Table S1. Constituents of e-Cigarette Solutions

Flavor	Nicotine formulations	Nicotine Concentration (mg/mL)	Density (g/mL)	PG/VG Ratio	pH
Tobacco	Free-base	29.42	1.16	60:40	8.30
	50% Lactic	27.78	1.18	60:40	7.36
	100% Lactic	29.00	1.18	60:40	5.09
	50% Benzoic	29.63	1.18	60:40	7.31
	100% Benzoic	29.14	1.18	60:40	4.83
Caramel	Free-base	27.66	1.15	55:45	7.88
	50% Lactic	29.47	1.15	55:45	6.86
	100% Lactic	29.26	1.15	55:45	4.47
	50% Benzoic	28.41	1.15	60:40	6.26
	100% Benzoic	33.02	1.16	55:45	4.54
Grape ice	Free-base	28.22	1.15	70:30	8.27
	50% Lactic	30.03	1.15	70:30	7.70
	100% Lactic	28.97	1.15	70:30	5.26
	50% Benzoic	27.02	1.14	70:30	7.43
	100% Benzoic	28.67	1.16	70:30	5.01
Strawberry	Free-base	28.49	1.13	60:40	8.39
	50% Lactic	28.76	1.13	60:40	7.42
	100% Lactic	27.75	1.14	65:35	5.04
	50% Benzoic	27.68	1.13	65:35	7.19
	100% Benzoic	28.45	1.14	60:40	4.82

Note. Differences of mean values of nicotine concentration ($F = 1.01$, $p = 0.43$), density ($F = 0.29$, $p = 0.88$), and PG/VG ($F = 0.10$, $p = 0.88$) by nicotine formulation were statistically non-significant. There was significant pH mean difference by nicotine formulation ($F = 74.63$, $p < 0.001$).

Table S2. Interaction Effects of pH × Acid Type on Appeal and Sensory Attributes

	Interaction, β (95% CI)	*p*-value
Liking	1.07 (-0.87, 3.01)	.280
Disliking	-1.66 (-3.74, 0.42)	.118
Willingness to use again	1.10 (-1.04, 3.25)	.312
Sweetness	-0.87 (-2.76, 1.01)	.363
Smoothness	0.71 (-1.23, 2.65)	.473
Bitterness	-0.69 (-2.45, 1.08)	.445
Harshness	-1.03 (-3.03, 0.97)	.314

Note. Estimates are the interactive effects adjusting for the main effects and flavor. Free-base solutions were excluded. The remaining 50% and 100% nicotine benzoate and 50% and 100% nicotine lactate solutions were included to examine the interaction effects between pH and acid type (benzoate vs. lactate) on study outcomes.

Table S3. Interactive effects of Study Nicotine Formulation with Tobacco Use Status and with Flavor on Appeal and Sensory Attributes

	Appeal						Sensory attributes							
	Liking		Disliking		Willingness to use again		Sweetness		Smoothness		Bitterness		Harshness	
	F	*p*	F	*p*	F	*p*	F	*p*	F	*p*	F	*p*	F	*p*
Study nicotine formulation × Tobacco use status[a]														
Lactic[b] × Tobacco use status	0.7	.749	0.3	.371	0.3	.967	0.9	.603	2.4	.091	0.1	.997	0.4	.908
Benzoic[c] × Tobacco use status	0.7	.712	1.3	.371	1.5	.300	1.0	.527	2.5	.084	1.9	.179	2.4	.089
Study nicotine formulation × Study Flavor														
Lactic[b] × Flavor[d]	0.6	.748	0.6	.721	1.2	.343	0.9	.564	0.9	.540	1.8	.125	1.0	.439
Benzoic[c] × Flavor[d]	1.2	.354	1.6	.195	2.2	.061	1.1	.392	1.1	.392	1.8	.128	2.0	.085

Note. Omnibus F test was used to calculate the estimates. P-values were corrected for multiple testing to control the false-discovery rate using the Benjamini-Hochberg procedure. *p* = p-value.

[a] Exclusive cigarette smoker, exclusive e-cigarette user, or dual use of cigarettes and e-cigarettes.

[b] Free-base vs. 50% nicotine lactate / 50% freebase vs. 100% nicotine lactate.

[c] Free-base vs. 50% nicotine benzoate / 50% freebase vs. 100% nicotine benzoate.

[d] Tobacco, caramel, grape ice, or strawberry.

Table S4. Interactive Effects of Study Nicotine Formulation with Current Nicotine Formulation Used in Own Device on Appeal and Sensory Attributes

	Appeal						Sensory attributes							
	Liking		Disliking		Willingness to use again		Sweetness		Smoothness		Bitterness		Harshness	
	F	*p*	F	*p*	F	*p*	F	*p*	F	*p*	F	*p*	F	*p*
Study nicotine formulation × Current formulation in own device[a]														
Lactic[b] × Current formulation	1.0	.524	0.8	.801	1.0	.524	0.7	.705	1.4	.374	1.1	.524	1.0	.524
Benzoic[c] × Current formulation	0.9	.567	1.0	.524	1.3	.374	0.3	.940	1.6	.303	0.8	.670	1.4	.374

Note. Omnibus F test was used to calculate the estimates. P-values were corrected for multiple testing to control the false-discovery rate using the Benjamini-Hochberg procedure. *p* = p-value.

[a] Response options included salt, free-base, switch back and forth between salt and free-base, or do not know. Exclusive cigarette smokers were excluded (n = 31).

[b] Free-base vs. 50% nicotine lactate / 50% free-base vs. 100% nicotine lactate.

[c] Free-base vs. 50% nicotine benzoate / 50% free-base vs. 100% nicotine benzoate.

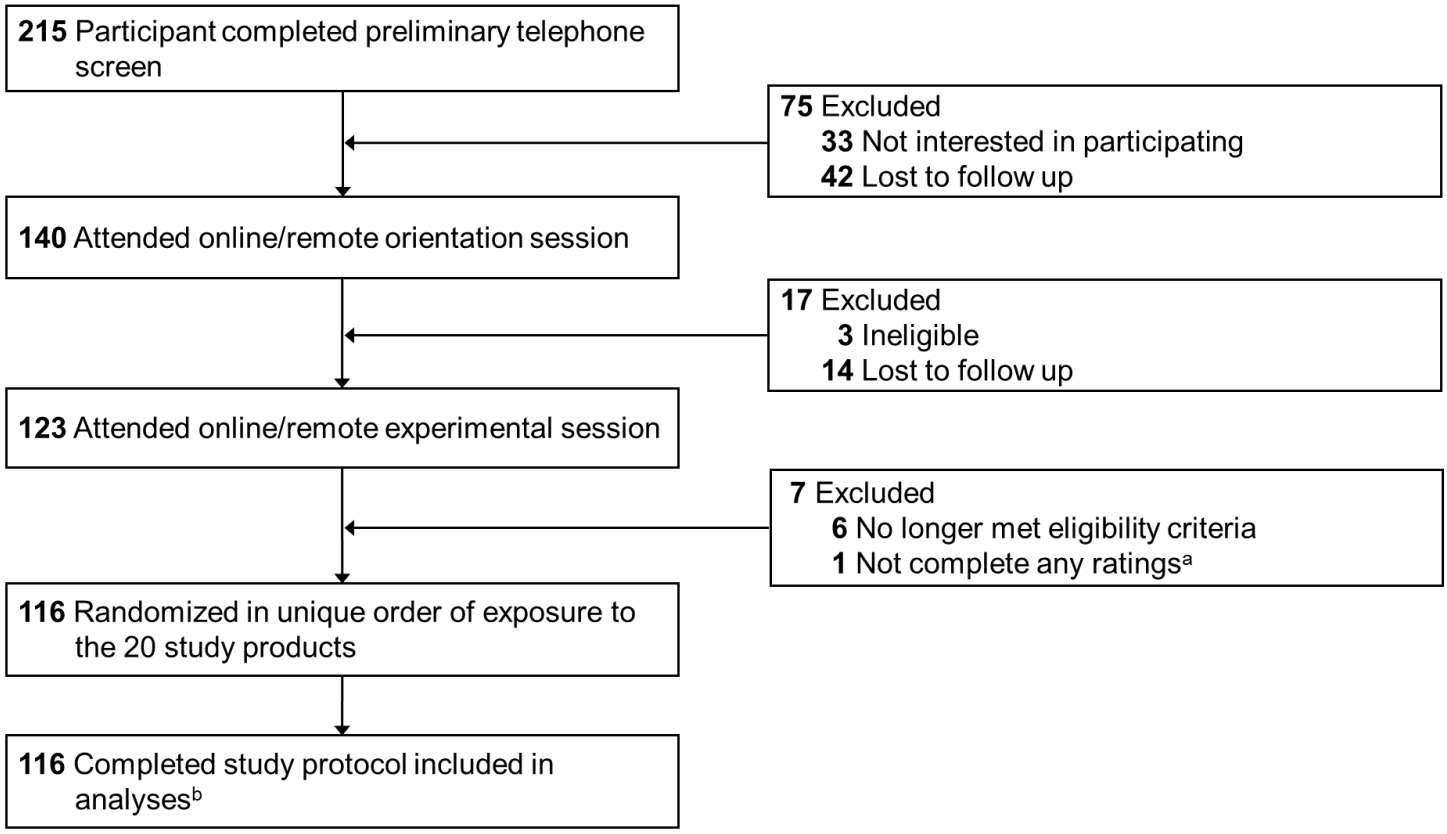
Table S5. Effects of Nicotine Formulation on Appeal and Sensory Attributes, Adjusting for PG/VG ratio

	Estimates, β (95% CI)						
	Appeal			Sensory attributes			
	Liking	Disliking	Willingness to use again	Sweetness	Smoothness	Bitterness	Harshness
Formulation: Lactic							
50% Lactic vs. Free-base	5.2* (1.8, 8.6)	-6.4* (-10.2, -2.8)	6.1* (2.4, 9.7)	6.1* (2.6, 9.7)	11.4* (8.0, 14.8)	-8.2* (-11.5, -4.9)	-14.9* (-18.4, -11.3)
100% Lactic vs Free-base	9.3* (6.5, 13.3)	-13.1* (-16.8, -9.4)	10.5* (6.9, 14.2)	7.5* (4.0, 11.1)	17.5* (14.1, 21.0)	-12.4* (-15.7, -9.0)	-21.1* (-24.7, -17.5)
Formulation: Benzoic							
50% Benzoic vs. Free-base	6.3* (2.7, 9.9)	-8.2* (-12.0, -4.3)	6.4* (2.6, 10.3)	5.1* (1.6, 8.7)	14.2* (10.7, 17.6)	-8.7* (-12.1, -5.3)	-17.1* (-20.8, -13.4)
100% Benzoic vs Free-base	10.7* (7.1, 14.3)	-12.6* (-16.4, -8.8)	10.2* (6.4, 14.0)	10.6* (7.0, 14.1)	19.9* (16.5, 23.3)	-13.6* (-17.0, -10.2)	-22.9* (-26.5, -19.2)

Note. Estimates were adjusted for PG/VG ratio.

* Statistically significant after Benjamini-Hochberg corrections for multiple testing to control the false-discovery rate at 0.05.

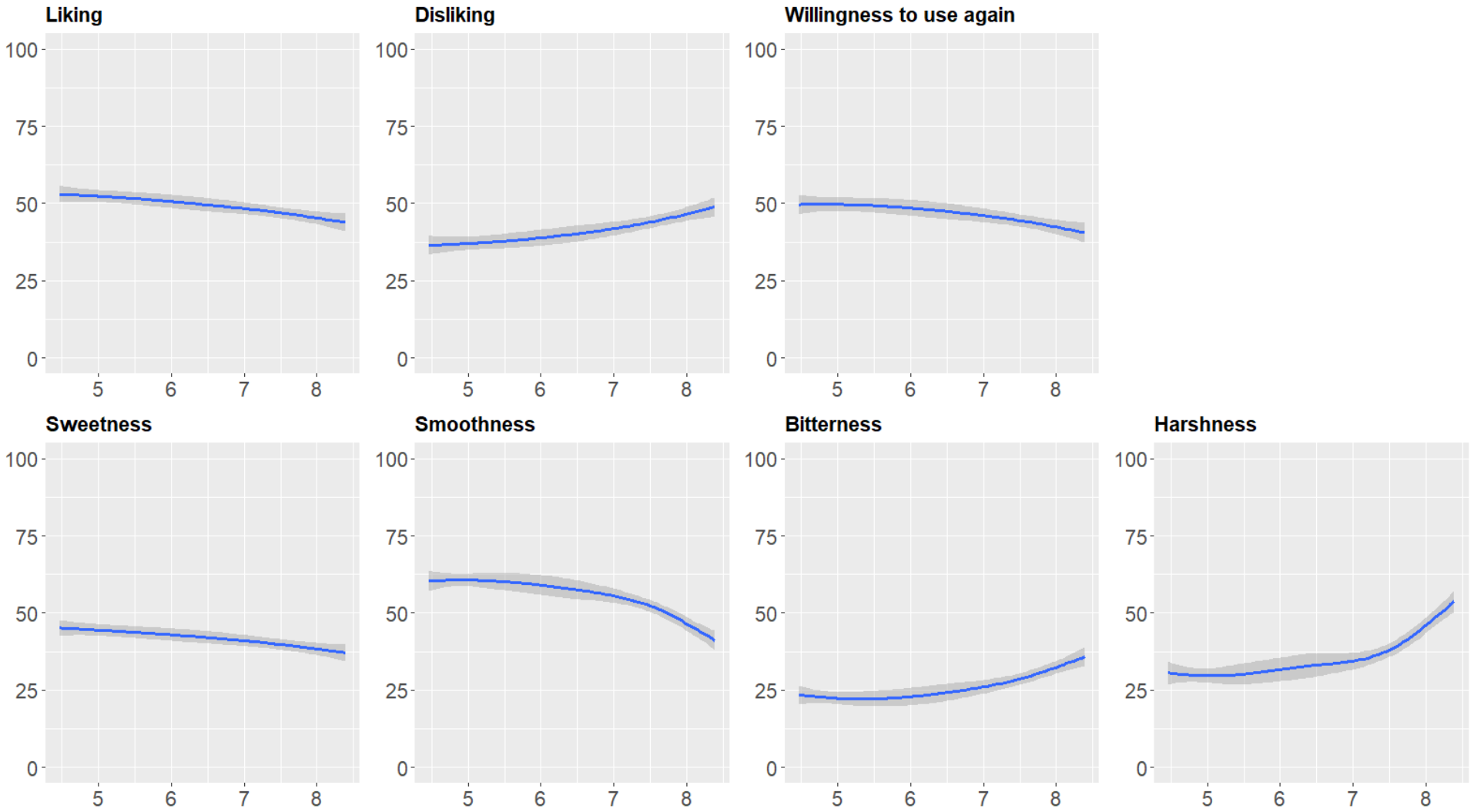
Figure S1. Study Flow Diagram



[a] Due to internet connection issue.

[b] Eleven participants with trial-level missing data (range, 1-19 trials).

Figure S2. Nonlinear Association of pH with Appeal and Sensory Attribute Ratings



Note. Y-axis = rating (0-100). X-axis = pH level.