

10/04/2026 18:36:10	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 18:44:15	Ya	Ya	Laki - Laki	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 18:49:19	Ya	Ya	Laki - Laki	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 18:54:24	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 19:31:30	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 19:41:39	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
10/04/2026 19:55:41	Ya	Ya	Laki - Laki	30 - 35 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 20:21:44	Ya	Ya	Perempuan	24 - 29 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 20:33:47	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 20:43:49	Ya	Ya	Laki - Laki	24 - 29 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000

10/04/2026 20:58:52	Ya	Ya	Laki - Laki	41 - 45 Tahun	Pascasarjana (S2/S3)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 21:05:54	Ya	Ya	Perempuan	24 - 29 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 21:17:59	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
10/04/2026 21:22:07	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 21:44:09	Ya	Ya	Laki - Laki	30 - 35 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 21:54:12	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 21:56:14	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 21:59:17	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 22:04:20	Ya	Ya	Laki - Laki	36 - 40 Tahun	Diploma (D1- D3)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 22:10:28	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000

10/04/2026 22:14:34	Ya	Ya	Perempuan	30 - 35 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 22:17:40	Ya	Ya	Laki - Laki	36 - 40 Tahun	Diploma (D1- D3)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 22:19:49	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
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10/04/2026 22:25:17	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
10/04/2026 22:37:21	Ya	Ya	Laki - Laki	24 - 29 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 22:38:30	Ya	Ya	Laki - Laki	24 - 29 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 22:39:47	Ya	Ya	Laki - Laki	24 - 29 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
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10/04/2026 22:44:03	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000

10/04/2026 22:49:07	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 22:50:18	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 22:56:26	Ya	Ya	Perempuan	30 - 35 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
10/04/2026 23:16:35	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
10/04/2026 23:19:38	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 23:26:41	Ya	Ya	Perempuan	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
10/04/2026 23:27:47	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
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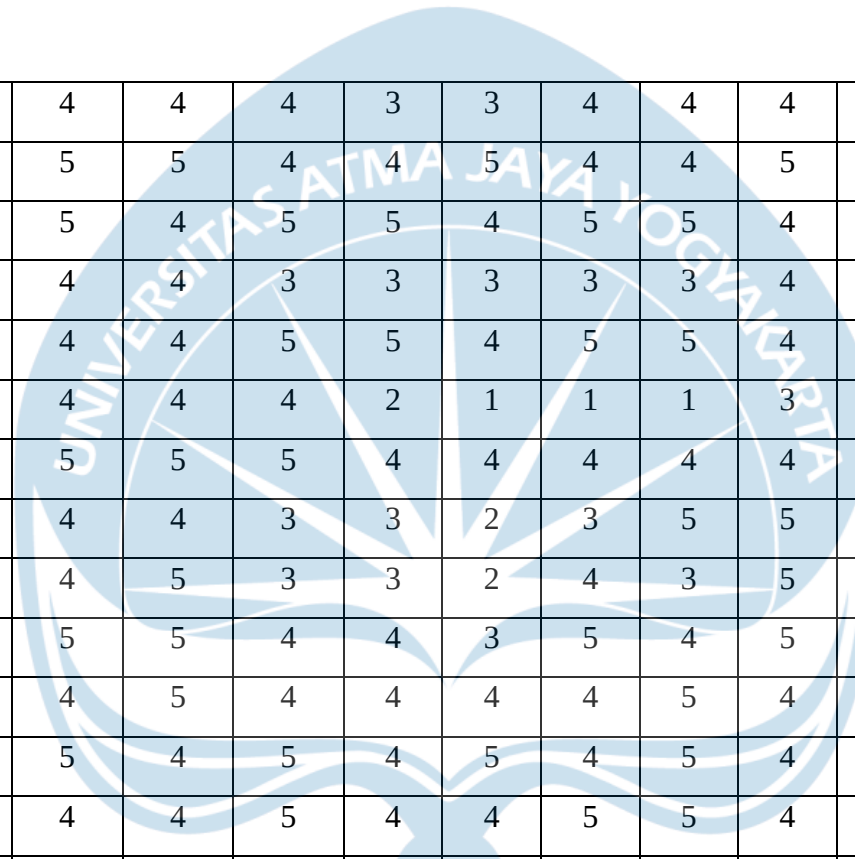
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11/04/2026 3:32:13	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
11/04/2026 4:22:20	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
11/04/2026 5:43:22	Ya	Ya	Laki - Laki	24 - 29 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
11/04/2026 6:07:31	Ya	Ya	Perempuan	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
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11/04/2026 7:19:46	Ya	Ya	Laki - Laki	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 7:37:49	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
11/04/2026 9:11:52	Ya	Ya	Perempuan	30 - 35 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000

11/04/2026 10:18:56	Ya	Ya	Laki - Laki	24 - 29 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
11/04/2026 10:24:05	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Pegawai Negeri Sipil	Rp. 3.000.001 - Rp. 5.000.000
11/04/2026 10:52:08	Ya	Ya	Laki - Laki	41 - 45 Tahun	Pascasarjana (S2/S3)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 11:56:25	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
11/04/2026 12:18:40	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 12:58:43	Ya	Ya	Laki - Laki	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 13:08:55	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
11/04/2026 13:19:03	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
11/04/2026 15:09:06	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
11/04/2026 15:15:09	Ya	Ya	Laki - Laki	30 - 35 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000

11/04/2026 15:19:15	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
11/04/2026 15:25:27	Ya	Ya	Laki - Laki	41 - 45 Tahun	Pascasarjana (S2/S3)	Pegawai Negeri Sipil	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 15:39:30	Ya	Ya	Laki - Laki	30 - 35 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
11/04/2026 15:55:33	Ya	Ya	Perempuan	24 - 29 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
11/04/2026 16:19:46	Ya	Ya	Perempuan	24 - 29 Tahun	Sarjana (S1)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
11/04/2026 16:50:42	Ya	Ya	Laki - Laki	36 - 40 Tahun	Sarjana (S1)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 20:33:40	Ya	Ya	Perempuan	24 - 29 Tahun	Pascasarjana (S2/S3)	Wirausaha / Pengusaha	Rp. 5.000.001 - Rp. 10.000.000
11/04/2026 23:39:27	Ya	Ya	Laki - Laki	18 - 23 Tahun	Sarjana (S1)	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000
12/04/2026 19:42:25	Ya	Ya	Perempuan	24 - 29 Tahun	Diploma (D1- D3)	Karyawan Swasta	Rp. 3.000.001 - Rp. 5.000.000
12/04/2026 22:11:01	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000

13/04/2026 13:32:46	Ya	Tidak					
13/04/2026 21:49:10	Ya	Ya	Perempuan	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	< Rp. 1.000.000
13/04/2026 23:26:25	Ya	Tidak					
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14/04/2026 20:04:20	Tidak						
14/04/2026 20:05:18	Ya	Tidak					
14/04/2026 20:55:26	Tidak						
15/04/2026 13:25:49	Tidak						
16/04/2026 0:21:00	Ya	Ya	Laki - Laki	18 - 23 Tahun	Sarjana (S1)	Pelajar / Mahasiswa	< Rp. 1.000.000
17/04/2026 16:05:13	Ya	Ya	Laki - Laki	18 - 23 Tahun	SMA / SMK	Pelajar / Mahasiswa	Rp 1.000.001 - Rp. 3.000.000

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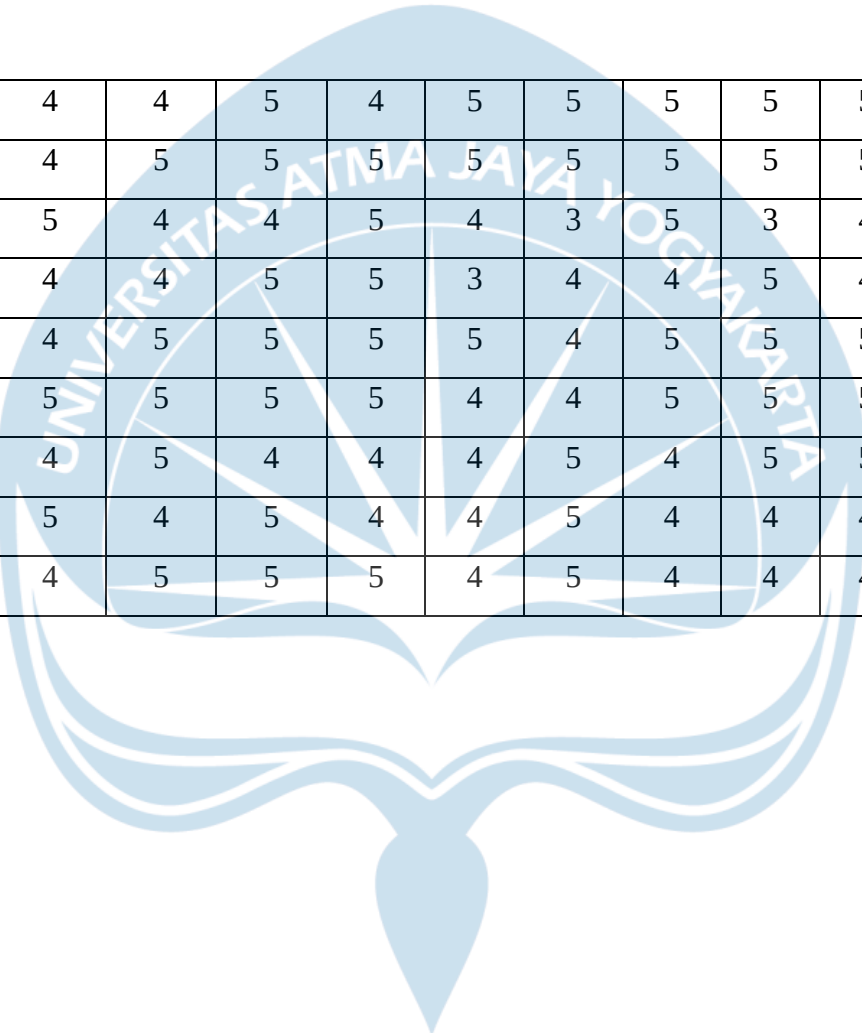
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Lampiran 4

Hasil Olahan Data Statistik

	No.	Missing	Mean	Median	Min	Max	Standard Deviation	Excess Kurtosis	Skewness
PA1	1	0	4.028	4.000	1.000	5.000	0.796	0.557	-0.657
PA2	2	0	4.124	4.000	2.000	5.000	0.812	-0.657	-0.485
MP1	3	0	4.056	4.000	1.000	5.000	0.826	1.380	-0.950
MP2	4	0	4.096	4.000	1.000	5.000	0.777	1.094	-0.821
KEP1	5	0	4.157	4.000	2.000	5.000	0.685	-0.460	-0.319
KEP2	6	0	4.202	4.000	2.000	5.000	0.657	0.318	-0.481
KEP3	7	0	4.275	4.000	2.000	5.000	0.660	-0.188	-0.488
RM1	8	0	3.871	4.000	1.000	5.000	0.757	0.287	-0.327
RM2	9	0	3.927	4.000	1.000	5.000	0.855	0.073	-0.566
RM3	10	0	4.157	4.000	1.000	5.000	0.820	1.782	-1.102
RM4	11	0	4.298	4.000	1.000	5.000	0.747	3.071	-1.284
RM5	12	0	4.073	4.000	1.000	5.000	0.750	0.734	-0.605
NP1	13	0	4.118	4.000	1.000	5.000	0.713	1.501	-0.739
NP2	14	0	4.219	4.000	2.000	5.000	0.713	0.555	-0.725
NP3	15	0	4.073	4.000	2.000	5.000	0.687	-0.520	-0.201
NP4	16	0	4.213	4.000	1.000	5.000	0.742	1.636	-0.951

Lampiran 5

Hasil Olahan Data SEM-PLS

Loading Factor / Outer Loading

	Kepuasan	Memori Penciuman	Niat Pembelian	Preferensi Aroma	Resonansi Merek
KEP1	0.820				
KEP2	0.823				
KEP3	0.758				
MP1		0.886			
MP2		0.886			
NP1			0.744		
NP2			0.737		
NP3			0.758		
NP4			0.817		
PA1				0.904	
PA2				0.891	
RM1					0.849
RM2					0.810
RM3					0.827
RM4					0.786
RM5					0.740

Construct Reliability dan Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Kepuasan	0.720	0.718	0.843	0.641
Memori Penciuman	0.726	0.726	0.879	0.785
Niat Pembelian	0.765	0.768	0.849	0.585
Preferensi Aroma	0.759	0.761	0.892	0.806
Resonansi Merek	0.862	0.864	0.901	0.645

Cross Loading

	Kepuasan	Memori Penciuman	Niat Pembelian	Preferensi Aroma	Resonansi Merek
KEP1	0.820	0.235	0.285	0.411	0.345
KEP2	0.823	0.274	0.364	0.325	0.370
KEP3	0.758	0.316	0.336	0.222	0.473
MP1	0.305	0.886	0.301	0.221	0.405
MP2	0.306	0.886	0.285	0.153	0.459
NP1	0.246	0.236	0.744	0.225	0.322
NP2	0.241	0.263	0.737	0.246	0.447
NP3	0.424	0.241	0.758	0.380	0.426
NP4	0.331	0.267	0.817	0.329	0.408
PA1	0.367	0.233	0.379	0.904	0.294
PA2	0.346	0.144	0.320	0.891	0.239
RM1	0.462	0.420	0.420	0.291	0.849
RM2	0.313	0.356	0.415	0.120	0.810
RM3	0.394	0.377	0.439	0.103	0.827
RM4	0.350	0.392	0.442	0.272	0.786
RM5	0.457	0.403	0.416	0.387	0.740

Fornell-Larcker Criterion

	Kepuasan	Memori Penciuman	Niat Pembelian	Preferensi Aroma	Resonansi Merek
Kepuasan	0.801				
Memori Penciuman	0.345	0.886			
Niat Pembelian	0.410	0.331	0.765		
Preferensi Aroma	0.398	0.212	0.390	0.898	
Resonansi Merek	0.497	0.488	0.531	0.298	0.803

Adjusted R-Square (R^2)

	R Square	R Square Adjusted
Kepuasan	0.229	0.221
Niat Pembelian	0.282	0.278
Resonansi Merek	0.247	0.243

F-Square (f^2)

	Kepuasan	Memori Penciuman	Niat Pembelian	Preferensi Aroma	Resonansi Merek
Kepuasan					0.329
Memori Penciuman	0.092				
Niat Pembelian					
Preferensi Aroma	0.143				
Resonansi Merek			0.394		

Q-Square (Q²)

	SSO	SSE	Q ² (=1-SSE/SSO)
Kepuasan	534.000	460.213	0.138
Memori Penciuman	356.000	356.000	
Niat Pembelian	712.000	604.903	0.150
Preferensi Aroma	356.000	356.000	
Resonansi Merek	890.000	755.913	0.151

Path Coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
Kepuasan -> Resonansi Merek	0.497	0.489	0.073	6.810	0.000
Memori Penciuman -> Kepuasan	0.273	0.269	0.078	3.517	0.000
Preferensi Aroma -> Kepuasan	0.340	0.335	0.078	4.373	0.000
Resonansi Merek -> Niat Pembelian	0.531	0.527	0.086	6.190	0.000

Lampiran 6

Hasil Turnitin

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The role of scent congruence with luxury brand image in consumers' emotions, memory, and brand resonance: A mixed-methods approach using EEG and quantitative analyses

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ABSTRACT

The extension of luxury retailers into the fragrance segment is an emerging trend, particularly as a compelling strategy to target young consumers. In line with this shift in the luxury market, through the lens of cognitive balance theory and the Proust effect, this study explores how the congruence of scents with the luxury brand image affects consumers' positive emotions (Study 1), memory, and approach responses (Study 2). By leveraging electroencephalography (EEG) analysis, Study 1 reveals contradictory results regarding emotional reactions: scent incongruence with the luxury brand image increases joy, while scent congruence elicits liking. Meanwhile, Study 2's findings indicate the importance of brand cues in cognitive reactions. The findings empirically demonstrate that scent congruence with the luxury brand image has a greater effect on consumer preference and memory, thereby leading to satisfaction, brand resonance, and purchase intention. The paradoxical findings from the EEG and quantitative analyses highlight that immediate brain responses and cognitive evaluations differ in consumer decision-making regarding luxury fragrances. This research enhances knowledge of luxury retailing concerning sensory experience and brand extension, providing practical insights for luxury retailers as they foray into the fragrance category as an effective strategy to strengthen consumer-brand relationships and drive potential luxury product purchases.

1. Introduction

The global luxury market reached a value of \$1.6 trillion in 2024, with beauty products, particularly fragrances, continuing to thrive as consumers are drawn to "small indulgences" (Bain & Company, 2024). Fragrance has emerged as a standout segment in beauty sales, particularly appealing to Generation Z (Sandler, 2025). The fragrance segment in the luxury market is part of an emerging brand extension strategy that strengthens consumer relationships with the parent brand and elevates brand equity (Ahn et al., 2018; Yoo, 2024). Accordingly, luxury brands such as Hermes, Louis Vuitton, and Celine are increasingly launching fragrance products, opening avenues for affordability alongside uniqueness (Voyer, 2023). Furthermore, olfactory congruence with the brand image, as a scent marketing strategy, can enhance consumer responses such as pleasure and spending (Errajaa et al., 2020). As the luxury market increasingly extends into perfumes, understanding how scents shape consumer behavior is crucial. The Proust effect illustrates how particular scents can trigger emotional memories of past events (Van Campen, 2014). Among these multifaceted senses, olfactory stimuli are particularly impactful in evoking brand-related memories and emotional responses. Prior research highlights the role of olfactory congruence with the brand image in fostering consumer reactions and behavioral intentions (Errajaa et al., 2020; Herrmann et al., 2013; Lin et al., 2018). As perfumes represent a core segment of luxury brands, scent-brand alignment is vital for enhancing positive responses. Grounded in the theory of cognitive balance, consumers may prefer a perfume that aligns with the brand image, as they favor balanced situations, which is consistent with

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their cognitions and expectations (Heider, 1958; Park et al., 2024).

Nevertheless, the literature on the effects of luxury brands' perfumes on consumers' memory and positive emotions is lacking. Moreover, little is known about how a particular scent affects consumers' psychological states and their emotional connection to the luxury brand, thereby increasing purchase intentions for luxury products. Luxury fragrances significantly shape personal identity through the lens of consumer psychology and are increasingly appealing to younger consumers due to their affordability and uniqueness, boosting niche marketing strategies (Voyer, 2023). Accordingly, understanding how luxury fragrances impact consumer decision-making and brand loyalty will help luxury brands develop more effective fragrance strategies and better target the young consumer segment.

To bridge these gaps, we propose the following research questions: Q1. *How does scent congruence with the luxury brand image affect consumers' positive emotions?* and Q2. *How does scent congruence with the luxury brand image affect consumers' memory and favorable reactions?* Accordingly, Study 1 explores differences in positive emotions based on scent congruence (vs. incongruence) with the luxury brand image using the electroencephalography (EEG) method, which accurately recognizes emotions through biological brain signals (Zhao and Wang, 2021). Study 2 empirically examines the effect of perfume scent congruence with the luxury brand image on memory and preference, as well as their relationships with satisfaction, brand resonance, and purchase intention for luxury products.

This study extends interdisciplinary research on luxury retailing by employing a mixed-methods approach that combines EEG and quantitative analyses. Prior scent studies, primarily survey-based, have shown that olfactory congruence with the brand image enhances positive emotions, memory, and approach responses (Errajaa et al., 2018, 2020; Green et al., 2023; Spangenberg et al., 2006). By combining neural and self-reported data, this study provides new insights into how consumers' brain activity and cognitive evaluations respond to scents aligned with the luxury brand image. We further advance theoretical understanding of cognitive balance theory and the Proust effect by illustrating how these two theoretical frameworks can be integrated to explain consumers' affective-cognitive responses to scent-brand congruence. As consumers experience emotional reactions and cognitive judgments simultaneously, this study offers a novel perspective on how these processes interact. Furthermore, this research contributes to the luxury retailing literature by demonstrating that congruent scents foster consumer memory and emotional connections to a brand, ultimately enhancing purchase intention. Thus, this theoretical contribution advances our understanding of consumer decision-making by demonstrating that a brand cue can shape cognitive responses and behavioral intentions for luxury scents, with consumers favoring scents from high-reputation brands (Morrin and Ratneshwar, 2003).

Additionally, this research provides notable implications for luxury marketers to establish effective strategies for developing fragrances that enhance positive consumer reactions and relationships, as well as increase brand loyalty and sales. As luxury brands launch new fragrance categories and personalization services, understanding how congruent scents with the luxury brand image impact consumer decision-making helps enhance fragrance development that aligns with brand identity and supports a successful brand extension strategy. Consequently, luxury brands can develop unique fragrances that resonate with consumer brand experiences and attachments, revitalizing luxury retail sales.

2. Theoretical background and hypotheses development

2.1. Cognitive balance theory

The cognitive balance theory posits that individuals typically strive to maintain internal harmony and consistency in their attitudes, values, and behaviors (Heider, 1958). People generally prefer balanced over unbalanced situations and seek to achieve consistency among their

cognitions (Errajaa et al., 2020; Spangenberg et al., 2006). Cognitive imbalance leads to dissatisfaction (Heider, 1958) and encourages individuals to avoid tension or resolve their psychological state of imbalance by changing their beliefs, attitudes, and behaviors to restore balance (Park et al., 2024). However, cognitive balance is achieved when information aligns with customers' cognition and expectations, resulting in a consistent psychological state (Heider, 1958).

According to scent research, strong olfactory congruence with the brand image creates a balanced experience that can evoke positive emotions, nostalgic memories, and approach responses such as satisfaction, purchase intention, and revisits (Errajaa et al., 2018, 2020; Green et al., 2023; Spangenberg et al., 2006). Conversely, weak olfactory congruence with the brand image is perceived unfavorably, creating dissonant or unpleasant avoidance reactions, including the desire to leave the store, lack of intention to revisit, and unwillingness to spend money (Errajaa et al., 2020; Spangenberg et al., 2006).

The role of scent-brand congruence in shaping consumer emotions, memories, and approach responses remains unexplored, although luxury brands such as Louis Vuitton, Gucci, and Bottega Veneta have expanded into fragrance lines in response to the growing popularity of high-end niche scents as affordable luxury (Gloria, 2025). Olfactory cues influence consumers' cognitive and affective responses, shaping their attitudes, perceptions, memories, and behaviors (Rimkute et al., 2016). Accordingly, examining how scent congruence with brand image influences the consumer decision-making process through positive emotions, memories, and approach responses—is critical for developing effective marketing strategies for luxury brands and their fragrance lines. Therefore, this study examines whether congruent (vs. incongruent) scents with the luxury brand image can be assessed as a balanced situation that elicits approach reactions, such as consumer preference and memory.

2.2. Proust effect and the role of scent congruence with the luxury brand image

The Proust effect, or Proustian effect, was mooted by French writer Marcel Proust (Errajaa et al., 2020; Green et al., 2023). It refers to involuntary memory triggered by the senses, particularly smell (Green et al., 2023). Olfaction is considered a primary human sense that connects to emotions and memories (De Luca and Botelho, 2020; Lin et al., 2018). This effect denotes that individuals often recall emotional memories associated with past events when triggered by a particular scent (Van Campen, 2014). Namely, memory for specific information can be enhanced when the same scent is present during both the encoding and retrieval processes (Rimkute et al., 2016). Indeed, scent can evoke an individual's nostalgic memories that elicit positive emotions (Green et al., 2023). Fragrances prompt more emotional and vivid memories compared with other types of memory cues (Errajaa et al., 2020).

The Proust effect, wherein a scent evokes memories, can be understood through the lens of cognitive balance theory. Exposure to a familiar brand scent can result in a balanced state aligned with the brand image, evoking positive emotions, favorable cognitive evaluations, and nostalgic memories that may ultimately lead to approach responses, such as satisfaction and behavioral intentions. Thus, among the various senses, scent has the greatest impact on marketing practices and consumer behavior (Lin et al., 2018). Specifically, scent plays a crucial role in enhancing customer satisfaction, evoking positive emotions, brand memory, brand evaluation, and behavioral intention (Errajaa et al., 2020, 2021; Herrmann et al., 2013; Morrin and Ratneshwar, 2003). However, consumers' unconscious emotional reactions can sometimes conflict with their conscious cognitive judgments (Loewenstein et al., 2001). By integrating the Proust effect with cognitive balance theory, this study explores how a previously encountered luxury brand scent elicits positive emotions, memory recall, and favorable evaluations.

Given the importance of understanding scent-brand congruence, we

designed the following studies to provide insights that guide strategic fragrance expansion. Study 1 explores how congruent (vs. incongruent) scents with the luxury brand image influence consumers' positive emotions as affective responses. Study 2 extends this by examining the mechanism underlying the effect of congruent (vs. incongruent) scents on approach responses. Scent congruence shapes cognitive appraisal and memory, leading to approach responses. Specifically, scent preference (i.e., joy and liking) and scent familiarity are key factors representing consumers' cognitive appraisal and memory (Errajaa et al., 2020, 2021; Herrmann et al., 2013; Morrin and Ratneshwar, 2003). In particular, scent congruence amplifies approach responses, such as positive emotions, satisfaction, scent pleasantness, brand recall, attitudes toward the brand, and purchase intention (De Luca and Botelho, 2020; Errajaa et al., 2020, 2021; Morrin and Ratneshwar, 2003). However, Compevale et al. (2023) suggest that scent congruence does not always increase purchase likelihood. These mixed findings highlight the need to comprehensively examine how scent congruence with brand image influences consumer decision-making.

Consequently, the impact of congruent (vs. incongruent) scents with the luxury brand image on consumers' affective, cognitive, and behavioral responses was investigated. In short, this study posits that congruent (vs. incongruent) scents with the luxury brand image evoke consumers' affective reactions (positive emotions) and cognitive reactions (scent preference and memory) that lead to satisfaction. Therefore, the following hypotheses are proposed:

- H1. Higher scent congruence (vs. incongruence) with the luxury brand image leads to higher positive emotions.
- H2. Higher scent congruence (vs. incongruence) with the luxury brand image leads to a higher evaluation of scent preference.
- H3. Higher scent congruence (vs. incongruence) with the luxury brand image increases the likelihood of consumers remembering the scent.
- H4. Consumer scent preference positively influences satisfaction.
- H5. Consumer scent memory positively influences satisfaction.

2.3. Brand resonance

Brand resonance refers to the nature of the consumer-brand relationship, specifically the degree to which an individual connects with a brand and feels 'in sync' with it (Jang et al., 2021). Brand resonance denotes a customer's level of engagement with and attachment to a brand, reflecting consistent and harmonious interactions aligned with the consumer's values and goals (Keller, 2012). It represents the degree to which an individual has psychological and emotional connections with a brand (Keller, 2012; Sharma et al., 2024). It is the highest level of the consumer-based brand equity model pyramid (Sharma et al., 2024), encompassing brand attachment, brand engagement, and brand judgment (Husain et al., 2022).

Consumers with high brand loyalty are likely to experience brand resonance (Keller, 2012; Sharma et al., 2024). Moreover, luxury consumers tend to develop high resonance with luxury brands due to personal and hedonistic connections with the brands (Teah et al., 2023). Millennial consumers, born between 1980 and 2000, cultivate luxury brand resonance through luxury brand salience, which refers to the brand's prominence in consumers' minds (Kang et al., 2022; Sharma et al., 2024). Brand resonance is also shaped by consumer satisfaction and enhances purchase intention and luxury consumption (Husain et al., 2022). While previous literature has demonstrated a direct effect of congruent scents with the brand image on consumers' approach responses (Errajaa et al., 2018, 2020), this study uniquely proposes a sequential decision-making process that includes satisfaction, brand resonance, and behavioral intentions (i.e., purchase intention). Therefore, we propose the following hypotheses:

- H6. Satisfaction positively influences brand resonance.

- H7. Brand resonance positively influences purchase intention for luxury products.

3. Study 1 – EEG analysis

3.1. Overview

This study employed a concurrent mixed-methods approach, collecting EEG and quantitative data simultaneously. This research design addresses the limitations of using either method independently, thus providing a holistic perspective on the findings from immediate brain reactions and perception-based responses (Venkatesh et al., 2013).

Study 1 leverages EEG analysis to determine how scent congruence (vs. incongruence) with the luxury brand image affects consumers' positive emotions, testing H1. The application of EEG facilitated the integration of neuroscience with psychology and consumer behavior. The EEG method is a precise and effective approach for identifying immediate emotions through brain signals, which play a vital role in consumer decision-making (Zhao and Wang, 2021).

EEG spectral power provides valuable insights into the brain's affective processing. Building on prior olfactory EEG studies, changes in power spectra, particularly in the low-alpha and theta bands, have been consistently linked with variations in emotional valence and arousal. We interpret these findings as neurophysiological correlates rather than definitive indicators of emotional states, consistent with current perspectives advocating multi-modal approaches to emotion assessment in affective neuroscience.

Prior studies on discrete positive emotions indicate that subjective ratings of joy and liking correspond to characteristic spectral-topographical modulations, including frontal theta and lower-alpha changes (Hu et al., 2017; Yuan and Liu, 2022). A substantial body of research demonstrates that theta-band (4–8 Hz) power reliably increases during pleasurable and joyful experiences across modalities. Hu et al. (2017) identified positive correlations between self-reported joy and frontal/midline theta activity, supporting the link between theta enhancement and subjective joy. Similarly, Nemati et al. (2019) and Geethanjali et al. (2019) found that music-evoked pleasure elicits enhanced frontal and midline theta activity, reflecting engagement of emotional-attentional and reward-related networks. Chabin et al. (2020) further showed that intensely pleasurable musical chills are accompanied by robust increases in theta power in regions associated with reward processing. Although these studies employed auditory stimuli, the findings converge on a general principle: subjective joy and pleasantness co-occur with theta enhancement, which we also observed in perfume-evoked responses.

Regarding liking, although it is behaviorally defined, its electrophysiological signature has become increasingly well characterized. Decreases in lower-alpha power, typically interpreted as alpha event-related desynchronization (alpha ERD; Event-Related Desynchronization), reflect increased cortical activation associated with attentional engagement, motivational salience, and positive evaluation. Hu et al. (2017) demonstrated negative correlations between subjective liking and lower-alpha power, directly supporting the role of alpha ERD as a neural marker of preference. Zhao et al. (2018) reported that positive emotions with affiliative or "care-like" qualities elicit stronger left-hemispheric activation and reduced frontal alpha power, reinforcing the interpretation that alpha suppression tracks approach-related positive affect. Additional evidence from Zhao et al. (2020) indicates that multi-target classifications of positive emotions consistently rely on lower-alpha ERD as a discriminative feature. Collectively, these findings converge on the principle that preferred or positively evaluated stimuli reliably induce lower-alpha ERD, which aligns closely with subjective liking judgments and supports our operationalization of liking in the present study.

Taken together, these converging findings indicate that theta-band enhancement is a well-established neural marker of joy, whereas lower-alpha ERD reflects a validated electrophysiological correlation of

liking and preference. Accordingly, the spectral indices used in our study reflect well-validated neural mechanisms underlying positive affect and subjective preference, confirming that our operationalization is grounded in established electrophysiological principles rather than exploratory interpretation.

3.2. Sample selection

We collected data from 20 participants in the United States ($M_{age} = 23.35$, 50 % female, and 40 % Hispanic, Latino, or Latinx) (see Table 1). Typically, EEG research involves fewer participants, ranging from 5 to 20 (Xu and Zhong, 2018). The target participants included Millennials (born between 1981 and 1996) and Generation Z (born between 1997 and 2007) consumers who had engaged in luxury consumption within the past year. They represent a significant portion of the luxury market, with an interest in spending on small indulgences, particularly in the fragrance segment, and unique luxury experiences (Bain & Company, 2024; de Kerviler and Rodríguez, 2015).

The sample size of the EEG dataset was 20 for each scent across two repeated sessions, resulting in each of 40 EEG datasets for the incongruent scents (Group 1: Scents A and B), the controlled (unscented) condition (Group 2: Scent C), and the congruent scents (Group 3: Scents D and E).

3.3. Procedure

EEG analysis was employed to accurately measure immediate positive emotions through brain waves (Noh et al., 2018). We prepared five different scents (A = Peony, B = Jasmine, C = Water, D = Louis Vuitton, E = Fluffy Musk), divided into three groups: Group 1 = incongruent scents (A and B), Group 2 = control (C), and Group 3 = congruent scents (D and E). Scent D was selected from a moderately priced fragrance brand but was presented to the participants as a Louis Vuitton scent at the beginning of the experiment. Scent E was chosen as the congruent scent with the luxury brand image because it was similar to scent D, which had a musky fragrance. Scents A and B were distinct from scents D and E. To prevent participants from being biased by bottle design, each perfume was transferred to unlabeled bottles labeled A, B, C, D, and E (see Fig. 1).

Before the EEG experimental sessions, participants were exposed to scent D (Louis Vuitton) to assess their propensity to remember scents congruent with the luxury brand image. During the experiment, EEG signals were obtained from the Nexus 10 MK-II Biofeedback Device, a system designed to measure a wide range of physiological signals. We

measured two channels of brain activity by placing two different electrodes on each participant's forehead. With a sampling frequency of 256 Hz, raw EEG signals were obtained from the respective channels.

Our measurement process involved hardware-level and software-level EEG preprocessing, conducted by the NeXus system (hardware) and BioTrace+ (software), respectively (Mind Media Europe, 2024; Mind Media, 2018). The Nexus system employs active shielding for EEG measurement (Mind Media Europe, 2024), a feature commonly found in other contemporary EEG measurement systems such as ANT Neuro, CGX, and Brain Products. This hardware-based active shielding mechanism suppresses mains (50/60 Hz) and other electromagnetic interference (EMI), thereby improving the signal-to-noise ratio (SNR) (Mind Media Europe, 2024). In conjunction with a high impedance, high common mode rejection ratio (CMRR) instrumentation front end, residual disturbances are shifted into common mode and effectively rejected (Mind Media Europe, 2024). In BioTrace+ with the NeXus-10 MKII, raw EEG data were preserved, and we utilized the default profile (50/60 Hz notch off, display smoothing disabled, no RMS offset & noise level correction) (Mind Media, 2018). Theta and lower-alpha bands were isolated using configurable digital band-pass filters with cutoff frequencies of 4–8 Hz (theta) and 8–10 Hz (lower-alpha) in BioTrace+, with artifacts marked during sessions and excluded at export to ensure replicability (Mind Media, 2018).

The EEG spectral power for each frequency band was expected to illustrate neural responses to positive emotions using the `pspectrum()` function in MATLAB R2025a. Our frequency bands of interest were theta (4–8 Hz) and low-alpha (8–10 Hz). From each EEG segment, we extracted amplitudes, their fluctuations (zero-crossing rate), and their average power spectral density to quantify neural activity.

EEG data were recorded to capture real-time responses and correlated with participants' online survey responses. Participants sniffed each scent for 30 s using perfume test strips and were then given 90 s to complete the survey. Each participant completed two repeated sessions, smelling each of five different scents twice, for a total of 10 sniffing trials. The entire experiment, including scent exposures and online surveys, lasted approximately 23 min (see Fig. 2). A manipulation check confirmed significant differences in perception between congruence, incongruence, and water (no scent) conditions.

3.4. Results

EEG amplitudes and their fluctuations were correlated with emotional responses. We assessed two positive emotions, namely joy and liking, by examining their EEG amplitudes and fluctuations in the theta (4–8 Hz) and low-alpha (8–10 Hz) bands, respectively (Hu et al., 2017). Fig. 3 illustrates average EEG signals for the theta band (positive correlation with joy) and low-alpha band (negative correlation with liking) over time, indicating that the EEG signals of Scents A (Peony) and B (Jasmine) fluctuate more often with higher amplitudes in joy and liking compared with those of Scents D (Louis Vuitton) and E (Fluffy Musk).

From this observation, we adopted the zero-crossing rate (ZCR), which provides information about the temporal fluctuation of the amplitude signal in the time domain. The EEG signals with features including ZCR have been widely used in various fields such as daily communication, sleep, and emotion recognition (Liu et al., 2025). Notably, ZCR has been applied to emotional activity, as higher ZCR indicates a more violent EEG oscillation, correlating with brain activity in the EEG signal (Pyrzowski et al., 2021). We performed a paired *t*-test to statistically compare the ZCR between the combinational pairs of Groups 1 (incongruent scents), 2 (no scent), and 3 (congruent scents), focusing on the theta (positive correlation with joy) and low-alpha (zha correlation with liking) bands. The results revealed significant differences in ZCR values between Groups 1 and 3 for both theta ($p = 0.003$, 95 % CI = [0.002, 0.006]) and low-alpha ($p = 0.000$, 95 % CI = [0.003, 0.007]).

Table 1
Demographic information.

Category	Frequency	Percentage (%)
Gender		
Male	10	50.0 %
Female	10	50.0 %
Ethnicity		
African American or Black	1	5.0 %
Asian	2	10.0 %
Asian American	1	5.0 %
Caucasian or White	6	30.0 %
Hispanic, Latino, Latinx	8	40.0 %
Mixed Race	2	10.0 %
Employment		
Working full-time	4	20.0 %
Working part-time	8	40.0 %
Student	8	40.0 %
Average Annual Income		
Less than \$25,000	10	50.0 %
\$25,000 - \$49,999	7	35.0 %
\$50,000 - \$74,999	1	5.0 %
Prefer not to say	2	10.0 %
Total	20	100 %



Fig. 1. The bottles of five different scents used in the EEG experiment.

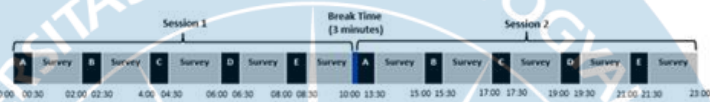


Fig. 2. EEG experiment design.

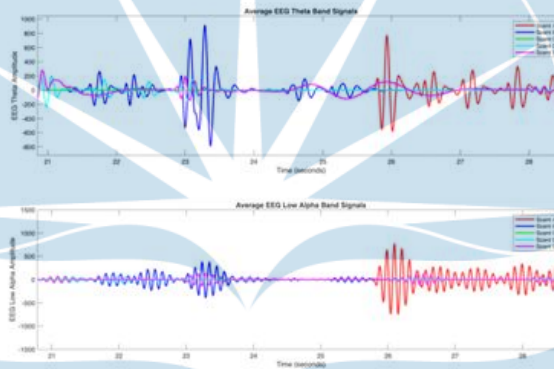


Fig. 3. The theta band signals (positive correlation with joy) and the low-alpha band signals (negative correlation with liking).

Fig. 4 displays the average power spectral density values of each group under congruent and incongruent scent conditions, highlighting their correlations with emotional responses. As shown in Fig. 4, incongruent scents (Scents A and B) elicited greater theta-band activation, indicating a stronger association with joy than congruent scents (Scents D and E). Conversely, congruent scents produced lower activation in the low-alpha band, reflecting higher liking. Therefore, H11 was partially supported.

We also performed a power analysis to validate the sample size of our study (VanVoorhis et al., 2007). In this context, the power is defined as the probability that the *t*-test rejects the null hypothesis when a difference between two groups actually exists. The sample size is considered sufficient when the power value exceeds 0.8. In our study, each group

included 80 samples (20 participants $\times$ 2 sessions $\times$ 2 scents per category: congruent vs. incongruent), yielding power values of 0.908 for theta and 0.997 for low-alpha, indicating that the sample size was adequate to reliably detect the observed effects in both frequency bands.

4. Study 2 – quantitative analysis

4.1. Overview

Study 2 employed a quantitative analysis approach to explore how scent congruence (vs. incongruence) with the luxury brand image influences consumers' memory, favorable reactions, and behavioral intentions, testing H12–H17. The survey method was chosen due to its

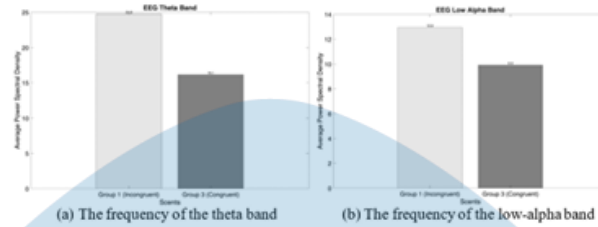


Fig. 4. (a) The frequency of the theta band (i.e., positive correlation with joy) in each scent and (b) the frequency of the low-alpha band (i.e., negative correlation with liking) in each scent.

widespread use in examining causal relationships in consumer decision-making. Specifically, Study 2 examined the impact of scent congruence (vs. incongruence) with the luxury brand image on consumers' scent preference and memory, leading to satisfaction, brand resonance, and intention to purchase the luxury brand's products. A total of 200 datasets were collected for quantitative data analysis (20 participants x two repeated sessions for five scents).

4.2. Measurements

The survey questionnaire link was created using Qualtrics. Seven-point semantic differential scales were employed to measure scent preference and scent memory (Morrin and Ratneshwar, 2003). Scent preference included pleasantness (very unpleasant/very pleasant) and liking (extremely not like at all/like a lot), while scent memory comprised familiarity (not very familiar/very familiar) and similarity (not very similar/very similar), adapted from Morrin and Ratneshwar (2003). Seven-point Likert scales were utilized (1 = strongly disagree; 7 = strongly agree) to measure satisfaction, brand resonance, and purchase intention for the luxury brand's products (Yi et al., 2021; Teah et al., 2023; Bian and Forsythe, 2012).

4.3. Results

4.3.1. Measurement model results

To evaluate the reliability and validity of the measurement, we employed Mplus 8.8. As shown in Table 2, the results of the confirmatory factor analysis (CFA) exceeded a threshold of 0.5, confirming the convergent validity of the constructs (Hair Jr et al., 2020). Cronbach's alpha was greater than 0.90, and composite reliability was above 0.7, demonstrating the reliability of the constructs (Hair Jr et al., 2020). The average variance extracted (AVE) values exceeded the criterion of 0.5 (Hair Jr et al., 2020). Table 3 shows that the AVE value for each construct was greater than the correlation between constructs (Fornell and Larcker, 1981). Table 4 indicates that the heterotrait-monotrait ratio of correlations (HTMT) values was less than 0.90 (Hair Jr et al., 2020). Consequently, discriminant validity was established.

VIF values ranged between 1 and 1.524; thus, no significant multicollinearity issues were detected (Hair Jr et al., 2020). In PLS-SEM, a model is considered free from common method bias if all VIF values obtained from the full collinearity test are equal to or below 3.3 (Kock, 2015). Therefore, common method bias was not observed in this study. Additionally, the overall assessment of model fit was acceptable ($\chi^2 = 405.22$; $df = 99$; $CFI = 0.94$; $TLI = 0.92$; $RMSEA = 0.11$; $SRMR = 0.06$). RMSEA may be less appropriate for evaluating model fit with samples smaller than 250 (Hu and Bentler, 1999). With CFI and TLI

Table 2
Results of reliability and convergent validity.

Constructs	Items	Loadings	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Scent Preference (Morrin and Ratneshwar, 2003)	SP1 This scent was very unpleasant – very pleasant	0.886	0.916	0.960	0.922
	SP2 This scent was extremely not like at all – like a lot	0.953			
Scent Memory (Morrin and Ratneshwar, 2003)	SM1 Compared to the Louis Vuitton scent, not very familiar – very familiar	0.981	0.954	0.960	0.956
	SM3 Compared to the Louis Vuitton scent, not very similar – very similar	0.929			
Satisfaction (Yi et al., 2021)	SAT1 I am satisfied with this scent.	0.978	0.978	0.985	0.958
	SAT2 This scent is a good scent to smell.	0.991			
	SAT3 This scent meets my expectations.	0.936			
Brand Resonance (Teah et al., 2023)	BR1 This brand would be my first choice.	0.898	0.948	0.960	0.827
	BR2 I consider myself to be loyal to this brand.	0.899			
	BR3 I belong to this brand lover.	0.869			
	BR4 I like to be seen as a consumer linked to this brand.	0.902			
	BR5 I am willing to talk positively about this brand.	0.852			
Purchase Intention (Bian and Forsythe, 2012)	PI1 If I were going to purchase a product, I would consider buying this brand.	0.926	0.966	0.975	0.909
	PI2 If I were shopping for a brand, the likelihood I would purchase this brand is high.	0.947			
	PI3 My willingness to buy this brand would be high if I were shopping for a branded product.	0.928			
	PI4 The probability that I would consider buying this brand is high.	0.949			

Table 3
Discriminant validity – Fornell-Larcker criterion.

	Scent Preference	Scent Memory	Satisfaction	Brand Resonance	Purchase Intention
Scent Preference	0.909				
Scent Memory	0.929	0.953			
Satisfaction	0.732	0.768	0.979		
Brand Resonance	0.604	0.591	0.717	0.978	
Purchase Intention	0.725	0.742	0.780	0.587	0.960

Table 4
Discriminant validity – HTMT criterion.

	Scent Preference	Scent Memory	Satisfaction	Brand Resonance	Purchase Intention
Scent Preference					
Scent Memory	0.626				
Satisfaction	0.824	0.742			
Brand Resonance	0.775	0.633	0.757		
Purchase Intention	0.789	0.615	0.789	0.870	

values of 0.90 or above and an SRMR of 0.08 or below (Niemand and Mai, 2018), the model fit was deemed acceptable.

4.3.2. Hypothesis testing

To test *H2* and *H3*, a one-way multivariate analysis of variance (MANOVA) was performed using SPSS 29.0. The assumptions for MANOVA were assessed, including multivariate normality and homogeneity of covariance across groups. The assumption of normality was evaluated using the Shapiro-Wilk test, which indicated a significant deviation from normality ($p = 0.000$). Consequently, a non-parametric method, specifically the Kruskal-Wallis test, was employed to compare the groups, and the results of the Kruskal-Wallis test revealed a significant difference between the groups ($p = 0.000$). Additionally, results of Box's test confirmed that the assumption of the homogeneity of variance-covariance was met ($p = 0.242$).

The results of the MANOVA indicated significant effects of scent congruence with the luxury brand on scent preference ($F [2,197] = 33.982, p = 0.000$) and scent memory ($F [2,197] = 52.595, p = 0.000$). As indicated in Table 5 and Fig. 5, scent preference was higher in the scent congruence condition with the luxury brand image ($M_{\text{congruence}} = 5.431, SD = 1.501$) than in the scent incongruence condition ($M_{\text{incongruence}} = 4.800, SD = 1.592$). Scent memory was also higher in the scent congruence condition with the luxury brand image ($M_{\text{congruence}} = 4.381, SD = 2.126$) than in the scent incongruence conditions ($M_{\text{incongruence}} = 2.881, SD = 1.506$). Therefore, *H2* and *H3* were supported.

To test *H4–H7*, we employed a structural equation modeling (SEM) analysis using Mplus 8.8. The results indicated that scent preference positively influenced consumer satisfaction ($\beta = 0.823, p = 0.000, 95\% \text{ CI} = [0.782, 0.874]$), supporting *H4*. Scent memory also positively influenced consumer satisfaction ($\beta = 0.735, p = 0.000, 95\% \text{ CI} = [0.684, 0.787]$), supporting *H5*. Furthermore, consumer satisfaction positively influenced brand resonance ($\beta = 0.779, p = 0.000, 95\% \text{ CI} = [0.713, 0.832]$), supporting *H6*. Lastly, brand resonance positively influenced purchase intention ($\beta = 0.972, p = 0.000, 95\% \text{ CI} = [0.955, 0.985]$), supporting *H7* (see Table 6 and Fig. 6). Additionally, consumer satisfaction had an indirect effect on purchase intention through brand resonance ($\beta = 0.681, p = 0.000, 95\% \text{ CI} = [0.599, 0.753]$).

5. General discussion

Luxury fashion brands have expanded their offerings to include fragrances, which represent an affordable luxury. Luxury fragrances allow consumers to access the luxury experience while maintaining a sense of uniqueness. In pursuit of this trend, the present study explored the effect of scent congruence with the luxury brand image on consumers' positive emotions, memory, brand resonance, and purchase intention. This study specifically focused on Millennials and Generation Z luxury consumers. Although they do not represent the core luxury consumers who dominate high-end experiential spending, younger generations account for a substantial share of the current luxury market and show a strong preference for small indulgences, particularly in the fragrance category (Dain & Company, 2024). Our findings also highlight that when these younger luxury consumers encounter a scent that aligns with the luxury brand's image, their cognitive responses, such as evaluations and memory, become more positive. This alignment strengthens their connection to the brand and increases their likelihood of purchase. Thus, this study demonstrates that the extension of luxury brands into the fragrance sector can appeal to Generation Z (Sandler, 2025), thereby fostering brand resonance and increasing profitability.

Specifically, the results of EEG analysis in Study 1 indicate that congruent scents with the luxury brand image correlate more strongly with consumers' liking than incongruent scents, aligning with previous findings (Errajaa et al., 2020). Liking, intertwined with perceptions, is considered a component of preference (Morrin and Ratneswar, 2003). Meanwhile, incongruent scents evoke stronger feelings of joy among consumers than congruent scents due to their surprise factor and novelty, creating a stronger impression by contrasting with typical brand associations.

Unlike the results yielded by EEG analysis, Study 2 empirically demonstrated that consumers were more likely to prefer and remember scents recognized as congruent with the luxury brand image during cognitive evaluation. This supports the notion that fragrance can trigger personal memories (Errajaa et al., 2020) and that a well-established brand name can serve as a cue for recall and recognition in consumer decision-making regarding fragrances (Morrin and Ratneswar, 2003). Our findings suggest that fragrance fosters brand resonance, establishing

Table 5
Results of testing *H2–H3*: one-way multivariate analysis of variance (MANOVA).

Dependent Variable	Scent Congruence	Mean	Mean Difference	SD	F	p-value
Scent Preference	Congruent	5.431	0.631	1.501	33.982	0.000
	Incongruent	4.800		1.592		
Scent Memory	Congruent	4.381	1.500	2.126	52.595	0.000
	Incongruent	2.881		1.506		

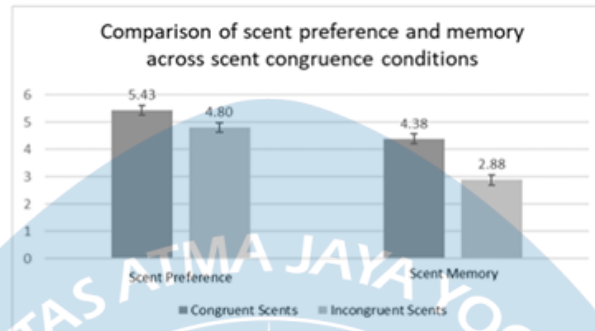


Fig. 5. Comparison of scent preference and memory across scent congruence with the luxury brand image conditions.

Table 6
Results of testing H4–H7.

No.	Hypothesized Relationships	Path Coefficients	S.E.	p-value	95 % CI	Result
H4	Scent Preference → Satisfaction	0.823	0.027	0.000	[0.782, 0.874]	Supported
H5	Scent Memory → Satisfaction	0.735	0.032	0.000	[0.684, 0.787]	Supported
H6	Satisfaction → Brand Resonance	0.779	0.038	0.000	[0.713, 0.832]	Supported
H7	Brand Resonance → Purchase Intention	0.972	0.009	0.000	[0.955, 0.985]	Supported

psychological and emotional connections that drive luxury consumption (Husain et al., 2022). Consequently, congruent scents strengthen the luxury brand's impact on consumers' minds (Kang et al., 2022) and enhance memory, emotional connection with the brand, and purchase intention (Lin et al., 2018; Herrmann et al., 2013; Morrin and Ratneshwar, 2003). In summary, the extension into the fragrance sector benefits luxury brands by reinforcing consumer-brand relationships (Yoo, 2024). Overall, EEG and quantitative analyses revealed that emotional reactions (measured by brand signals) and cognitive responses (based on evaluations) differ in consumer decision-making.

By integrating cognitive balance theory and the Proust effect, this

study explored how fragrance shapes both emotional and cognitive responses to brands. The Proust effect suggests that familiar scents trigger memory and positive emotions (Green et al., 2023). However, Study 1 showed that congruent and incongruent scents can evoke positive emotions, but in different ways, as reflected in EEG-based neural responses (i.e., congruent scents elicited liking, whereas incongruent scents elicited joy). This nuance extends the Proust effect by indicating that emotional reactions toward fragrances may not always manifest at the neural level. Study 2 further demonstrates that scent congruence with the luxury brand's image enhances memory recall, cognitive evaluations, and positive behavioral intentions, aligning with both cognitive balance theory and the Proust effect (Errajaa et al., 2018, 2020; Spangenberg et al., 2006).

Beyond the interaction of these two theories, our paradoxical findings between affective and cognitive reactions can be bridged by a dual-process model, which proposes two distinct systems of information processing: (1) a cognitive system and (2) an affective system (Gregoire, 2003). Although these systems operate simultaneously, scent congruence with the luxury brand image (a balanced experience) can elicit positive cognitive assessments, whereas scent incongruence (an imbalanced experience) can trigger immediate affective responses, such as joy (Loewenstein et al., 2001).

In summary, our findings highlight that emotional and cognitive responses operate simultaneously in shaping overall reactions to brand fragrances. The impact of scent congruence with the luxury brand image on immediate positive emotions cannot be generalized. Beyond affective responses, however, the findings also reveal that brand cues

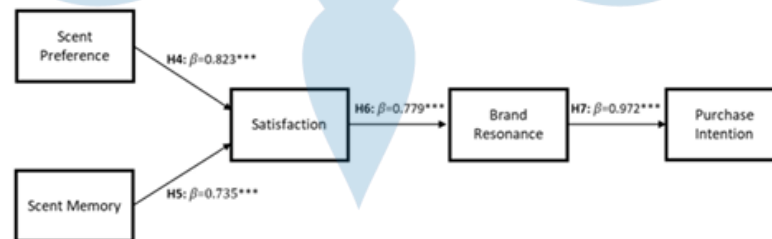


Fig. 6. Results of study 2.

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

systematically influence cognitive evaluations and behavioral intentions in the luxury scent context (Morrin and Ratneshwar, 2003). Ultimately, this study underscores that luxury brands' extension into the fragrance category can be an effective strategy to augment brand equity by strengthening relationships with consumers and inducing positive behavioral intentions (Ahn et al., 2018).

5.1. Theoretical implications

This study advances interdisciplinary research on luxury brand scents by employing a mixed-methods approach, including EEG and quantitative analyses. It also unlocks the potential of affective neuroscience in luxury retailing. Prior scent studies have primarily utilized quantitative methods to identify the impact of scent congruence with the luxury brand image on consumers' emotions, perceptions, attitudes, and purchase intention (Errajaa et al., 2018, 2020, 2021; Herrmann et al., 2013; Lin et al., 2018). Our findings provide novel insights for developing luxury retailing strategies by emphasizing the importance of scent congruence in shaping consumers' cognitive evaluations, memory recall, and behavioral intentions. Thus, we highlight the value of revisiting previous research on the effectiveness of scent congruence with a luxury brand image using a mixed-methods approach.

By integrating EEG and survey methods, our study further expands existing research on luxury scents, demonstrating that consumers' immediate emotional reactions detected through brain signals and their cognitive perceptions from subjective evaluations can differ in their alignment with the scent congruence (vs. incongruence) of the luxury brand image. The novelty of this study lies in the partial contradiction between the EEG and survey method results. In other words, this study provides insights into luxury scent research by showing that consumers' unconscious emotional responses can conflict with their conscious cognitive evaluations (Loewenstein et al., 2001). This discrepancy suggests that immediate emotional responses and cognitive assessments should be treated as distinct processes when examining consumer reactions to luxury scents.

Furthermore, we applied cognitive balance theory and the Proust effect to explain how congruent (vs. incongruent) scents with the luxury brand image influence affective, cognitive, and behavioral responses. Our findings reveal that luxury brand scents can evoke individuals' memories (Green et al., 2023), but not necessarily all types of positive emotions, challenging the generalizability of the Proust effect. Referring to the Proust effect, we suggest that scents elicit positive emotions when they are related to long-term nostalgic memories, such as the smell of a mother's soap or memorable past events, rather than with short-term experiences (Green et al., 2023; Van Campen, 2014). These insights imply that luxury brands should adopt long-term fragrance marketing strategies to approach a broader range of consumers.

Additionally, the paradoxical findings between emotional reactions and cognitive evaluation mechanisms provide unique insights into cognitive balance theory and the Proust effect. Our paradoxical findings can be interpreted through the lens of the dual-process model, which posits cognitive and affective processing systems separately (Gregoire, 2003). Although these systems operate simultaneously, scent congruence with the luxury brand image (a balanced experience) elicits memory recall and positive cognitive assessments, while scent incongruence (an imbalanced experience) triggers immediate emotional reactions, such as joy (Loewenstein et al., 2001). Thus, this dual-process framework helps in understanding distinct affective and cognitive responses toward fragrances, illustrated by cognitive balance theory and the Proust effect.

Lastly, this study enhances our understanding of consumers' sensory experiences, particularly olfactory cues that resonate with the luxury brand image, thereby improving consumer satisfaction, brand resonance, and the intention to purchase luxury items from the same brand (Husain et al., 2022; Teah et al., 2023). It also sheds light on how brand cues influence consumers' memory and decision-making in the context

of fragrances (Morrin and Ratneshwar, 2003). It emphasizes the importance of sensory marketing in luxury retailing and its role in driving holistic consumer responses. This study aligns with the growing trend of luxury brands expanding into the fragrance sector, as exemplified by Louis Vuitton, Gucci, and Bottega Veneta. The growing popularity of high-end niche scents as accessible luxuries among younger consumers may stem from the strong reputations of these brands (Ahn et al., 2018; Flora, 2025; Sandler, 2025). In conclusion, our findings demonstrate how sensory experiences in luxury fragrance extensions can reinforce brand power and positively impact luxury product purchases.

5.2. Managerial implications

This study has several managerial implications. Given the recent trend of luxury brands entering the fragrance market, this study is timely for understanding its relevance to building consumer-brand relationships and the potential for luxury product purchases. Our findings demonstrate that luxury brands' extension into the fragrance category can effectively enhance their brand equity (Ahn et al., 2018). In particular, Study 2 indicates that the scent should be clearly recognized as the luxury brand's fragrance. Accordingly, each luxury brand should develop a unique scent that aligns with its brand image. This approach can also be applied and expanded to luxury brands with unique identities and positioning beyond their brand name. In short, this study suggests that luxury brands should focus on fragrance development that resonates with their brand identity to strengthen long-term consumer-brand relationships. For example, Chanel No. 5 is a well-known perfume with a scent distinct from that of other perfume brands. Likewise, luxury brands should create signature scents that evoke positive reactions and memories among consumers to boost their luxury purchases.

While survey results showed that scents aligned with a luxury brand's image foster long-term consumer relationships and potential sales, EEG data indicated that consumers respond with positive emotions, such as joy and liking, at a neurological level. Accordingly, luxury brands should adopt strategic approaches when incorporating scents into their marketing efforts. Specifically, luxury brands could use incongruent scents in pop-up stores or events to temporarily elevate consumers' joy, while developing congruent scents for branded perfumes and in-store diffusers to enhance customer revisits and foster long-term relationships.

Furthermore, luxury brands' strategy to sell their perfumes in brick-and-mortar stores alongside other luxury fashion products may strengthen relationships with consumers and increase sales. Testing luxury brands' perfumes in stores can be an enjoyable experience for consumers, enhancing consumer-brand relationships and business growth. In particular, Millennials and Gen Z consumers seek small indulgences and unique experiences through luxury consumption (Bain & Company, 2024; de Kerviler and Rodriguez, 2019). Displaying and selling perfumes in luxury brand stores can provide unique sensory experiences, while personalized fragrance services that incorporate the brand's distinctive identity can accelerate young consumers' establishment of a strong connection with the brand and their experience of self-expansion (de Kerviler and Rodriguez, 2019). Moreover, luxury perfumes, with their unique blends and intriguing brand storytelling, help fulfill young consumers' demands and effectively penetrate the niche perfume market (Voyer, 2023).

Lastly, this study revealed that consumers are more likely to prefer and remember branded scents that evoke satisfaction, brand resonance, and purchase intention. Therefore, luxury brands should use their own diffusers in stores while also offering them for sale. Our findings indicate the importance of carefully considering how perfumes are advertised to a broader range of consumer segments and how word-of-mouth marketing can be leveraged. For example, Louis Vuitton (LV) currently sells its perfumes exclusively through its boutiques and official website. However, if access to the luxury brand's fragrance is broadened to

include more diverse consumers, they are more likely to connect the luxury scent with their personal experiences, thereby enhancing positive emotions, loyalty, and sales. Namely, luxury brands' extension into the fragrance category contributes not only to consumers' unique experiences at their boutiques but also to long-term profitability. Therefore, this study suggests that luxury brands should develop long-term marketing strategies when expanding into the niche perfume sector.

5.3. Limitations and suggestions for future research

Some limitations in this study present potential avenues for future research. First, this experimental research collected data from both female and male participants, but future research should gather data from each gender separately, as preferences for perfumes may differ by gender. Second, this research focused on Millennials and Gen Z consumers, but future studies could explore a broader range of generations to establish personalized strategies for each demographic. Additionally, this study focused on scent congruence with the luxury brand image. Thus, future research could also investigate how non-luxury brand fragrances, such as those from fast fashion brands like Zara and H&M, influence consumers' approach responses. The rise of niche perfumes through acquisitions like Le Labo by Estée Lauder, Byredo by Puig, and Creed by Kering also warrants investigation into how consumers perceive fragrances from niche versus luxury brands. Lastly, given that ambient scents, which are moderately incongruent, may be more effective in enhancing favorable reactions than incongruent and congruent scents in retail settings (Spangenberg et al., 2006), future studies could compare the effects of ambient scents, congruent scents, and incongruent scents on luxury consumers' approach responses.

CRedit authorship contribution statement

Sanghee Kim: Writing – review & editing, Writing – original draft, Visualization, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Hyo Jung (Julie) Chang:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Bengie L. Ortiz:** Writing – review & editing, Writing – original draft, Visualization, Methodology, Formal analysis. **Jo Woon Chong:** Writing – review & editing, Visualization, Supervision, Methodology, Formal analysis.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Data availability

Data will be made available on request.

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