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Short Communication

Attitudes toward smokeless tobacco use at all public sports venues among U.S. adults, 2016[☆]Satomi Odani^{a,*}, Kevin O'Flaherty^b, Nichole Veatch^b, Michael A. Tynan^a, Israel T. Agaku^a^a Office on Smoking and Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Atlanta, GA, USA^b Campaign for Tobacco-Free Kids, Washington D.C., USA

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ABSTRACT

Policies prohibiting smokeless tobacco (SLT) use at sports venues have been enacted in California and nine U.S. cities. We measured opposition toward SLT use at all public sports venues and its correlates among U.S. adults. Data were from the 2016 *SummerStyles*, a web-based survey of U.S. adults aged ≥ 18 years ($n = 4203$). Weighted estimates of opposition (“strongly” or “somewhat”) SLT use were computed overall and by selected characteristics. Multivariable Poisson regression analyses were performed to identify determinants of opposition toward SLT use overall and among current tobacco product users. Overall, 81.8% of U.S. adults opposed SLT use at all public sports venues. Opposition varied by tobacco product use status: 85.9%, 86.9% and 60.4% among never, former, and current tobacco product users, respectively. Among all adults, the likelihood of opposition was higher among females than males (Adjusted Prevalence Ratio [APR] = 1.05; 95%CI = 1.01–1.08) and increased with every 10-year increase in age (APR = 1.01; 95%CI = 1.00–1.02). Likelihood was lower among persons with a high school diploma (APR = 0.92; 95%CI = 0.88–0.96) than those with college degree or higher; persons widowed/divorced/separated (APR = 0.92; 95%CI = 0.87–0.97) than those married; and current tobacco product users (APR = 0.70; 95%CI = 0.65–0.76) than never users. Among current tobacco product users, likelihood was lower among persons living in the Midwest (APR = 0.81; 95%CI = 0.66–0.98) and South (APR = 0.78; 95%CI = 0.65–0.94) than the Northeast. Most U.S. adults, including three-fifths of current tobacco product users, oppose SLT use at all public sports venues. Complete tobacco-free policies for sports venues that prohibit all forms of tobacco product use can help reduce the social acceptability of SLT use.

1. Introduction

The use of smokeless tobacco (SLT) (chewing tobacco, snuff, or dip) in the United States has remained unchanged despite declines in cigarette smoking in the past two decades (Wang et al., 2016b). Internal tobacco industry documents from the early 1970s reveal numerous marketing strategies designed to instill strong acceptance of SLT use in organized sports, particularly baseball, hockey, and car racing (Truth Tobacco Industry Documents, 1972; Truth Tobacco Industry Documents, 1978). Some of these strategies included SLT advertising in sports magazines and TV, the design of smokeless initiation products marketed as suitable alternatives to cigarettes, promotional activities using free sampling to promote initiation, and endorsements by major sport figures. Despite prohibitions on brand-name sponsorship of sporting and other cultural events under the Family Smoking Prevention and Tobacco Control Act (Food and Drug Administration, 2010) and the Master Settlement Agreement (Public Health Law Center,

2017), smokeless tobacco manufacturers spent, in 2014, 1.18 million dollars in advertising and promoting SLT products in sports and sporting events (Federal Trade Commission, 2016).

SLT use is higher among athletes than U.S. adults overall. For example, while 2.5% of U.S. adults are current SLT users (4.8% of males, 0.3% of females) (Hu et al., 2016), about one-third (33%) of major league baseball players reported using smokeless tobacco in 2014 (New York Magazine, 2016). SLT use by athletes is of concern because of the potential for such behavior to serve as an unpaid advertisement, despite restrictions on direct brand marketing. This is especially important because of the influence that sports figures play as youth role models (Chaffee et al., 2017).

High SLT use also is noted among male college athletes; about 47.2% of baseball players, 40.0% of lacrosse players, and 23.8% of football players reported SLT use during 2013 (NCAA Research, 2014). A 2013 study of U.S. high school students found similar patterns of tobacco use among high school athletes; SLT use was higher among

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* Corresponding author.

E-mail address: lpu7@cdc.gov (S. Odani).

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high school students participating in athletic activities (11.1% overall, 17.4% among males, 3.4% among females) compared to those not engaging in any athletic activity (5.9% overall, 10.6% among males, 2.3% among females) (Agaku et al., 2015). Factors that might influence SLT use among athletes include the perception that SLT use behavior is part of sports culture and the misperception that SLT use can enhance sports performance (Chaffee et al., 2017; NCAA Research, 2014).

Since youth are highly impressionable and adolescence marks a period of high susceptibility to tobacco use (U.S. Department of Health and Human Services, 2012), efforts to eliminate SLT use in sporting events could benefit public health by reducing the social acceptability of tobacco use. Several U.S. jurisdictions have enacted laws prohibiting tobacco product use, including SLT, at sports venues, including their professional baseball stadiums. These include Boston, Chicago, Milwaukee, New York, Los Angeles, San Francisco, Washington D.C., St. Louis, Tampa Bay, and the state of California (Campaign for Tobacco-Free Kids, 2017). These laws, which, in 2017, effectively cover 14 of the 30 Major League stadiums in the United States, are strongly supported by the public. Surveys conducted in San Francisco and Massachusetts during 2015–2016 showed that > 60% of voters supported policies prohibiting the use of all tobacco products at all baseball venues and other athletic fields (Campaign for Tobacco-Free Kids, 2015; Campaign for Tobacco-Free Kids, 2016).

Measuring public attitudes toward tobacco use issues is important given the role of the public in informing policy makers and helping to enforce tobacco-free policies. However, no study has assessed public attitudes toward SLT use at public sports venues. Therefore, this study measured opposition toward SLT use at all public sports venues and its correlates among U.S. adults.

2. Methods

2.1. Data source

Data were obtained from *Summer Styles*, a web-based, cross-sectional survey of U.S. adults aged 18 years or older conducted during June 24th to July 11th, 2016 by Porter Novelli. A total of 4203 adult participants were selected randomly from a pool of about 55,000 online panelists to be representative of U.S. adults (GfK's Knowledge Panel®). Panelists were randomly recruited using probability-based sampling by address to reach respondents regardless of whether or not they had landline phones or Internet access. Data were weighted to approximate U.S. Current Population Survey proportions. The overall response rate for the 2016 *Summer Styles* was 68%. This analysis was exempt from Institutional Review Board review because it was a secondary analysis of deidentified data.

2.2. Measures

2.2.1. Opposition toward SLT use at all public sports venues

Respondents were asked: “The use of smokeless tobacco also known as chewing tobacco, snuff, or dip, is common in several sports, including baseball, rodeo, and hockey. What is your opinion on the use of smokeless tobacco products at all public recreational facilities, including stadiums, parks, and school gymnasiums, by players, coaches, referees, and fans?” Response options were “strongly favor”, “somewhat favor”, “somewhat oppose”, and “strongly oppose”. Respondents who reported “somewhat oppose” or “strongly oppose” were classified as opposing the use of SLT at all public sports venues.

2.2.2. Tobacco product use

Respondents were asked: 1) “Have you ever tried any of the following products, even just one time?” and 2) “In the past 30 days, which of the following products have you used at least once?” Categorical response options for both questions were grouped into seven tobacco product types: cigarettes, cigars, smokeless tobacco products, electronic

nicotine delivery systems, loose tobacco products (i.e., pipe tobacco and roll-your-own tobacco), water pipes/hookahs, and other products not specified. Current tobacco product users were persons who reported using at least one of the seven tobacco products in the past 30 days. Former tobacco product users were persons who reported using at least one tobacco product type during their lifetime, but did not use any tobacco product in the past 30 days. Never tobacco product users were persons who reported never having used any of the seven tobacco product types during their lifetimes.

2.2.3. Sociodemographics

Assessed sociodemographic characteristics included: sex, age, race/ethnicity, marital status, presence of children aged < 18 years in household, education, annual household income, metropolitan area status, and U.S. region.

2.3. Analysis

Analyses were performed separately for all adults and current tobacco product users. Weighted estimates of opposition and 95% confidence intervals (CIs) were calculated overall and by sociodemographics. Chi-squared tests were used to examine differences within subgroups. Statistical significance was set at $p < 0.05$.

Multivariable Poisson regression analyses were used to calculate Adjusted Prevalence Ratios (APRs) for determinants of opposition (“somewhat” or “strongly” oppose) toward SLT use in public sport venues. Independent variables included all sociodemographics and tobacco product use status; the latter was included only in the models for all adults. Regression models were iteratively fitted for each independent variable, adjusting for age, sex, race/ethnicity, and tobacco product use as appropriate; the latter was adjusted only in the models for all adults. Analyses were performed using R, version 3.2.2.

3. Results

3.1. Respondent characteristics

The weighted distributions of respondent characteristics were comparable to the U.S. population (U.S. Census Bureau, 2017). 58.3% of respondents were married or living with a partner. Overall, 70.7% reported not having children aged < 18 years in household. By tobacco product use, 39.7% were never users, 42.5% were former users, and 17.8% were current users.

3.2. Opposition toward SLT use at all public sports venues: all adults

Among all adults, 81.8% (52.4% “strongly” and 29.4% “somewhat”) opposed SLT use at all public sports venues (Table 1). Opposition was higher among women (84.5%) than men (78.9%). Opposition ranged from 79.0% among adults aged 18–24 years to 88.0% among those aged ≥ 65 years. Opposition was lowest among those widowed/divorced/separated (76.2%) and highest among those married or living with a partner (83.3%). By education, opposition ranged 74.7% among adults < high school education to 86.2% among those with a college degree or higher. By income, opposition ranged 76.4% among adults with annual household income < \$20,000 to 83.7% among those with \$50,000–99,999. Finally, opposition was lowest among current tobacco product users (60.4%) and highest among former users (86.9%) (all $p < 0.05$). Significant differences were not observed by race/ethnicity, presence of children aged < 18 years, metro status, and U.S. Census region.

The adjusted likelihood of opposing SLT use at all public sports venues was higher among females than males (APR = 1.05; 95%CI = 1.01–1.08) and increased, on average, with every 10-year increase in age (APR = 1.01; 95%CI = 1.00–1.02). Likelihood was lower among: those widowed/divorced/separated persons

Table 1
Weighted sample characteristics and opposition toward SLT use at all public sports venues^a, United States, 2016.

Characteristic ^b	All adults		Current tobacco product users	
	n (%)	% (95% CI)	n (%)	% (95% CI)
Overall	4202	81.8 (80.3–83.3)	731	60.4 (56.1–64.8)
Sex				
Male	1997 (48.3)	78.9 (76.7–81.2)	415 (57.4)	56.9 (51.1–62.7)
Female	2206 (51.7)	84.5 (82.5–86.4)	316 (42.6)	65.3 (58.8–71.7)
Age (years)				
65 +	957 (19.1)	88.0 (86.0–90.4)	96 (10.3)	63.9 (51.7–76.1)
45–64	1766 (34.5)	80.3 (78.0–82.3)	335 (38.4)	60.4 (54.3–66.6)
25–44	1215 (34.1)	80.9 (78.1–83.6)	262 (41.4)	60.1 (52.9–67.2)
18–24	265 (12.2)	79.0 (74.0–84.5)	38 (9.8)	58.7 (41.3–76.1)
Race/ethnicity				
Non-Hispanic White	3104 (65.1)	82.7 (81.1–84.3)	527 (67)	58.6 (53.5–63.6)
Non-Hispanic Black	424 (11.6)	81.7 (77.3–86.1)	101 (16.3)	70.0 (59.3–80.7)
Hispanic	469 (15.4)	79.4 (74.9–83.9)	73 (12.8)	59.4 (45.8–72.9)
Non-Hispanic other/multi race	206 (7.9)	78.3 (70.0–86.5)	30 (3.9)	56.5 (16.5–96.5)
Marital status				
Married/living with a partner	2626 (58.3)	83.3 (81.5–85.0)	394 (49.7)	58.2 (52.4–64.0)
Widowed/divorced/separated	771 (15.6)	76.2 (72.3–80.2)	183 (22.9)	59.4 (50.1–68.6)
Never married	806 (26.1)	81.8 (78.6–85.0)	154 (27.5)	65.4 (56.5–74.2)
Children < 18 years in household				
No	2805 (70.7)	82.5 (80.8–84.2)	473 (68.8)	60.5 (55.3–65.7)
Yes	1394 (29.3)	80.2 (77.4–83.1)	255 (31.2)	60.7 (52.8–68.7)
Education				
College graduate and higher	1404 (29.9)	86.2 (84.0–88.5)	142 (16.1)	61.6 (52.5–70.8)
Some college	1275 (28.3)	83.8 (81.3–86.3)	235 (28.2)	65.3 (57.8–72.7)
High school	1247 (29.7)	77.7 (74.9–80.5)	268 (35.9)	57.4 (50.3–64.5)
< High school	277 (12.1)	75.7 (69.7–81.7)	86 (19.8)	58.1 (46.0–70.1)
Household income				
≥ \$100,000	1126 (27)	83.0 (80.3–85.8)	121 (17.3)	58.1 (47.8–68.3)
\$50,000–\$99,999	1350 (35.1)	83.7 (81.3–86.1)	200 (29.2)	58.9 (50.9–67.0)
\$20,000–\$49,999	1156 (25)	80.4 (77.4–83.5)	232 (30.3)	63.9 (56.2–71.7)
< \$20,000	571 (12.9)	76.4 (72.0–80.9)	178 (23.2)	59.5 (50.3–68.7)
Metro status ^c				
Metro	3588 (84.9)	81.9 (80.3–83.5)	603 (81.3)	61.4 (56.6–66.1)
Non-metro	615 (15.1)	81.1 (77.2–85)	128 (18.7)	56.5 (46–66.9)
Census region ^d				
Northeast	777 (18.1)	84.2 (81.1–87.2)	120 (15)	70.8 (61.6–80.1)
Midwest	1027 (21.4)	81.8 (78.7–84.8)	208 (27.3)	57.0 (48.5–65.5)
South	1501 (37.1)	80.6 (78.1–83.1)	286 (41.5)	57.6 (50.7–64.5)
West	898 (23.4)	81.8 (78.6–85.0)	117 (16.2)	63.9 (53.1–74.7)
Tobacco product use ^e				
Never user	1513 (39.7)	85.9 (83.6–88.2)	–	–
Former user	1941 (42.5)	86.9 (85.1–88.7)	–	–
Current user	731 (17.8)	60.4 (56.1–64.8)	–	–

^a Opposition defined as a report of “Strongly oppose” or “Somewhat oppose” to the question “The use of SLT, also known as chewing tobacco, snuff, or dip, is common in several sports, including baseball, rodeo, and hockey. What is your opinion on the use of SLT products at all public recreational facilities, including stadiums, parks, and school gymnasiums, by players, coaches, referees, and fans?”.

^b Within-group differences were determined with standard chi-squared tests. Significant differences were observed by sex, age, marital status, education, household income, and tobacco product use status ($p < 0.05$). Significant difference was not observed by race/ethnicity, presence of children < 18 years in household, metro status, and Census region.

^c Metropolitan area defined as an area which contains a core urban area of 50,000 or more population as well as any adjacent counties that have a high degree of social and economic integration with the urban core.

^d Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

^e Respondents were asked: “Have you ever tried any of the following products, even just one time?” and “In the past 30 days, which of the following products have you used at least once?” Categorical response options for both questions were grouped into seven classes of tobacco products: cigarettes, cigars, smokeless tobacco products, electronic nicotine delivery systems, loose tobacco products (i.e., pipe tobacco and roll-your-own tobacco), water pipes/hookahs, and other products not specified. Current users were persons who reported using at least one of the seven tobacco product classes at least once in the past 30 days. Former users were persons who reported ever use of at least one product type, but were not current users of any tobacco product at the time of the study. Never users were persons who reported never having used any of the seven tobacco product types in their lifetime.

(APR = 0.92; 95%CI = 0.88–0.96) compared to those married or living with a partner; those with a high school diploma (APR = 0.92; 95%CI = 0.87–0.97) than those with a college degree or higher; and current tobacco product users (APR = 0.70; 95%CI = 0.65–0.76) than never users (Table 2).

3.3. Opposition toward SLT use at all public sports venues: current tobacco product users

Among current tobacco product users, opposition toward SLT use at all public sports venues did not vary significantly within each socio-demographic subgroup (Table 1). However, within adjusted analyses, the likelihood of opposing SLT use at all public sports venues was lower among those in the Midwest (APR = 0.81; 95%CI = 0.66–0.98) and South (APR = 0.78; 95%CI = 0.65–0.94) than the Northeast (Table 2).

Table 2
Adjusted Prevalence Ratios (APRs) of opposition toward SLT use at all public sports venues^{a,b}, United States, 2016.

Characteristics	All adults (n = 4203)	Current tobacco product users (n = 731)
	APR (95% CI)	APR (95% CI)
Sex		
Male	Ref.	Ref.
Female	1.05 (1.01–1.08)	1.14 (0.99–1.31)
Age		
(For 10-year increase)	1.01 (1.00–1.02)	1.01 (0.97–1.06)
Race/ethnicity		
Non-Hispanic White	Ref.	Ref.
Non-Hispanic Black	1.01 (0.95–1.07)	1.19 (1.00–1.42)
Hispanic	0.95 (0.90–1.01)	1.03 (0.81–1.30)
Non-Hispanic other/multi race	0.92 (0.84–1.01)	1.00 (0.63–1.57)
Marital status		
Married/living with a partner	Ref.	Ref.
Widowed/divorced/separated	0.92 (0.87–0.97)	0.96 (0.79–1.16)
Never married	1.03 (0.98–1.08)	1.17 (0.96–1.41)
Children < 18 years in household		
No	Ref.	Ref.
Yes	0.99 (0.95–1.03)	1.01 (0.86–1.19)
Education		
College graduate or higher	Ref.	Ref.
Some college	0.99 (0.95–1.03)	1.01 (0.83–1.23)
High school	0.92 (0.88–0.96)	0.90 (0.74–1.10)
< High school	0.93 (0.86–1.01)	0.94 (0.73–1.21)
Household income		
≥ \$100,000	Ref.	Ref.
\$50,000–\$99,999	1.02 (0.97–1.06)	1.00 (0.81–1.25)
\$20,000–\$49,999	0.99 (0.95–1.05)	1.08 (0.87–1.33)
< \$20,000	0.98 (0.92–1.04)	0.99 (0.78–1.25)
Metro status ^c		
Metro	Ref.	Ref.
Non-metro	1.00 (0.95–1.05)	0.91 (0.75–1.11)
Census region ^d		
Northeast	1.00	1.00
Midwest	0.99 (0.94–1.05)	0.81 (0.66–0.98)
South	0.98 (0.93–1.02)	0.78 (0.65–0.94)
West	0.98 (0.93–1.03)	0.91 (0.74–1.13)
Tobacco product use ^e		
Never user	1.00	–
Former user	1.00 (0.97–1.03)	–
Current user	0.70 (0.65–0.76)	–

^a Opposition defined as a report of “Strongly oppose” or “Somewhat oppose” to the question “*The use of SLT, also known as chewing tobacco, snuff, or dip, is common in several sports, including baseball, rodeo, and hockey. What is your opinion on the use of SLT products at all public recreational facilities, including stadiums, parks, and school gymnasiums, by players, coaches, referees, and fans?*”.

^b APRs for overall U.S. adults were obtained using Poisson regression model adjusted for sex, age, race/ethnicity and any tobacco use.

^c Metropolitan area defined as an area which contains a core urban area of 50,000 or more population as well as any adjacent counties that have a high degree of social and economic integration with the urban core.

^d Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

^e Respondents were asked: “*Have you ever tried any of the following products, even just one time?*” and “*In the past 30 days, which of the following products have you used at least once?*” Categorical response options for both questions were grouped into seven classes of tobacco products: cigarettes, cigars, smokeless tobacco products, electronic nicotine delivery systems, loose tobacco products (i.e., pipe tobacco and roll-your-own tobacco), water pipes/hookahs, and other products not specified. Current users were persons who reported using at least one of the seven tobacco product classes at least once in the past 30 days. Former users were persons who reported ever use of at least one product type, but were not current users of any tobacco product at the time of the study. Never users were persons who reported never having used any of the seven tobacco product types in their lifetime.

4. Discussion

This study revealed that four of five U.S. adults, including three of five current tobacco product users, opposed the use of SLT at all public sports venues. This is consistent with surveys showing that > 60% of voters in San Francisco and Massachusetts supported legislation prohibiting all forms of tobacco, including SLT, at sports venues (Campaign for Tobacco-Free Kids, 2015; Campaign for Tobacco-Free Kids, 2016). Considering the general support for making public sports venues tobacco free, these findings have the potential to inform tobacco prevention and control efforts.

Differences in attitudes toward SLT use at all public sports venues were seen across subpopulations. This remained so, even after controlling for tobacco product use. Higher likelihood of opposing SLT use at sports venues among females and older adults might reflect their concern about the potential impact of pro-tobacco social influences on tobacco use initiation among younger generations; females and older individuals are more likely to support policies to reduce tobacco product acceptability and accessibility (Wang et al., 2016a). A 2013 study also found higher support for smoke-free environments among women, older individuals, and those with higher education, which was ascribed to the lower cigarette smoking prevalence among those groups (King et al., 2013). Higher opposition toward SLT use among certain populations could be leveraged to create support for tobacco-free sports policy by implementation of tailored communication campaigns and educational interventions.

We also observed regional variation among current tobacco product users, with those in the Midwest and South reporting lower likelihood of opposition. Tobacco-free sports policies were first enacted in cities in the West and Northeast in early 2016. At the time these data were collected (June–July 2016), four cities had such policies: San Francisco, Los Angeles, Boston, and New York. Similar to previous studies showing that support for smoke-free environments increases after policy adoption (Tang et al., 2003; Fong et al., 2006), the same phenomenon might apply to SLT prohibitions. In addition, a recent report showed prevalence of SLT use was highest in the South and lowest in the Northeast (Hu et al., 2016), generally consistent with the geographic patterns in this study. Since public support for smoke-free environment are higher in states with comprehensive smoke-free laws and lower adult smoking prevalence (King et al., 2013), geographic variation in SLT use might also explain regional difference in public attitudes toward SLT use.

Prohibiting SLT use at all sports venues could benefit public health by promoting tobacco-free environments, encouraging athletes and sports fans to quit SLT use, reducing perceived social acceptance of SLT use, and reducing the health risks of SLT use. In addition, continued implementation of comprehensive tobacco-free policies and other evidence-based interventions can help reduce all forms of tobacco; such interventions include increasing tobacco prices, conducting mass media anti-tobacco use campaigns, and promoting accessible cessation assistance (Centers for Disease Control and Prevention, 2014).

This study is subject to at least four limitations. First, the cross-sectional design of SummerStyles prevents establishment of causal relationship between covariates and attitudes toward SLT use. Second, data were self-reported, which could result in misrecall and social desirability bias. Third, data were obtained from the second wave of a series of Styles survey, which could introduce panel-conditioning bias. Fourth, sample size was not large enough for stratification by more nuanced tobacco product use categories, including SLT use status.

5. Conclusion

Most U.S. adults, including three-fifths of current tobacco product users, opposed SLT use at all public sports venues. Complete tobacco-free policies prohibiting all forms of tobacco, including SLT, at all public sports venues could reinforce efforts to promote public wellness

by reducing the social acceptability of tobacco use and consequently reducing tobacco-related disease and death.

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Conflict of interest

The authors have no conflicts of interest to disclose.

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