7.5.7-2: UPDATE – CONSUMER PERCEPTIONS - LITERATURE SUMMARY

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ATP	alternative tobacco products
BTI	brief tobacco intervention
C-F	comparative framing
CI	confidence interval
LNST	low nitrosamine smokeless tobacco
MCDA	multicriteria decision analysis
MRTP	modified risk tobacco product
NHC	Negative Health Consequences
NRT	nicotine replacement therapy
OTP	other tobacco product
OR	odds ratio
PATH	Population Assessment of Tobacco and Health
PHR	perceived health risk
PR	positive reinforcement
S-F	similarity framing
SD	standard deviation
SE	standard error
SEM	standard error of the mean
ST	smokeless tobacco
TNCP	tobacco- and nicotine-containing product
TSNA	tobacco-specific nitrosamines
U.S.	United StatesPERCEPTIONS LITERATURE REVIEW

7.5.7-2. LITERATURE REVIEW ON CONSUMER PERCEPTIONS

The United States (U.S.) Food and Drug Administration's Modified Risk Tobacco Product Application 2012 Draft Guidance Section V (A) (4) requires that applicants evaluate:

- "[t]he ability of consumers to understand the modified risk claims and the significance of the information in the context of one's health;
- [c]onsumers' beliefs about the health risks of using the product relative to other tobacco products, including those within the same class of products;
- [c]onsumer beliefs about the risks of using the product relative to quitting all tobacco use;
- [c]onsumer beliefs about the health risks of using the product relative to cessation aids."

The intent of this literature review is to summarize information regarding consumer perceptions of smokeless tobacco (ST).

7.5.7-2.1. Literature Search and Review Process

A comprehensive literature review was conducted in December 2014 that reviewed the health and behavioral effects of ST (Section 7.5.1), and literature summaries were drafted in areas that are important in the assessment of a modified risk tobacco product (MRTP) candidate. A second literature review was conducted for the period of December 08, 2014, to February 06, 2017, to update the original search. During the new search, 1,029 citations were identified, and, after applying predetermined inclusion and exclusion criteria, 165 articles were deemed to be in-scope. In general, the in-scope articles were peer-reviewed and included ST products commercially available in the U.S. A keyword assignment exercise was performed to determine how many of those articles provide additional information about consumer perceptions of ST. A summary of the 34 articles identified is provided in Table 7.5.7-2-1, and the results can largely be grouped into three categories: perceptions of the health risks of ST (Section 7.5.7-2.2), interest in and reasons for trying ST (Section 7.5.7-2.3), and perceptions of the prevalence of ST (Section 7.5.7-2.4).

This section is intended to supplement the previous literature review (Section 7.5.7-1) to provide a current, updated literature review of perceptions of ST.

7.5.7-2.2. Perceptions of Health Risks Associated with Smokeless Tobacco Use

A multicriteria decision analysis was generated by an international expert panel convened by the Independent Scientific Committee on Drugs (Nutt et al., 2014). The panel considered 12 tobacco products and defined 14 harm criteria (seven criteria represented harm to the user, while the other seven represented harm to others). All products were then scored by the panel (on a scale of 0 to 100) on each criterion. The overall weighted score of cigarette was 99.6, whereas snus was 5. Both unrefined ST (contains higher levels of nitrosamines than refined ST) and refined ST scored below 15.

The studies examined for this review have found both adults and adolescents to have misperceptions about the relative harm of various tobacco products (Borgida et al., 2015). Expectedly, studies have found that people from different age groups and with different tobacco product use statuses have different perceptions about health risks of ST products. Some studies suggest that current or former users of ST are more likely to perceive ST as less harmful or less addictive than cigarettes, compared with people who have never used ST (Amrock et al., 2016; Little et al., 2016; Persoskie, Nguyen, Tworek, & Kaufman, 2017; Persoskie, O'Brien, Nguyen, & Tworek, 2017; Rodu, Plurphanswat, Hughes, & Fagerstrom, 2016). In contrast, in one study, smokers perceived snus to be more risky than e-cigarettes (Banerjee, Greene, Li, & Ostroff, 2016) and, in another study, felt that cigarettes and ST only posed different risks to each (e.g., overall, one was not necessarily safer than the other) (Wackowski, Lewis, & Delnevo, 2016). Representative studies performed among subjects in different age groups and with different tobacco-use statuses are discussed below.

Amrock et al. (2016) performed a study based on the 2012 and 2014 National Youth Tobacco Survey (NYTS) among U.S. middle and high school students. Regarding health risks compared with those of cigarettes, 13.0% of surveyed adolescents believed that ST is less harmful, 32.0% believed ST is equally as harmful, 19.4% believed ST is more harmful, 3.2% were unaware of ST, and 32.5% believed that they did not know enough to have an opinion. Regarding addictiveness compared with that of cigarettes, 8.6% of surveyed adolescents believed that ST is less addictive, 38.7% believed ST is equally addictive, 14.0% believed ST is more addictive, 3.2% were unaware of ST, and 35.5% did not believe they knew enough to have an opinion. Another study was performed among youth aged 12 to 17 years by Persoskie et al. (2017). The study was based on the Wave 1 of the Population Assessment of Tobacco and Health survey that was conducted between September 2013 and December 2014. It included direct (i.e., subjects explicitly compare the harmfulness of each product) and indirect (i.e., subjects rate the harmfulness of each product separately, and ratings are compared) measures of perceived harm of ST compared with cigarettes. Subjects were more likely to rate ST products as less harmful than cigarettes on an indirect measure (29.7%) than on a direct measure (11.7%). Additionally, they were more likely to rate ST harm as about the same as cigarette harm on the indirect measure (63.0%) than the direct measure (53.8%). Subjects who rated ST as less harmful than cigarettes in the direct measure category were more likely to be past 30-day-ST users than those who gave any other response. In the indirect measure category, subjects who rated ST as less harmful than cigarettes were more likely to be past 30-day-ST users than were participants rating ST as harmful as cigarettes.

Couch et al. (2016) interviewed 55 male students (32 ST ever-users) at three rural California high schools. The authors reported that ST users and nonusers had similar ST-related perceptions, including: that ST is a common, normative way of life in rural culture among certain groups; that ST use conveys oral health risks; and that the decision to use is based on personal preference. ST users' and nonusers' perceptions were different with regard to the immediacy, severity, and inevitability of health risks (particularly when compared with those associated with cigarette smoking), perceived parental permissiveness, and the expected social benefits of ST use, such as peer acceptance and conveying maturity. ST users highlighted the social benefits of ST use, while acknowledging, but discounting, health risks.

A study to examine risk-perception responses among young U.S. adults, aged 18 to 34 years, was conducted with data from the 2011 National Young Adult Health Survey (Wackowski & Delnevo, 2016). Of respondents, 23.8% were current smokers and 3.6% were current ST users. Among all subjects, between 22% and 32% of them believed that ST and snus were more risky than cigarettes. Among subjects who were in the 18- to 24-year age group, 7.4% and 11.0% believed that ST and snus, respectively, are less risky than cigarettes, whereas 38.6% and 24.4% of them perceived that ST and snus, respectively, are more risky than cigarettes. Among subjects who were in the 25- to 34-year age group, 6.9% and 9.3% of them thought that ST and snus, respectively, are less risky than cigarettes, whereas 26.9% and 20.7% of them perceived ST and snus, respectively, are more risky than cigarettes.

Another study among young adults aged 18 to 29 years was performed by Mays et al. (2016) from 2012-2013 National Adult Tobacco survey data to characterize openness to using tobacco products. Among all subjects, 8.3% were open to using chew, snuff, and dip (an additional 5.9% were current users); 11.1% were open to using snus (an additional 2.2% were current users); and 1.5% were opened to using dissolvables (an additional 0.1% were current users). Current smokers, former smokers, and noncurrent ever-smokers were significantly more likely to report openness to using chew, snuff, dip, and snus (all ps < 0.001). Receipt of tobacco industry promotions was associated with significantly higher odds of openness to using chew, snuff, dip, and snus (all ps < 0.001).

Choi et al. (2017) performed a study based on data collected annually during 2010-2013 from the Minnesota Adolescent Community Cohort, when subjects were aged 21 to 29 years. During the 2011 to 2012 and 2012 to 2013 survey periods, these young adults were slightly more likely to be aware of snus and were slightly more likely to have ever used snus than the young adults in the 2010 to 2011 survey period (all $p < 0.05$; except for the comparison of snus use between 2011-2012 and 2010-2011). Additionally, they were more likely to believe that snus is less harmful than cigarettes in 2012-2013 when compared with 2010-2011 ($p < 0.05$).

Macy et al. (2016) performed a longitudinal study to identify tobacco-use trajectories from adolescence to midlife and test correlates of trajectory group membership among all male subjects that reported cigarette smoking or ST use in 1987, 1993, 1999, 2005, or 2011. The authors categorized ST users into four ST trajectory groups: early onset, then cessation (20.8%); consistent abstinence from ST (38.6%); late onset, escalating (10.9%); and consistent regular (29.7%). The consistent regular trajectory group had significantly higher scores that reflected pro-ST beliefs and more positive beliefs in ST when compared with the consistent abstinence from the ST group and the late-onset, escalating groups (all ps < 0.05).

Finally, Czoli et al. (2016) performed a systematic review of published literature through October 2014 and identified 83 samples from 30 studies that compared the relative risk perceptions of ST and cigarettes. The authors reported that "[t]he proporation of respondents who correctly perceived [ST] to be less harmful than [combustable cigarettes] ranged from 2% to 29% for direct measures, and from 41% to 59% for indirect measures."

Studies of tobacco interventions, of information sessions, and of exposures to health warnings demonstrated a clear ability of educational materials and programs to change perceptions of the risks of ST and other tobacco products (Borgida et al., 2015; Little et al.,

2016). Borgida et al. (2015) showed that, after being presented with information about the constituents of ST, subjects increased their knowledge that toxicity contributes to disease risk while nicotine contributes to addiction; ST products vary in their levels of nicotine and toxicity; and cigarettes and ST are more toxic than nicotine replacement therapy. Similarly, after a brief tobacco intervention, Little et al. (2016) demonstrated that both tobacco users and nontobacco users significantly increased their perceived harm of several tobacco products, including cigarettes, ST, and snus, when compared with their perceived harm before the intervention (all ps < 0.0001).

Banerjee et al. (2016) conducted a study among young U.S. adults (n = 1,051, aged 18-24 years), of whom 50% were cigarette smokers at the time of the study, to examine product-related perceptions and the effects in e-cigarette and snus advertisements of comparative framing (C-F; i.e., advertisements highlighting differences between the advertised product and conventional cigarettes and/or ST) versus similarity framing (S-F; i.e., advertisements highlighting congruence with conventional cigaretes and/or ST) . Exposure to e-cigarette advertisements was more persuasive than exposure to snus advertisements. Advertisment perceptions and credibility, product appeal, and product use intentions were more positive or higher, and absolute and comparative risk perceptions lower, in current cigarette smokers than former or never-smokers. Perceptions of e-cigarette C-F advertisements among study participants were more favorable and their credibility greater than e-cigarette S-F advertisements, snus C-F advertisements, and snus S-F advertisements. For absolute risk perceptions (rated on a scale of 1 to 5, with 5 indicated the highest level of risk), results indicated that, for snus, there was no difference in perceived risk between never–cigarette smokers (mean = 4.18, standard error [SE] = 0.04) and former cigarette smokers (mean = 4.17, SE = 0.07), but, for e-cigarettes, never-smokers (mean = 3.53, SE = 0.04) perceived higher absolute risk compared with former smokers (mean = 3.25, SE = 0.08). Current cigarette smokers, on the other hand, reported the lowest absolute risk perceptions for snus (mean = 3.81, SE = 0.04) and e-cigarettes (mean = 2.90, SE = 0.05), although they perceived snus to be more risky than e-cigarettes.

In another assessment of U.S. adult ST users' responses after exposure to ST health warnings, Agaku et al. (2016) performed a study among past 30-day ST users (n = 1,626) with data from the 2012-2013 National Adult Tobacco Survey. Among the subjects, 77.5% reported exposure to ST health warnings. About 73.9% of subjects who were exposed to ST health warnings reported thinking about the health risks of ST and 17.1% reported stopping ST use on more than one occasion within the past 30 days. Exposure to ST warnings was associated with perceived ST harmfulness (adjusted odds ratio = 2.16, 95% confidence interval: 1.15-4.04).

Furthermore, Rodu et al. (2016) exposed adult daily smokers (n = 4,324), daily ST users (n = 1,033), daily users of other tobacco products (n = 1,205), former tobacco users (n = 726), and triers or never-users (n = 5,915) to one of four current warnings (mouth cancer, gum and tooth, addictive and not–safe-alternative) and two proposed relative-risk labels for snus ("No tobacco product is safe, but this product presents lower risks to health than cigarettes," or "No tobacco product is safe, but this product presents substantially lower risks to health than cigarettes."). More than 80% of smokers who viewed one of the current warnings reported that these warning were believable, while approximately 60% reported that the proposed

labels were believable. Additionally, approximately 90% of smokers perceived that snus is harmful. Compared with cigarette smokers, a smaller percentage of ST users believed the current warnings (73% to 79%), a higher percentage believed the proposed labels (70% to 72%), and a smaller percentage perceived snus as harmful (78% to 89%). Of former users, 80% to 97% thought that the current warnings were believable, while 62% to 67% of them thought that the proposed labels were believable. Most former users (94% to 98%) also thought that snus is harmful. Never-users were more likely to believe the current warnings (73% to 85%) than the proposed labels (48% to 49%) and most thought that snus is harmful (over 90%).

7.5.7-2.3.Interest In and Reasons for Trying Smokeless Tobacco

One study found that, overall, there is low interest in snus among youth and adults. Adkison et al. (2016) conducted a web-based survey among adolescents (n = 116, aged 14-17 years), young adults (n = 463, aged 18-34 years), and older adults (n = 596, aged 35-65 years) in 2014 to evaluate the applicability of the ST Expectancies Questionnaire to snus and to examine association of the questionnaire results with interest in using snus. As part of the study, subjects were shown advertisements for cigarettes and snus and then asked which of the products they would be most interested in trying: cigarretes, snus, or neither. The selection of snus as the product that respondents were most interested in trying was low (adolescents: 16%, young adults: 19%, older adults: 15%); those who were least interested were predominantly adolescents who had tried ST and adults who reported current ST use.

A study performed by Banerjee et al. (2016) among U.S. adults in 2014 (methodology described in Section 7.5.7-2.2) showed that there was no difference in product use intentions (measured on a scale from 1 to 7, with 7 indicating the highest likelihood of future use) after exposure to e-cigarette (mean = 1.55, SE = 0.06) versus snus advertisements (mean = 1.47, SE = 0.06) for never-smokers. For former smokers, those exposed to e-cigarette advertisements reported higher product use intentions (mean = 2.20, SE = 0.12) than those exposed to snus advertisements (mean = 1.59, SE = 0.12). Similarly, for current smokers, those exposed to e-cigarette advertisements reported higher product use intentions (mean = 4.00, SE = 0.07) than those exposed to snus advertisements (mean = 2.56, SE = 0.07).

In several studies, commonly cited reasons for trying snus and other ST products were as an alternative to cigarettes to try to cut down on smoking cigarettes and/or to cope with smoking restrictions (Ambrose et al., 2015; Burris et al., 2016; Dunbar, Shadel, Tucker, & Edelen, 2016). Other reasons given for interest in ST products were that they can be used discreetly and that they reduce health risks to others by avoiding second-hand smoke (Ambrose et al., 2015; Couch et al., 2016; England et al., 2016). Additionally, based on interviews with 55 male students (32 ST ever-users) at three rural California high schools, Couch et al. (Couch et al., 2016) found that there was an association between ST use and a rural or “country” way of life. Finally, Meier et al. (2016) conducted a study in 543 adult cigarette smokers who had no interest in quitting in the next month. Subjects were randomly assigned to either receive or not receive free snus by mail to sample ad libitum for 6 weeks, and subjects in the snus group were labeled as either never-users, experimenters, or persistent users based on how frequently they used snus during the study. Compared with that for experimenters, a higher

proportion of persistent users reported that snus provides equal or better relief from withdrawal, reduction of cravings, ease of use, satisfaction, and liking relative to cigarettes (all ps < 0.05).

Among younger individuals, flavor also appeared to be a reason for trying snus. In an experimental study of a small sample of young adults who have never used tobacco, participants tended to increase their beliefs that snus pouches taste good after trying a pouch (Ozga, Felicione, Elswick, & Blank, 2016). However, none of the participants reported use of snus up to three months after completion of the study. Ozga et al. did not examine the effects of specific flavorings, whereas another study in youths suggested that flavoring may be a reason for trying snus (Ambrose et al., 2015).

7.5.7-2.4. Perceptions of Prevalence of Smokeless Tobacco Use

Current product users tended to perceive a higher prevalence of use. In two studies of Texas youths, dual- or polytobacco-product users perceived a higher prevalence of ST use among their peers compared with nonusers of tobacco products (Cooper, Case, Loukas, Creamer, & Perry, 2016; Cooper, Creamer, et al., 2016). Similar results were obtained in a longitudinal study of males from the Midwestern United States, wherein adolescents who eventually became regular users of ST thought that the prevalence of ST use was higher than did those who abstained from ST use (Macy et al., 2016).

7.5.7-2.5. Updated Findings

Information on consumer perceptions of ST in the updated literature review are consistent with those seen in the initial literature review. Although the conclusions from the initial literature review (Section 7.5.7-1) have not changed, the updated literature review provides new evidence that tobacco interventions, information sessions, or exposures to health warnings changed perceptions of the risks of ST and other tobacco products.

A tabular summary of the perceptions literature review is presented in Table 7.5.7-2-1.

Table 7.5.7-2-1: Literature Review for Perceptions of Smokeless Tobacco

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Choi et al., 2017)	Trends in awareness, use of, and beliefs about electronic cigarette and snus among a longitudinal cohort of US Midwest young adults	Data were from the Minnesota Adolescent Community Cohort Study, collected when subjects were 21-29 years old. The data used were collected in 2010-2011 (n = 2,622, 47.3% male, 89.4% non-Hispanic white, mean age = 24 y), 2011-2012 (n = 2,550, 47.6% male, 89.3% non-Hispanic white, mean age = 25 y), and 2012-2013 (n = 2420, 46.8% male, 90.0% non-Hispanic white, mean age = 26 y). This is a longitudinal study. Objective: To assess the trends in awareness and use of as well as beliefs about e-cigarettes and snus among a cohort of young adults from the U.S. Midwest.	Awareness and use of e-cigarettes and snus were assessed over time. Subjects who were aware of e-cigarettes or snus were also asked about their beliefs (about the health risks and addictiveness) related to e-cigarettes or snus, respectively. Demographic information was also collected for covariate analysis.	Among those who were aware of snus, there was a slight but nonsignificant increase over time in subjects believing that snus helps people quit smoking and is less harmful than cigarettes. The proportion of the sample believing snus is less addictive than cigarettes slightly decreased over time ($p < 0.05$). "Among those who had heard of snus, young adults in our sample were more likely to agree that snus is less harmful than cigarettes in 2012-2013 when compared to 2010-2011 ($p < 0.05$)."	Strengths: The study is a longitudinal study that followed beliefs about ST products over time. Limitations: (1) Attrition among the study subjects may have introduced bias into the findings; (2) The U.S. Midwest sample in this study limits the ability to generalize the findings to young adults in other U.S. regions; and (3) data for 2014 and later, which may be more relevant in a rapidly changing tobacco-use environment, were not available

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Couch et al., 2016)	Smokeless tobacco decision-making among rural adolescent males in California	Individual, in-person interviews were conducted with a sample of 55 male high school students (mean age 16.5 ±0.8 y, 69.1% white) at three rural California high schools selected for their rural location, for offering football or agriculture classes, and for having school administration support. In this study, ST is defined as dip (moist snuff) or chewing tobacco. Objective: To describe rural California adolescent males' perceived ST acceptability, health risks, and social implications and how these perceptions differ between ST users and never-users.	Subjects were classified into four use categories: never-users, experimenters, former-users, and current-users of ST. Subjects were asked open-ended questions about ST awareness, experiences, future intentions, and perceptions of product appeal, social norms, health risks, and acceptability. Questions about ST use patterns, initiation experiences, and changes in use over time were asked of current users, former users, and experimenters. Similarities and differences across user groups were identified.	"[Subjects] overwhelmingly related ST use with a rural or country way of life." "Family ST use contributed to familiarity and acceptance, reducing barriers to ST experimentation." "… social acceptance frequently motivated ST trial and continued use." Relaxation or stress relief was another reasons for use. "Adolescents were highly aware of health and addiction risks associated with ST." "Despite near-universal admission that ST is not harmless, many ST-users framed ST use as an alternative to cigarette smoking with a greatly reduced risk of systemic disease" "Reducing health risks to others by avoiding second-hand smoke was also frequently mentioned." "Many ST-users viewed health risks as distant in time and avoidable, for example, by quitting before health effects can occur."	Limitations: (1) The study had a very small sample size derived from schools of a particular type, and so the generalizability of the findings is limited; (2) The study was qualitative, relying entirely on responses from study subjects, and the authors did not perform any form of quantitative or statistical analyses in comparing ST user groups.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Persoskie, Nguyen, et al., 2017)	Criterion validity of measures of perceived relative harm of e-cigarettes and smokeless tobacco compared to cigarettes	This study analyzed data from the 2015 National Cancer Institute's Health Information National Trends Survey, a nationally representative, cross-sectional mail survey assessing health-related beliefs and behaviors. The overall weighted response rate was 33%: a total of 3,738 individuals (49.1% male, mean age 47.2 ±0.13 y) returned eligible surveys. Objective: To compare the construct validity of direct and indirect measures of perceived relative harm of e-cigarettes and ST compared with cigarettes.	The study analyzed data regarding tobacco-use status (ever-trying e-cigarettes, ever-trying snus, and current ST use) and direct and indirect measures of perceived relative harm of e-cigarettes and ST relative to cigarettes. Questions that explicitly asked people to compare one product (e-cigarettes or ST) with another (cigarettes) were direct measures of relative harm. Questions that asked people to rate products separately were indirect measures of relative harm. These ratings were then compared by the researchers.	"People were less likely to rate [ST] as less harmful than cigarettes on the direct measure (11.0%; 95% CI=9.2–12.7) than on the indirect measure (25.5%; 95% CI = 22.7–28.4)… People rating [ST] as less harmful than cigarettes on the direct measure were more likely to also do so on the indirect measure (47.9% vs. 22.8%), OR=3.11, 95% CI=1.98–4.91, p < 0.0001…" "People who rated [ST] as less harmful than cigarettes on the direct measure were 1.99 times more likely to have tried snus (17.9% vs. 9.0% [p = 0.025]), and those who rated [ST] as less harmful on the indirect measure were 1.60 times more likely to have tried snus (13.6% vs. 8.5% [p = 0.050])." "People who rated [ST] as less harmful than cigarettes on the direct measure were more likely to have used [ST]: They were 3.2 times more likely to be current [ST] users (6.8% vs. 2.1% [p < 0.050]) and 2.2 times more likely to be former [ST] users (13.6% vs. 6.2% [p < 0.050])."	Strengths: The use of nationally representative data supports the generalizability of the results. Limitations: (1) The items used in the indirect analysis consisted of only three response items (not at all, moderately, or very harmful), and providing additional options may have allowed for finer expressions of perceived harm. (2) This study used a 2-level coding of perceived harm ("less harmful" vs. any other option) rather than a 3-level coding (less, equally, or more harmful), which prevented distinguishing between subjects who rated products as equally vs. more harmful than cigarettes.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Persoskie, O'Brien, et al., 2017)	Measuring youth beliefs about the harms of e-cigarettes and smokeless tobacco compared to cigarettes	Data from the Population Assessment of Tobacco and Health Study, a nationally representative, longitudinal study of tobacco use and health were analyzed. Data were from 13,651 youths (51.3% male, 54.2% non-Hispanic white, age 12-17 y [mean age 14.5 y]) and collected during Wave 1 in 2013-2014 in subjects' homes using audio computer-assisted interviews. Objective: To compare the validity of direct and indirect measurement approaches for perceived relative harm of e-cigarettes and ST compared with cigarettes in a nationally representative sample of U.S. youth.	The study analyzed data about awareness of cigarettes, e-cigarettes, and ST, and use of the latter two products (by subjects grouped as never-user, non-past–30-day users, and past 30-day users), and direct and indirect measures of perceived relative harm of e-cigarettes and ST relative to cigarettes. Questions that explicitly asked people to compare one product (e-cigarettes or ST) with another (cigarettes) were direct measures of relative harm. Questions that asked people to rate products separately were indirect measures of relative harm. These ratings were then compared by the researchers.	Subjects were more likely to rate ST as *less harmful* than cigarettes on an indirect measure (29.7%, 95% CI: 28.5%–30.9%) than on a direct measure (11.7%, 95% CI: 11.0–12.5%). In addition, subjects were more likely to rate ST as *more harmful* than cigarettes on a direct measure than on an indirect measure. On the direct measure of perceived relative harm, "[subjects] rating [ST] as less harmful than cigarettes were more likely to be past 30-day [ST] users than were [subjects] who gave any other response." On the indirect measure of perceived relative harm, "[subjects] rating [ST] as less harmful than cigarettes were more likely to be past 30-day users and non-past-30-day users than were [subjects] rating [ST] as *About the same* as cigarettes, but did not significantly differ from [subjects] who gave other responses."	Strengths: The use of nationally representative data supports the generalizability of the results. Limitations: (1) The items used in the indirect analysis consisted of only five response items (no harm, little harm, some harm, a lot of harm, or do not know), and providing additional options may have allowed for finer expressions of perceived harm; (2) in addition, the perceived harm measures did not specify the frequency or intensity of product use to be assessed; and (3) measures were based on single items that asked about global harm in general.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Adkison, Bansal-Travers, et al., 2016)	Application of the Smokeless Tobacco Expectancies Questionnaire to snus	Data from a web-based, opt-in panel of 116 adolescents (14-17 y, 52.6% male, 70.7% white), 463 young adults (18-34 y, 50.1% male, 69.8% white), and 596 older adults (35-65 y, 55.0% male, 81.4% white) were collected via a 10-item Snus Expectancies Questionnaire and questions about interest in trying snus in the next month. Objective: To evaluate the applicability of the ST Expectancies Scale Questionnaire to snus.	Confirmatory factor analysis was performed for the latent factor structure for PR and NHC associated with snus use within each age group. The data were analyzed for perceptions of snus PR and NHC and interest in trying snus based on tobacco-user status (non-user, smoker, ST user) or age group.	The interest in trying snus was low among all age groups (16% adolescents, 19% for young adults, and 15% for older adults). In adolescents, ever-users of ST reported lower scores on the NHC scale than never-users (6.61 versus 8.39, respectively). "… we observed low level interest in snus among all age groups and tobacco-user statuses, with the majority of interest among those who [already] use [ST]."	Limitations: (1) The sample group was taken from a web-based, opt-in panel and might not represent the population as a whole, therefore limiting the generalizability of the results. (2) The study does not have prospective data to evaluate if product expectancies are associated with future use.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Adkison, O'Connor, et al., 2016)	Validation of a measure of normative beliefs about smokeless tobacco use	Data from 2,991 smokers and nonsmokers (15-65 y; 47.1% male; 68.2% white) were collected from a web-based survey. A second sample of 305 youths (14-17 y; 52.15% male; 69.5% white) were given a similar survey. Objective: To develop and validate a measure of normative beliefs about ST.	Survey data included demographic characteristics, tobacco-use history and dependence, and a measure of attitudes about ST. The Normative Beliefs about Smoking scale was adapted to evaluate normative beliefs about ST: (1) use in general, (2) use among the successful/elite, and (3) approval of use by parents/peers. The data were analyzed for normative beliefs about snus, subject characteristics, and interest in trying snus, accounting for tobacco-use status.	The perceived prevalence of ST use in the U.S. among 8th graders, 12th graders, college students, and the entire population (10%-26%) exceeded actual rates of use, but respondents tended to disagree that most successful/elite people use ST and to agree that parents, friends, and peers would disapprove of ST use. Increased perceptions of the prevalence of ST use was associated with prior ST use ($p < 0.01$), but was also associated with a decreased interest in trying snus ($p < 0.05$). Believing that successful/elite members of society use ST was associated with an interest in trying snus ($p < 0.01$).	Limitations: (1) The study utilized a web-based panel, which limits the generalizability of findings to the broader population; (2) The study only evaluated a general interest in trying snus, not an actual intention to use the product within some defined time frame; (3) Likewise, the study does not have long-term prospective data to evaluate if perceived social norms regarding snus are associated with future use; and (4) Since the independent sample used to confirm the structure of the data included only adolescents, the authors were unable to affirm that the measure would be effective for understanding normative beliefs about ST products for adult subjects.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Agaku et al., 2016)	Exposure and response to current text-only smokeless tobacco health warnings among smokeless tobacco users aged ≥ 18 years, United States, 2012-2013	Data from the 2012-2013 National Adult Tobacco Survey, a national random-digit–dialed landline and cellular telephone survey of 60,192 adults aged ≥18 y. As part of the survey, past-30-day ST users (n = 1,626, 93.7% male, 72.3% non-Hispanic white) were asked to self-report if they saw warnings on ST packages. This is a cross-sectional study. Current users of ST were defined as those who had met a specified lifetime use threshold for chewing tobacco/snuff/dip (≥20 times) and snus (≥1 time), and who now used the product every day, some days, or rarely. Objective: To assess the effectiveness of existing ST health warnings on eliciting cognitive and behavioral responses among U.S. adult ST users.	Self-reported cognitive (thinking about health risks of ST use) or behavioral (stopping ST use) response to ST health warning labels within the past 30 days was assessed. Association between ST health warning exposure (warnings seen "Very often," "Often," "Sometimes," "Rarely," or "Never") and perceptions of ST harmfulness and addictiveness was also assessed.	Of past 30-day ST users, 77.5% reported exposure to ST health warnings. Exposure to ST health warnings decreased linearly with reducing education and annual household income (all ps < 0.01). The majority (73.9%) of past 30-day ST users reported thinking about the health risks of ST, and 17.1% reported stopping ST use on at least one occasion within the past 30 days. Exposure to ST warnings was associated with perceived ST harmfulness but not with perceived ST addictiveness.	Strength: The study used nationally representative data. Limitations: (1) Retrospective self-reporting may have been subject to habituation, recall bias, or misclassification of exposure from alternative sources, or alternative time-windows. The limited number of questions assessing only certain constructs of interest and response options were collapsed. (2) The temporal sequence between exposure and some outcomes could not be established because of the cross-sectional design. (3) The relatively low survey response rate (44.9%) might have resulted in nonresponse bias, even after adjustment for nonresponse.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Amrock et al., 2016)	Perceptions of e-cigarettes and noncigarette tobacco products among US youth	Data from the 2012 and 2014 National Youth Tobacco Survey, a repeated cross-sectional survey of Grades 6 to 12 students, were used. Data from 22,007 students in 2014 and 24,658 students in 2012 were included in this study. Types of ST asked about in the questionnaire included chewing tobacco, snuff, dip, and snus. Objective: To provide an updated analysis on youth perceptions of relative harm and addictiveness of multiple noncigarette products, including a novel analysis of how such perceptions may have changed over time.	This study determined correlates of perceptions of harm and addictiveness of e-cigarettes, cigars, and ST compared with cigarettes. Additionally, self-reported use of and exposure to tobacco products were assessed.	Regarding health risks compared with those of cigarettes, 13.0% of surveyed adolescents believed that ST is less harmful, 32.0% believed ST is equally as harmful, 19.4% believed ST is more harmful, 3.2% were unaware of ST, and 32.5% believed that they did not know enough to have an opinion. Regarding addictiveness compared with that of cigarettes, 8.6% of surveyed adolescents believed that ST is less addictive, 38.7% believed ST is equally addictive, 14.0% believed ST is more addictive, 3.2% were unaware of ST, and 35.5% did not believe they knew enough to have an opinion. Perceptions of decreased harm and addictiveness were associated with use of the product or cohabitation with someone who uses the product. "Of all products, use of [ST] most markedly increased the likelihood of perceiving that that product was less harmful than cigarettes among the study's sample."	Strengths: Data were from a large, nationally representative sample of youths. Limitations: (1) The repeated cross-sectional survey design prevents inferences about causality and full differentiation between possible underlying period, age, or cohort effects; (2) Data rely on self-reporting; (3) There are no data regarding individual changes in perception over time. Questions assessing risk were not consistent within the survey across years and tobacco products. Survey assessments were based on comparative perceptions of the products, as opposed to perceptions of each product alone; (4) Potential influential socioeconomic factors such as household income were not available in the data sets analyzed.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Banerjee et al., 2016)	The effect of comparatively-framed versus similarity-framed e-cigarette and snus print ads on young adults' ad and product perceptions	A total of 1,051 U.S. young adults (age 18-24 y, 24% male, 69.3% white) from existing consumer panels were recruited in a within-subjects quasi-experiment. Half of the subjects were ever-smokers (n = 524) and the other half were nonsmokers (n = 527). Among ever-smokers, 137 were former smokers, and 387 were current smokers. Of the 1,051 subjects, 384 had ever used an e-cigarette, and 83 had ever used snus. Objective: To examine the effects of C-F versus S-F in advertisements for e-cigarette and snus on young adult smokers' and nonsmokers' ad- and product-related perceptions.	Each subject viewed four online ads, varied by advertised tobacco product type (e-cigarette or snus) and ad framing (C-F or S-F), then completed several assessments about attitudes toward the ad and the product portrayed in it. The primary study measurements were ad perceptions, ad credibility, absolute and comparative risk perceptions, product appeal, and product use intentions.	"Former and current smokers rated C-F ads as more persuasive than S-F ads, as evidenced by favorable ad perceptions and high product use intentions." Exposure to e-cigarette ads was more persuasive (for each of the dependent variables) than exposure to snus ads ($p < 0.01$). Current smokers had more positive ad perceptions, ad credibility, product appeal, and product use intentions; and lower absolute and comparative risk perceptions as compared with those of former or never-smokers ($p < 0.01$). "For absolute risk perceptions, results indicated that for snus, there was no difference in perceived risk between never cigarette smokers … and former cigarette smokers … Current cigarette smokers … reported the lowest absolute risk perceptions for both snus … and e-cigarettes …, albeit they perceived snus to be more risky than e-cigarettes."	Limitations: (1) Of the survey subjects, 76% were female, a proportion that is not reflective of the national population nor tobacco users. (2) This study used online convenience sampling, which limits the generalizability of the findings to all young adults. (3) The study is not well controlled due to quasi-experimental design that limited the control over stimuli (the ads) because original ads were used instead of manipulating ads for consistency. (4) The study did not control for brand and current e-cigarette and snus use status of subjects, which may have modified the findings. (5) The study did not follow the subjects longitudinally to explore the longer-term influence of ads on tobacco-use behaviors. (6) The study was based on self-reporting.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Burris et al., 2016)	A longitudinal, naturalistic study of U.S. smokers' trial and adoption of snus	Subjects (n = 626, mean age 48.7 y, 30.0% male, 85.5% non-Hispanic white) were U.S. adult smokers who denied intention to quit in the next month. Camel snus was used in this longitudinal study. Objective: To advance the current literature via a detailed description of snus uptake during a longitudinal study with adult U.S. smokers who denied intention to stop smoking in the near future.	Subjects were offered free snus for 6 weeks and then were advised to quit all tobacco use; subjects were then followed for 1 y via phone call. During follow-up assessments, subjects were asked to provide information about their tobacco use for snus and cigarettes. If snus use was indicated, subjects were asked about the reasons for the snus use.	Among subjects who reported current snus use, 79.3% said snus use functioned at least once as an alternative to smoking, and 58.4% said it functioned at least once as a method of coping with smoking restrictions. Among those who used snus exclusively, it was more likely to be used as an alternative to smoking (71.6%) than as a means of coping with smoking restrictions (28.4%). A higher perceived likelihood of using LNST to reduce smoking increased the odds of snus trial (OR = 1.78, 95% CI: 1.24, 2.55; $p < 0.01$) and frequent use (OR = 1.45, 95% CI: 1.06, 1.99; $p < 0.05$). A higher perceived likelihood of using LNST to cope with smoking restrictions increased the odds of frequent use of snus (OR = 1.28, 95% CI: 1.01, 1.64; $p < 0.01$).	Limitations: (1) Females and white, non-Hispanic males were over-represented in the study sample relative to the U.S. population. (2) The study only offered a single snus product, and it is possible the product's features influenced study outcomes. (3) The study population was limited to smokers who reported little-to-no interest in smoking cessation, and therefore the generalizability of the study is limited to smokers who are not motivated to quit.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Cooper, Case, et al., 2016)	E-cigarette dual users, exclusive users and perceptions of tobacco products	Subjects were 13,602 students (50.1% male, 43.9% non-Hispanic white) in Grades 6 through 12 attending public schools in Texas. Data were drawn from the 2014 Texas Youth Tobacco Survey, wherein subjects were recruited based on school participation. This is a cross-sectional study. ST products investigated included chewing tobacco, snuff or dip, and snus. Objective: To examine Texas adolescents' harm perceptions of various tobacco products and perceived peer use of e-cigarettes based on usage group.	Subjects completed surveys on paper or online during class time. Pairwise differences were examined among four usage groups (noncigarette and non–e-cigarette users, cigarette-only users, e-cigarette–only users, and dual users) about their demographic characteristics and tobacco-use behaviors. Pairwise differences were examined among the four usage groups about harm perceptions of various tobacco products and alcohol use as well as perceptions of peer use of tobacco products. Differences in cigarette and e-cigarette harm perceptions by usage group were examined.	Nonusers of tobacco were significantly more likely to rate all tobacco products and alcohol use as more harmful than the dual-user group ($p < 0.001$). The e-cigarette–only group perceived cigarettes, chew, and snus as more harmful than the dual-user group ($p < 0.001$).	Limitations: (1) The cross-sectional design precludes causal inferences about the findings. (2) The study subjects are limited to Texas youth, and the results therefore may not be generalizable to populations outside of the sample.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Cooper, Creamer, et al., 2016)	Social norms, perceptions and dual/poly tobacco use among Texas youth	This study is a cross-sectional analysis of baseline data collected from Texas middle school and high school students by the Texas Adolescent Tobacco and Marketing Surveillance system during the 2014-2015 academic year. Tobacco-use behaviors were assessed among 6th (32.2%), 8th (34.7%), and 10th (33.1%) grade students (n = 3,907, 51.1% male, 27.9% non-Hispanic white/other). Objective: To assess risk perceptions and social norms about tobacco use among adolescent nonusers of tobacco, single-product users, and dual/polyproduct users.	The survey included questions specific to demographic information, tobacco-use behaviors (nonusers, single-product users, and dual/polyproduct users), cognitive and affective factors (perceptions of harm), social norms, and self-reported exposure to tobacco marketing.	Dual/polyproduct users perceived that more of their close friends use ST than nonusers perceived ($p < 0.001$). Dual/polyproduct users were more likely than nonusers to think it is okay for people their age to use ST ($p < 0.001$). Dual/polyproduct users (26.48%) and single-users (14.85%) were more likely than nonusers (7.06% to report that ST is not at all harmful ($p < 0.001$). Dual/polyproduct users (69.39%) and single-users (72.60%) were more likely than nonusers (51.93%) to report that ST is not at all addictive ($p < 0.001$). "Few differences were seen between dual/poly-product users and single-product users in their perceptions of harm and addictiveness [of tobacco products]."	Strengths: The study uses a large cohort. Limitations: Since analyses were based on cross-sectional data, causal relationships between social norms and perceptions and use of tobacco products cannot be inferred.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Czoli et al., 2016)	How do consumers perceive differences in risk across nicotine products? A review of relative risk perceptions across smokeless tobacco, e-cigarettes, nicotine replacement therapy and combusitble cigarettes	A literature search through MEDLINE and PsycINFO on articles published up to October 2014 was performed. ST products examined include chew, dip, snuff, snus, and dissolvables. The authors employed a search strategy built on three concepts: risk, perception, and nicotine products. Measures of relative risk perceptions were extracted from identified studies. Objective: To systematically review literature regarding relative risk perceptions across noncombustible tobacco products.	Results were analyzed through the narrative synthesis approach by categorizing them by product comparisons across nicotine product classes. Within every product comparison, relative risk perceptions were examined overall, in general samples, in smokers, and in users of noncombustible nicotine products. Findings were examined overall across all samples and stratified by the sampling method. Findings were also examined with respect to whether they accurately reflected the epidemiological continuum.	Fifty-four studies from 55 articles were selected out of 5,266 records. Of these, there were 83 samples in 30 studies of relative risk perceptions of ST compared with combustible cigarettes, of which 77 were observational samples. Among observational study samples overall (n = 77), 18% reported that a majority of respondents perceived ST to be less harmful than cigarettes and 13% reported equal risk. Among samples of general population (n = 20), 20% reported a majority of respondents perceived ST to be less harmful and 20% reported equal risk. Among samples of smokers (n = 38), 13% reported a majority of respondents perceived ST to be less harmful and 11% reported equal risk. Among samples of ST users (n = 13), 38% reported a majority of respondents perceived ST to be less harmful and 15% reported equal risk. "The proportion of respondents who correctly perceived [ST] to be less harmful than [combustible cigarettes] ranged from 2% to 29% for direct measures, and from 41% to 59% for indirect measures." "…using the direct measure, 22% of respondents reported that snus was less harmful than [cigarettes]…however, using indirect measure, 52% respondents rated snus as less harmful than [cigarettes]…"	Limitations: (1) "…given the heterogeneity of studies with respect to quality, populations, policy contexts and measures included in this review, readers should interpret the findings with care: although the findings provide a summary of relative risk perceptions across products, additional research is needed to examine these factors' influence in greater detail." (2) "…due to the fact that the descriptive analyses conducted here depend in part on the epidemiological evidence base of the risks of non-combustible nicotine products, the findings are relative to this evidence base and the product market at this point in time, and may change as these elements evolve."

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Dunbar et al., 2016)	Use of and reasons for using multiple other tobacco products in daily and nondaily smokers: Associations with cigarette consumption and nicotine dependence	The study utilized data from the RAND Patient Reported Outcomes Measurement Information System Smoking Initiative. Subjects were current adult smokers who had smoked for at least a year, had smoked in the past 30 days, and had no plans to quit within the next 30 days. Subjects included 656 daily smokers (mean age 48.61 ±10.85 y, 46.25% male, 61.59% white) and 203 nondaily smokers (mean age 43.85 ±12.07 y, 55.67% male, 44.55% white). This was a cross-sectional study. ST use included snus, dissolvables, and snuff/chew. Objective: To examine the ways in which cigarette consumption and nicotine dependence among current daily and nondaily smokers are associated with (1) likelihood of OTP use, (2) number of different types of tobacco products used, and (3) reasons for OTP use.	The association of smoking status with OTP use (ever-use and current use) and reasons for use were assessed. Within each smoking group, the associations of OTP use and reasons for use with cigarette consumption and nicotine dependence were assessed.	Nondaily smokers were significantly more likely than daily smokers to report ever-use of any OTP (OR = 1.72, 95% CI: 1.20, 2.46; $p < 0.01$). There were no significant differences between nondaily or daily smokers in the likelihood of endorsing ever-use or current use of snus or snuff/chew. Daily smokers indicated “cigarette smoking not allowed in the place where you were” and “trying to cut down on smoking cigarettes” as some of the reasons for snus use (25.40% and 12.70%, respectively), whereas no nondaily smokers listed these as reasons for snus use. Both groups also indicated “just wanted to try it” as a reason for snus use (nondaily: 66.67%; daily: 55.56%). For both daily and nondaily smokers, individuals with nicotine dependence were more likely to report using OTPs to cut down on smoking cigarettes ($p < 0.001$).	Limitations: (1) Although a number of significant correlations were identified, the effects were relatively modest, which may suggest a role for other factors in explaining OTP use in daily and nondaily smokers. For example, OTP use in relation to smoking history or history of quit attempts was not explored. (2) Data about tobacco consumption were self-reported and not verified by biochemical measures. (3) The study did not collect information on the number of cigarettes consumed on smoking days for nondaily smokers. (4) The study also did not collect information about the frequency of OTP use. (5) The study data were collected in 2013 and 2014, and the availability and use of OTPs (particularly e-cigarettes) has increased in recent years. (6) The study did not have information on “other reasons” why nondaily smokers may be using OTPs.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(England et al., 2016)	Perceptions of emerging tobacco products and nicotine replacement therapy among pregnant women and women planning a pregnancy	Fifteen focus groups were conducted in 2013 in Memphis, Tennessee; Philadelphia, Pennsylvania; Oklahoma City, Oklahoma; and Billings, Montana. Subjects (n = 102, age 18-40 y, 49% non-Hispanic white) were females who were pregnant smokers (n = 32), pregnant quitters (abstinent for at least 30 days; n = 27), or smokers planning a pregnancy (n = 43). ST products investigated included snus and dissolvables. Objective: To assess women's perceptions toward emerging noncombusted tobacco and NRT products, specifically in regards to pregnancy.	Discussion topics in the focus groups included tobacco-use history, familiarity with emerging tobacco products and NRT (snus, dissolvables, e-cigarettes), general perceptions of emerging products and NRT, perceptions of emerging products and NRT when used during pregnancy, and health effects of emerging products and NRT in general and during pregnancy.	"Many [subjects] were unfamiliar with snus. Those familiar with snus often associated it with chewing tobacco and spitting, and felt the product was intended for people who already used chewing tobacco, especially men." "While most women expressed that snus was unattractive and unappealing, … a few found it intriguing or noted that the lack of an odor would be an advantage over smoking." "Some [subjects] noted that snus and dissolvables could be used discreetly, thus, allowing women to avoid stigma from smoking while pregnant." "Many women felt the health effects of snus are similar to those of smoking cigarettes, such as causing cancer. Some thought snus and/or dissolvables might be more harmful than cigarettes." "Many women felt that using snus and dissolvables were especially dangerous for pregnant women because the product is used orally and saliva is swallowed."	Limitations: (1) The study was qualitative and no quantitative or statistical analyses were performed comparing groups by pregnancy status or products used. (2) The small sample size and limited geographic distribution of the subjects limit the generalizability of the study. (3) Perceptions about noncombusted products likely are changing rapidly in response to evolving advertising and marketing strategies by tobacco companies as well as state and local tobacco policies. (4) The study design and limited sample size precluded comparisons of subgroups, such as those based on age, race/ethnicity, or education.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Hatsukami et al., 2016)	Perceived health risks of snus and medicinal nicotine products	Data were obtained from a randomized clinical trial. Subjects (n = 391, mean age 43.9 ±12.5 y, 52.9% male, 81.8% non-Hispanic white) were current smokers interested in completely switching to snus or nicotine gum and were recruited from Minneapolis/St. Paul, Minnesota, and Eugene, Oregon. Subjects were randomly assigned to snus or to medical nicotine gum for a period of 12 weeks (and told to only use the assigned product). The ST used was Camel Snus. Objective: To examine differences in PHRs between snus and medicinal nicotine, between cigarettes and these products, and the extent to which PHRs are associated with product use.	The PHR scale involves rating perceived disease risk on a 1–10 visual analogue scale with 1 anchored at very low risk for disease and 10 anchored at very high risk. At baseline and Weeks 4 and 12 during treatment, subjects were asked to assess the PHR of the product to which they were assigned. Relationships between the PHR scale scores and study attrition, compliance with only using the product, and continued use of the product after treatment were determined.	"Significant reductions were observed in PHR after use of both gum and snus at weeks 4 and 12 compared with before use for lung cancer (all $P < .05$), emphysema (all $P < .05$) and bronchitis (all $P < .05$…)." The snus group reported increased PHR for other cancers at Weeks 4 and 12 compared with baseline before product use (both $p < 0.0001$). The same pattern was observed for the PHR for addiction ($p = 0.004$ for Week 4 and $p = 0.002$ for Week 12). "Response to the PHR scale showed no significant differences between the snus and medical nicotine for perceived risks for lung cancer, emphysema, and bronchitis. However, significant differences were observed for other cancers, heart disease, stroke and risk for addiction, particularly after product use, with higher scores among those assigned to snus."	Limitations: (1) The institutional review board for this study required informing the subjects of the risks of the tobacco products, which may have influenced the subjects' perceptions of risk. (2) The generalizability of the study is limited to a population of smokers who were interested in switching from cigarettes and who attended a clinic for visits. In addition, the sample size of subjects who were compliant and continued product use was relatively small.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Kaufman et al., 2016)	Perceptions of harm and addiction of snus: An exploratory study	A community convenience sample was recruited in the Washington, DC, area in 2013. Subjects were male smokers (n = 22, age 19-29 y (mean age 26.64 ±2.92 y), 22.7% non-Hispanic white). Subjects were shown five snus advertisements for 20 s each, and eye movements were tracked. Subjects responded to questions about harm and addiction after each advertisement, and interviews were conducted after seeing all advertisements. Objective: To examine perceptions, in particular those related to harm and addiction, of subjects after exposure to snus print advertisements.	The study utilized a combination of eye-tracking methodology to examine advertisement-viewing patterns, and survey and semistructured interviews to measure perceptions of harm and addiction after exposure to snus print advertisements.	"At baseline, the majority [of subjects] believed that snus posed about the same harm and addiction as ordinary cigarettes." After viewing the advertisements and during the semi-strucutrued interviews, "… many [subjects] perceived the snus products in the advertisements to be less harmful than cigarettes. The absence of smoke and comparisons made with cigarettes gave some [subjects] the impression that using snus was not worse than using cigarettes and might be less harmful… Unlike with cigarettes, many [subjects] thought that snus might now have widespread physical effects on health beyond the mouth."	Strengths: This study used eye-tracking measurements to assess associations between attention to particular areas of snus product advertisements and perceptions about the product. Limitations: The study's small convenience sample and laboratory setting limit the generalizability of the data. In addition, the subjects' awareness that they were participating in a study may have changed their behaviors or responses. The researchers also did not assess if subjects had seen the advertisements before the study, which may have influenced the subjects' responses.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Little et al., 2016)	Efficacy of a brief tobacco intervention for tobacco and nicotine containing product use in the US Air Force	Subjects were 1,055 U.S. Air Force Airmen (77.4% male, mean age 20.1 ±2.5 y) undergoing Technical Training at a base in San Antonio, Texas from October 2014 to March 2015. At the time of data collection, subjects were undergoing an 11-week period of involuntary tobacco abstinence. Participation in the study was voluntary. Subjects were administered questionnaires immediately before and after a mandatory BTI (as part of Technical Training). The BTI was a 40-min intervention in an interactive group format that targeted cigarettes, ST, hookah, and e-cigarettes. ST products listed in the questionnaire include chewing tobacco and snus. Objective: To evaluate the efficacy of a BTI for reducing intentions to use TNCPs and increasing perceptions of harm of TNCPs.	The pre-BTI questionnaire assessed demographics, use of TNCPs (before basic military training), perceptions of harm of TNCPs, and intention to use TNCPs. The post-BTI questionnaire evaluated the perceptions of harm of TNCPs and intention to use TNCPs.	For both users and nonusers of TNCPs, ratings of the perceived harm of all TNCPs studied (cigarettes, ST, snus, cigar, cigarillo, pipe, e-cigarette, roll your own, and hookah) increased from before to after the BTI (all $p < 0.0001$). "Airmen significantly decreased in their prevalence of not knowing the perceived harm of all TNCPs except for cigarettes (all $p < 0.05$)." In general, TNCP users perceived snus and ST to be less harmful than TNCP nonusers perceived them to be, both before and after the BTI. "The BTI had a significant effect on lowering intentions to use three of the targeted TNCPs (ie, cigarettes, [ST], and hookah) and cigarillos both during the later phases of Technical Training as well as over the next 12 months for both users and nonusers (all $p < 0.05$)."	Strength: Due to the similarities in Basic Military Training for all branches of the military, the generalization of the study results to other branches of the military is possible. Limitations: (1) The study did not directly measure changes in TNCP use behavior. (2) In addition, the time offered by the military to conduct studies on military personnel was limited, thus limiting the measures that could be assessed. (3) The questionnaires were administered immediately before and after the BTI, and no follow-up was performed several weeks after the intervention. (4) There is also no control group for this study because the BTI is required for all Airmen as part of Technical Training. (5) Since the BTI was administered during a time of involuntary tobacco and nicotine abstinence, the results may not be widely generalizable.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Little et al., 2016)	Prevalence and correlates of tobacco and nicotine containing product use in a sample of United States Air Force trainees	Subjects were 13,685 U.S. Air Force Airmen (78.2% male, mean age 20.5 ±2.9 y, 61.3% non-Hispanic white) training at Air Force bases in San Antonio, TX; Biloxi, MS; and Wichita Falls, TX, from 2013 to 2014. The study utilized cross-sectional data from a baseline questionnaire after a binge and problem drinking intervention (required for all Airmen). At the time of the survey, the Airmen were undergoing a period of military-mandated abstinence from alcohol and TNCPs. ST products listed in the questionnaire included chewing tobacco and snus. Objective: To determine the prevalence of TNCP and correlates of use across multiple cohorts of trainees undergoing Technical Training in the U.S. Air Force.	The baseline questionnaire assessed demographics, prevalence of TNCP use (tobacco and e-cigarette use before Basic Military Training), and reporting of common correlates of tobacco and e-cigarette use (intentions to use and perceived harm).	"Perceived harm across all TNCPs [cigarettes, ST, snus, cigars, cigarillos, pipe, roll your own cigarettes, hookah, and e-cigarettes] were higher for nonusers compared with users ($p < 0.0001$)."	Strengths: This study included a large sample size in a military population with timely data. Limitations: (1) The study sample was only Airmen and therefore might not be generalizable to other military branches. (2) Another limitation is the intentional slowing of recruitment into the study, which may have resulted in the study no longer being representative of all Airmen entering the U.S. Air Force during this time. (3) In addition, Airmen who were excluded from analyses due to missing TNCP data were more likely to be of Hispanic descent, which could skew the findings among minority Airmen. (4) This cross-sectional study did not explore changes in TNCP use or perceptions over time. (5) The study was based on self-reports of tobacco and nicotine status.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Macy et al., 2016)	Dual trajectories of cigarette smoking and smokeless tobacco use from adolescence to midlife among males in a Midwestern US community sample	Data were from the Indiana University Smoking Survey, an ongoing cohort-sequential study of the natural history of cigarette smoking and other tobacco use. After participant enrollment in 1987, follow-up surveys were conducted every 6 years from 1987 to 2011. The current study analyzed data from male subjects (n = 2,230, 93% white, mean age 20.1 ±2.7 y in 1987) who reported any cigarette smoking or ST use. Objective: To identify tobacco-use trajectories from adolescence to midlife and test correlates of trajectory group membership.	At each wave of data collection, subjects reported their smoking status and ST use. In 1987, subjects reported the highest level of education of their parents and their health beliefs about tobacco products in regards to lung cancer and heart disease. Subjects also reported (in 1987) general health beliefs and normative beliefs about tobacco products, personalized risk of addiction, perceived prevalence of tobacco product use, and comparative health beliefs between cigarettes and ST. Group-based trajectory analyses were conducted to identify patterns of tobacco use.	"Adolescent beliefs favorable to smoking and [ST] were associated with membership in consistent regular use groups." "… for [ST]-related beliefs, the consistent regular use trajectory group had the highest levels [most pro-ST] for all beliefs except personalized risk of addiction to [ST]." Consistent abstainers from ST and late-onset users of ST had lower general health risk belief scores and normative belief scores about ST than regular ST users ($p < 0.05$ to $p < 0.001$). Consistent abstainers from ST had lower perceived prevalence of ST use than regular ST users ($p < 0.05$). Late-onset users of ST had lower general health belief scores about ST use and risk of lung cancer or heart disease than regular ST users ($p < 0.05$).	Strengths: (1) This study analyzed data from a longitudinal study spanning over 20 years. (2) Since the demographics of the study sample reflect the demographics of the common ST users, the findings may be generalizable to groups at elevated risk of ST use. Limitations: (1) The community from which this representative sample was drawn is predominantly white, non-Hispanic and located in the Midwestern U.S. Thus, these findings may not generalize to other racial and ethnic groups or other geographic regions. (2) There were missing data from 1987 on health beliefs, particularly for the regular use trajectory groups. (3) The health beliefs tested in this study were measured during adolescence (presumably in 1987), and beliefs may change over time. (4) The study was not able to detect any short-term changes in tobacco-use behaviors because waves of data collection in the study were separated by 6 years.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Mays et al., 2016)	Openness to using non-cigarette tobacco products among U.S. young adults	Data are from a cross-sectional study. Subjects (n = 5,985, 51.5% male, 55.9% non-Hispanic White, 20.5% Hispanic, 10.7% non-Hispanic black, mean age = 23.3, 39.9% never smoker, 28.4% non-current ever smoker, 22.8% current smoker, 8.9% former smoker) were adults aged 18-29 years. In this study, ST included chew, snuff, dip, snus, and dissolvable tobacco. Objective: To characterize openness to using non-cigarette tobacco products and associated factors among U.S. young adults.	Data derived from the 2012-2013 National Adult Tobacco survey were analyzed for demographic characteristics (age, gender, race/ethnicity, education, and marital status), current cigarette smoking, and current use of non-cigarette products.	About 5.9%, 2.2%, and 0.1% of subjects were current chew/snuff/dip, snus, and dissolvables users, respectively. Among subjects, 91.3%, 26.9%, and 8% reported that they would not use chew/snuff/dip, snus, and dissolvables, respectively, About 8.3%, 11.1%, and 1.5% of subjects were open to using chew/snuff/dip, snus, and dissolvables, respectively. The odds of being open to using chew/snuff/dip, snus, and dissolvables were significantly higher among men (all ps < 0.001); odds were significantly higher for young adults aged 18-24 years for snus (p < 0.01). Minority racial/ethnic respondents were significantly less likely to report openness to using chew/snuff/dip and snus (all ps < 0.05). Non-current/ever smokers, current smokers, and former smokers reported significantly higher openness to use chew/snuff/dip and snus compared to never smokers (all ps < 0.001).	Strengths: (1) The study had a large sample population; and (2) the study used nationally representative data. Limitations: (1) Findings may not generalize to other populations; (2) definitions of openness and use behaviors varied across products owing to the survey questions, which may have affected findings, and (3) this was a cross-sectional study.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Meier et al., 2016)	Perceptions of snus among US adult smokers given free product	This study analyzed a subsample of participants from a randomized, controlled trial in which smokers with no interest in quitting (over the next 30 days) were assigned to either receive or not receive free snus by mail to sample ad libitum for 6 weeks. Participants completed three assessments, before, during, and after the sampling phase via phone call. This study analyzed data from participants assigned to the snus condition. Subjects (n = 543, 30.8% male, 89.4% non-Hispanic white, mean age 49.3 ± 12.4 y) were U.S. adult smokers who had no interest in quitting (over the next 30 days). ST product used was Camel Snus. This is a longitudinal study. Objective: To examine longitudinal perceptions of snus within a randomized controlled trial.	At each phone call assessment, subjects answered questions about snus use (never-user, experimenter, or persistent user), attitudes and risk perception of alternative tobacco products, snus outcome expectancies, and product preference for snus versus cigarettes.	Perceived harmfulness of ATPs in general and personally was equal at baseline across subjects who populated the the three snus user groups at the end of the study. Persistent users of snus were more likely than experimenters to believe that switching to ATPs would lower others' health risk ($p = 0.012$). Persistent snus users were also more likely than experimenters or never-users to buy ATPs, use ATPs to cut down on cigarettes, use ATPs to quit smoking, and use ATPs to get around smoking restrictions (all $ps < 0.001$). "Compared to those who became experimenters, persistent users reported that snus provided greater negative affect [sic] relief ($p < .001$, …), craving reduction ($p < .001$, …), and weight control ($p = .002$, …)." Compared with experimenters, a higher proportion of persistent users reported that snus provided equal or better relief from withdrawal, reduction of cravings, ease of use, satisfaction, and liking relative to cigarettes (all $ps < 0.05$).	Strength: This study analyzed data from a longitudinal study, assessing subject perceptions of snus after being given an opportunity to try it. Limitations: (1) The study has limited information about never-users' perceptions during the sampling period in part because they could not provide feedback on a product they did not try. (2) The study was also limited to smokers who were uninterested in quitting, and therefore the results should not be generalized to all smokers. (3) The subjects were only informed of the manufacturer's claim that snus and other ATPs confer lower risk than cigarettes, and were not told also about research supporting this claim. Providing evidence of this claim may have increased experimentation with snus during the sampling period.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Ozga et al., 2016)	Acute effects of snus in never-tobacco users: a pilot study	Eleven never-user of tobacco (< 100 uses per lifetime, 54.5% male, 81.8% Caucasian, age 19-26 y [mean age: 21.5 ±2.0 y]) were recruited from the community via print advertisements. Subjects used 6 pouches of snus (containing 0 [placebo] to 8 mg nicotine respectively; matching placebo was tobacco-free Onico White Large) in ascending dose order for 20 min each, with 45 min between starting successive pouches. Prepouch and postpouch assessments were performed for each dose/pouch. Objective: To profile the acute effects of snus on physiological and subjective assessments in a sample of never-users of tobacco.	Prepouch and postpouch assessments were performed for each dose/pouch. For each subject, physiological measures (heart rate and blood pressure were recorded every 5 min) and subjective measures (the Direct Effects of Nicotine Scale and the Direct Effects of Tobacco Scale) were recorded before and immediately after each snus pouch. Three months after the study, subjects were also asked to report use of any tobacco products in the interim.	Ratings for the subjective measure "*taste good*" increased from prepouch to postpouch for some doses, but were only statistically significant for the 0.0-mg nicotine dose ($p < 0.05$). "A significant main effect of Time was observed for the [Direct Effects of Tobacco Scale] item "*Was the product satisfying?*" Average ratings, collapsed across dose, increased from pre- ([mean] = 4.6, SEM = 1.3) to post-pouch ([mean] = 7.7, SEM = 1.6) (… $p < .05$)." "Consistent with other work, some [subjects] reported relatively high ratings of aversive effects (e.g., "dizzy", "nauseous") and relatively low ratings of positive effects (e.g., "satisfying", "tastes good") at the same dose (e.g., 8 mg), while other [subjects] reported the opposite."	Limitations: (1) Individual differences were observed between the never-users of tobacco sampled, which may be more pronounced due to the small sample size. (2) The overall lack of significant effects may have been to the dosing regimen (not enough time between pouches).

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Popova et al., 2016)	Testing antismoking messages for Air Force trainees	In a pretest–posttest experiment, subjects (n = 782, age 18+ y, 72% male, 69% Caucasian) were randomized to view antismoking advertisements in one of six conditions: anti-industry, health effects + anti-industry, sexual health, secondhand smoke, environment + anti-industry or control. ST in this study includes chewing tobacco and snuff. Objective: To evaluate responses to existing antismoking advertisements with different themes on perceptions of harm of cigarettes and other tobacco products and intentions to use tobacco products in the future among Air Force personnel.	The effect of different conditions on changes in perceived harm and intentions to use cigarettes, e-cigarettes, ST, hookah, and cigarillos from pretest to posttest were evaluated with multivariable linear regression models (perceived harm) and zero-inflated Poisson regression model (intentions).	"At pretest, [subjects] rated cigarettes as the most harmful (8.4 on a 1–9-point scale), followed by secondhand smoke (7.7), [ST] (7.5), cigarillos (7.5), hookah (5.7) and ecigarettes (5.2)." At posttest, perceived harm of ST increased in the health effects+anti-industry ($p < 0.001$) and the environment+anti-industry ($p < 0.01$) condition.	Limitations: (1) Subjects were taken from only two of the five major training Air Force facilities, which limits the generalizability to all Air Force trainees or other service branches. (2) The study relies on self-reported measures.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Rodu et al., 2016)	Associations of proposed relative-risk warning labels for snus with perceptions and behavioral intentions among tobacco users and nonusers	Subjects (n = 12,553, age: ≥18 y) were daily exclusive cigarette smokers (n = 4,324), daily ST users (n = 1,033), daily other tobacco users (n = 1,205), former users (n = 726), and triers/never-users (n = 5,915). Subjects were exposed to one of six labels: the four current warning labels for snus and the two proposed relative-risk labels for snus in this cross-sectional study. In this study, subjects viewed warning labels on cans of three snus brands and, after viewing the labels, assessments were carried out. Objective: To provide information about the potential population impact of Swedish Match's proposed relative-risk labels.	Descriptive and logistic regression analyses examined four outcomes for each of the four label groups: believability, harmfulness, motivation to use, and intention to buy snus. The study also measured tobacco use status and demographic characteristics.	Former users (80%-97% vs. 62%-67%) and triers/never-users (73%-85% vs. 48%-49%) found the current warnings more believable than the proposed labels. For ST users, 78% to 89% perceived that using snus was harmful; for all others, 84% to 98% perceived that using snus was harmful. "The vast majority of all respondents, with minimal variation according to labels, also perceived that using snus is harmful." "With smokers as the referent group: (1) lower proportions of ST users believed the current warnings (the differences were significant except for the not–safe-alternative warning), and significantly higher percentages believed the proposed labels and (2) across all labels significantly smaller proportions of ST users perceived snus as harmful and significantly higher proportions reported that they were likely to use snus and motivated to buy snus."	Strengths: (1) The study included the large sample sizes of the five tobacco-use subgroups that were demographically similar; and (2) The survey was specifically designed and executed to examine the perception of existing and proposed snus warnings. Limitations: (1) The cross-sectional study design, in which each subject viewed only one label, prevented any within-person comparisons of labeling effects; (2) The survey did not allow subjects to indicate how much labels changed their belief because only beliefs after viewing the label were collected; (3) subjects were obtained from online consumer panels, which underrepresent subjects with lower education and literacy; (4) Recruitment was designed to enroll equal numbers of tobacco users and nonusers (may not be generalizable); (5) Tobacco status was based on self-reporting; and (6) Individuals may habituate to the messages, and the labels may become less effective over time.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Thapa et al., 2016)	Improving cancer risk awareness including obesity as a risk factor for cancer in a small U.S. community	This interventional study evaluated subjects' (n = 863; age: ≥18 y; ~33% male, 61% white) perceptions of cancer risk through in-person surveys in June 2011 and June 2012. Roughly half of the subjects received educational materials and one-on-one counseling on healthy living and maintaining healthy weight between the two surveys. ST products investigated in this study included chewing tobacco and snuff. Objective: To evaluate the intervention effect when including obesity and overweight as risk factors for cancer on cancer risk awareness.	The cancer knowledge score is the sum of affirmative responses to the questions on the five cancer risk awareness indicators (overweight or obese, tanning bed, sunburn, chewing tobacco/using snuff, and smoking tobacco). An example question: "Do you believe chewing tobacco/using snuff can cause cancer?"	The proportion of subjects (matched and unmatched subjects from the control and intervention communities) identifying chewing tobacco/snuff as a risk factor for cancer ranged from 92% to 97% at baseline. The proportion of subjects identifying chewing tobacco/snuff as a risk factor for cancer ranged from 90% to 98% after intervention.	Limitation: The sociodemographic factors were not balanced between the control and intervention groups, which may have biased the results.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Wackowski et al., 2016)	Interviews with smokers about smokeless tobacco products, risk messages and news articles	Subjects (n = 30, aged 20-66 y [mean age 37 y]) were current smokers, but they were not current ST users. Subjects participated in interviews after reading one of three constructed news stories about ST and snus: a favorable article (ST is a safer smoking alternative), a cautions article (ST has various risks), and a mixed article (states ST risks and potential risk-reducing benefits). Objective: To explore smokers' perceptions of ST and snus products and news stories with different risk messages about them.	During the interviews, subjects were asked open-ended questions about their experience with and perceptions about ST and snus, including their acceptability, popularity, and perceived risks, particularly as compared with smoking. They were also asked about their interpretations or impressions of ST risk messages and quotes in the article, quoted sources, their overall experience and thoughts about the story, and any changes in their ST perceptions.	"With respect to risks relative to cigarettes, some [subjects] noted that they thought [ST] products were safer than cigarettes (even before reading the article) but that they nevertheless posed risks and were not safe. However, many across groups expressed the idea that [ST] and cigarettes posed 'different risks' or a trade off in risks (particularly less risk for lung cancer but more risk for oral cancer), and thus one was not necessarily safer than the other overall." "Across groups, many [subjects] acknowledged that [ST] has benefits (eg, smoke-free/odourless, cheaper than smoking and available for use in quitting smoking), and agreed it was becoming more popular." "However, [subjects] across groups largely thought [ST] products overall are 'gross' and 'disgusting', perceptions attributed to the spitting associated with [ST], its taste and its direct contact with the mouth." "…exposure to reduced-risk [ST] information may influence smokers' perceptions about and interest in snus, but . . . perhaps strong and repeated exposure to such messages from credible sources may be needed to overcome deeply ingrained [ST] attitudes and beliefs."	Limitations: Each subject read only one story about ST and snus, and the small sample size and qualitative nature of the study prevent precise analyses of results.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Wackowski & Delnevo, 2016)	Young adults' risk perceptions of various tobacco products relative to cigarettes: results From the National Young Adult Health Survey	Risk-perception responses from the 2011 National Young Adult Health Survey (n = 2,871; age 18-34 y; 49.8% male; 55.7% non-Hispanic white; 3.6% currently used some form of ST) were analyzed. ST products investigated in the study included snus, snuff, dip, and chew. Objective: To explore risk perceptions of various tobacco products relative to traditional cigarettes with young adults, a group with higher rates of tobacco use.	To measure beliefs about the comparative risk of different tobacco products relative to cigarettes, subjects were asked the following question: "Compared to cigarettes, how risky do you think the following tobacco products are?" Subjects were asked this question about cigars; e-cigarettes; hookah; snuff, dip, or chew; and snus, and the order of these products was randomized. Subjects were asked about snus separately from "snuff, dip, or chew" (i.e., ST) but were not asked about different types of "cigars" separately.	Regarding risk perception of ST relative to cigarettes, 7.1% felt ST was less risky, 58.2% felt ST was about as risky, 31.8% felt ST was more risky, and 2.8% did not know. Regarding risk perception of snus relative to cigarettes, 10.0% felt ST was less risky, 58.9% felt ST was about as risky, 22.3% felt ST was more risky, and 8.8% did not know. Both being male ($p = 0.0005$) and product use ($p = 0.0003$) were associated with the perception that ST use is less risky than smoking. The same two factors were also associated with the perception that snus use is less risky than smoking ($p = 0.0002$ and $p < 0.0001$, respectively). Subjects in the 25- to 34-y age group were more likely than subjects in the 18- to 24-y age group to perceive ST to be more risky than cigarettes ($p < 0.0001$).	Limitations: (1) This was a secondary data analysis of the National Young Adult Health Survey, which was not designed specifically to study product risk perceptions. (2) Only direct measures of comparative risk were used, which may bias the results.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Ambrose et al., 2015)	Flavored tobacco product use among US youth aged 12-17 years, 2013-2014	This study analyzed youth data from Wave 1 of a PATH study (Sep. 2013-Dec. 2014, n = 13,651, aged 12-17 y, 51.3% male, 54.5% non-Hispanic white). This was a cross-sectional study. Objective: To assess flavored tobacco use among a nationally representative sample of U.S. youth.	Questions were asked about past use of various tobacco products and if the first product used of each type was flavored. Data were collected about demographics (age, gender, race), ever-use and past 30-day use of tobacco products, and if the first product of each type respondents used was flavored.	The majority (80.8%) of users who ever tried tobacco reported their first product used as flavored (81.2% for flavored snus and 68.9% for flavored ST); 79.8% of users who used tobacco in the past 30 days reported their first product used as flavored (80.4% for flavored snus and 81% for flavored ST). "Among a survey of youth aged 12 to 17 years, the majority who self-reported ever experimenting with tobacco started with a flavored product, and most current youth tobacco users reported use of flavored products." Of past 30-day ST users (n = 180), 69.3% reported flavoring as a reason for use of ST, and 69.7% reported ability to use it when smoking is not allowed as a reason for use of ST. Also, minimizing effects on others (harmful or bothersome) and themselves was listed as a reason for using ST by 47.7% to 68.3%. Of past 30-day snus users (n = 64), 67.2% reported flavoring as a reason for use of snus, and 70.7% reported ability to use it at times when/places where smoking is not allowed as a reason for use of snus. Also, about 50% also listed minimizing effects on others (harmful or bothersome) as a reason for using snus.	Limitations: (1) There may be a potential difficulty with recall because youth often experiment with many products. (3) The analysis does not estimate role of flavoring in initiation of tobacco use among youth.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Borgida et al., 2015)	Assessing constituent levels in smokeless tobacco products: A new approach to engaging and educating the public	Subjects (n = 397, mean age of 34.07 ±12.01 y, 46.1% male, 88.4% Caucasian) were recruited online at two time points (T1 and T2) through Amazon's Mechanical Turk. Objective: To develop and test a format for educating the public about nicotine and carcinogenic TSNA content in ST.	At T1, subjects were asked to complete a "lifestyle" survey with items on eating, physical activity, tobacco, and demographics. The survey also included cigarette smoker andnonsmoker identity measures. At T2 (3 days later), they were shown the poster presentation followed by survey measures specific to tobacco. The primary study endpoints were knowledge of ST constituents (nicotine and toxicity) and knowledge of variability of these constituents between different brands, compared between smokers and nonsmokers (defined as having smoked a cigarette in the past 30 days) before and after presentation of constituent information.	Viewing ST constituent information led to increased knowledge (and confidence in knowledge) about tobacco constituents among both smokers ($p < 0.05$ to $p < 0.001$) and nonsmokers ($p < 0.001$). "… viewing the poster [constituent information] significantly increased the perceptions of both smokers and nonsmokers that individual brands of [ST] vary in their amounts of nicotine and toxicity." ($p < 0.001$) Viewing ST constituent information increased smokers' ($p < 0.05$) and nonsmokers' ($p < 0.001$) beliefs about increased vulnerability to cancer if they were to use ST.	Strengths: The study followed the same group of subjects before and after exposure to information about ST constituents. Limitations: (1) The study did not determine the long-range effectiveness of conveying knowledge about the relative harmfulness of brands and types of ST, and the relative harmfulness of ST in comparison to cigarettes and nicotine-replacement therapy. (2) This study also did not assess short-term or long-term behavioral consequences of viewing ST constituent information. (3) The study did not evaluate knowledge and perceptions in a youth cohort.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Kiviniemi & Kozlowski, 2015)	Deficiencies in public understanding about tobacco harm reduction: Results from a United States national survey	Data were analyzed from the Health Information National Trends Survey 4 Cycle 2, a population-representative survey of U.S. adults conducted between Oct 2012 and Jan 2013. Subjects (n = 3,630) were U.S. adults. This was a cross-sectional study. Objective: To examine public perceptions of the relative risk of different tobacco formulations.	Subjects reported their perceptions about the relative risks of e-cigarettes, ST, and different types of cigarettes compared to "traditional" cigarettes. Relative risk perceptions for each product type, as well as the consistency and accuracy of harm reduction beliefs, were analyzed. Measurements included harm reduction beliefs and smoking behavior.	Of the overall population, 9.4% of respondents perceived ST as less risky than cigarettes. There were no significant differences in risk perception based on smoking status. "… about 9 in 10 individuals did not know that [ST] products are less hazardous than cigarettes."	Strengths: This is a nationally representative survey. Limitations: (1) The survey analyzed in this study collected perception data at a single time point, rather than tracking changes in perception over time. (2) Since risk perceptions may be somewhat dependent on the wording of particular questions, there is the possibility that variability in how individuals interpret a question might affect their risk perceptions.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Liu et al., 2015)	Risk perceptions of smokeless tobacco among adolescent and adult users and nonusers	Subjects were adolescents (n = 53, mean age 17.0 ±0.8 y, 66.0% male, 84.9% white) and adults (n = 63, mean age 33.6 ±13.8 y, 79.4% male, 98.4% white) recruited through flyers around the community. Focus groups and qualitative interviews were conducted between Feb 2009 and May 2010 in this cross-sectional study. Objective: To examine risk perceptions of ST products among adolescent and adult users and nonusers in the Appalachian region of Ohio, where tobacco use, especially ST, is high and part of the culture and social norm.	Subjects were asked about their ST use (and frequency, if applicable), their perceptions of risk from ST use, safety of ST use, and the relative safety of ST compared with cigarettes.	"All adolescents and adults in the study, with the exception of one adult ST user, believed that adverse health effects are associated with ST use." "Knowledge of these ST-related health problems, which were learned either from school or through firsthand observations of ST's effect on the health of others, influenced some adolescent and adult ST nonusers to not initiate." "Nearly all [subjects], including ST users, strongly believed that ST use is not safe …" "Although nearly all [subjects] believed that ST use is not safe, there was disagreement about the relative safety of ST. Some [subjects] believed that tobacco products are equally harmful whereas others believed that ST is safer than cigarettes." "Some people perceived novel ST (i.e., dissolvable tobacco and snus) just as harmful as traditional ST (i.e., chew), viewing the various ST products as different forms of the same product."	Limitations: (1) The study was qualitative, relying on responses from study subjects in regards to perceptions of health risks and safety of ST, and did not perform any quantitative or statistical analyses. (2) Subjects were not asked about the relative risk perceptions of specific ST products. (3) Because of the sampling of adolescents and adults in selected counties only, findings may not be generalizable. (4) The strong cultural role of tobacco in Appalachia might make the adolescent and adult beliefs of ST unique to the Appalachian community and different from those of other vulnerable populations. (5) The ST users in the study were all males.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Smith, Bansal-Travers, O'Connor, Goniewicz, & Hyland, 2015)	Associations between perceptions of e-cigarette advertising and interest in product trial amongst US adult smokers and non-smokers: results from an internet-based pilot survey	Subjects (N = 600, aged 18-65 y, 49% male, 80% white) were recruited from an Internet panel in the U.S. in 2013 and were randomized to view either Blu e-cigarette (n = 300) or Camel Snus (n = 300) ads. This is a cross-sectional study. Objective: To assess whether exposure to ads for e-cigarettes or a comparison product (snus), elicited differences in interest to try e-cigarettes between smokers and nonsmokers.	Subjects answered questions assessing tobacco use, and then viewed 9 magazine ads for Blu e-cigarettes or Camel snus, a LNST product, in random order. After viewing each ad, respondents were asked a series of questions about their perceptions, beliefs, attitudes, and interest in product trial. At the end, respondents were asked to choose a free sample product from the following options: an e-cigarette, ST, pack of cigarettes, or no product.	"In general, [subjects] in our study who were exposed to e-cigarette ads rated [e-cigarettes] more favorably across this set of measures when compared to [subjects] who were shown ads for snus." The 300 subjects who viewed snus ads responded that snus: is sophisticated (14%) is fun (15%) is satisfying (20%) is stupid (48%) is hard to quit using (53%) makes me nauseated (39%) is for kids (8%) is for adults (51%) "We observed a positive, strong relationship between product attitudes and smoking status."	Limitations: (1) The study was conducted among a small sample, which is not nationally representative, and only used one type of ad (magazine); (2) No baseline measures were collected; hence, effects relating to the product advertisements could not be isolated; (3) The study only used existing advertisements for one brand of each product; (4) The study was limited to a sample of U.S. adults aged 18 to 65; and (6) The study evaluated only one form of advertising among several that exist for these products.

Table 7.5.7-2-1. Literature Review for Perceptions of Smokeless Tobacco (continued)

Author	Title	Study Methods	Primary Study Measurements and Endpoints	Author's Findings Related to Perceptions of Smokeless Tobacco	Comments[1]
(Nutt et al., 2014)	Estimating the harms of nicotine-containing products using the MCDA approach	The Independent Scientific Committee on Drugs selected experts from several different countries for a MCDA of 12 tobacco products and 14 harm criteria (to the user or others). The MCDA took place during a 2-day workshop in Jul 2013, and the panel of experts performed the analysis with a worldwide perspective. ST products considered during the decision conference include moist chewing tobacco, chewing tobacco, snuff, dry snuff, and snus. Objective: To convene a group of experts with expertise in the field of nicotine and tobacco research from different disciplines that could discuss and agree on the harmfulness of nicotine-containing products.	The panel of experts scored all of the tobacco/nicotine products (cigarettes, cigars, small cigars, pipes, water pipe, refined ST, unrefined ST, snus, e-cigarettes, oral nicotine products [such as NRT], patch, and nasal sprays) on each harm criterion, weighted the criteria, and calculated a weighted score to give an overall index of the harm of each tobacco product.	Refined ST, unrefined ST, and snus each had overall harm scores of under 10 out of 100, ranking them as 6th, 7th, and 8th most harmful out of the 12 products examined. In comparison, cigarettes and small cigars had an overall harm score of 99.6 and 67 out of 100, respectively, and were ranked as the most and second most harmful of all products. The harms of refined ST, unrefined ST, and snus were only harms to the user, and not to others.	Limitations: (1) This study had a lack of hard evidence for the harms of most products on most of the harm criteria, and instead scores were based on knowledge and experience of a panel of experts and a modelling algorithm. (2) Despite care being taken to have raters from many different disciplines, there was no formal criterion for the recruitment of the experts.

[1] Comments are largely author-defined, methodological strengths and limitations.

7.5.7-2.6.Literature Cited

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