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Supplementary Table 1. Missing Data

Filtered First (N=21)	T1, V1 (N=21)	T1, V2 (N=21)	T2, V1 (N=17)	T2, V2 (N=17)
mCEQ	0	0	4[a]	0
Smoking Perceptions	0	0	4[a]	0
CPD	0	0	4[a]	0
Cotinine	0	0	4[a]	4[b]
Quit intention	0	0	4[a]	0
FTND	0	0	4[a]	0

Unfiltered First (N=22)	T1, V1 (N=21)	T1, V2 (N=21)	T2, V1 (N=20)	T2, V2 (N=19)
mCEQ	1[ac]	0	1[ac]	1[ac]
Smoking Perceptions	1[ac]	0	1[ac]	1[ac]
CPD	1[ac]	0	1[ac]	1[ac]
Cotinine	1[ac],1[b]	0	1[ac]	1[ac],4[b]
Quit intention	1[ac]	0	1[ac]	1[ac]
FTND	1[ac]	0	1[ac]	1[ac]

[a]due to drop-out/loss to follow-up/withdrawal; [b]due to COVID protocol adaptation; [c]unique participant

Supplemental Table 2. Study Participant Demographics and Baseline Characteristics

Demographic/Characteristic	Total N =43	Filtered First N = 21	Unfiltered First N = 22
	n (%)	n (%)	n (%)
Age, Mean (SD)	36.7 (9.9)	36.6 (10.6)	36.9 (9.5)
Sex			
Female	18 (41.9)	9 (42.9)	9 (40.9)
Male	25 (58.1)	12 (57.1)	13 (59.1)
Ethnicity			
Not Hispanic / Latino	35 (81.4)	17 (81.0)	18 (81.8)
Hispanic/Latino	8 (18.6)	4 (19.0)	4 (18.2)
Mexican	5 (11.6)	2 (9.5)	3 (13.6)
Puerto Rican	2 (4.7)	1 (4.8)	1 (4.6)
Another Hispanic / Latino origin	1 (2.3)	1 (4.8)	0
Race			
White	30 (69.8)	15 (71.4)	15 (68.2)
Multiple races	5 (11.6)	2 (9.5)	3 (13.6)
Asian American	3 (7.0)	1 (4.8)	2 (9.1)
African American	2 (4.7)	2 (9.5)	0
Native Hawaiian or Other Pacific Islander	0	0	0
American Indian or Alaska Native	0	0	0
Unknown	3 (7.0)	1 (4.8)	2 (9.1)
Education			
High school or below	11 (25.6)	8 (38.1)	3 (13.6)
Some college or technical school	21 (48.8)	7 (33.3)	14 (63.6)
College graduate or above	11 (25.6)	6 (28.6)	5 (22.7)
Income (in $1000s), Mean (SD)	38.7 (35.4)	36.5 (30.4)	41.8 (41.0)
# years smoked cigarettes, Mean (SD)	17.19 (9.6)	17.86 (10.0)	16.55 (9.4)
# days smoked in past 30 days, Mean (SD)	30.00 (0.0)	30.00 (0.0)	30.00 (0.0)
# cigarettes smoked per day, past 30 days, Mean (SD)	14.51 (6.7)	12.10 (5.6)	16.82 (7.0)

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Supplemental Table 3. Full Model: mCEQ questionnaire

Predictors	SS			PR			AV			EN			CR		
	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p	Estimates	CI	p
(Intercept)	3.50	2.97 – 4.03	**<0.001**	3.34	2.76 – 3.92	**<0.001**	1.99	1.41 – 2.57	**<0.001**	3.60	3.03 – 4.18	**<0.001**	4.12	3.50 – 4.73	**<0.001**
Treatment [F v. U]	0.56	0.32 – 0.81	**<0.001**	0.15	-0.06 – 0.37	0.159	-0.28	-0.52 – -0.03	**0.029**	0.52	0.25 – 0.80	**<0.001**	-0.38	-0.70 – -0.06	**0.020**
Arm [FU v. UF]	-0.12	-0.67 – 0.42	0.651	-0.31	-0.95 – 0.33	0.330	-0.02	-0.64 – 0.60	0.948	-0.25	-0.83 – 0.32	0.382	0.21	-0.37 – 0.78	0.478
Visit	-0.08	-0.17 – 0.01	0.085	-0.07	-0.15 – 0.01	0.073	0.01	-0.08 – 0.11	0.782	-0.12	-0.22 – -0.01	**0.028**	-0.16	-0.28 – -0.04	**0.011**
Sequence	0.24	-0.17 – 0.65	0.255	0.16	-0.20 – 0.52	0.385	0.01	-0.40 – 0.43	0.958	0.18	-0.29 – 0.64	0.453	0.73	0.20 – 1.27	**0.008**

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Sex [F v. M]	-0.05	-0.60 – 0.50	0.857	0.08	-0.57 – 0.72	0.813	0.28	-0.34 – 0.91	0.361	-0.21	-0.79 – 0.38	0.477	0.52	-0.06 – 1.11	0.078

Random Effects

σ^2	0.63	0.49	0.65	0.81	1.10
τ_{00}	0.69 $_{ID}$	1.00 $_{ID}$	0.90 $_{ID}$	0.76 $_{ID}$	0.72 $_{ID}$
ICC	0.52	0.67	0.58	0.48	0.40
N	43 $_{ID}$	43 $_{ID}$	43 $_{ID}$	43 $_{ID}$	43 $_{ID}$
Observations	317	317	317	317	317
R^2	0.552	0.680	0.590	0.526	0.432

Note. SS=smoking satisfaction; PR=psychological rewards, AV=aversion, EN=enjoyment of respiratory tract sensation; CR=craving

Supplemental Table 4. Full Model: Single-Item Perceptions Questionnaire

	Addiction			**Taste**			**Harshness**			**Draw**			**Potency**		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	72.87	62.22 – 83.51	**<0.001**	39.50	27.77 – 51.22	**<0.001**	63.59	53.49 – 73.68	**<0.001**	65.83	54.42 – 77.25	**<0.001**	51.70	38.53 – 64.87	**<0.001**
Treatment [F v. U]	0.95	-2.29 – 4.18	0.565	13.33	8.41 – 18.26	**<0.001**	-21.25	-27.00 – -15.50	**<0.001**	-5.10	-11.68 – 1.48	0.128	-14.83	-19.81 – -9.84	**<0.001**
ARM [FU v. UF]	-0.65	-12.84 – 11.55	0.915	-1.36	-13.82 – 11.11	0.827	3.65	-5.28 – 12.57	0.414	1.94	-7.94 – 11.83	0.693	7.22	-7.20 – 21.65	0.318
Visit	-0.43	-1.65 – 0.79	0.484	-1.52	-3.37 – 0.32	0.105	2.58	0.41 – 4.75	**0.020**	-1.96	-4.45 – 0.52	0.120	-0.09	-1.97 – 1.79	0.927
Sequence	-0.15	-5.59 – 5.29	0.957	6.39	-1.86 – 14.63	0.128	-8.39	-18.06 – 1.29	0.089	8.04	-3.06 – 19.14	0.155	1.90	-6.49 – 10.28	0.656

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	Estimate	CI	p	Estimate	CI	p	Estimate	CI	p	Estimate	CI	p	Estimate	CI	p
Sex [F v. M]	4.78	-7.57 – 17.13	0.439	4.10	-8.52 – 16.71	0.515	2.95	-6.07 – 11.97	0.512	-0.65	-10.64 – 9.34	0.896	13.87	-0.74 – 28.47	0.062

Random Effects

σ^2	111.93	256.65	355.66	464.82	266.02
τ_{00}	374.46 ID	370.83 ID	158.15 ID	188.86 ID	508.02 ID
ICC	0.77	0.59	0.31	0.29	0.66
N	43 ID	43 ID	43 ID	43 ID	43 ID
Observations	317	316	317	311	317
R^2	0.773	0.620	0.442	0.295	0.697

Note. Linear mixed-effects model fit by REML with Arm, Visit, Sequence, Treatment and Sex as fixed effects; ID as random effect

Supplemental Table 5: Full Model: Fagerstrom Test of Nicotine Dependence (FTND)

	Score		
Predictors	*Estimates*	*CI*	*p*
(Intercept)	6.72	4.96 – 8.47	**<0.001**
Treatment [F v. U]	0.15	-0.22 – 0.52	0.421
Arm [FU v. UF]	-0.59	-1.29 – 0.11	0.094
Visit	-0.13	-0.27 – 0.00	0.058
Sequence	-0.81	-1.43 – -0.20	**0.010**
Sex [F v. M]	0.81	0.11 – 1.52	**0.025**
Random Effects			
σ^2	1.45		
$\tau_{00\ ID}$	1.07		
ICC	0.42		
N_{ID}	43		
Observations	317		
R^2	0.486		

Footnote. The FTND scale ranges from 0-10 with a higher score indicative of greater nicotine dependence. Model fit using REML with participant ID as a random effect, arm, treatment, visit, condition and sex as fixed effects, compound symmetry correlation structure and degrees of freedom for the factor t-tests were estimated using the Satterthwaite approximation.

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Supplemental Table 6. Full Model: Cigarettes smoked per day

	Cigarettes		
Predictors	*Estimates*	*CI*	*p*
(Intercept)	15.59	12.87 – 18.32	**<0.001**
Treatment [F v. U]	0.66	0.01 – 1.30	**0.047**
Arm [FU v. UF]	-3.45	-6.66 – -0.23	**0.037**
Visit	-0.36	-0.60 – -0.12	**0.004**
Sequence	0.47	-0.62 – 1.55	0.396
Sex [F v. M]	-1.62	-4.88 – 1.64	0.321
Random Effects			
σ^2	4.41		
$\tau_{00\ ID}$	26.58		
ICC	0.86		
N_{ID}	43		
Observations	314		
R^2	0.875		

Footnote. Model fit using REML with participant ID as a random effect, arm, treatment, visit, condition and sex as fixed effects, compound symmetry correlation structure and degrees of freedom for the factor t-tests were estimated using the Satterthwaite approximation
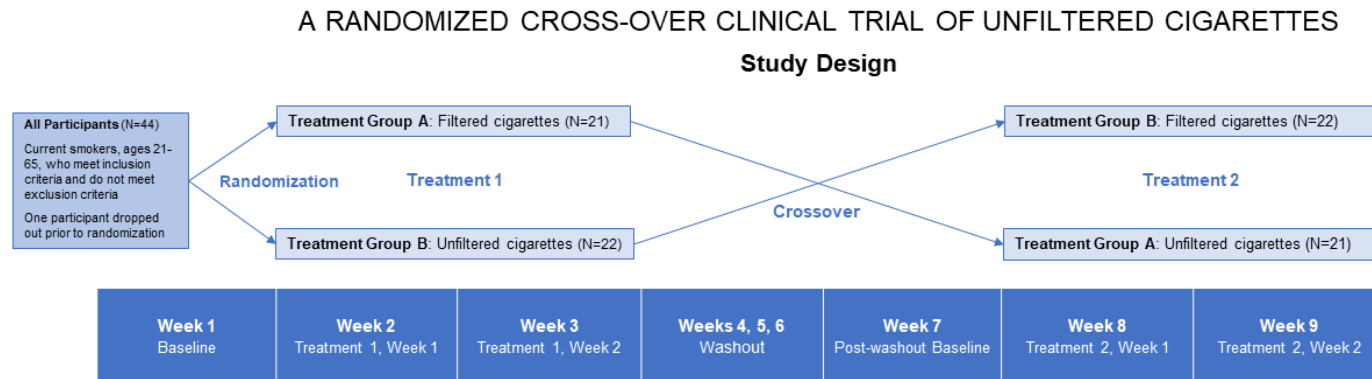
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Supplemental Table 7: Ordinal Logistic Regression Model for Quit Intention

Predictor	Odds Ratio	95% CI	Chi-Square	P-value
Treatment (F v. U)	0.96	0.56 - 1.66	0.02	0.89
Arm (FU v. UF)	4.62	1.48 - 14.47	6.91	0.01
Visit	1.38	1.08 - 1.78	6.49	0.01
Sequence	0.59	0.25 - 1.39	1.45	0.23
Sex (F v. M)	1.89	0.62 - 5.78	1.23	0.26
Quit intention ≥ 3	0.01	0.00 - 0.07	-4.74*	<0.01
Quit intention ≥ 2	0.09	0.02 - 0.40	-3.15*	<0.01
Quit intention ≥ 1	5.82	1.39 - 24.46	2.41*	0.02

The quit intention scale ranges from 1-4 with a higher score indicative of more immediate intention to quit. The ordinal logistic regression is modeling the probabilities of a lower score.
*Z score from GEE

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Supplemental Figure 1. Trial Design

A RANDOMIZED CROSS-OVER CLINICAL TRIAL OF UNFILTERED CIGARETTES

Study Design

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Supplemental Figure 2. CONSORT Diagram of Participant Flow Through Trial

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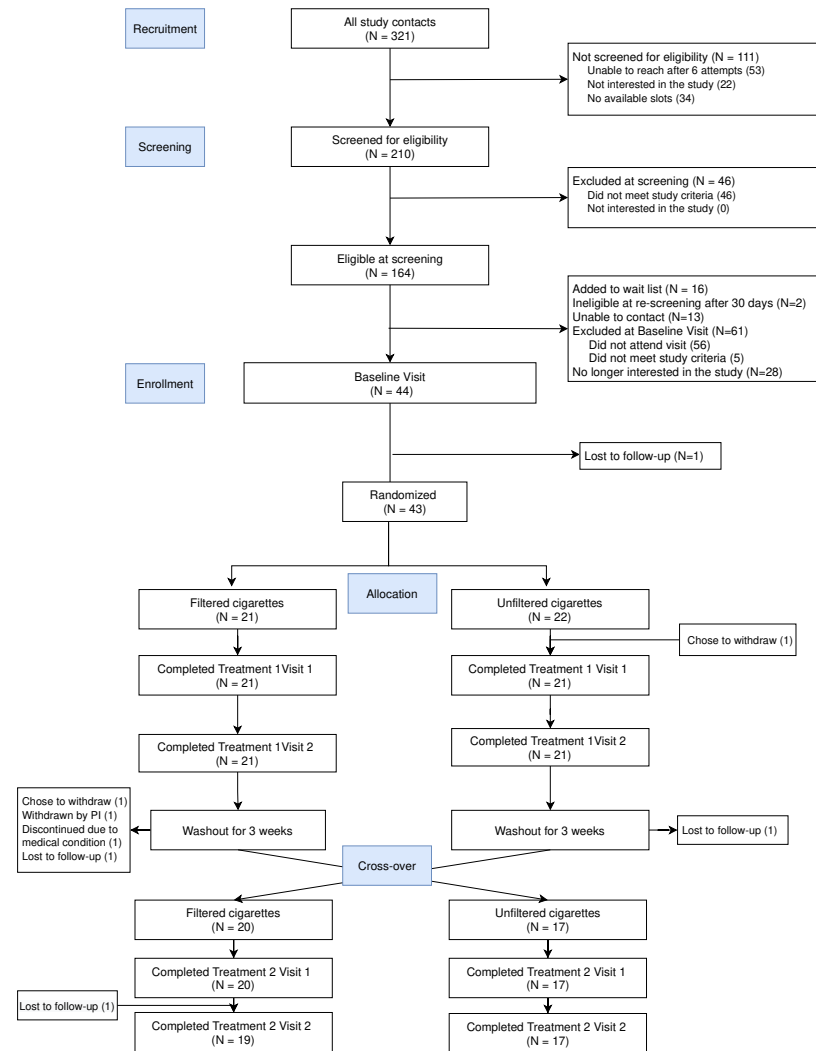
Supplemental Figure 3. Modified Cigarette Evaluation Questionnaire (mCEQ) Model Results

Figure Footnote: The figure displays the estimated coefficients and 95% confidence intervals from the linear mixed effects models for each of the five mCEQ domains. The 'Treatment0' variable corresponds to the comparison between filtered and unfiltered smoking status.

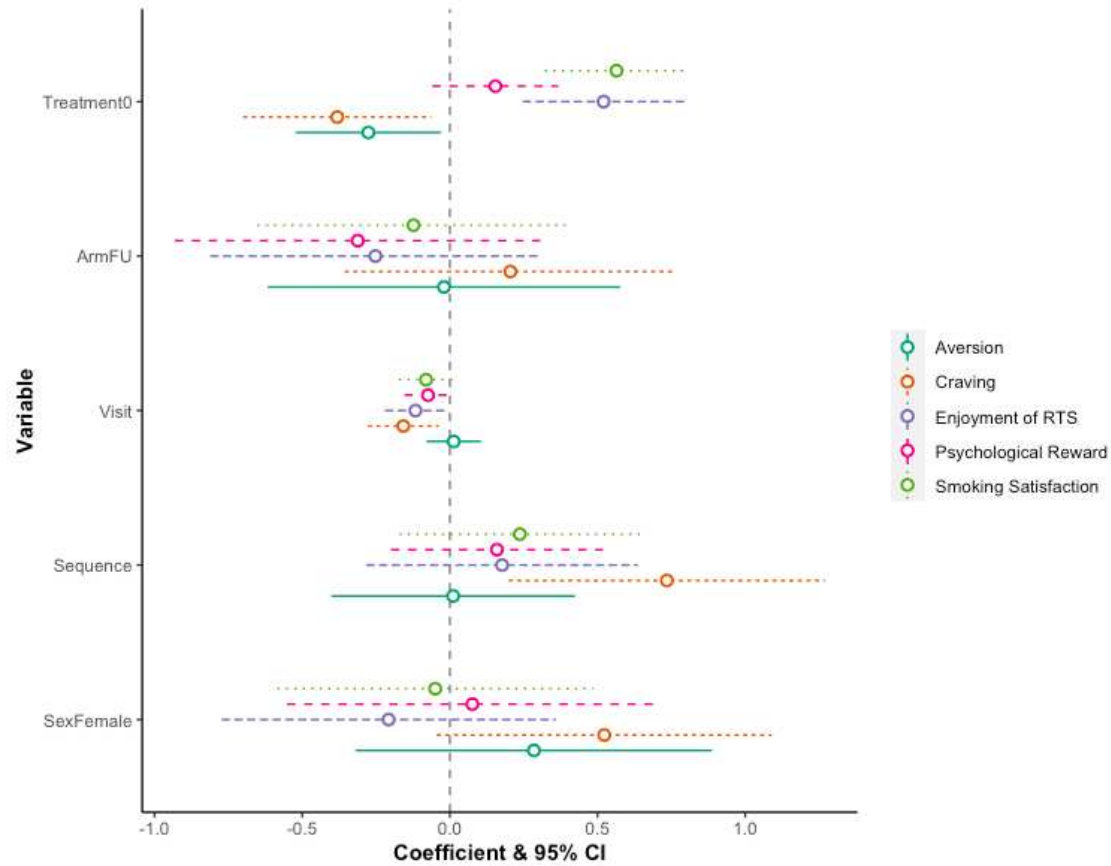Supplemental Figure 4. Cigarette Perception Question Model Results
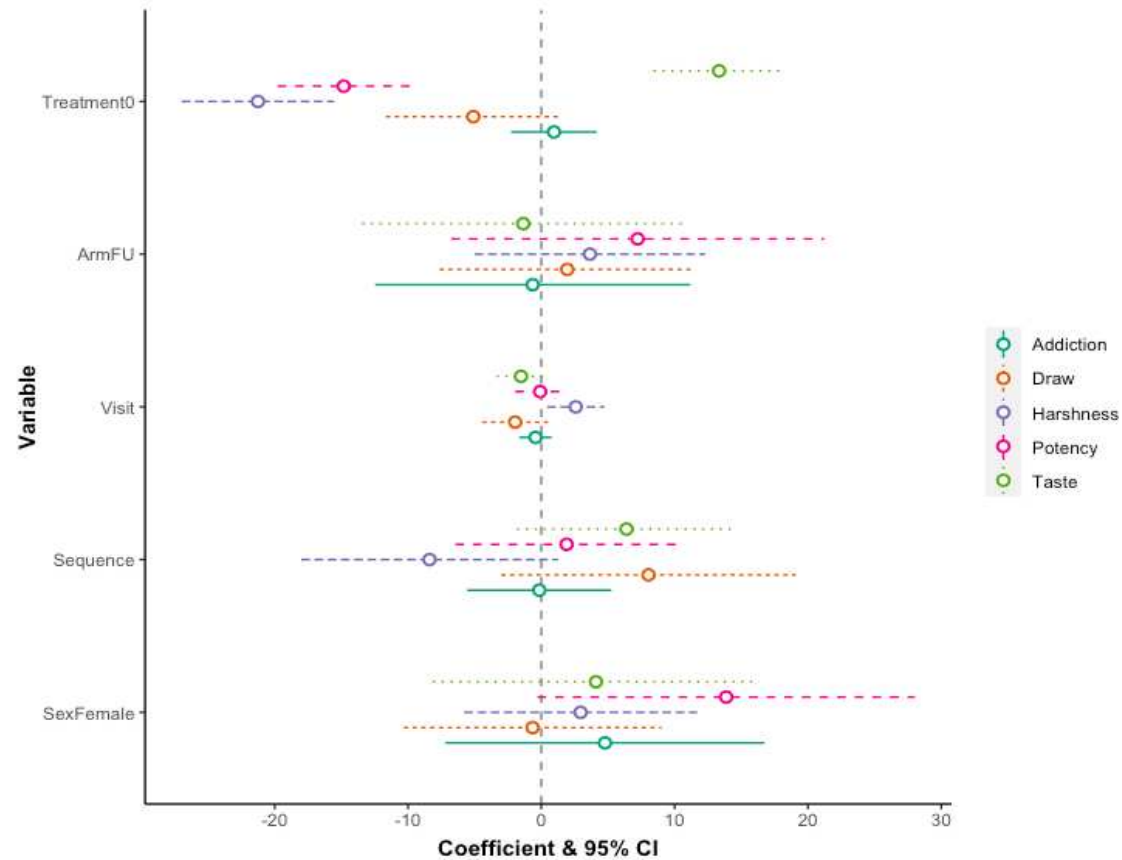

Figure Footnote: The figure displays the estimated coefficients and 95% confidence intervals from the linear mixed effects models for each of the five perception questions. The 'Treatment0' variable corresponds to the comparison between filtered and unfiltered smoking status.

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Supplemental Figure 5. Model Results for Cigarette Consumption and FTND
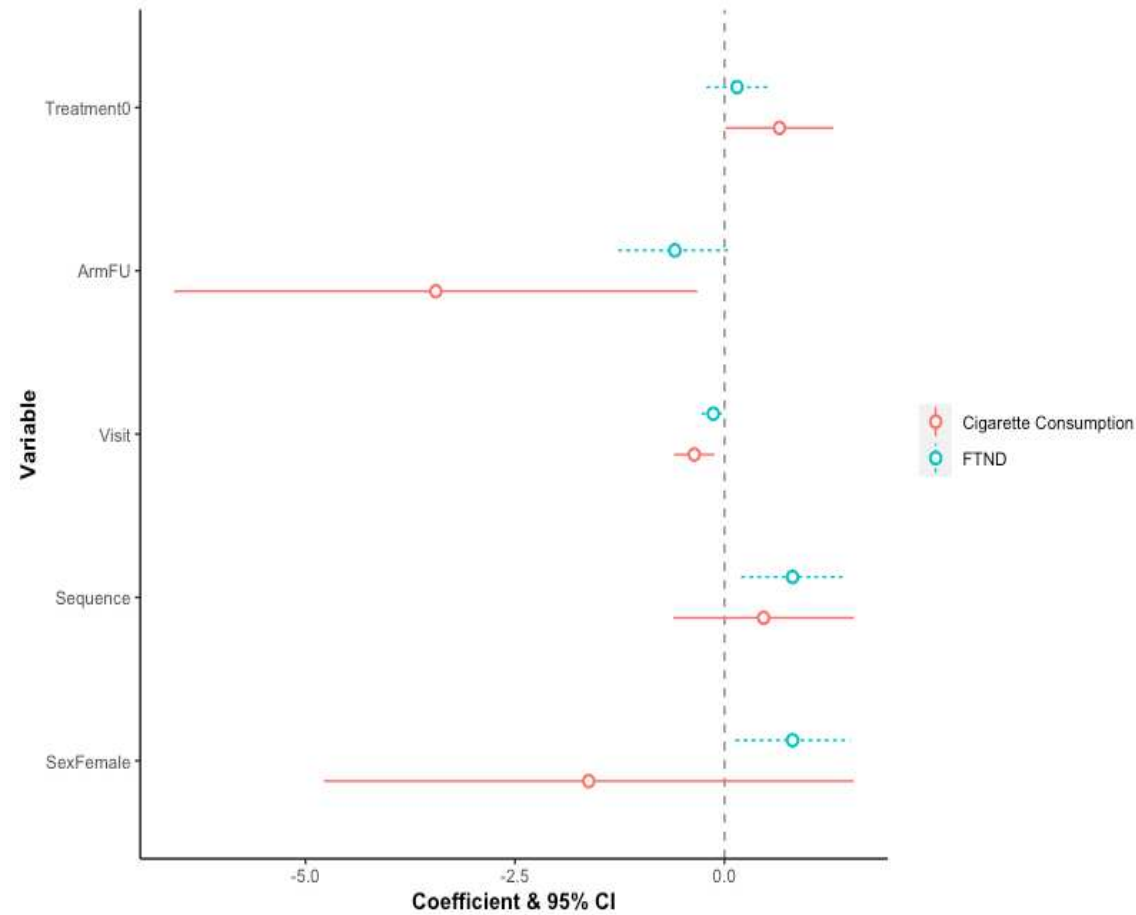

Figure Footnote: The figure displays the estimated coefficients and 95% confidence intervals from the linear mixed effects models for the cigarette consumption and FTND questionnaires. The 'Treatment0' variable corresponds to the comparison between filtered and unfiltered smoking status.