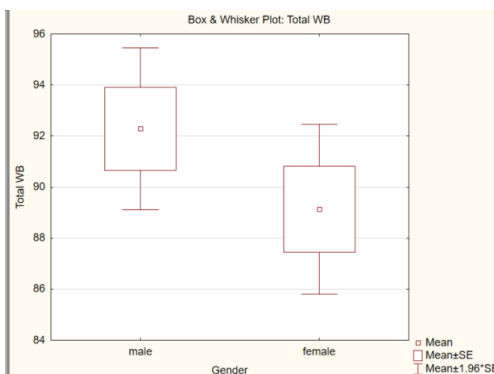


Fig. 4 Gender and WB Box and Whisker plot

Long-term Exposure (Months vs. Years)

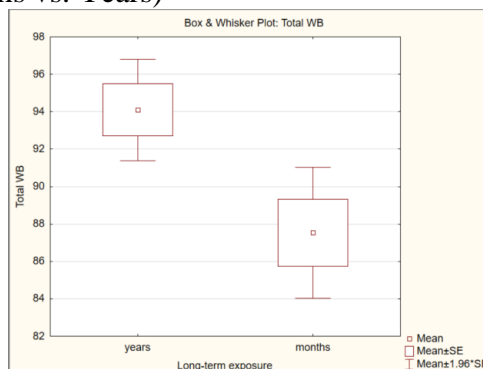


Fig. 5 Long-term exposure and WB Box and Whisker plot

I. Analysis of Variance

A. Main Effect ANOVA (to check if IVs are separately affecting DV well-being)

Univariate Tests of Significance for Total WB (RAW DATA EFFECTS OF LONG-TERM EXPOSURE TO SCENTS AND ROOM FRAGRANCE ON WELL-BEING)					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	863626.2	1	863626.2	6308.127	0.000000
Age	98.5	1	98.5	0.719	0.398375
Gender	93.1	1	93.1	0.680	0.411629
Long-term exposure	985.6	1	985.6	7.199	0.008525
Error	13827.6	101	136.9		

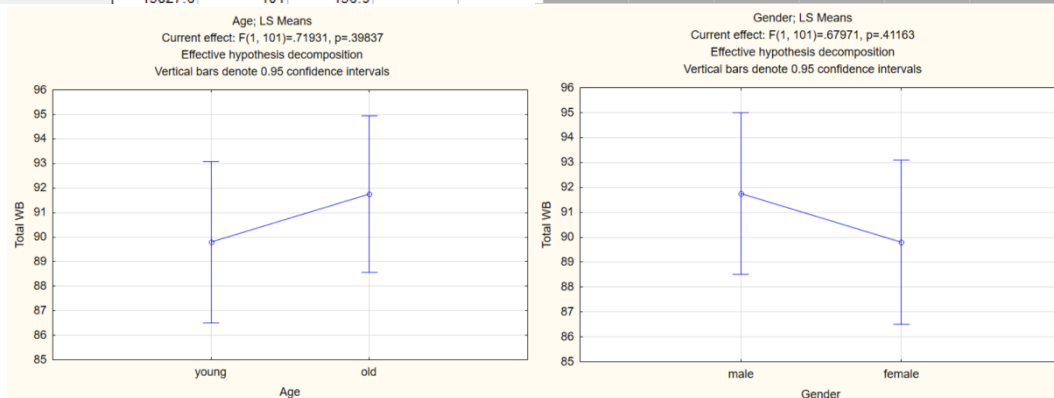


Fig 6

Fig 7

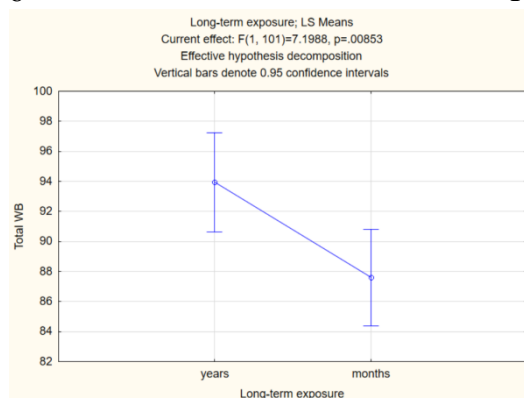


Fig. 8

Interpretation: Demographics age and gender does not significantly affect respondent’s well-being as shown on Figure 6 and 7. However, main affect ANOVA revealed p value 0.008525 stating significance, that long-term exposure to scents and room fragrance separately affect respondent’s well-being.

II. Factorial Analysis of Variance (Performed to check if IVs are interactively affecting DV)

Univariate Tests of Significance for Total Wellbeing (RAW DATA EFFECTS OF LONG-TERM EXPOSURE TO SCENTS AND ROOM FRAGRANCE ON WELL-BEING)					
Sigma-restricted parameterization					
Effective hypothesis decomposition					
Effect	SS	Degr. of Freedom	MS	F	p
Intercept	741709.3	1	741709.3	5821.069	0.000000
Age	141.2	1	141.2	1.108	0.295151
Gender	10.8	1	10.8	0.085	0.771488
Long-term exposure	1222.9	1	1222.9	9.598	0.002548
Age*Gender	892.8	1	892.8	7.007	0.009476
Age*Long-term exposure	82.6	1	82.6	0.648	0.422639
Gender*Long-term exposure	29.7	1	29.7	0.233	0.630461
Age*Gender*Long-term exposure	368.4	1	368.4	2.891	0.092256
Error	12359.6	97	127.4		

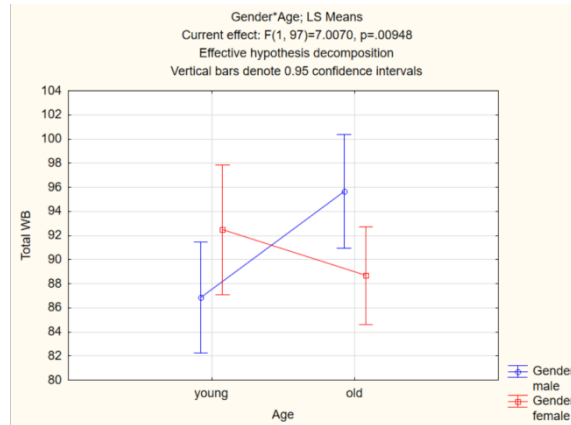


Fig 9

Interpretation: The interaction of age and gender will significantly affect the participant’s well-being.

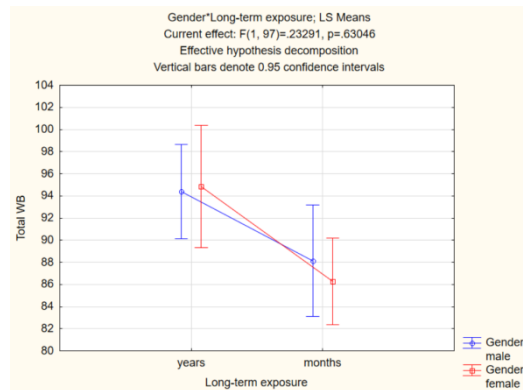


Fig 10

Interpretation: The interaction of gender and long-term exposure will not significantly affect the participant’s well-being.

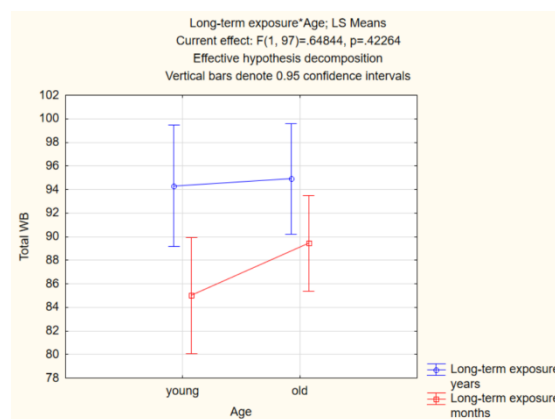


Fig 11

Interpretation: The interaction of age and long-term exposure will not significantly affect the participant’s well-being.

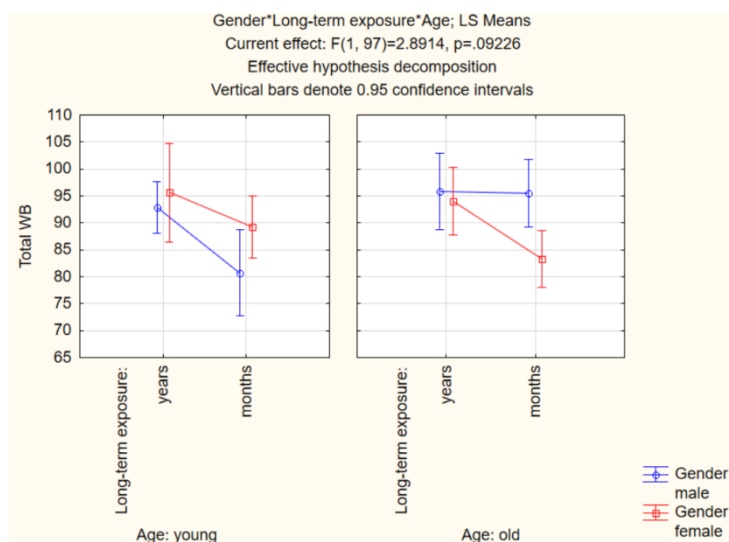


Fig 12

Interpretation: The interaction of age, gender and long-term exposure will not significantly affect the participant's well-being.

Table 3

Descriptive statistics for the BBC subjective well-being scale, n = 105

WBS Items	Ran k	Min	Max	Mean	SD
Physical health and wellbeing scale					
1.Are you happy with your physical health?	21	1.00	5.00	3.4571 43	0.9760 84
2.Are you happy with the quality of your sleep? (lowest)	22	1.00	5.00	3.3714 29	0.9174 36
3.Are you happy to perform daily living activities? (tie)	19	1.00	5.00	3.6190 48	0.8898 45
Psychological wellbeing scale					
4.Do you feel depressed or anxious? *reversed score*	7	1.00	5.00	3.9428 57	0.9180 73
5.Do you feel able to enjoy life? (tie)	11	2.00	5.00	3.8095 24	0.7218 46
6.Do you feel you have a purpose in life?	8	2.00	5.00	3.9333 33	0.7998 4
7.Do you feel optimistic about the future?	10	2.00	5.00	3.8190 48	0.7817 75
8.Do you feel in control of your life? (tie)	19	1.00	5.00	3.6190 48	0.8591 25
9.Do you feel happy with yourself as a person?	3	2.00	5.00	3.9809 52	0.7465 43
10.Are you happy with your looks and appearance?	18	1.00	5.00	3.6666 67	0.8733 96
11.Do you feel able to live your life the way you want?	16	1.00	5.00	3.7238 1	0.7271 55
12.Are you confident in your own opinions and	11	1.00	5.00	3.8095	0.7977

belief? (Tie)				24	76
13.Do you feel able to do things you choose to do?	12	2.00	5.00	3.7714 29	0.6969 32
14.Do you feel able to grow and develop as a person?	2	2.00	5.00	3.9904 76	0.6278 05
15.Are you happy with yourself and your achievements? (highest)	1	1.00	5.00	4	0.7071 07
Relationship Scale					
16.Are you happy with your personal and family life?	4	1.00	5.00	3.9714 29	1.4284 05
17.Are you happy with your friendships and personal relationships?	6	2.00	5.00	3.9519 23	1.4980 45
18.Are you comfortable about the way you relate and connect with others?	9	2.00	5.00	3.8857 14	1.5613 25
19.Are you happy with your sex life?	17	1.00	5.00	3.6952 38	1.9080 62
20.Are you able to ask someone for help with a problem?	15	1.00	5.00	3.7333 33	1.8429 83
Physical health and wellbeing scale					
21.Are you happy that you have enough money to meet your needs?	20	1.00	5.00	3.5428 57	1.9122 01
22.Are you happy with your opportunity for exercise and leisure?	13	1.00	5.00	3.7619 05	1.9384 28
23.Are you happy with access to health services?	14	1.00	5.00	3.7428 57	2.0175 33
24.Are you happy with your ability to work?	5	1.00	5.00	3.9619 05	2.11476 6
Wellbeing (Mean Score) Total		32	120	90.761 45	28.262 49

Note: Item number 4 was reverse scored. Other items are rated on a 5-point scale, 1 = not at all to 5 = Extremely.

Table 3 shows the descriptive statistics of respondent's responses on BBC Subjective Well-being scale. The mean scale score for well-being scale (WBS) is 90.76145 with the Standard deviation of 28.26249. Well-being scale contains different items that measures a person's psychological, physical health and relationship well-being, among these items are the questions "Are you happy with yourself and your achievements?", "Do you feel able to grow and develop as a person?" and "Do you feel happy with yourself as a person?" ranked the top 3 highest mean value, which belongs to the psychological subscale. Meanwhile questions like "Are you happy with the quality of your sleep?", "Are you happy with your physical health?", "Are you happy to perform daily living activities?" and "Do you feel in control of your life?" ranked the lowest mean value, majority of these questions belong to the physical health and well-being subscale. The maximum over all well-being score of respondents is 120 which ranks as high well-being score, with the minimum mean score of 32.

Table 4

Responses on long-term exposure to scents and room fragrance survey

Questions	Responses	n	Rank
1. Which of the following home fragrance products have you used?	Candles	33	1
	Diffusers	22	3
	Incense sticks	10	4
	Room and linen spray	31	2
	Others(please specify)	1	5
2. Which fragrance are you most exposed to?	Odor neutralizer	13	4
	Room and linen spray	19	3
	Air purifier	25	2
	Insect repellent	4	6
	humidifier	32	1
	Others(please specify)	12	5
3. What is the common effect you get when exposed to scents and room fragrance?	Relaxed	32	1
	Positive Energy	21	3
	Mood Enhancement	24	2
	Therapeutic	19	4
	Improved concentration	7	5
	Others(please specify)	2	6
4. Which scent or room fragrance product(s) are you exposed to?	organic	19	3
	natural	32	2
	vegan	2	6
	Eco-friendly	33	1
	Ethical	4	5
	Handmade	15	4
5. Have you used scented candles if you have what would be your preferred type of candles?	Paraffin candles	16	3
	Beeswax candles	11	4
	Soy wax candles	54	1
	Palm wax candle	6	5
	Never used candles.	17	2
	Others (please specify)	1	6
6. Which Fragrance are you commonly exposed to?	Floral	25	2
	Fruity	4	7
	Fresh	29	1
	Citrus	13	3
	Marine/ Ocean	12	4
	Musky	2	8
	Herbal	4	7
	Sweet	5	6
	Spice	2	8

	Woody	7	5
	Others(please specify)	2	8
7. Which of these eco-friendly, natural products have you been exposed to?	Perfumed Beeswax/soy wax candles	17	3
	Aroma or Fragrance Oils	49	1
	Reed Diffuser	5	5
	Incense Sticks	6	4
	Incense Cones	1	6
	Water-based humidifiers	27	2
	Other (please specify)	0	7
8. Which of the following benefits do you know that comes from using scents and fragrances?	Relieves anxiety	19	3
	Improves sleep	20	2
	Decrease blood pressure	3	6
	Increase focus	14	4
	Odor neutralizer	23	1
	Insect repellent	3	6
	Therapeutic reasons such as anti-depressant / anti-spasmodic, etc.	19	3
	Not aware of these benefits	4	5
	Other (please specify)	0	7
9. How many hours a day are you usually exposed to scents and room fragrances?	1- 3 hours	32	2
	4-8 hours	62	1
	9-12 hours	9	3
	12 hours and up	2	4
10. Which of the following fragrance concept are you often exposed to?	Scents that are refreshing/revitalizing	15	4
	Scents that smell clean	28	1
	Scents that are comforting	16	3
	Scents that help me relax	17	2
	Scents developed with natural ingredients	7	6
	Scents that boost my energy	4	8
	Scents that smell luxurious and expensive	9	5
	Scents that help me	5	7

	concentrate		
	Scents inspired by the seasons	2	9
	Scents inspired by locations	1	10
	Scents inspired by food or drinks	1	10
	Others(please specify)	0	11

Table 4 presents the ample data needed to suffice the exposure to scents and room fragrance. The most used room fragrance for this population are scented candles and room and linen spray, meanwhile the least used product were incense sticks and other products ranked the least. Humidifier, air purifier and room and linen spray ranked highest when asked about the fragrance most exposed to, while insect repellent ranked last. The feeling of being relaxed, enhanced mood and positive energy ranked the highest, while improved concentration ranked the least when asked about the effects felt when exposed to scents and room fragrance. Eco-friendly, natural and organic products scored the highest when asked about which product they are most exposed to. Soy wax candles ranked first, and palm wax candle scored the least when asked about their preferred type of candles. When asked about which fragrance respondents are commonly exposed to, fresh and floral fragrances scored the highest while spice, musky and fruity scents scored least. Results showed that most exposed eco-friendly product in this study are aroma or fragrance oils and water-based humidifiers while incense cones scored the least. Odor neutralizer scored the highest rank when asked about the benefits that comes from using scents and fragrances, meanwhile decreased blood pressure and insect repellent scored the least. Most of the respondents were exposed to scents and room fragrances from 4-8 hours a day, while the least majority answered 12 hours and up. Lastly, the most fragrance concept that scored the highest are scents that smell clean, meanwhile the least ranked fragrance concept are scents inspired by locations or scents inspired by food or drinks.

DISCUSSION

This study investigated on the effects of long-term exposure to scents and room fragrance on well-being with demographics age and gender as moderating variables. Results showed that the mean scale score of BBC well-being scale is 90.76145 (SD 28.26249) out of a maximum score of 120 as seen on Table 3, suggesting high well-being score in this population. Overall, T-test revealed that there is a significant effect in long-term exposure to scents and room fragrance on total well-being and that this is the only significant variable that influences well-being. Meanwhile, age and gender has showed no significance on well-being. T-test however states that independently long-term exposure to scents and room fragrance have no significant relationship on psychological well-being subscale, yet data from table 3 shows that questions belonging to psychological well-being got the highest mean score with emphasis on achievement, growth and being happy with themselves as a person. Since, table 2 states t statistics = 2.882539 and p value 0.047614 the numbers prove that long-term exposure to scents and room fragrance have a significant effect on well-being. Moreover, PERMA model of well-being is a huge basis to understand the scores showed on BBC well-being scale survey. Data with the highest mean score belonged to psychological wellbeing with questions about achievement, growth and being happy with themselves as a person, this supports the statement of Moore (2020) suggesting that PERMA is a primary source of self-care during stressful times and an effective way to elicit positive emotions are through paying attention to

our tactile sensations which included the sense of smell. Scents does play a vital role to practice *positive psychology*, this suggests that scents are solid grounds to improve the feeling of happiness. Questions belonging to the physical health and well-being subscale showed the least mean score, with statements quality of sleep, physical health and being happy to perform daily living activities as seen on table 3, this may be due to the reason that the population chosen is exposed to the fresh and clean fragrance to most, this tells us that olfactory stimulation does not guarantee automatic relaxation or calmness as other scents like coffee, citrus and other odor neutralizers awakens, revitalizes and boosts cognitive mood instead. Some scents keep a person awake like the scent of coffee as proven in a research lead by Madzharov et al. (2018) *highlighting the power of coffee scent and the cognitive boost it provides. Since the study is cross-sectional this is a valid reason which proves why the results suggest high well-being on the population studied yet reveals a variation of effects or health benefits found in the long-term exposure to scents and room fragrance. Another factor seen are the settings of exposure, as workplace could also play a role as a mediator in the effects. Furthermore, Main affect ANOVA tells us that long-term exposure to scents and room fragrance separately affects well-being and Factorial analysis of variance revealed that the interaction of age and gender significantly affects well-being, which further supports the fact that age and gender are moderating variables in this study.*

Finding about exposure to scents suggest that public awareness on the health benefits of scents and room fragrance are still weak, as results showed that the answer with the highest mean score when asked about public awareness on the benefits of using scents are still on its traditional definition as odor neutralizer, to merely provide fragrance despite the growth of the studies stating its effectivity to improve mood, promote sleep, calm the senses, alter cognition and promote well-being. Results are supported by previous research of scientists studying Psycho-neuro-endocrine-immunology (P.N.E.I) focusing on the mind and body connection, establishing the essence of scent inhalation as an integral part that impacts our positive emotions, mental, hormonal, nervous and our immune system. Humidifier, air purifier and room and linen spray ranked highest when asked about the fragrance that respondents are mostly exposed to, this tells us that if we are to incorporate the effectivity of scents for medical use even for consumer retention and scent branding, the three highest products to consider for extending the effects of scents and its usage should include humidifier, air purifier and room and linen spray.

CONCLUSIONS

Backed up by empirical studies the researcher concludes that long-term exposure to scents and room fragrance plays a vital role in our well-being. These results are essential not just for consumer awareness, but also highly recommended for medical and social institutions which may deemed the study most useful.

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