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## Advertising receptivity and youth initiation of smokeless tobacco

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### Abstract

**Background**—Cross-sectional data suggests that adolescents' receptivity to the advertising of smokeless tobacco is correlated with use of chewing tobacco or snuff. Lack of longitudinal data has precluded determination of whether advertising receptivity precedes or follows initiation of smokeless tobacco.

**Objectives**—The objective of this study was to test for the association between advertising receptivity and subsequent initiation of smokeless tobacco among adolescent males.

**Methods**—Adolescent males from the 1993–1999 Teen Longitudinal California Tobacco Survey were selected at the baseline survey for never having used smokeless tobacco. Separate longitudinal analyses corresponded to two dependent variables, ever use of smokeless tobacco (1993–1996; n=1,388) and use on 20 or more occasions (1993–1999; n=1,014). Models were adjusted for demographic variables, risk factors for smokeless tobacco use, and exposure to users of smokeless tobacco.

**Results**—Advertising receptivity at baseline was predictive of ever use by late adolescence (RR(95% CI)=2.0 (1.3, 3.1)) and regular use by young adulthood (RR(95% CI)=3.7 (2.0, 7.0)) in models that were adjusted for covariates.

**Conclusions/Importance**—The findings challenge the tobacco industry's assertion that tobacco marketing does not impact youth initiation. This is particularly relevant to tobacco control in the United States because the 2009 Tobacco Control Act places fewer restrictions on smokeless tobacco products compared to cigarettes.

### Keywords

smokeless tobacco; adolescence; marketing; advertising receptivity; tobacco industry

### Introduction

Fundamental changes in the advertising of smokeless tobacco (SLT; chewing tobacco/snuff) have occurred over the past few years in the United States (Hatsukami, Ebbert, Feuer,

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#### Declaration of interest

The author reports no conflict of interest. The author alone is responsible for the content and writing of the paper.

Stepanov, & Hecht, 2007). The traditional focus of advertising was on a product that appeals to males' individuality, masculinity, interest in outdoors, and desire for a well-made product (Curry, Pederson, & Stryker, 2011; Haddock et al., 2008). A change in the marketing of SLT to a more socially acceptable product, which can be used indoors, stems from the tobacco industry's desire to reach a broad demographic of male and female smokers (Mejia & Ling, 2010). This is particularly true for the new snus products that contain low concentrations of tobacco-specific nitrosamines and do not require expectoration (Rogers, Biener, & Clark, 2010). Additional changes in the marketing of SLT include an emphasis on the cheaper discount brands (Timberlake & Pechmann, 2013) and flavored products (Alpert, Koh, & Connolly, 2008; Curry et al., 2011; Delnevo et al., 2014) that appeal to youth.

Despite academic interest in the changes in SLT advertising, there is a dearth of literature of the effect of advertising on the uptake of smokeless tobacco. One study reported that an adolescent who could recall a favorite SLT advertisement had 7.5 times the odds of being a current user relative to a non-user (W.S. Choi, Farkas, Rosbrook, Elder, & Pierce, 1995). Though, use of cross-sectional data in this study had a number of shortcomings, notably the inability to establish the temporal relationship between SLT marketing and SLT use. In lieu of scant epidemiologic data, historical data supports the hypothesis that exposure to SLT marketing increases use. In the 1980s, the U.S. Tobacco Company (UST) employed a number of marketing tactics and campaigns aimed at young males (Connolly, 1995), which included the provision of free samples, sports sponsorships (e.g., rodeos), and marketing on college campuses (i.e. College Marketing Program). As a likely result of the marketing campaigns, an approximate nine-fold increase in the prevalence of snuff use occurred among 18 to 24-year-old males between 1970 and 1991 (Giovino et al., 1994). More recently, expenditures for SLT advertising have increased unabated by efforts such as the 1998 Smokeless Tobacco Master Settlement Agreement (Morrison, Krugman, & Park, 2008). This trend highlights the need for examining the impact of advertising on SLT use via an epidemiologic approach.

Data from a cohort of California adolescents in the mid-1990s was utilized in the current study for examining the impact of advertising receptivity on youth initiation of SLT. These data originate from one of the few longitudinal studies that queried participants about marketing and subsequent use of SLT. Hence, the effect of SLT advertising could be quantified and compared to other known risk factors for SLT use.

## Methods

### Participants

The California Tobacco Survey (CTS) is a statewide cross-sectional survey of the prevalence, knowledge and attitudes regarding various tobacco-related issues (Al-Delaimy, Edland, Pierce, Mills, & White, 2009). Funded by California's Department of Health Services, the CTS is conducted by telephone to a population-based sample every third year. A total of three instruments (screener, adult and adolescent instruments) are administered to participants as part of a two-stage sampling process. In the 1993 CTS, a total of 30,910 households had completed the screener survey (Gilpin, White, Messer, & Pierce, 2007) from which 3,376 adolescents completed an in-depth interview. These participants, who were

between the ages of 12 and 17 years, were subsequently contacted for follow-up surveys as part of the 1993–1999 Teen Longitudinal California Tobacco Survey.

In the current investigation, the sample was restricted to males who had never used SLT by the 1993 survey. The sample was restricted to males due to the rarity of SLT use among females (Giovino et al., 1994), as evidenced by the 1.5% of high-school females in the U.S. who were users of SLT in 2012 (CDC, 2012). This statistic is consistent with the 2.1% of females who had ever tried SLT by the 1999 survey in the current study. The inclusion criteria for this study yielded sample sizes of 1,388 and 1,014 for the 1993–1996 and 1993–1999 longitudinal analyses, respectively.

## Measures

Two binary dependent variables in the analyses were ever use of SLT (i.e. chewing tobacco/snuff), and use of SLT on 20 or more occasions. The two variables were assessed in the 1996 and 1999 follow-up surveys, respectively, corresponding to periods when participants were late adolescents (15–20 year-olds) and young adults (18–23 year-olds).

The primary independent variable was the identification of a “chewing tobacco or snuff brand that is advertised the most”. Participants were coded as being receptive to SLT advertising if they had selected any brand from a list, or specified an unlisted brand by name. The list included Redman, Levi Garrett, Beechnut, Skoal, Skoal Bandits, Copenhagen, Kodiak, and other (specify). Conversely, participants were coded as being non-receptive if they had neither identified a brand from the list nor specified a brand by name. A similar version of this measure of receptivity to tobacco advertising was validated as a predictor of future smoking (Gilpin et al., 2007). Henceforth, the variable in the manuscript is referred to as advertising receptivity. An additional measure in the survey corresponded to a participants’ receipt of a gift (e.g., T-shirt) endorsing a particular SLT brand. However, the measure was not included in any of the analyses due to a small number of affirmative responses (<10).

Covariates from the 1993 survey were selected on the basis of being known risk factors of SLT use (Ebbert et al., 2006; Gansky, Ellison, Kavanagh, Isong, & Walsh, 2009; Lando, Haddock, Klesges, Talcott, & Jensen, 1999). They were lifetime cigarette smoking (ever smoked, never smoked); a scale of risk-taking/rebelliousness (composite score of eight items ( $\alpha=.55$ )); and two binary variables corresponding to intent to use SLT (“definitely yes - probably not” vs. “definitely not”), and having at least one friend or family member who uses SLT. Intent to use SLT was examined as a binary variable because less than 10% of participants had expressed interest in using SLT. In a preliminary analysis, the variable was not proven to mediate the association between advertising receptivity and SLT use (*data not shown*), and, thus, was treated as a covariate. Lastly, two demographic variables were age group (12 to 13-year-olds, 14 to 15-year-olds, 16 to 18-year-olds) and race/ethnicity (non-Hispanic white, Hispanic, other).

## Statistical Analysis

Poisson regression models were developed to test for the associations between advertising receptivity and the two outcome variables, ever use of SLT in adolescence (1993–1996) and

regular use by young adulthood (1993–1999). Poisson regression was chosen over other regression methods because it yields adjusted relative risk estimates that are unaffected by the frequency of the outcome. The odds ratio from logistic regression, in contrast, overestimates the relative risk for common outcomes in cohort studies (e.g., ever use of smokeless tobacco) (Knol, Le Cessie, Algra, Vandenbroucke, & Groenwold, 2012). Negative binomial regression was considered because it also yields relative risk estimates, but was not chosen due to non-convergence of models. Concerns arising from the modeling of a binary outcome, which does not fit a Poisson distribution, have been addressed by using robust error variances (Zou, 2004). The regression models in this study incorporated sample and replicate weights to account for the complex probability sampling of the 1993–1999 Teen Longitudinal California Tobacco Survey. The final models were developed using the survey command `svy: poisson` in STATA v12.1 (StataCorp., 2012).

## Results

### Descriptive analysis

The sample was comprised primarily of young adolescents between the ages of 12 and 15 (75.1%). Among the never users at the baseline survey, 16.8% had tried SLT by the 1996 survey and 5.8% had used SLT on 20 or more occasions by the 1999 survey. At the baseline survey, 27% of the never users had identified the SLT brand perceived to be the most advertised. In descending order, the most advertised brands were Skoal, Redman, Copenhagen, Kodiak, Skoal Bandits and Beechnut. Among the participants who identified the most advertised brand, 27.7% were 12 to 13-year-olds, 41.5% were 14 to 15-year-olds, and 30.8% were 16 to 18-year-olds.

### Predictors of SLT Initiation/Use

Relative risks from the poisson models are presented in Table 1. The adjusted relative risks were derived from the regression model  $\log(y) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_9 X_9$ , where  $X_1$  and  $X_2$  represent indicator variables for Hispanic ethnicity and other race/ethnicity, respectively (non-Hispanic whites are the reference);  $X_3$  and  $X_4$  represent the indicator variables for 14 to 15-year-olds and 16 to 18-year-olds, respectively (12 to 13-year-olds are the reference);  $X_5$  through  $X_8$  represent four risk factors for SLT use; and  $X_9$  represents exposure to a friend or family member who uses SLT. In all four models in Table 1, Hispanics were less likely than non-Hispanic Caucasians to initiate or use SLT regularly. The risk factors risk-taking/rebelliousness and intention to use SLT were significantly associated with ever use of SLT by 1996, but not regular use by 1999. Cigarette smoking and advertising receptivity were significantly associated with both SLT outcomes in unadjusted and adjusted models. Using estimates from the latter, participants who identified an SLT brand were 2.0 and 3.7 times more likely to ever use SLT and use on 20 or more occasions, respectively, compared to participants who did not identify an SLT brand.

## Discussion

The findings of this study suggest that adolescents' identification of a SLT brand is predictive of initiating use of SLT in adolescence and using the tobacco regularly by young

adulthood. This study complements the only other known study on the effects of advertising on SLT use among California adolescents (W.S. Choi et al., 1995). Choi et al. (1995) reported similar effects of SLT advertising, but was limited in making causal inferences due to the use of cross-sectional data. Longitudinal data was necessary in the current study for establishing the temporal sequence between advertising receptivity and SLT initiation. Unlike the well-known relationship between advertising and cigarette use (W. S. Choi, Ahluwalia, Harris, & Okuyemi, 2002; Gilpin et al., 2007), the temporal relationship between SLT advertising and SLT initiation had not been established prior to this study.

The most relevant question is whether the findings can inform public health practitioners and policymakers about the effects of SLT advertising in the year 2015. Some may argue that the findings are not relevant due to the significant changes in advertising messages, many of which appeal to adult consumers. The modern advertisements often target cigarette smokers with messages pertaining to the convenience of using SLT at any location (Curry et al., 2011). Furthermore, some may argue that there is less of a public health concern today regarding adolescents' use of SLT products compared to the 1990s. Past-month use of SLT among 10<sup>th</sup>-graders in 1993 was twice that of 10<sup>th</sup>-graders in 2014 (10% vs. 5%, respectively)(Johnston, O'Malley, Bachman, & Schulenberg, 2004). Though, data from a cohort of California adolescents in the 1990s may serve as a baseline for comparison with current data. Without a baseline comparison, there is no means of assessing the changing effects of SLT advertising over time. For several reasons, the impact of SLT advertising reported in this study may differ from the impact in today's market. First, the Federal Trade Commission reported that the advertising and promotional expenditures for moist snuff have increased substantially over time, doubling from 1986 (\$43 million) to 1996 (\$86 million), and more than tripling from 1996 to 2006 (\$308 million) (Federal Trade Commission, 2014). Surprisingly, the 1998 Smokeless Tobacco Master Settlement Agreement had little effect on expenditures for SLT advertising in magazines with a high youth readership(Morrison et al., 2008).

Two additional factors may account for changes over time on the impact of marketing on adolescents' use of SLT. First, the federal ban on the flavoring of cigarettes, as mandated by the 2009 Tobacco Control Act, does not apply to SLT products. The large variety of snuff flavors (e.g., cherry), which are being marketed in consumer magazines (Curry et al., 2011), could entice adolescents. Curry et al. (2011) reported that 71% of SLT advertisements in consumer magazines between 2005 and 2006, versus 17% between 1998 and 1999, included a flavored product. Young adults (18 to 24-year-olds) were reported to have greater odds of using flavored tobacco (OR= 1.89 (1.14, 3.11)) relative to 25 to 34-year-olds (Villanti, Richardson, Vallone, & Rath, 2013). The second factor affecting adolescents' use of SLT is the rising popularity of discount snuff brands, notably the brand Grizzly. One study reported a dramatic increase from 2002 to 2009 in the proportion of adolescent snuff users who preferred discount over premium snuff (Timberlake & Pechmann, 2013). This trend, however, may diminish over time with passage of state legislation that taxes snuff by weight rather than by price (Timberlake et al., 2014).

Aside from the analysis of older data, the primary limitation of this study was the use of a rudimentary measure for advertising receptivity. Other measures for advertising receptivity

were considered (e.g., receipt of a tobacco promotional item), but excluded due to the few participants who had received a promotional item. Despite this limitation, it is likely that advertising has an impact on youth initiation of SLT because moderate to strong associations were observed with the crude measure, even after having made adjustments for demographic variables, SLT risk factors, and exposure to SLT users. In contrast to advertising receptivity, associations with SLT use were not consistently observed with traditional risk factors such as exposure to SLT users (i.e. friends/family members). The findings of this study should assist the Center for Tobacco Products at the FDA in evaluating the effect of marketing tactics that are employed by SLT manufacturers. A comparison to more recent data should indicate whether effects of marketing tactics over time are having a more profound effect on youth initiation of smokeless tobacco.

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**Table 1**

Relative risks of male adolescents experimenting with smokeless tobacco and using it regularly by adulthood

Baseline measure (1993)	1993–1996 Follow-up Outcome: <i>Ever use</i>		1993–1999 Follow-up Outcome: <i>Reg. use ( 20 times)</i>	
	Unadjusted RR (95% C.I)	Adjusted RR (95% C.I)	Unadjusted RR (95% C.I)	Adjusted RR (95% C.I)
Sample size	1388	1333	1014	973
<b>Demographics</b>				
Non-Hispanic White			Referent	
Hispanic	.41 (.23, .72) ¥	.49 (.28, .83) ¥	.11 (.03, .38) ¥	.15 (.04, .56) ¥
Other race/ethnicity <sup>a</sup>	.65 (.36, 1.19)	.77 (.42, 1.41)	.68 (.31, 1.51)	.89 (.35, 2.26)
Age (12 to 13-year-olds)			Referent	
Age (14 to 15-year-olds)	1.60(1.08,2.35) *	1.36 (.94, 1.96)	1.05 (.59, 1.86)	.78 (.47, 1.29)
Age (16 to 18-year-olds)	1.38 (.84, 2.28)	1.09 (.67, 1.75)	.97 (.36, 2.64)	.62 (.25, 1.56)
<b>Risk factors for SLT use</b>				
Ever smoked a cigarette	2.47(1.75,3.48) £	1.89(1.28,2.81) ¥	2.12(1.13,3.98) *	2.26(1.24,4.12) ¥
Risk-taking/rebellious. <sup>b</sup>	1.23(1.13,1.33) £	1.11(1.02,1.21) *	1.05 (.92, 1.19)	.90 (.78, 1.03)
Intention to use SLT	2.07(1.51,2.83) £	1.57(1.09,2.25) *	1.51 (.74, 3.09)	1.21 (.56, 2.61)
Advertising receptivity	2.76(1.79,4.24) £	2.02(1.33,3.06) ¥	4.42(2.46,7.95) £	3.73(1.98,7.01)£
<b>Exposure to SLT user</b>				
Friend/family uses SLT <sup>c</sup>	1.49(1.12,1.98) ¥	1.12 (.84, 1.49)	1.54(1.01,2.34) *	1.15 (.75, 1.76)

\* p<.05;

¥ p<.01;

£ p<.001;

<sup>a</sup> African-Americans, Asians and other ethnic groups were combined due to low cell counts;

<sup>b</sup> rebelliousness scale (0–8);

<sup>c</sup> friend or family member uses SLT