Supplemental Table 1. Component loadings for smokeless tobacco individual conditional risk assessment items following principal component analysis

	Component 1	Component 2	Component 3
Oral and rule-breaking risks			
Upset family	-0.01	**0.36**	-0.06
Mouth cancer	-0.03	**0.42**	0.02
Bad breath	0.05	**0.35**	-0.02
Brown teeth	0.00	**0.39**	0.00
Mouth sores	0.01	**0.37**	0.02
Get in trouble	0.01	**0.30**	0.02
Become addicted	-0.01	**0.33**	0.12
Systemic health risks			
Worse athletic performance	**0.25**	0.10	-0.10
Bad cough	**0.39**	0.01	-0.03
Upset friends	**0.24**	0.10	-0.01
Trouble catching breath	**0.41**	-0.02	0.00
Lung cancer	**0.41**	-0.04	0.01
Start smoking / using dip[1]	**0.28**	0.07	0.02
Heart attack	**0.36**	0.02	0.02
Harm someone nearby	**0.37**	-0.05	0.02
Benefits			
Feel relaxed	-0.08	0.08	**0.43**
Fit in more	-0.05	0.08	**0.46**
Look cool	-0.04	0.05	**0.48**
Feel more alert	0.11	-0.07	**0.41**
Better athletic performance	0.11	-0.20	**0.42**

Table shows component loading (Varimax rotation) for the 3 principal components retained in the analysis (cumulative variance explained: 59.6%). Items were then grouped based on components, groups thematically named, and used to create composite scores for analysis.

Supplemental Table 2. Individual item perception ratings for cigarettes and smokeless tobacco: exploratory analysis

	Cigarette Mean Rating	ST Mean Rating	Product Rated Higher (%)[a]			Both Products Rated As... (%)[b]			
			cigarettes	ST	same	0	< 5	> 95	100
Oral and rule-breaking risks									
Upset family	83.3	78.3	46	23	31	2	3	40	27
Mouth cancer	63.9	74.2	28	59	12	2	4	11	8
Bad breath	77.0	71.3	51	31	17	1	2	20	13
Brown teeth	68.4	72.3	39	47	14	2	3	14	9
Mouth sores	58.6	68.6	30	61	10	2	3	8	6
Get in trouble	71.6	68.0	45	34	22	3	3	22	16
Become addicted	66.8	66.7	48	40	13	2	4	14	8
Systemic health risks									
Worse athletic performance	72.4	55.4	62	24	14	1	3	14	9
Bad cough	71.2	46.4	72	21	8	2	3	8	5
Upset friends	60.2	49.3	58	31	11	3	4	8	5
Trouble catching breath	70.8	46.8	72	21	7	1	2	7	4
Lung cancer	70.5	46.7	70	21	9	2	3	7	4
Start smoking / using dip[c]	57.9	44.8	55	36	9	3	6	6	4
Heart attack	56.5	47.4	54	37	9	3	4	5	3
Harm someone nearby	56.4	35.4	63	25	13	6	8	5	4
Benefits									
Feel relaxed	44.3	47.2	43	48	9	5	8	3	1
Fit in more	24.8	32.4	32	53	15	10	15	1	1
Look cool	21.6	32.6	25	59	17	13	20	2	1
Feel more alert	25.0	30.9	33	53	14	10	15	0	0
Better athletic performance	16.1	23.2	22	57	21	19	28	2	1
Global Rating									
Overall harm	89.6	74.2	65	15	20	0	0	23	18

a. Row percentages may not sum to 100% due to rounding

b.   Reflects percent of respondents giving a rating to both products at or near the minimum (0) or maximum (100) rating

c.   Worded as start smoking cigarettes in smokeless survey questions and as start using dip/chew on cigarette questions

N = 563 to 567 (depending on missing values per item)

Abbreviation: ST = smokeless tobacco

Supplemental Table 3. Cigarette and smokeless tobacco perceived risk and benefit standardized composite scores, according to tobacco use group

	n	Cigarette Score	ST Score	Difference (95% CI)	p-value[a]
Oral and rule-breaking risks					
Total sample	568	69.9	71.4	-1.4 (-3.3, 0.4)	0.13
Never	244	73.7	77.2	-3.4 (-6.3, -0.7)	0.02*
Tried	134	71.4	73.0	-1.6 (-4.6, 1.5)	0.32
Former	24	69.7	73.0	-3.3 (-17.1, 8.9)	0.58
Infrequent	97	68.7	69.5	-0.8 (-4.9, 3.6)	0.81
Non-ST established	17	68.3	66.6	1.7 (-9.3, 12.1)	0.86
Dual established	14	50.2	42.2	8.0 (-12.5, 29.2)	0.43
ST established	38	51.9	45.5	6.4 (-3.9, 18.3)	0.22
Systemic health risks					
Total sample	568	64.5	46.5	18.0 (14.5, 21.8)	<0.001*
Never	244	67.1	54.6	12.6 (8.1, 18.2)	<0.001*
Tried	134	66.0	47.3	18.7 (13.9, 23.6)	<0.001*
Former	24	65.2	43.8	21.5 (9.8, 32.9)	<0.001*
Infrequent	97	63.0	41.2	21.8 (15.3, 28.2)	<0.001*
Non-ST established	17	59.0	43.3	15.7 (0.4, 33.4)	0.044
Dual established	14	52.5	18.6	33.9 (14.8, 54.6)	<0.001*
ST established	38	52.4	19.3	33.1 (22.8, 42.4)	<0.001*
Benefits					
Total sample	568	26.4	33.2	-6.8 (-9.5, -4.3)	<0.001*
Never	244	24.5	27.7	-3.2 (-6.9, -0.3)	0.03*
Tried	134	26.7	34.2	-7.6 (-11.7, -3.1)	<0.001*
Former	24	30.5	36.1	-5.6 (-13.2, 5.8)	0.35
Infrequent	97	26.6	39.3	-12.7 (-18.3, -7.2)	<0.001*
Non-ST established	17	26.5	32.2	-5.7 (-17.0, 4.6)	0.22
Dual established	14	42.2	47.5	-5.3 (-27.5, 14.0)	0.44
ST established	38	28.6	43.0	-14.4 (-22.3, -4.7)	0.01*
Overall harm					
Total sample	565	89.6	74.2	15.3 (12.2, 18.6)	<0.001*
Never	241	92.2	81.7	10.6 (7.1, 15.0)	<0.001*
Tried	132	89.7	76.8	12.8 (6.8, 19.0)	<0.001*
Former	24	89.5	78.1	11.4 (-1.4, 24.1)	0.08
Infrequent	100	88.1	67.9	20.2 (13.5, 25.9)	<0.001*
Non-ST established	17	89.3	76.2	13.1 (4.6, 22.5)	<0.001*
Dual established	14	68.6	31.6	36.9 (14.8, 65.9)	<0.001*
ST established	37	83.8	46.7	37.1 (24.9, 48.0)	<0.001*

Composite scores determined within categories of risks or benefits, as identified by principal components analysis. Higher values indicate greater perceived likelihood of the outcome.

Overall harm was from a single global item. Values adjusted for age, race/ethnicity, parental education, and year survey was taken.

Use group definitions: Never, tried, and former included participants who reported no use of any tobacco product in the past 30 days. Never-users had not tried any tobacco product, even once. Participants who had tried tobacco had ever used ≥1 products but not used any product as many as 20 times. The most commonly tried product was e-cigarettes (52%); the mean number of products tried was 1.9. Former users had used ≥1 products ≥20 times in their life. The most commonly used former product was e-cigarettes (58%). The 4 remaining groups included past 30-day tobacco users. Infrequent users did not use any product as many as 10 days in the month. The most commonly used product (past 30-days) in this group was dip/chew (48%). Non-ST established users used non-ST products frequently (≥10 days/month), but did not use ST in the past 30-days. The most commonly used products (past 30-days) in this group were cigars and e-cigarettes (both 76%). Dual users used both ST and non-ST products in the past 30-days. The most commonly used products (past 30-days) in this group were dip/chew (100%) and cigars (80%). ST established users (n = 38) all used dip/chew ≥10 days in the month and no non-ST product as many as 10 days (71% did not use a non-ST product even once).

    a.   Comparing mean cigarette score to mean ST score

* = Statistically significant after Benjamini-Hochberg correction for multiple testing
Abbreviations: CI = confidence interval; ST = smokeless tobacco

Supplemental Table 4. Cigarette and smokeless tobacco perceived risk and benefit standardized composite scores, according to tobacco use group (complete-case analysis)

	n	Cigarette Score	ST Score	Difference (95% CI)	p-value[a]
Oral and rule-breaking risks					
Total sample	525	70.3	71.7	-1.4 (-3.3, 0.6)	0.17
Past 30-day non-user	372	73.1	75.6	-2.5 (-4.6, -0.5)	0.01*
Past 30-day non-ST user	62	68.5	70.1	-1.6 (-6.6, 2.8)	0.45
Past 30-day dual-user	38	54.3	49.8	4.5 (-4.4, 14.9)	0.33
Past 30-day ST user	53	63.8	61.2	2.6 (-4.7, 11.8)	0.42
Systemic health risks					
Total sample	526	64.5	46.5	18.0 (14.3, 21.8)	<0.001*
Past 30-day non-user	373	66.7	51.3	15.3 (11.7, 19.4)	<0.001*
Past 30-day non-ST user	62	59.5	44.3	15.3 (8.6, 22.3)	<0.001*
Past 30-day dual-user	38	53.9	21	32.9 (21.9, 43.7)	<0.001*
Past 30-day ST user	53	62.7	33	29.7 (18.3, 38.8)	<0.001*
Benefits					
Total sample	527	26.4	32.9	-6.5 (-9.2, -3.8)	<0.001*
Past 30-day non-user	376	25.7	30.4	-4.7 (-7.7, -1.9)	<0.001*
Past 30-day non-ST user	61	26.0	32.7	-6.7 (-12.8, -1.1)	0.02*
Past 30-day dual-user	38	32.9	43.6	-10.7 (-20.3, -1.7)	0.02*
Past 30-day ST user	52	27.2	43.5	-16.3 (-22.6, -8.1)	<0.001*
Overall harm					
Total sample	528	89.4	74.5	15.0 (11.7, 18.2)	<0.001*
Past 30-day non-user	374	91.0	79.8	11.2 (7.9, 14.8)	<0.001*
Past 30-day non-ST user	64	88.8	75.0	13.8 (7.5, 20.7)	<0.001*
Past 30-day dual-user	38	77.3	43.2	34.1 (21.0, 48.0)	<0.001*
Past 30-day ST user	52	87.8	58.4	29.4 (19.8, 37.7)	<0.001*

Composite scores determined within categories of risks or benefits, as identified by principal components analysis. Higher values indicate greater perceived likelihood of the outcome. Overall harm was from a single global item. Values adjusted for age, race/ethnicity, parental education, and year survey was taken. Analysis restricted to observations with complete data on all perception measures and covariates (no imputation).

    a. Comparing mean cigarette score to mean ST score

* = Statistically significant after Benjamini-Hochberg correction for multiple testing

Abbreviations: CI = confidence interval; ST = smokeless tobacco

Supplemental Table 5. Cigarette and smokeless tobacco perceived oral/rule-breaking risks and systemic health risk composite scores, according to tobacco use group

	n	Oral / Rule-Breaking Risks Composite Score	Systemic Health Risks Composite Score	Difference (95% CI)	p-value
Cigarettes					
Total sample	567	69.9	64.5	5.4 (4.1, 6.7)	<0.001*
Past 30-day non-user	401	72.5	66.5	6.0 (4.2, 7.6)	<0.001*
Past 30-day non-ST user	66	67.7	59.0	8.7 (4.5, 7.6)	<0.001*
Past 30-day dual-user	39	54.9	54.3	0.6 (-3.9, 5.4)	0.74
Past 30-day ST user	61	64.8	63.6	1.1 (-3.5, 5.7)	0.60
Smokeless Tobacco					
Total sample	567	71.4	46.5	24.8 (21.9, 27.9)	<0.001*
Past 30-day non-user	401	75.3	51.3	24.0 (20.9, 27.6)	<0.001*
Past 30-day non-ST user	66	70.0	44.0	26.0 (19.9, 32.6)	<0.001*
Past 30-day dual-user	39	49.9	22.1	27.8 (18.0, 37.3)	<0.001*
Past 30-day ST user	61	60.7	33.6	27.0 (19.0, 32.5)	<0.001*

Composite scores determined within categories of risks, as identified by principal components analysis of smokeless tobacco risks. Higher values indicate greater perceived likelihood of the outcome. Values adjusted for age, race/ethnicity, parental education, and year survey was taken. Here, the difference between perceived oral/rule-breaking risks and systemic health risks is larger in regards to smokeless tobacco than cigarettes.
* = Statistically significant after Benjamini-Hochberg correction for multiple testing
Abbreviation: CI = confidence interval