Smokeless tobacco use among rural California high school baseball athletes: research to inform tobacco regulation

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Adolescent Tobacco Use: United States (males, grade 9 -12)

Source: Youth Risk Behavior Surveillance Survey
Populations at elevated risk of smokeless tobacco use

Male
Young adult
Non-Hispanic White
Lower-income & education
Rural
Why Study Smokeless Tobacco Use in California?
1.9 million Californians live in rural areas
California Counties: Population Density

California Counties: % Smokeless Tobacco Ever-Use 11th Grade

Data Source: California Healthy Kids Survey
Smokeless Tobacco Use Among Rural High School Baseball Players in California

Baseball teams at 36 rural California high schools

Assess:

- SLT use patterns & predictors
- Risk perceptions
- Biological markers of nicotine and carcinogen exposure
- Decision-making
Methodology

- Prospective cohort
- In-person surveys: baseline & 1 year later
- Saliva and urine samples both time points
- Separate qualitative interviews

Sample Attributes (N = 594)

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td><strong>15.8</strong> years</td>
</tr>
<tr>
<td>Follow-up</td>
<td><strong>86%</strong></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td><strong>48%</strong></td>
</tr>
<tr>
<td>Parent is college grad</td>
<td><strong>59%</strong></td>
</tr>
</tbody>
</table>
Current (past month) tobacco use

Rural California High School Male Baseball Players, 2014-2016

- Dip/Chew: 18%
- Cigars: 9%
- E-Cigarettes: 9%
- Hookah: 8%
- Snus: 6%
- Cigarettes: 4%

25% of SLT users were using daily
Smokeless Tobacco and Sports

Elevated use in baseball, hockey, football, rodeo, wrestling, auto racing

Modeled use by admired athletes during widely broadcast games

Tobacco marketing infiltrates baseball culture and tradition

Officially banned in minor leagues (1993)

Cannot be carried in uniform (2012)

Some cities ban tobacco in ballparks (2015-16)

New major leaguers cannot use in games (2017)

Momentum encouraging, but rules rely on enforcement
Do you think your favorite Major League Baseball player uses smokeless tobacco (dip/chew)?

- Definitely Yes
- Probably Yes
- Definitely No
- Probably No

Ever-tried SLT: 25%
Current SLT: 8%

Ever-tried SLT: 38%
Current SLT: 18%
Susceptibility to SLT initiation
High school baseball players (*SLT never-users*)

Does Your Favorite MLB Player Use ST?
- Black: Definitely Not
- Grey: Probably Not
- Red: Probably Yes
- Deep Red: Definitely Yes

Willing or Expect to Try
- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
### Multivariable models: Predictors of increased SLT use over time

#### Baseline Non-Users (N=331)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adj. Odds Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other tobacco use</td>
<td>2.35*</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>1.43</td>
</tr>
<tr>
<td>Family SLT use</td>
<td>1.09</td>
</tr>
<tr>
<td>SLT ad receptivity</td>
<td>1.56</td>
</tr>
<tr>
<td>SLT warning labels</td>
<td>1.54</td>
</tr>
<tr>
<td>Perceived Harm (mod.)</td>
<td>2.13</td>
</tr>
<tr>
<td>Perceived Harm (low)</td>
<td>4.34*</td>
</tr>
<tr>
<td>Friends’ SLT use (few)</td>
<td>2.89*</td>
</tr>
<tr>
<td>Friends’ SLT use (most)</td>
<td>1.23</td>
</tr>
</tbody>
</table>

#### Baseline Experimenters (N=123)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adj. Odds Ratios</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLT Initiation</td>
<td>2.89*</td>
</tr>
<tr>
<td>Onset of Established SLT Use</td>
<td>1.90</td>
</tr>
<tr>
<td>Friends’ SLT use (most)</td>
<td>3.91</td>
</tr>
</tbody>
</table>

Note: * indicates statistical significance.
In your opinion, how harmful is using dip or chew to general health?

Use this scale from 0 to 100 to demonstrate:

- 100 = extremely harmful
- 0 = not at all harmful
Perceived Harm Differs by Tobacco Product

100 = extremely harmful
90

0 = not at all harmful
74 74

standardized for age, race/ethnicity, parental education, and intra-school clustering
Perceived Harm Differs by Tobacco Product & Use Status

Product Use:
- Never
- Tried/Former
- Current

standardized for age, race/ethnicity, parental education, and intra-school clustering
Quantifying *Specific* Tobacco Risk Perceptions

Imagine you used dip/chew.
How likely will ______ happen to you?

Use this scale from 0% to 100% to demonstrate

- Get into Trouble
- Brown Teeth
- Mouth Cancer
Specific Tobacco Risk Perceptions: Three Classes

SLT users perceive:
- Lower chance of risks
- Greater chance of benefits

Oral and rule-breaking risks
- Upset family
- Mouth cancer
- Bad breath
- Brown teeth
- Mouth sores
- Get in trouble
- Become addicted

Systemic health risks
- Worse athletics
- Bad cough
- Upset friends
- Trouble catching breath
- Lung cancer
- Starting smoking
- Heart attack
- Harm someone nearby

Benefits
- Feel relaxed
- Fit in more
- Look cool
- Feel alert
- Better athletics

Never tried smokeless tobacco
Ever tried smokeless tobacco
* p < 0.05
Specific Tobacco Risk Perceptions: Three Classes

Unlike cigarettes, smokeless viewed to convey lower chance of systemic health risks
Smokeless Tobacco and Carcinogens

Tobacco-Specific Nitrosamines (TSNAs):

- **NNN** - oral cancer
- **NNK** - lung and pancreatic cancer

*Similar (or higher) levels of NNAL (urinary marker of NNK) in adult smokeless users vs. cigarette smokers*

Hecht, et al. (2007) Cancer Epidemiol Biomarkers
Exposure to TSNAs in Adolescent SLT Users

Frequency of SLT Use

NNAL
(pg/mg)
creatine-
standardized
(log scale)

None in past month
None in past week
1-6 days in past week
Daily

Frequency of SLT Use
"Country" Culture

ST related to rural or country way of life

Part of community tradition and culture

“The group I hang out with, like boots, blue jeans...they're like cowboys, like country kids – [SLT] is really accepted. It's just like a thing that happens. No one even takes a second look at it.”
Maturity and Independent Choice

ST use a way to express newly earned independence.

Chewing in light of health risks signaled reaching an age that required less protection from potential dangers.

“I'm doing it at my own risk, and it's something I decided to do.”
Perceived Health Risks

High awareness of oral health risks: mouth cancer, tooth loss, and gum disease

“Your teeth rot away. Makes your breath smell bad. Makes your teeth turn different colors. Gums, you lose your gums. Teeth start to fall out.”
Many users framed ST as an alternative to cigarettes with greatly reduced risk of systemic disease.

“Cigarettes, it goes into your body and through your lungs and into everything like that... chewing tobacco just stays in my mouth.”

“Cigarettes, you have lung damage. Makes your skin all wrinkly. Chew, just your gums and teeth. Your lungs are fine still.”
Summary and Implications

Smokeless tobacco is a sizeable, persistent public health problem; even in California

*Don’t overlook rural communities in policy & research*

Highly effective industry marketing targets and attracts young rural males

*Forceful public health action needed as industry seeks profits beyond smoking*

Perceived community norms and use by others puts youth at risk

*Full ban with enforcement in professional baseball*

Awareness of oral health risks, but these risks dismissed & compared to smoked tobacco

*“Wrecks your gums” cannot be only message: emphasize addiction, chemicals*

To protect community health: reduce youth appeal and avoid harm reduction arguments