Original investigation

Validation of a Measure of Normative Beliefs About Smokeless Tobacco Use

Sarah E. Adkison MA[1], Richard J. O'Connor PhD[1],
Maansi Bansal-Travers PhD[1], K. Michael Cummings PhD, MPH[2],
Vaughan W. Rees PhD[3], Dorothy K. Hatsukami PhD[4]

[1]Department of Health Behavior, Roswell Park Cancer Institute, Buffalo NY; [2]Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston, SC; [3]Department of Social and Behavioral Sciences, Harvard T. H. Chan School of Public Health, Boston, MA; [4]Department of Psychiatry, University of Minnesota, Minneapolis, MN

Corresponding Author: Sarah E. Adkison, MA, Department of Health Behavior, Roswell Park Cancer Institute, Elm & Carlton Streets, Buffalo, NY 14263, USA. Telephone: 716-845-8304; Fax: 716-845-1265; E-mail: sarah.adkison@roswellpark.org

Abstract

Introduction: Validated methods to evaluate consumer responses to modified risk tobacco products (MRTPs) are needed. Guided by existing literature that demonstrates a relationship between normative beliefs and future intentions to use tobacco the current research sought to (1) develop a measure of normative beliefs about smokeless tobacco (ST) and establish the underlying factor structure, (2) evaluate the structure with confirmatory factor analysis utilizing an independent sample of youth, and (3) establish the measure's concurrent validity.

Methods: Respondents (smokers and nonsmokers aged 15–65; *N* = 2991) completed a web-based survey that included demographic characteristics, tobacco use history and dependence, and a measure of attitudes about ST adapted from the Normative Beliefs about Smoking scale. A second sample of youth (aged 14–17; *N* = 305) completed a similar questionnaire.

Results: Exploratory factor analysis produced the anticipated three-factor solution and accounted for nearly three-quarters of the variance in the data reflecting (1) perceived prevalence of ST use, (2) popularity of ST among successful/elite, and (3) approval of ST use by parents/peers. Confirmatory factor analysis with data from the youth sample demonstrated good model fit. Logistic regression demonstrated that the scales effectively discriminate between ST users and nonusers and are associated with interest in trying snus.

Conclusions: Assessment of MRTPs for regulatory purposes, which allows messages of reduced risk, should include measurement of social norms. Furthermore, surveillance efforts that track use of new MRTPs should include measures of social norms to determine how norms change with prevalence of use.

Introduction

While conventional cigarettes remain the industry's leading tobacco products, numerous noncombusted oral tobacco products have entered the market that pose fewer health risks to users.[1] Some of these products include Swedish-style "snus", a pasteurized form of tobacco packaged in tea-bag like pouches that are typically cheaper than cigarettes (Figure 1). Pasteurization of the tobacco reduces the formation of cancer causing nitrosamines in these products lowering the cancer risk.[2] Snus has been used in Sweden for decades and there is evidence that availability of snus lowers cigarette smoking rates and the occurrence of cancer.[3–7] United States cigarette

Photo by Anthony Brown, Roswell Park Cancer Institute, Buffalo, NY

Figure 1. Example snus packaging with both an intact and deconstructed snus pouch.

manufacturers first introduced snus into the US marketplace in 2006[8]; however, adoption of these products has been very low,[9,10] despite shared branding with dominant cigarette brands (eg, Camel Snus, Marlboro Snus) and significant marketing support.[11] This may be attributable in part to negative perceptions of smokeless tobacco (ST) products generally.[12,13]

In 2009, the Family Smoking Prevention and Tobacco Control Act granted the Food and Drug Administration authority to regulate tobacco products including modified risk tobacco products (MRTPs), defined as tobacco products "… sold or distributed for use to reduce harm and the risk of tobacco-related disease associated with commercially marketed tobacco products."[14] In order for MRTPs to make health-related claims, however, manufacturers must demonstrate to the Food and Drug Administration that the product significantly reduces harm and risk of individual disease, and protects the public health of the population as a whole. This may require demonstration of consumers' responses to product marketing, including how consumers perceive and intend to use the product.

Understanding how consumers perceive MRTPs is important for several key reasons. While those who switch to an MRTP may reduce their individual risk compared with continued use of conventional cigarettes, there also may be the potential for unintended negative consequences of a growing MRTP market. Some potential unintended consequences of wide availability of MRTPs might include uptake of tobacco use among youth and nonusers who would otherwise be dissuaded by health concerns, dual use of MRTPs with conventional products, and delayed cessation among smokers who switch to MRTPs rather than quit. Rees and colleagues,[15] in a review of research methods used to evaluate consumer responses to tobacco products, highlighted the need for "scientifically validated methods" for assessment of consumer responses to MRTPs, as well as strategies to assess public perceptions around other MRTPs, including ST products. Social norms have been demonstrated to be a reliable predictor of behavioral intentions though no measure has been established to evaluate social norms related to ST use.[16] A measure of normative beliefs has successfully been applied to smoking, and there is a substantial body of evidence to support the role of perceived smoking norms in youth initiation—particularly misperceptions of the prevalence of peer smoking.[17–19] In contrast, the influence of social norms on ST use has not been rigorously demonstrated, due in part to limitations in the way normative beliefs about ST use are measured.[13,20] Given that uptake of both smoking and ST use are almost always initiated and established during the adolescent years,[21] it is particularly important to validate a measure for beliefs about ST among youth by demonstrating that the measure reliably differentiates between ST users and nonusers, and is associated with interest in ST product use.

Given ST use and smoking are both ways to self-administer nicotine, and initiation of both appears to be predicted in part by common pathways, including rebelliousness, risk-taking, peer and parent influence, and marketing,[22–24] it is sensible to use normative measures around smoking as a starting point.

Guided by existing literature that demonstrates a relationship between norms and future intentions to use tobacco[25–28] the primary goals for the current research were to (1) develop a measure for normative beliefs about ST and establish the underlying factor structure, (2) evaluate the structure with confirmatory factor analysis (CFA) utilizing an independent sample, and (3) establish the measure's predictive validity by assessing the scales' ability to discriminate between those who do and do not use ST products and express an interest in low-nitrosamine snus among a sample of adolescents.

Methods

Data Collection Procedure

A web-based survey with a consumer panel maintained by Global Market Insite (www.gmi-mr.com/global-panel/index.php) was used to recruit two samples of respondents for this research. The first sample was recruited to evaluate the underlying factor structure and test-rest reliability of the measure. The second sample was recruited to confirm the structure and evaluate the concurrent validity of the measure. Membership in the panel involves a double opt-in process where interested parties complete an online registration form and activate their account by clicking a link via email. The first sample targeted 2000 adults aged 18–65 and 1000 youth aged 14–17 in the United States. After reviewing an emailed statement outlining the risks, benefits, compensation, and confidentiality, adult participants provided informed consent. Parents of youth participants received

the same emailed advice about the study and provided consent. Following this, youth participants provided their assent and completed the survey.

Respondents completed a set of questions about their demographic characteristics, tobacco use history and dependence, and attitudes regarding ST products and were reinvited to complete the survey 3 months later in order to evaluate test-retest reliability. Respondents were compensated with 60 Global Market Insite "marketpoints" for completing the survey at the first administration and 90 Global Market Insite marketpoints at the second administration (20 marketpoints = 1 USD).

A second new sample of participants aged 14–17 (*n* = 305) was recruited using the same procedures and administered a similar questionnaire. Respondents were compensated with 60 Global Market Insite marketpoints. The study protocol was approved by the Institutional Review Board at Roswell Park Cancer Institute, Buffalo, NY.

Measures

Normative Beliefs About Snus

The 11-item Normative Beliefs About Smoking scale[29] captures the multidimensional nature of normative beliefs toward smoking, and is associated with smoking status among youth. The three subscales were adapted to reflect normative beliefs regarding ST including: (1) perceptions of ST use, (2) perceptions of ST use among successful/elite members of society, and (3) subjective normative beliefs that others support or discourage the use of ST. Individual items comprising each scale are outlined in Table 3.

Participant Characteristics

Demographic variables for analyses included age, sex, race, and tobacco use history. Smoking status was divided into four categories including: never-smoker (defined as someone who reported having never taken a puff of a cigarette); former or ever smoker (defined as someone who has reported smoking at some point, but has not smoked in the past 30 days); some day smoker (someone who reported smoking in the past 30 days but not on all days); everyday smoker (defined as someone who reported daily smoking in the past 30 days). ST use history was defined as ever use of any ST product, including dip, moist snuff, or chewing tobacco.

Interest in Trying Snus

To assess the measure's concurrent validity, the sample of adolescent respondents was asked to indicate if they would be interested in trying any of the products they had been exposed to during the survey. Specifically, respondents were asked, "Of all the ads you saw today, which of the products would you be most interested in trying?" (survey respondents were exposed to Camel cigarettes and Camel Snus and were also permitted to select "None"). Those who selected snus were coded as 1; all others were coded as 0 to construct a dichotomous dependent variable for interest in snus. Following product selection, respondents who selected snus or cigarettes were also asked, "How likely are you to purchase Camel Snus in the next month?" on a scale of 0 "No chance, almost no chance" to 10 "Certain, practically certain."

Analyses

Results were analyzed using SPSS 21 and AMOS (IBM, Armonk, NY). Data from the first sample were first evaluated with exploratory factor analysis to determine underlying structure of the data and Cronbach's alpha to assess internal consistency for each scale. The first sample was re-administered the survey and these data were evaluated for factor structure and used to assess test-retest reliability. Test-retest was evaluated with the single measures intra-class correlation coefficient (ICC; two way random effects model per Shrout & Fleiss[30]), where values greater than 0.80 reflected strong agreement, 0.60 reflected good agreement, and 0.40 moderate agreement between the two test administrations.

For the second independent sample of adolescents we evaluated the underlying factor structure with exploratory factor analysis and CFA. Goodness-of-fit for the CFA was assessed using several metrics to evaluate absolute fit and parsimony fit, including the comparative fit index (CFI > 0.95), root-mean-square error of approximation and *P* of Close Fit (RMSEA < 0.08, PCLOSE > 0.05), Standardized RMR (<.09), and minimum discrepancy (CMIN/DF < 3).[31] Logistic regression with "prior ST use" and "interest in snus" as the dependent variables was used to evaluate concurrent validity of the measure. We did not weight the data to match the US population as we are not detailing population estimates.

Results

Demographic Characteristics for Each Sample

Demographic data and tobacco use history for each sample is presented in Table 1. Of respondents from first administration (*N* = 2991; Adults: 1999, Youth: 992) who completed a re-administration 3 months later, 42% (*N* = 1251; Adults: 52.8%, Youth: 19.1%) had complete data at both administrations. Chi-square tests of independence showed that respondents who completed the second administration were more likely to be older adults (X^2 (3, *N* = 2991) = 318.72, *P* < .001), male (X^2 (1, *N* = 2991) = 25.58, *P* < .001), those who reported ever smoking (X^2 (1, *N* = 2991) = 88.67, *P* < .001), and those who reported ever use of ST (X^2 (1, *N* = 2991) = 12.04, *P* < .001).

Exploratory Factor Analysis

The 11-item normative beliefs about ST questions were submitted to exploratory factor analysis with principal axis factoring and promax rotation, to allow for correlated factors. This produced the anticipated three-factor solution and accounted for nearly three-quarters of the variance at each administration reflecting: (1) perceived prevalence of ST use, (2) popularity of ST among successful/elite, and (3) approval of ST use by parents/peers. Eigenvalues, percent variance accounted for, and scale means are presented in Table 2.

Scale Components

Descriptive statistics for each the questions are presented in Table 3. Perceived prevalence of ST use in the United States exceeded actual rates of use in each area assessed (prevalence of use among 8th graders, 12th graders, college students, and in the United States overall), though respondents tended to disagree that ST use was popular among successful/elite members of society and agree that others discourage its use. For the first sample, 7% agreed or strongly agreed that successful business people use (59% disagree or strongly disagree), 8% that cool people use (64% disagree or strongly disagree), 14% that wealthy use (57% disagree or strongly disagree), and 10% of celebrities use ST (54% disagree or strongly disagree). Respondents agreed or strongly agreed that parents (69%), friends

Table 1. Demographic Characteristics for Each Sample

	Sample 1, N = 2991 (%)	Test-retest sample, N = 1251 (%)	Youth sample 2, N = 305 [% (age)]
Sex			
Male	47.1	52.5	52.1
Female	52.9	47.5	47.9
Age (for sample 1 and test-retest)			
14–17	33.3	15.3	22 (14)
18–34	15.8	18.1	22 (15)
35–45	15.5	19.5	31 (16)
46–65	35.5	47.2	25 (17)
Race/ethnicity			
White	68.2	68.9	69.5
Black	11.6	11.4	8.2
Hispanic	12.3	12.1	12.5
Other	7.9	7.7	9.8
Education			
Not in school/did not complete HS	1.3	1.1	—
In grades 8–12	32.7	14.9	—
High school grad	11.0	12.3	—
Some college/technical/associate	27.6	33.6	—
College degree or higher	27.4	38.0	—
Tobacco use status		(T1, T2)	
Ever smoked	55.7	65.8, 70.2	39.0
Among those who reported ever smoking:			
Smoked 100 cigarettes	68.1	73.5, 75.1	57.1
Smoke daily	28.6	31.5, 32.0	43.7
Smoke nondaily	15.5	14.9, 14.5	
Ever used smokeless tobacco	13.1	15.7, 20.4	12.8
Current ST use among ever users			
Every day	10.9	11.0, 9.0	12.8
Some days	26.0	28.1, 28.6	43.6
Not at all	63.1	60.7, 62.4	43.6

HS = high school; ST = smokeless tobacco.

(57%), and people their age (60%) believe it is very important for them not to use ST.

For the second sample, 17% agreed or strongly agreed that successful business people use (58% disagree or strongly disagree), 16% that cool people use (58% disagree or strongly disagree), 21% that wealthy use (57% disagree or strongly disagree), and 19% of celebrities use ST (54% disagree or strongly disagree). Respondents agreed or strongly agreed that parents (79%), friends (64%), and people their age (65%) believe it is very important for them not to use ST.

Internal Consistency and Test-Retest Reliability

Each of the proposed measures had a high degree of internal consistency at each administration (range α: 0.828–0.924). Test-retest reliability and validity for each of the items and total scales was assessed for respondents who had complete data at the first and second administration. The scale for the perceived prevalence of ST had a high internal consistency (T1: α = 0.935, T2: α = 0.939) and demonstrated good test-retest reliability (ICC: 0.718). The scales for popularity of ST among successful/elite elements of society (T1: α = 0.882, T2: α = 0.890) and approval of using ST by parents/peers (T1: α=0.914, T2: α=0.898) had a high internal consistency, though test re-test reliability was moderate (ICC: 0.572 and 0.523, respectively). At the item level, for the prevalence scale, items had ICCs > 0.6 reflecting good test-retest reliability; the successful/elite scale and parents/peers had ICCs > 0.4 reflecting moderate test-retest reliability.

Confirmatory Factor Analysis

CFA with maximum likelihood estimation was employed on the data from the adolescent respondents from the second sample to confirm the three-factor structure. The model proved a moderate fit for the data (CMIN/DF: 2.821, CFI: 0.967, TLI: 956, SRMR: 0.0599, RMSEA: 0.077 PCLOSE, 0.004); however, the absolute fit indices which assesses how well the a priori model fits the data and provide the most meaningful assessment of model fit, RMSEA and SRMR, were near the upper limit. Because the question wording for the perceived prevalence of use questions was extremely similar across each of the items comprising that scale, we next inspected the modification indices and estimated parameter change values to see if correlating error covariances would improve model fit. We correlated the error terms between items 1 & 3 and 1 & 4 which resulted in the following fit: CMIN/DF: 2.696, CFI: 0.971, TLI: 959, SRMR: 0.0593, RMSEA: 0.075 PCLOSE, 0.010. Measurement invariance was assessed and demonstrated that the underlying constructs retained their theoretical structure across sex and tobacco use history.

Concurrent Validity

Univariate analysis of variance was used to assess whether the normative beliefs about ST were able to differentiate between ST users and nonusers. Adolescents who reported using any form of ST at least once previously reported significantly higher perceptions of the prevalence of ST use ($F(1, 303) = 25.968$, $P < .000$, $\eta^2 = 0.079$,

Table 2. Eigenvalues and Variance for Exploratory Factor Analysis

	Administration 1			Administration 1: test-retest sample			Administration 2: test-retest sample			Administration 3		
	N = 2992			N = 1251			N = 1251			N = 305		
	Scale mean	Eigenvalue	% variance	Scale mean	Eigenvalue	% variance	Scale mean	Eigenvalue	% variance	Scale mean	Eigenvalue	% variance
Prevalence	18.51% (16.84)	3.90	35.5	17.08% (16.95)	4.08	37.1	18.16% (18.09)	4.37	39.7	19.24% (17.19)	4.72	42.9
Successful/elite	3.79 (0.89)	2.20	20.0	3.79 (0.92)	2.35	21.4	3.77 (0.95)	2.21	20.1	3.67 (1.08)	1.89	17.2
Parent/peers	2.19 (1.11)	1.66	15.1	2.25 (1.29)	1.70	15.5	2.20 (1.06)	1.58	14.3	1.96 (0.95)	1.24	11.2
Total variance explained	70.5%			73.9%			74.1%			71.2%		

$d = 0.33$), greater use among elite/popular elements of society ($F(1, 303) = 19.767$, $P < .000$, $\eta^2 = 0.061$, $d = 0.74$), and favorable subjective normative beliefs that others support the behavior $F(1, 303) = 10.165$, $P < .002$, $\eta^2 = 0.032$, $d = 0.54$). Furthermore, for the latter two scales, the effect size (Cohen's d) was moderate to large. Finally, we conducted two logistic regressions (see Table 4), (1) to evaluate if scales were associated with reports of prior use, (2) to evaluate if the scales were associated with selecting Camel Snus as the product they were most interested in in trying. Overall, 11.1% of respondents reported an interest in snus.

For the first model, prevalence of use and perceptions that others approve the behavior were associated with prior use. For the second model believing that successful/elite members of society use ST and perceiving significant others do not disapprove of the behavior were significantly associated with interest in trying snus. Increased perceived prevalence of ST was associated with a slight decrease in snus interest. Among the subset of respondents who selected a product ($n = 89$), 46% reported that there was a "Fairly good possibility" to "Certain, practically certain" likelihood that they would purchase Camel Snus within the next month. Each analysis adjusted for sex, age, and race as use rates are known to differ across these demographic characteristics, particularly for ST (www.cdc.gov/mmwr/preview/mmwrhtml/mm6325a3.htm).

Discussion

MRTPs, including certain ST products, may present a harm reduction option for those who are unable to achieve abstinence from tobacco altogether. However, potential MRTPs must be rigorously evaluated prior to entering the market, to ensure that Food and Drug Administration requirements for individual risk and population harm reduction are met. Such evaluation requires assessment of consumer perceptions of marketing and intended use. Social norms surrounding ST may contribute to consumer perceptions and intention to use these products, yet no validated measures which allow evaluation of this association have been previously published. The current study sought to adapt the Normative Beliefs for Smoking Scale[29] to reflect normative beliefs for ST use in order to develop an initial metric of perceived norms to begin to fill this research gap. Data from this study showed that the Normative Beliefs for Smokeless Tobacco Use scales were reliable and demonstrated concurrent validity in terms of discriminating between ST users and nonusers and was associated with interest in trying snus.

These data provide evidence of reliable and potentially valid measures to predict the uptake of ST/snus that could be easily incorporated into ongoing surveillance studies to predict future trends in the use of ST/snus. Additionally, the scale described in this study could potentially be adapted for use in predicting the use of other types of tobacco products such as cigars, hookah, and e-cigarettes. Because social norms surrounding the use of different tobacco products may shift over time, having measures that could be used to predict future market trends would be helpful. In addition, having reliable and valid measure of social norms of tobacco products would be valuable for investigating how different features of product marketing such as product packaging, claims, descriptors, and health warnings influence consumer product perceptions.

The findings showed that increased perceptions of the prevalence of ST was associated with prior ST use, but was also associated with a decreased interest in trying snus. This may indicate that those who have tried ST products in the past may not be interested in trying

Table 3. Descriptive Statistics for Each of the Items at Each Survey Administration

	Scale range	Sample 1 Mean (SD)	Test-retest sample Mean (SD)	Sample 2 Mean (SD)
Perceived prevalence of ST use				
In your opinion…				
What percentage of all people in the US use…	1–100	25.82 (19.05)	23.93 (19.46)	24.70 (19.74)
What percentage of 12th graders in the US use…	1–100	16.95 (18.80)	16.75 (19.74)	18.64 (19.46)
What percentage of 8th graders in the US use…	1–100	10.70 (16.63)	11.89 (18.59)	12.28 (18.14)
What percentage of college students in the US use…	1–100	20.50 (19.94)	20.09 (20.81)	21.32 (18.94)
Use among successful/elite				
Most successful business people use smokeless tobacco at least once a month	1–5	3.83 (1.012)	3.83 (1.05)	3.72 (1.22)
In general, more "cool" people use smokeless tobacco than "uncool" people	1–5	3.91 (1.05)	3.86 (1.12)	3.75 (1.22)
Wealthy people are more likely to use smokeless tobacco than poor people	1–5	3.73 (1.12)	3.71 (1.13)	3.62 (1.21)
My favorite celebrities probably use smokeless tobacco at least once a month	1–5	3.71 (1.046)	3.69 (1.08)	3.59 (1.22)
Approval of smokeless tobacco use by parents/peers				
According to my parents, it is very important for me not to use smokeless tobacco	1–5	1.98 (1.24)	2.04 (1.18)	1.69 (1.06)
According to my friends, it is very important for me not to use smokeless tobacco	1–5	2.29 (1.23)	2.27 (1.17)	2.11 (1.17)
According to most people my age, it is very important for me not to use smokeless tobacco	1–5	2.28 (1.19)	2.28 (1.14)	2.08 (1.06)

1 "strongly agree" to 5 "strongly disagree". ST = smokeless tobacco.

Table 4. Normative Beliefs of Smokeless Tobacco Use Associated With Prior Use/Predict Interest in Snus

		Prior ST use			Interest in snus		
		OR	95% CI	95% CI	*OR*	95% CI	95% CI
		Exp(B)	LB	UB	Exp(B)	LB	UB
Ever use ST	Yes (12%)	—	—	—	8.20***	2.44	27.53
Ever smoke	Yes (39%)	34.43	8.08	146.66	2.37	0.74	7.63
Normative	Prevalence of use	2.39**	1.38	4.125	0.532*	0.29	0.987
Beliefs	Elite/popular elements	0.861	0.51	1.44	2.209**	1.26	3.88
	Favorable norms	1.071*	1.009	2.67	1.83**	1.15	2.92

CI = confidence interval; Exp(B) = Exponentiated beta; LB = lower bound; *OR* = odds ratio; ST = smokeless tobacco; UB = upper bound. Models adjust for sex, age, and race; normative belief scales coded such that higher scores indicate increased perceived prevalence and use of ST and favorable norms regarding ST use. Prevalence is based on a five-point scale with a one-unit increase associated with a 20% increase in prevalence.
*$P < .05$; **$P < .01$; ***$P < .001$.

snus. One possibility is that prior users had a negative experience with ST and therefore have no interest in future use of similar products. Alternatively, it may be that prior users may have negative perceptions of snus, viewing it as "wimpy" compared with conventional ST products or simply have no interest in trying a new form of ST. If the latter is true, it may be necessary to develop measures that that are product specific (eg, what percent of the US population used snus in the past 30 days vs. what percent of the US population used ST in the past 30 days) to ensure the measure is adequately evaluating the intended target.

Interestingly, these data showed that the subscale assessing perceptions of use among the elite/popular was associated with an interest in trying snus, but not associated with actually having previously used ST. It is possible that use among elite/popular is especially relevant for nonusers who may show interest in trying these products in the future.

This may be of particular importance and highlight an area where youth education programs may develop strategies that deliver accurate data regarding the prevalence of ST products, and tobacco products generally. Similar to perceptions of the prevalence of smoking, perceptions of the percent of people who use ST are much higher than actual use. Such a program may result in reduced uptake over time. Future research should also conduct prospective studies to evaluate if perceptions of ST products are associated with actual product uptake.

We acknowledge that there are a few limitations with the current research that should be considered when interpreting the results. First, this study utilized a web-based panel which limits the generalizability of findings to the broader population. Second, we were only able to evaluate interest in trying snus with a single question targeting interest generally but not actual intention to use the product in some defined time frame (eg, intend to us in the next 6 months). While interest in

trying a product is likely correlated with intention to use a product we did not assess intention to use in a defined time frame. Future research would benefit from evaluating actual intention to use snus. Thirdly, we do not have long-term prospective data on the actual uptake of ST/snus, so we are unable to examine in this study predictive validity of future uptake of ST as predicted by responses to the perceived norms scales. Future studies will need to test the predictive validity of the Normative Beliefs for ST use scale on actual uptake of ST.

A forth limitation of the present study is that the independent sample used to confirm the structure of the data included only adolescents, so we are unable to affirm that this measure would be effective for understanding normative beliefs about ST products for adult respondents. However, because concern exists regarding uptake among youth, and a recent longitudinal study shows increased smoking initiation among adolescent snus users, these data provide an initial metric for understanding why adolescents may or may not demonstrate interest in MRTPs.[32] Finally, we did not provide respondents with a time frame in which to make their prevalence estimates which may have introduced some error. It is possible that some interpreted the question to mean ever use, current use (daily or nondaily), or current daily use. Indeed, there were large differences in prevalence estimates regarding use of ST on each of the items measured between the first and second sample, and both samples provided estimates much higher than current data support. In 2013, the year this survey was completed, the Monitoring the Future survey showed that 30-day prevalence rates of ST use was 2.8% and 8.1% for 8th and 12th graders, respectively and the Centers for Disease Control Prevention estimates that prevalence of use for adults was 3.6% in 2012. It is unclear why the second sample had substantially higher prevalence estimates than the first, though the factor structure was upheld in each sample.

Social norms surrounding snus have the potential to shift over time should products be permitted to market themselves explicitly as less harmful alternatives. Evaluation of these products by the Food and Drug Administration as MRTPs is needed to communicate reduced risk and reduced harm messages in advertising and marketing messages, potentially increasing use. Ongoing surveillance efforts such as PATH (https://pathstudyinfo.nih.gov/) that track usage of various tobacco products should consider adding measures of social norms surrounding the use of those products, to determine if such views change with time, particularly as newer products gain in popularity.

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Declaration of Interests

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