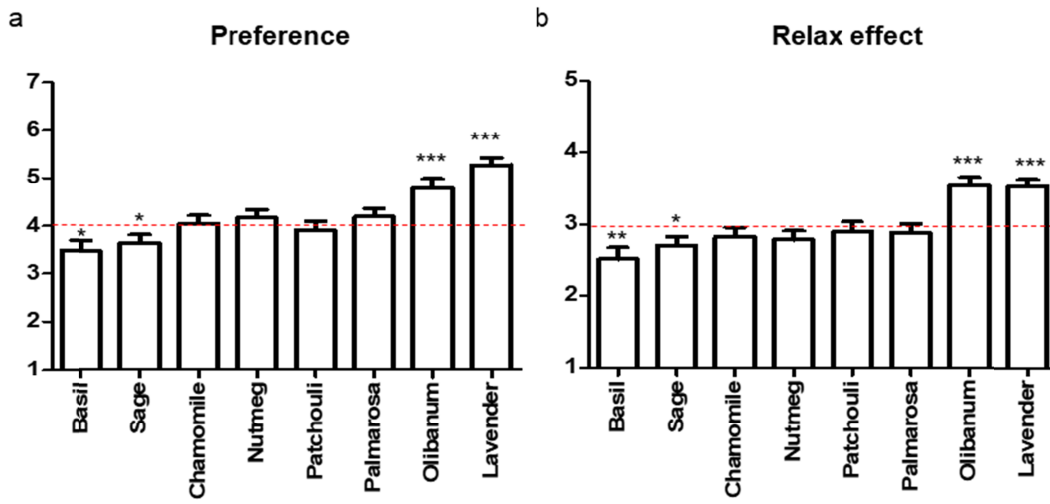


1 **Supporting information captions**



2

3 **S1 Fig. Fragrances were selected, which scored above average in relax effects and preference.** Pre-testing

4 results of fragrance screening in perimenopausal women (n = 46, age: 43–59). ‘Lavender’ and ‘olibanum’ was

5 selected because it scored above average in the ‘relaxed effect’ and ‘preference’ of fragrances. The ‘palmarosa’ was

6 selected as ‘neutral fragrance control’. It scored average in the ‘relaxed effect’ and ‘preference’. Participants rated

7 fragrance preference (The score ranged from 1 to 7) and relaxation effects (The score ranged from 1 to 5) after

8 inhalation of fragrances. Participants answered to “How do you like this fragrance?” for rating fragrance preference

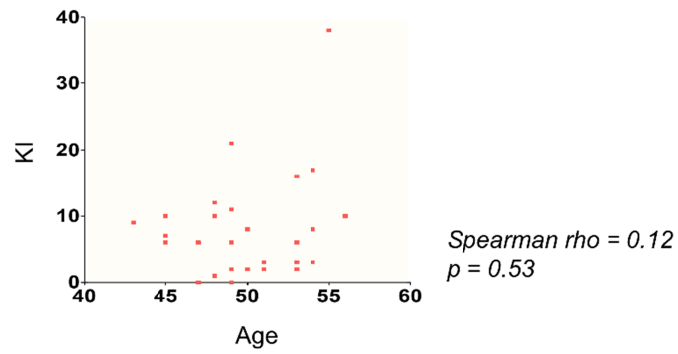
9 and answered to 5 questions for relaxing effect, “after inhalation of fragrance, (1) feel comfortable, (2) feel brighter,

10 (3) feel relieved depressed emotion, (4) feel the negative mood change, (5) feel relieved stress. One sample t-test

11 performed to verify the difference from the middle (Preference middle score 4, two-tail, Relaxed effect middle score

12 3, two-tail) (# P<0.1, \* P < 0.05; \*\* P < 0.01, \*\*\* P<0.001).

13

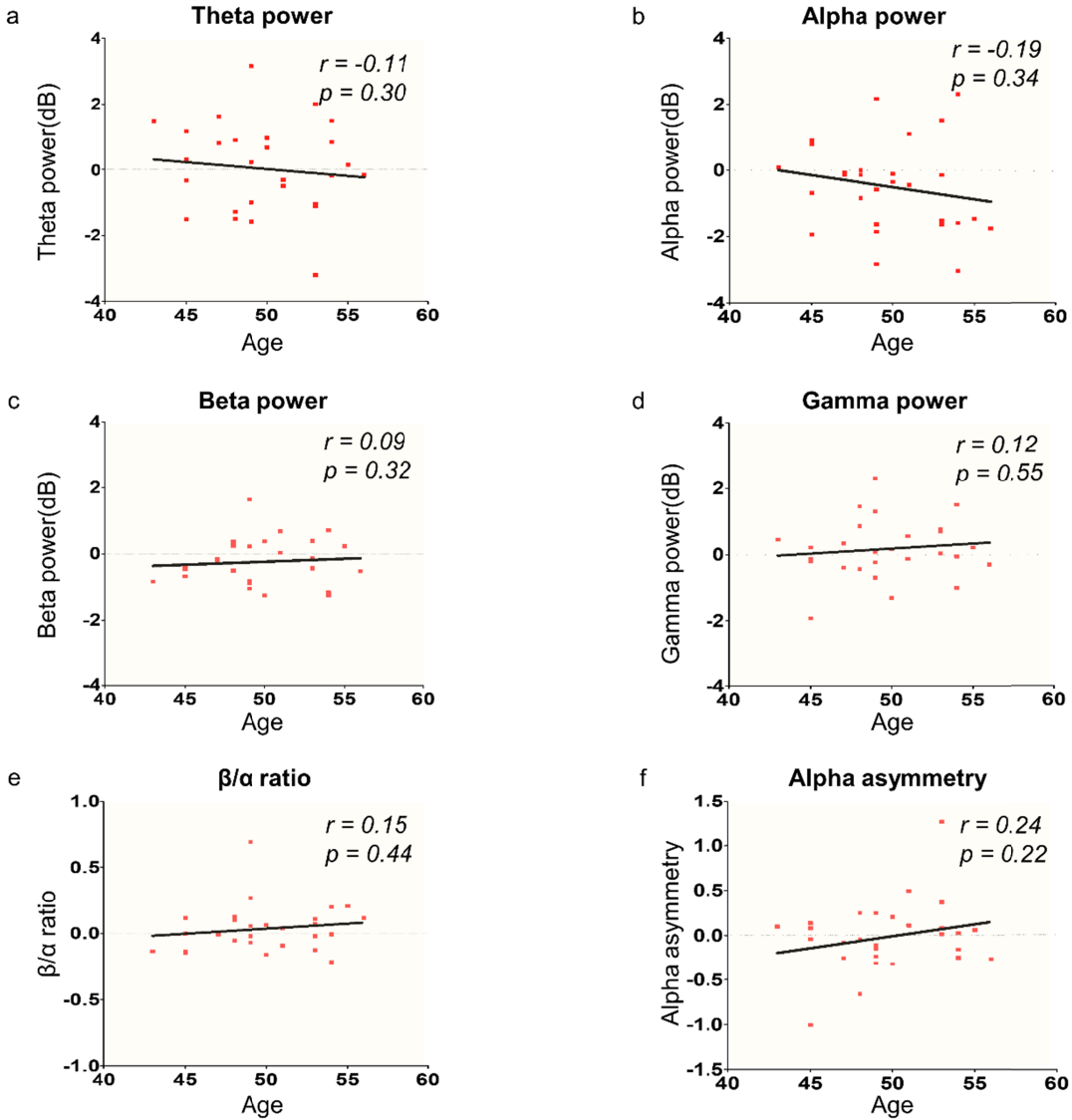


1

2 **S2 Fig. Correlation between participants age and Kupperman index score.** Spearman correlation between age  
3 and KI (Spearman rho = 0.12, p-value = 0.53, two-tailed)

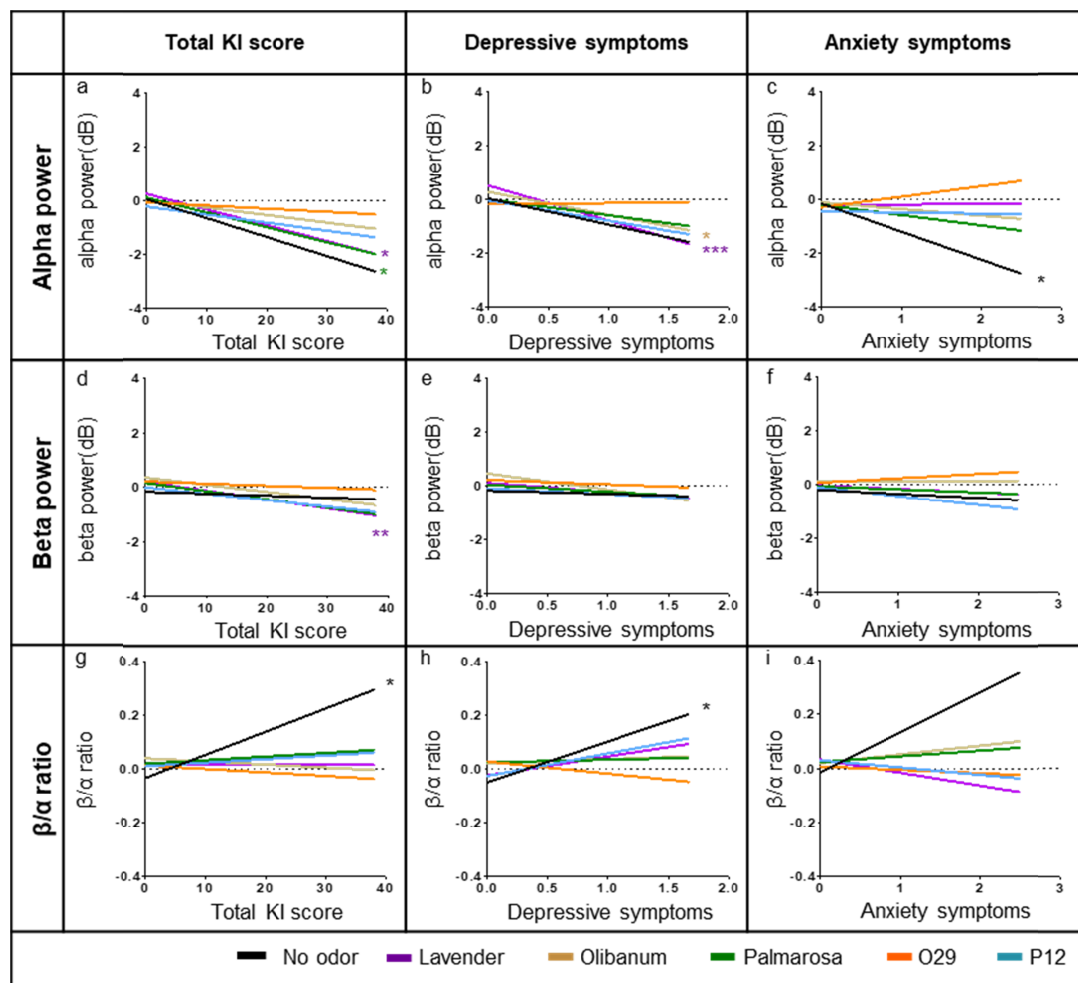
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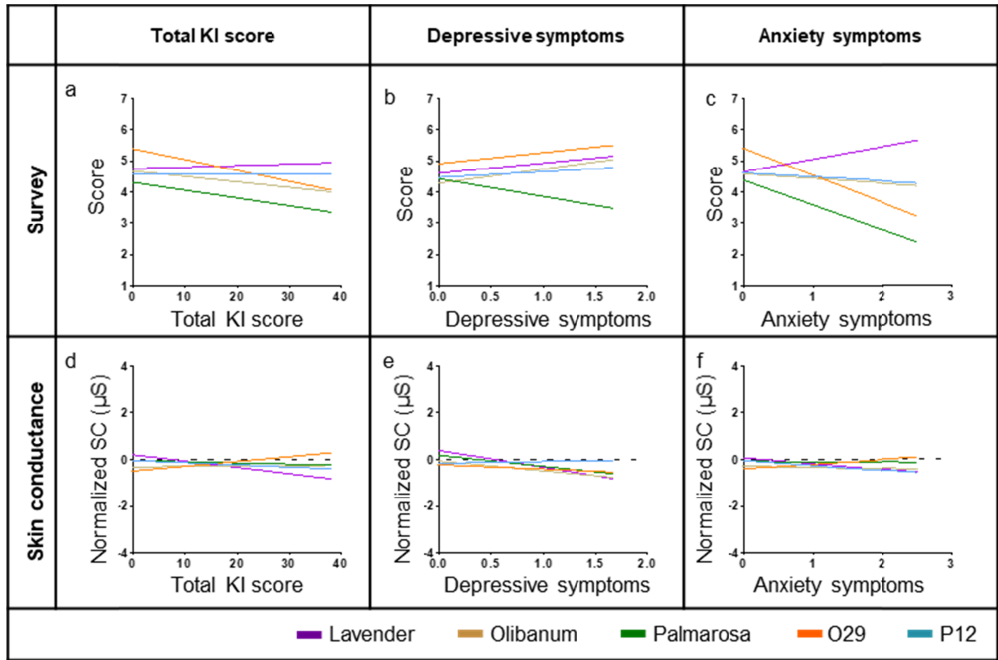
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**S3 Fig. Correlation between participants age with the four EEG frequency band powers,  $\beta/\alpha$  ratio, and alpha asymmetry.** Alpha power and  $\beta/\alpha$  ratio showed a correlation with total KI score after negative affective stimuli in comparison with baseline brain activity. Red dots: individual data points; (a–d) Pearson’s correlation between age and EEG frequency band powers under no-odor conditions. (e) Pearson’s correlation between age and  $\beta/\alpha$  ratio (arousal index). (f) Pearson’s correlation between age and alpha asymmetry (valence index).



1

2 **S4 Fig. Pattern changes of EEG indexes while inhalation fragrances.** Fragrances alter the slope of the linear  
3 regression of (a–c) alpha power, (d–f) beta power, and (g–i)  $\beta/\alpha$  ratio slope vs. total KI score, depressive symptoms,  
4 and anxiety symptoms. Black lines: no-odor condition (solvent). Color lines: odor conditions. Asterisks denote  
5 statistical significance (spearman’s correlation, \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ ).



1

2 **S5 Fig. Pattern changes of survey and skin conductance while inhalation fragrances.** Regression analysis (a–c)

3 survey and (d–f) Skin conductance vs. total KI score, depressive symptoms, and anxiety symptoms. Color lines:

4 odor conditions. No statistically significant among the overall conditions.

5

1 S1 Table. Age, smell ability, Kupperman index score of participants.

P#	Age	T	D	K1	K2	K3	K4	K5	Total KI
P01	50	6	100	0.00	0.50	0.00	0.00	0.00	2
P02	43	8	75	1.33	0.50	0.00	1.00	0.00	9
P03	55	8	100	1.33	2.50	3.00	1.67	1.00	38
P04	54	5	100	0.67	0.50	1.50	1.00	2.00	17
P05	49	7	100	1.67	0.50	1.00	1.00	1.00	21
P06	45	over 4	over 70	1.00	0.50	0.50	0.67	0.00	10
P07	45	7	100	0.67	0.50	0.00	0.33	0.00	6
P08	48	4	100	1.00	0.00	1.00	0.67	0.00	12
P10	47	7	100	0.67	0.00	0.00	1.00	0.00	6
P11	45	7	100	0.00	0.00	0.50	0.67	0.00	6
P12	53	6	100	1.33	0.00	0.00	0.00	1.00	6
P13	50	9	100	0.00	0.50	1.00	0.67	0.00	8
P14	54	over 4	over 70	0.00	0.00	0.00	0.33	2.00	3
P15	56	10	100	0.00	0.50	1.00	0.33	1.00	10
P16	54	10	100	0.33	1.00	0.50	0.33	0.00	8
P17	51	4	100	0.00	0.00	0.00	0.00	2.00	2
P18	47	5	67	0.00	0.00	0.00	0.00	0.00	0
P19	53	11	100	0.67	0.00	1.50	0.33	2.00	16
P20	53	6	100	0.33	0.00	0.00	0.00	0.00	2
P22	49	8	100	1.67	1.00	0.00	1.00	0.00	11
P23	51	4	100	0.67	0.00	0.00	0.00	0.00	3
P24	49	6	100	0.00	0.00	0.00	0.00	0.00	0
P25	53	9	100	0.00	0.00	0.00	0.67	1.00	3
P26	49	9	75	0.00	0.00	1.00	0.00	2.00	6

P27	49	over 4	over 70	0.00	0.00	0.00	0.67	0.00	2
P28	48	4	100	0.00	0.00	0.00	0.33	0.00	1
P29	48	7	100	1.00	0.50	0.50	1.00	0.00	10
P30	45	8	100	1.33	0.50	0.00	0.33	0.00	7

1

2 Sniffin' sticks test score and Kupperman index score of participants. T and D are results from Sniffin' stick test (T:

3 Threshold, D: Discrimination (%)). K1, K2, K3, K4, K5, and total KI were from the Kupperman index (K1:

4 Depression, K2: Anxiety, K3: Vasomotor, K4: Somatic, K5: Virginal dryness). P06, P14, and P27 only have part of

5 the Sniffin' sticks test data, but they achieved a satisfactory score above the normal range.

6

1 **S2 Table. Valence and arousal scores of the negative affective pictures.**

	Set 1		Set 2		Set 2		Set 4		Set 5		Set 6	
	V	A	V	A	V	A	V	A	V	A	V	A
1	4.55	6.84	2.69	6.33	3.30	6.64	2.41	6.82	4.53	6.24	4.31	6.00
2	4.25	5.89	3.73	6.96	4.13	5.88	2.81	6.15	2.35	6.77	4.33	6.04
3	3.80	6.60	3.10	5.67	3.63	6.07	3.11	6.96	2.90	6.35	2.81	6.89
4	3.46	6.06	4.00	6.14	3.97	6.41	4.42	5.96	4.24	5.49	2.79	6.90
5	4.28	5.03	2.93	6.67	3.28	6.28	3.61	5.97	3.88	5.88	4.08	5.07
6	4.22	5.93	4.14	5.69	4.44	5.61	4.07	5.12	3.40	6.33	4.08	5.72
7	2.88	6.19	2.86	6.86	3.49	6.36	3.64	6.29	3.14	6.50	3.21	6.39
8	2.57	6.66	3.96	6.12	3.37	5.84	3.28	5.79	2.66	6.66	4.48	5.12
9	3.52	5.94	3.78	5.37	3.83	5.52	3.54	5.71	2.85	6.88	3.21	7.17
10	3.48	5.56	3.87	5.97	2.78	6.07	4.33	4.89	3.71	6.03	2.63	6.30
11	3.62	5.74	4.50	5.30	4.19	6.26	3.34	6.38	3.96	5.60	3.21	6.43
12	4.14	5.07	3.47	5.93	3.04	6.46	3.16	6.06	3.48	5.97	3.32	6.00
13	3.83	5.48	3.19	5.97	3.08	6.31	3.35	6.32	3.39	5.48	4.19	5.78
14	4.56	4.69	3.65	5.70	3.60	5.28	3.55	5.55	3.32	6.59	3.75	5.96
15	2.61	7.04	4.19	5.35	3.77	5.65	4.38	5.19	3.87	5.88	3.80	5.38



16	3.45	7.03	2.47	6.97	3.03	6.55	2.52	7.12	3.68	7.08	3.17	6.69
17	3.07	5.83	2.74	7.37	4.04	6.81	4.41	6.22	3.33	6.30	2.59	6.28
18	3.38	6.38	4.03	6.70	4.13	5.88	4.00	6.25	3.55	5.79	3.07	5.86
19	2.50	6.16	3.53	6.78	3.39	5.75	4.11	5.44	2.81	6.78	3.61	5.22
20	3.38	5.81	3.88	5.96	3.19	6.07	3.15	6.35	3.88	5.77	4.22	6.54
<b>Average</b>	<b>3.58</b>	<b>6.00</b>	<b>3.54</b>	<b>6.19</b>	<b>3.58</b>	<b>6.09</b>	<b>3.56</b>	<b>6.03</b>	<b>3.45</b>	<b>6.22</b>	<b>3.54</b>	<b>6.09</b>
<b>T-test</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>	<b>***</b>

1 These data selected from the Nencki Affective Picture System database[33]. V is valence, and A is arousal response  
2 in this table. Significantly low valence and high arousal pictures were selected based on the women's rating in this  
3 database. All scales range from 1 to 9 by subjective-rating (rating 1 means negative valence and low arousal).  
4 Overall six sets have no differences and significantly different from the middle (i.e., score 5). P values were  
5 calculated by one-sample t-test (two-tailed, \*\*\* P < 0.001).

6

1 S3 Table. Regression analysis results of outlier rejected data

	<b>r2</b>	<b>t value</b>	<b>p value</b>
<b>Theta power</b>	0.029	-0.86	0.40
<b>Alpha power</b>	0.21	-2.58	0.016
<b>Beta power</b>	0.082	-1.49	0.15
<b>Gamma power</b>	0.00035	0.086	0.93
<b><math>\beta/\alpha</math> ratio</b>	0.15	2.065	0.050
<b>Alpha asymmetry</b>	0.021	-0.71	0.49

2

1 **S4 Table. Regression analysis results from the details of Figure 3.**

<b>Alpha power</b>									
	KI			Depressive			Anxiety		
	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>
L	0.00	0.31	0.76	0.02	-0.66	0.51	0.13	2.01	<b>0.055</b>
O	0.05	1.16	0.26	0.00	0.22	0.83	0.08	1.49	0.15
P	0.01	0.45	0.65	0.03	0.84	0.41	0.07	1.36	0.19
O29	0.08	1.49	0.15	0.13	1.96	0.06	0.21	2.63	<b>0.014</b>
P12	0.05	1.23	0.23	0.01	0.47	0.64	0.15	2.15	<b>0.041</b>
<b>Beta power</b>									
	KI			Depressive			Anxiety		
	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>
L	0.06	-1.29	0.21	0.03	-0.83	0.42	0.00	0.07	0.94
O	0.01	-0.49	0.63	0.03	-0.9	0.37	0.00	0.27	0.79
P	0.05	-1.18	0.25	0.01	-0.51	0.61	0.00	0.13	0.9
O29	0.00	-0.03	0.98	0.00	-0.17	0.87	0.05	1.19	0.25
P12	0.02	-0.71	0.48	0.00	-0.29	0.77	0.01	-0.51	0.62
<b>β/α ratio</b>									
	KI			Depressive			Anxiety		
	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>	<b>r<sup>2</sup></b>	<b>t value</b>	<b>p value</b>
L	0.08	-1.54	0.13	0.04	-1.07	0.29	0.2	-2.53	<b>0.018</b>
O	0.11	-1.77	<b>0.089</b>	0.12	-1.87	<b>0.073</b>	0.07	-1.38	0.18
P	0.06	-1.29	0.21	0.13	-1.95	<b>0.062</b>	0.08	-1.53	0.14
O29	0.13	-1.97	<b>0.06</b>	0.29	-3.22	<b>0.0034</b>	0.15	-2.17	<b>0.039</b>
P12	0.08	-1.5	0.14	0.04	-1.02	0.32	0.21	-2.62	<b>0.015</b>

2 Regression analysis results of figure 3, which included r<sup>2</sup>, t value, p-value. The bold character represents significant  
 3 and marginally significant p values.