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Publication Date
2014-04-01

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Taking a Dip: Understanding smokeless tobacco use among rural youth

by

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A thesis submitted in partial satisfaction of the requirements for the degree of Master of Science in Health and Medical Sciences in the Graduate Division of the University of California, Berkeley

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Spring 2014
Dedicated to my family,
for teaching me that even the smallest town needs a doctor.

And to my mentors, advisors, and peers who continue to teach and inspire me.
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Acknowledgements

Research for Taking a Dip: Understanding smokeless tobacco use among rural youth was completed with the support of funding from the UC Berkeley-UCSF Joint Medical Program thesis grant, the UCSF Health and Society Pathways Fellowship and Dr. Steve Schroeder, and the Sierra Institute for Community and Environment.

This project would not have been possible without Jonathan Kusel and Amy Hafsrud of the Sierra Institute for Community and Environment for their assistance with project planning, community engagement, and project implementation. I also thank Bonnie Halpern-Felsher for her continued support and desire to make rural health a priority in adolescent research.

Special thanks to Coco Auerswald and Julie Deardorff for their guidance and lessons about adolescent health and development. Thank you to my mentors, especially Steve Eyre, John Balmes, and Karen Sokal-Gutierrez, and my peers at the Joint Medical Program for their continual wisdom and support.

I am most indebted to the people of Plumas County, CA for their hospitality and to the youth who were willing to contribute their words, experiences, and support to this project.
Part 1
Understanding Smokeless Tobacco Use among U.S. Adolescents
Introduction

Tobacco use accounts for over 440,000 total deaths and 170,000 cancer deaths every year in the United States. While cigarettes continue to be the most commonly used form of tobacco in the United States, smokeless tobacco (ST) is becoming an increasingly popular form of tobacco use, particularly among adolescent and young adult males. Over the past decade, major tobacco companies have invested in ST products and advertising. As such, ST use has become an increasingly significant public health concern. Rates of ST use are highest in rural communities, especially among youth. Despite the growing rates of ST use, tobacco research and control (policy) efforts have predominately focused on adolescent cigarette use. Little is known about the factors that affect adolescent ST use and how rural context affects adolescents’ decisions to use ST. This review explores the burden of ST use in the United States and theories of adolescent decision-making to understand how they might inform future research on rural adolescent ST use.

Smokeless Tobacco: Defining the Problem

Smokeless tobacco is a non-combustible form of tobacco that the user places between his or her lips and gums. The user then absorbs the nicotine from the ST through the gums and mucosal membranes of the mouth, delivering it to the blood. There are various types of ST products sold in the United States, the most common being moist snuff (fermented, moist, ground tobacco leaves), dry snuff (heat dried and ground tobacco leaves), and chewing tobacco (cut tobacco leaves) [1]. In addition to these more traditional forms of ST, major tobacco companies have started to sell more novel ST products such as flavored forms of chewing tobacco and snuff, snus (spitless moist snuff in porous packets), and dissolvable tobacco products (spitless, dissolvable products resembling breath mints and oral strips) [2,3].

Early research from the 1990s on the health effects of ST found that ST has fewer negative health effects than cigarettes. However, current research indicates that ST is associated with numerous adverse and life-threatening health outcomes. In the U.S., long-term ST use is associated with increased risk of mouth and throat cancers [4,5]. Zhou and associates found that individuals who reported 10 or more years of ST use had significantly higher odds of head and neck squamous cell carcinoma (OR = 4.06, 95% CI: 1.31-12.64) than matched controls who had never used ST after adjusting for age, gender, race, education level, cigarette smoking, and alcohol consumption [4]. A recent meta-analysis of eighty-nine studies on the carcinogenic effects of ST in the U.S. and Scandinavia also found that ST use is associated with increased risk of oropharyngeal cancer and may also have effect for esophageal, pancreatic, larynx, and kidney cancer [5]. Unfortunately, head and neck cancers, despite being one of the most preventable forms of cancer, are most often detected at late stages and eventually require complex, costly, and generally ineffective treatments, leading to increased burden of medical costs and death [6].

In addition to its carcinogenic effects on the mouth and throat, ST has been associated with other adverse oral and systemic conditions. Long-term and frequent ST use have been linked to oral lesions known as leukoplakia, white or yellow-brown lesions of thickened tissue on the gums or other mucosal linings of the mouth, which may be predictive of future oral cancer [7]. A study by Little et al. found that there is a dose-response relationship between the presence and severity of these lesions and the extent
and frequency of ST use. They found that a significantly greater percentage of users who had been using for over 10 years had more severe lesions than those who had been using for less than five years ($\chi^2 = 71.5, p < .001$). They also reported that as individuals use ST more frequently (both in terms of using more days out of the week and number of times a day) a greater percentage of users will have lesions and a greater percentage of users will have severe lesions [8]. Other oral effects of ST usage that have been identified include forms of periodontal disease such as gingivitis, periodontitis, halitosis, and staining of the teeth [7]. ST use is also associated with reduced sense of taste and smell acuity in long-term users [9]. More recently, a study by Yatsuya and associates identified that ST users are at a 1.26-fold increased risk of cardiovascular disease incidence (95% CI: 1.06, 1.52), such as myocardial infarction and stroke, than non-users, independent of demographic, socioeconomic, and life-style and other tobacco-related variables [10]. Additionally, a study of 789 women who regularly used ST during pregnancy found that these women experience lower birth weights, increased risk of preterm births, and increased odds of preeclampsia than non-users [11].

Apart from the various adverse health outcomes associated with ST, in 1986, both the U.S. Surgeon General and the National Institutes of Health independently concluded that ST is an addictive drug. Users experience clinical signs of nicotine dependence, abuse, and withdrawal, similar to those of cigarettes [12,13]. The nicotine from ST produces psychoactive effects in users, such as euphoria, that increases the likelihood of addiction and long-term use [14]. The addictive properties of ST are particularly important when considering its long-term health consequences, because prolonged use of ST due to addiction is associated with increased risk of the harmful health conditions described above. Studies have also shown that individuals who use tobacco, particularly adolescents, are more likely to engage in other risk-taking behaviors including drinking alcohol, using other illicit drugs, engaging in sexual activity, engaging in violent and antisocial behaviors, and experiencing mental health problems [15].

Despite the documented health effects associated with ST and an 18% decline in cigarette tobacco sales over the past decade, rates of ST sales and use in the U.S. have risen over the past decade [16]. Rates of ST use have risen from about 3.1% in 1998 to up to 15% in 2011, depending on the age and location of the sample [16-18].

ST use among adolescents is of particular concern because rates of adolescent ST use have increased markedly in the past decade. At least three million of the eight million ST users in the U.S. are under the age of 21 [15]. According to the 2009 Youth Risk Behavior Surveillance Survey, 15% of adolescent males in the U.S. reported current ST use [19]. This represents a 36% increase in ST usage nationally since 2003. Among both adults and adolescents, ST use is up to 15 times more common among males than females [20,21]. ST usage rates are higher among white males, at 15.6%, compared to both black males (5.4%) and Hispanic males (8.7%) [17]. There is also some age and grade variation in rates of ST usage, with increasing rates of usage as adolescents proceed through middle school and high school. In the U.S., 6.5% of 10th graders and 8.4% of 12th graders reported ST use in 2009, representing a 30% increase between the two years [19].

Rates of ST use are highest in rural communities, with both adults and adolescents in rural areas using ST at significantly higher rates than those in urban and suburban communities [15,20,22,23]. In fact, although most research on adolescent drug use has focused on urban youth, more recent research indicates that rural adolescents are more
likely to ST and other substances than are their urban counterparts [24]. More specifically, the Center on Addiction and Substance Abuse (CASA) whitepaper on substance abuse in the rural U.S. reports that rural eighth graders are up to five times more likely than their metropolitan counterparts to use ST (8.9 percent versus 1.8 percent respectively) [25]. A recent study comparing ST use among adolescents in communities with varying degrees of rurality found that the most rural communities had the highest rates of ST use [24]. Rural youth are more likely than metropolitan youth to use ST and they also initiate use of ST at significantly earlier ages, though no recent literature has explored the bimodal ST initiation pattern differences between rural and urban youth [22,26,27]. A study by Lisnerski et al. found that up to 36% of rural first grade males and 70% of rural seventh grade males had ever tried ST as compared to only 5% of urban first grade males and 38% of urban seventh grade males [26]. The study reported that the prevalence of continued use (i.e. daily, weekly, or occasional use) was 9.1, 12.8, 12.9, and 20 percent for rural first, third, fifth, and seventh graders respectively. These studies demonstrate that ST use among rural children and youth is a pressing concern.

It is evident that smokeless tobacco is a growing public health concern, with increasing rates of use over the past decade among adolescent males and exceptionally high rates of use in rural communities in the United States. Adolescent substance use, such as ST use, is a significant problem because early initiation of an addictive substance, like ST, is associated with increased risk of abuse and dependence in later life as well as other physical and psychological conditions [24]. Due to the high rates of use of ST among rural adolescents, there is a profound need for health and psychiatric related prevention and intervention strategies that target this high-risk group. Before successful interventions can be put into place, however, it is necessary to understand the process of rural adolescent ST initiation and continued use, as few studies have addressed factors that influence ST use among rural populations, including values, ST images and role models, attitudes and social norms that may be unique to rural societies.

Theories of Adolescent Tobacco Use: A framework to understand initiation, further use, and discontinuation

Adolescence is a critical time in development associated with significant biological, cognitive, affective and social changes, and life-event transitions that can result in decisions and behaviors that can have long-term effects on health outcomes in adulthood [28,29]. Adolescence is a time of generally good physical health, after the time of childhood diseases and before the illnesses of advanced age. Rather, most morbidity and mortality during adolescence is due to preventable causes such as risky behaviors and unhealthy decisions [30]. Health-related behaviors such as substance use and abuse, violence, accidental injury, premature and unprotected sexual activity, and mental health disorders are the leading causes of morbidity and mortality among adolescents [17].

Substance use among adolescent populations is of particular concern because, during adolescence, the brain is more vulnerable to the effects of drugs, which can result in permanent changes in brain function and an increased likelihood of addiction in adulthood [31-33]. Research in adolescent smoking has found that adolescents who initiate frequent smoking (more than six days out of a month) before the age of 14 have a higher risk of nicotine addiction in adulthood than do their peers [34]. This suggests that adolescents who begin using other tobacco products, such as ST, at young ages should also be at increased risk of addiction in later life because adolescent ST users show
similar levels of addiction to nicotine as their smoking peers [35]. Because of increased exposure time to ST, adolescents who begin using and become addicted to ST early in life may be at increased risk of the long-term consequences associated with ST, including oral and throat cancers, periodontal disease, and cardiovascular disease.

In order to effectively prevent or intervene in adolescent ST use, it is necessary to understand what factors affect adolescents’ decisions to use ST and how they make decisions regarding trying, continuing, and discontinuing use of ST. Models that explain adolescents’ decisions to use tobacco often rely on health decision models such as the rational decision making model and the social reaction model. These models describe discrete processes that aid in understanding why individuals engage in health behaviors and what factors affect decisions to engage. Few studies have looked specifically at decision-making surrounding adolescents’ decisions to use ST or how rural communities affect adolescents’ decision-making regarding health behaviors.

The following section will discuss the theories of adolescent decision-making. These theories have not been used to explain tobacco use among rural populations specifically or ST use in the population at large. However, research has consistently applied them to adolescents’ experiences with cigarette tobacco use, providing a valuable framework for understanding how decision-making theories apply to adolescents’ health-risk behaviors.

The Rational Model of Decision-Making

Traditional theories of decision-making regarding health behaviors that have been applied to adolescent tobacco use are primarily based on the rational decision making models of health behavior, including the Health Belief Model [36], Decisional Balance Theory [37] and the Theory of Planned Behavior [38]. These models assume that health-related behaviors are the result of a deliberate, reasoned, and analytical process that ultimately influences an individual’s intentions to engage in a certain health behavior. Intentions are then able to predict how likely it is that an individual will or will not engage in a particular behavior. In the rational decision making model, intentions are influenced by an individual’s attitudes toward the behavior and subjective norms regarding the behavior. Attitudes are formed by 1) perceived consequences of the behavior, 2) perceived vulnerability to those consequences, and 3) desire to engage in the behavior despite the consequences. Traditionally, this model focused solely on perceived negative consequences of behaviors, but recent literature has found that, in addition to perceived negative consequences, or risks, due to a behavior, real and perceived benefits of an act also influence attitudes towards a behavior [39,40].

Another component that is included in the rational decision making model is subjective norms. “Subjective norms” refers to an individual’s perceived social pressure to perform or not perform a behavior and is based on perceptions of the extent to which others are engaging in the behavior. In the rational decision making model, subjective norms also influence an individual’s intentions to perform a behavior. Few studies have looked at the entire decision-making process, but instead have focused on the individual components of decision-making. Empirical evidence supporting the impact of each of these components, attitudes and social norms, is discussed in the following sections.

Attitudes: Applied to adolescent tobacco use, rational decision-making models most often argue that adolescents engage in cigarette smoking because they perceive few personal negative consequences from cigarette use. Empirical evidence supports these
theories for cigarette use, showing that youth who have smoked or intend to smoke hold lower perceptions of risk from smoking than their peers who have not smoked or do not intend to smoke [40-42]. A study by Halpern-Felsher and colleagues in 2004 found that adolescents between the ages of 12 and 15 who have smoked estimated significantly lower risk of social consequences (e.g. getting into trouble, smelling like an ashtray, friends being upset with them) and physical consequences (e.g. getting a bad cough, having trouble catching one’s breath, really bad colds, bad breath, lung cancer, and heart attack) than did adolescent nonsmokers [40]. This study showed that adolescents’ perceptions of both long-term and short-term risks are related to their decisions to engage in tobacco use. More recently, Song and colleagues found that perceptions actually predict tobacco use among adolescents. In a longitudinal study, they showed that adolescents who held the lowest perceptions of long-term and short-term smoking risks were 3.64 and 2.68 times more likely to initiate smoking in the future [43]. This evidence is in concordance with Slovic’s (1998) argument that teens who smoke are even more likely than their peers to see the short-term risks of smoking as trivial and that denial of these short-term risks may be even more predictive of smoking status than understanding or denial of long-term risks.

In addition to knowledge of the tangible consequences of tobacco use, such as a bad cough or the risk of lung cancer with long-term cigarette use, adolescents’ understanding of the addictive nature of smoking has an effect on their perceptions of the future risks of smoking and their vulnerability to those risks. Extensive research has looked at the addictive properties of nicotine, primarily in the context of cigarette smoking. Nicotine has the ability to enhance the neural dopamine-reward pathway and chronic exposure results in neuroadaptation, or tolerance. Thus, after using nicotine for a prolonged period, smokers experience symptoms of addiction and dependence and, upon discontinuing nicotine, they experience symptoms of withdrawal such as irritability, anxiety, and general unpleasant symptoms [44]. Adolescents appear to experience these addictive effects from nicotine more rapidly than adults upon initiating use [45].

Research has shown that adolescent smokers can understand that nicotine addiction occurs because of continued use and that it results in the body becoming used to nicotine [46]. However, adolescent smokers do not always recognize that they are addicted to nicotine, despite regular use of cigarettes [47]. Several studies argue that adolescent smokers might believe that the long-term health risks of smoking do not apply to them because they think that they can quit smoking easily and whenever they wish [40,48,49]. A study by Arnett found that 60% of adolescent smokers surveyed believed that they “could smoke for a few years and then quit” if they wanted to, which was significantly higher than nonsmoking adolescents [48].

Recently, research has also demonstrated that adolescents’ understanding of tobacco-related health risks alone does not adequately predict and explain their tobacco-related attitudes because the risks associated with smoking are only part of the decision-making formula. During adolescence, youth are more focused on peer acceptance and perceived peer attitudes than on parental or adult standards; accordingly, if youth perceive that there are peer-related benefits to using tobacco, such as looking cool or impressing friends, these benefits may affect their decisions to use tobacco, along with perceptions of the associated consequences [40,50]. Halpern-Felsher and colleagues (2004) found that, adolescents who perceived that benefits from smoking were likely to
occur were significantly more likely to have smoked cigarettes or had intentions to smoke. In addition, Song and colleagues found that perceived benefits predicted future smoking behaviors, with adolescents holding the highest perceptions of benefits from smoking being 3.31 times more likely to initiate smoking. Thus, adolescents who perceive fewer risks and more benefits from smoking are likely to have more positive attitudes towards tobacco use and are therefore more likely to engage in tobacco-related behaviors.

Social Norms: Peer influence and the influence of social norms are believed to be factors that influence decision-making for both risky and protective health behaviors. Social norms are individuals’ perceptions of others’, particularly peers’, expectations regarding a behavior and can be seen as a filter that individuals use to weigh whether or not particular behaviors are desirable and “worth” the risks that the behavior poses. Social influence is particularly important among adolescents because adolescence is a time when youth are exploring their identity apart from their parents. Interactions with peers during adolescence have been proven to be vital to normal development into adulthood and lack of socialization and peer bonds have been shown to predict negative outcomes such as depression, maladaptive relationships, and increased mortality. Peer groups and friends are especially important in adolescent decision-making because adolescents use them as social comparisons that can guide behaviors and actions that influence socialization. Empirical evidence has shown that social norms are influential for a variety of health risk behaviors, including substance use.

A large body of literature has shown that peer influence and social norms affect adolescents’ decisions to smoke cigarettes. In a study of adolescents in grades 7-12, Maxwell (2002) found that, when controlling for a previous behavior, a friend’s smoking behavior significantly predicted adolescents’ initiation of cigarette use after one year (log odds 1.73, CI = 1.33, 2.25). Another study by Alexander and colleagues, examining smoking among adolescents in grades 7-12, found that the risk of current smoking was not only affected by having a close friend who smoked (OR = 2.00), but the risk of smoking was also greater when the peer networks consisted of at least half smokers (OR = 1.91) and when prevalence of smoking at school increased (OR = 1.73). In addition to findings that support the theory that social norms influence adolescents to smoke, a study by Beal, Ausiello, and Perrin (2001) found that peer norms are also protective, with peer disapproval of cigarette use associated with less tobacco use ($p < .0001$). Social norms among peer groups, ranging from close friends to larger social networks, such as schools, provide both modeling of and protection from health risk behaviors.

In accordance with the rational-model theory of adolescent decision-making, there is evidence that perceptions of risks and benefits of ST and social norms regarding ST use affect adolescents’ decisions to use ST. A study by Gerber and colleagues (1988) of 8th and 9th grade adolescents found that there was a relationship between adolescents’ intentions to use ST, examining both perceptions of risks and benefits and social norms regarding ST, and adolescents’ use of smokeless tobacco (Pearson correlate .65, $p < .001$). However, the items used to indicate adolescent’s perceptions of risks and benefits of ST use as well as social norms were derived from studies based on adolescent decision-making regarding smoking. Cigarette smoking and ST are not the same product.
and adolescents may weigh the risks and benefits of each differently. The context of ST use may also dramatically affect both social norms and perceptions of risk and benefits of ST use, particularly when looking at adolescents in a rural setting where ST is more common and could be seen as a part of rural culture.

Dual-Process Model of Adolescent Decision-Making: Willingness and Prototypes

While empirical evidence supports the theories of the rational decision making models of health behaviors in predicting adolescent tobacco-related behaviors, tobacco prevention strategies that are based on these models alone, addressing long-term health risks, attitudes and myths about smoking, and perceived social norms, have not been effective in preventing adolescent tobacco use or causing change in tobacco-related behaviors. This suggests that the rational decision making model does not adequately describe how adolescents make decisions about risky health behaviors. More recent research on theories of adolescent decision-making argue that the rational decision making models are limited in their ability to explain more impulsive and socially undesirable behavior, such as tobacco use. In order to address this less deliberate and more emotional and reactive process, researchers have developed theories that describe a dual-process model, reflecting the two paths of decision-making that lead to risk behavior. [59,60]

A dual-process model outlining adolescent decision-making for smoking is outlined in Figure 1.
The first path of the dual-process model is known as the reasoned path—the thoughtful, rational, analytical pathway described above. This model takes into account attitudes (perceptions of risks and benefits) and social norms (perceptions of others’ expectations of what to do and not do), which predict intentions to perform an action. These intentions then predict behavior. The second pathway is called the social reaction path; it does not employ planning or intentions, but rather, describes the heuristic, reactive path that adolescents often employ in risk-taking behavior. The social reaction path assumes that adolescents are presented with opportunities to engage in risky behaviors, such as using tobacco, and that their behavior is more likely to be predicted by their willingness, or openness, to engage in a risky behavior. Gerrard describes willingness as almost the opposite of intentions, in that it involves little to no precontemplation of the behavior and may even incorporate avoidance of contemplation of risks and negative consequences of the action [59]. Willingness to engage in an action may result in a behavior that an individual had not previously considered. The social reaction pathway argues that willingness, and ultimately decisions to engage in a risky behavior such as tobacco use, is also based on attitudes (perceptions of risks and benefits) and social norms (perceptions of the extent to which others are engaging in the behavior). Willingness is also based on the additional factor of prototypes, or images, of individuals who engage in risky behaviors, such as a “typical smoker.” The degree to which an adolescent sees a prototype as positive or negative influences their willingness to engage in a risky behavior. For example, if an adolescent has positive social images of smokers, they will be more willing to engage in smoking when presented with the opportunity. A study by Blanton and colleagues that examined prototypes and willingness as predictors of smoking among adolescents, ages 15 to 18 years old, found that when adolescents found a smoking prototype, such as a friend or social contact, to be favorable they were more willing to smoke, resulting in increases in smoking one year later [61]. These findings have been supported by multiple studies [62-66]. In a longitudinal study of Dutch adolescents, ages 11 to 13, van den Eijnden and colleagues found that adolescents who held positive smoking prototypes, such as being attractive, being sociable, and being rebellious, were significantly more likely to smoke one year later [63]. They also compared the contribution of prototypes and variables of the theory of planned behavior and found that smoking prototypes explained a unique part of the variance in smoking status, concluding that it was a unique and important factor in adolescents’ decisions to smoke.

There are various sources that can serve as smoking prototypes. Blanton and colleagues found that parents and peers are social images of smokers. In particular, they described that peer images, even more than parent images, of smoking are associated with increased willingness to engage in smoking [61], and these findings have been supported by subsequent studies [62-66]. In addition to prototypes and images found in an adolescent’s social network, research has indicated that media, including film, music, and cigarette advertising, also provide significantly influential smoking prototypes that encourage smoking among adolescents [67-69]. Villanti and colleagues (2011) found that exposure to a high amount of tobacco advertising in multiple media, including television, movies, internet, and in-store marketing, was positively associated with current smoking among adolescents between 10-13 years old. Studies have also found that high volume of exposure to certain forms of media, particularly music, television and movies, result in
increased risk of smoking initiation [69-71]. In addition, Wellman at al. found that adolescents who had more contact with pro-tobacco advertising and mass media had higher odds of holding positive attitudes regarding smoking and were more likely to initiate smoking [72].

The dual-process model of decision-making described above is well supported and shows that multiple factors affect adolescent decision-making regarding health risk behaviors. Understanding of these factors, such as knowledge and attitudes (e.g. perceptions of risks and consequences) and social context (e.g. social norms, prototypes), is critical in order to intervene in and ultimately prevent adolescent engagement in risky behaviors. In the context of ST, evidence also supports the theory that user prototypes and images affect adolescents’ ST use behaviors [51,73]. A study by Boyle and colleagues (1997) found that ST use among best friends (F = 124.54, \( p = .0001 \)) was positively associated with adolescent ST use. However, research has not examined how friends’ use affects adolescents and what aspects of friends’ use should be tested as associated with an adolescents’ use nor is the issue of social context addressed, which is important to understanding rural adolescents’ use. Another factor regarding images and prototypes of ST users is the increasing presence of ST media that has recently emerged. A recent study by Curry et al. (2011) identified that the number of ST advertisements have increased in magazines, with advertising focusing more on flavored products as alternatives to smoking, particularly in indoor settings. In 2008, Morrison and colleagues found that not only were more ST advertisements appearing in magazines, but they were also in magazines with high adolescent readership [74]. This recent increase in ST advertising suggests that media prototypes should be explored as a factor contributing to adolescents’ decisions to use ST. So, while there is evidence that the dual-process model may apply well to ST use among adolescents, there is incomplete knowledge of how the context of a rural setting affects adolescents’ decision-making process.

**Applying the Dual-Process Model of Decision-Making to Rural ST Use: What are we missing?**

Smokeless tobacco use is a significant public health concern. Long-term ST use is associated with adverse health outcomes, including cancer, cardiovascular disease, and periodontal disease. Despite association with adverse health outcomes, rates of ST use and sales have risen in the past decade. Rural residents, particularly adolescent males, have significantly higher rates of use than their urban counterparts. It is therefore important that we understand the process of rural adolescent ST initiation and use in order to promote cessation and abstinence of ST and prevent long-term sequelae associated with ST among rural adolescents.

Previous studies indicate that the dual process decision-making model, which addresses both the rational and the reactive decision-making processes, can accurately predict adolescent health-risk behaviors such as substance use. This model requires reliable inputs in the form of thorough understanding of social context and factors and adolescent knowledge and perceptions. Few studies of adolescent decision-making have applied these models to ST, so the specifics of the decision-making components regarding ST are not well known. More importantly, there is little understanding of how rural communities, which have the highest prevalence of ST use, influence adolescents’ behavior regarding ST. While the existing dual-process model may be useful in helping to explain rural adolescents’ decisions to use ST, it is not currently informed by the
contextual factors that are unique to rural communities and are important to understanding the influences on rural adolescents’ risk-taking behavior. More research is needed to understand specific factors that influence rural adolescents’ decisions to use ST before meaningful progress can be made towards understanding and then preventing the burden of adolescent smokeless tobacco use in rural areas.

Rural communities are distinctive environments from urban and suburban communities and may influence adolescents’ decisions to use ST and other substances in various ways [75]. Research has shown that rural communities have fewer economic, educational and health care resources, factors which have been associated with increased substance use [24]. Rural communities may also hold particular social norms that influence adolescents’ attitudes towards substance use [24]. It is therefore important to understand what adolescents in rural communities perceive as the risks and benefits as well as the social norms regarding ST use in their social context to build stronger models for preventive intervention. Once key risk and protective factors are identified, further hypothesis testing can be performed to examine how attitudes and social norms affect behaviors towards ST among rural adolescents.
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Part 2
Taking a Dip: Understanding Smokeless Tobacco Use among Rural Adolescents
Introduction

Smokeless tobacco (ST), also known as “chew” or “dip,” is a non-combustible oral form of tobacco. In the United States, the most common types of ST are moist snuff, dry snuff, and chewing tobacco [1,2]. Users of ST experience addictive effects similar to cigarettes, including clinical signs of nicotine dependence, abuse, and withdrawal [3,4]. Long-term use of ST is associated with significant adverse health outcomes such as oral and throat cancer, periodontal disease, and cardiovascular disease, including increased risk of myocardial infarction and stroke [5-9].

Compared to cigarette use, for which prevalence rates have declined over the past decade, the prevalence of ST use has nearly tripled over the past twenty years [10,11], with rates almost reaching the national smoking prevalence among adults (20.3%) [12]. ST is used almost exclusively by adolescent and adult males [12-15]. Approximately 15% of adolescent males currently use ST [10,13]. Rates of ST use are highest in rural communities – about three times higher than in urban areas [16]. Rural youth report younger ages of ST initiation and higher rates of regular use than their suburban and urban counterparts [11,17-21].

Because there is no existing framework that describes the adolescent decision-making process regarding ST use in rural communities, we conducted a qualitative study that allowed youth to narrate their experiences with ST and recount the factors that most influenced their decisions to use ST. This process created a youth-driven framework of adolescents’ decisions to use ST in rural communities. Reducing and preventing ST use, especially among rural male adolescents, is an important component of improving rural adolescents’ health and preventing future negative health outcomes. In order to effectively address the high rates of ST use among rural adolescents, intervention and prevention strategies must address the factors that influence adolescent ST use in rural communities. Most existing studies regarding ST use in rural populations only describe rates and demographics of ST use [15,19,22,23]. Few studies identify the factors associated with rural adolescents’ decisions to use ST [24]. Qualitative or formative research is needed because studies that have examined factors that influence ST use in rural communities primarily test investigator-driven hypotheses and sets of ST use risk factors. However, because investigators, rather than youth, develop these hypotheses for testing, it is unknown whether currently investigated factors are important influences on adolescent ST initiation and use. A recent study by Nemeth and colleagues (2012) found adolescents were likely to initiate and continue to use ST in rural Appalachia because use was common among their adult and peer male social networks and because it was an accepted aspect of rural Appalachian culture.

No existing studies have identified rural-specific factors or the process by which adolescents in rural communities make decisions regarding ST use. The purpose of this study was to understand and describe the rural-specific factors that influence rural adolescent ST initiation, continued use, and discontinuation in these communities. A better understanding of the factors that go into rural adolescents’ decision-making process regarding ST use can inform more targeted and effective strategies to prevent and promote discontinuation of ST use, decrease frequency of ST use, and help to reduce the burden of ST use among adolescents in rural communities.
Methods

Participants

Adolescents (n = 20; 15 males, 5 females) were recruited from a rural community in northern California between June 2012 and March 2013. Eligible participants included English-speaking 9th through 12th graders (age 13 – 18 years) attending the local high school or a local, weekly teen-oriented social event sponsored by our community partner. We over-sampled for male participants because ST use is most prevalent among males in the United States[13]. All participants received a $10 gift card to a local vendor following their participation in the study. The internal review boards at the University of California, San Francisco and the University of California, Berkeley approved all study procedures.

Procedures

All adolescent participants under 18 signed assent forms. Parents of those under 18 years of age signed consent forms for the adolescent to participate. Participants 18 and over signed their own consent. Participants first completed a survey concerning their demographic information, and their patterns and intentions to use ST and cigarettes. They then took part in a one-hour one-on-one semi-structured interview with the first author.

Measures

Surveys evaluated participant ST and cigarette use by asking about lifetime and past 30 day experiences with tobacco products. Participants were also asked about their intentions to use tobacco by asking what is the chance that they will “try ST” or “try a cigarette” sometime in the next 6 months and the likelihood that they would “use ST” or “use cigarettes” if someone offered it to them.

Interviews with participants focused on adolescents’ experiences using ST (Describe the first time you used ST), knowledge and beliefs regarding ST (What did you know about ST before you tried it?), and perceptions of ST use in the community (Can you describe a typical ST user in your community?). The interview guide is available upon request. We performed preliminary analysis in parallel with data collection, leading to iterative modification of the interview guide over time. Data collection ended when the study team felt that we had reached saturation of dominant themes from the interviews [25].

Data analysis

We used SPSS v21.0 to determine frequencies and means of participants’ survey responses.

To analyze the interviews, we used modified Grounded Theory [25]. Through open coding (close reading of discrete sections of interview transcripts), a codebook was developed that described dominant themes that appeared across participant interviews. Over time, study team members collaborated to iteratively refine and modify codes based on emerging data [25]. Memos were then drafted that described each of the codes and relationships between codes.

At the end of initial data analysis, a preliminary model of adolescent decision-making and ST initiation, continued use, and discontinuation was drafted from these relationships. The model was informed primarily by participants’ descriptions of their
experiences with ST as well as the Theory of Planned Behavior [26] and the Prototype/Willingness Model of Adolescent Health Risk Behavior [27,28]. The preliminary model was then tested using cross-case analysis, in which we applied the model to experiences described in the individual interviews [29]. By comparing the model across individual participant experiences, we were able to understand the generalized processes occurring across the group and address the individual events described by participants. The process model is presented and described in the Results section.

**Survey Results**

Table 1 describes the demographics of our study participants, including age, race, and the age at which they first tried cigarettes, smoked a whole cigarette, first tried ST, and first tried marijuana. Table 2 describes participants’ tobacco-related behaviors, intentions regarding use of tobacco products, and parent tobacco use status.

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Demographic data (n = 20)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Total</td>
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<td>n = 20</td>
</tr>
<tr>
<td>Age</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Race</td>
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<tr>
<td></td>
<td>Caucasian</td>
</tr>
<tr>
<td></td>
<td>Latino</td>
</tr>
<tr>
<td>Age first tried a cigarette (puff)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Age first smoked a whole cigarette</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Age first tried ST</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Age first tried marijuana</td>
<td>Mean (SD)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Numbers who participate in tobacco- and substance-related risk behaviors (n = 20)</th>
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<tbody>
<tr>
<td></td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>n = 20</td>
</tr>
<tr>
<td>Lifetime cigarette use</td>
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</tr>
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<td>Never</td>
<td>2</td>
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<tr>
<td>1 time</td>
<td>4</td>
</tr>
<tr>
<td>6 - 10 times</td>
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</tr>
<tr>
<td>More than 10</td>
<td>12</td>
</tr>
<tr>
<td>Lifetime ST use</td>
<td></td>
</tr>
<tr>
<td>1 time</td>
<td>1</td>
</tr>
<tr>
<td>6 - 10 times</td>
<td>3</td>
</tr>
<tr>
<td>More than 10</td>
<td>16</td>
</tr>
<tr>
<td>Lifetime cigar or cigarillo use</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1</td>
</tr>
<tr>
<td>1 time</td>
<td>2</td>
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<tr>
<td>2 - 5 times</td>
<td>2</td>
</tr>
<tr>
<td>6 - 10 times</td>
<td>5</td>
</tr>
<tr>
<td>More than 10</td>
<td>10</td>
</tr>
<tr>
<td>Lifetime marijuana use</td>
<td></td>
</tr>
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<td>Never</td>
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</tr>
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<tr>
<td>2 - 5 times</td>
<td>2</td>
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<tr>
<td></td>
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<tr>
<td>Life-time one alcoholic drink</td>
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</tr>
<tr>
<td>Life-time 5 or more alcoholic drinks in a row</td>
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</tr>
<tr>
<td>Life-time recreational drug use</td>
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</tr>
<tr>
<td>Life-time smoked at least 100 cigarettes</td>
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<tr>
<td>Last 30 days cigarette use</td>
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<tr>
<td>Last 30 days ST use</td>
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<tr>
<td>Would use cigarettes if offered</td>
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</tr>
<tr>
<td>Would use ST if offered</td>
<td>15</td>
</tr>
<tr>
<td>Chance of using cigarettes in next 6 months</td>
<td>12</td>
</tr>
<tr>
<td>Chance of using ST in next 6 months</td>
<td>15</td>
</tr>
<tr>
<td>Would like to quit smoking</td>
<td>7</td>
</tr>
<tr>
<td>Would like to quit using ST</td>
<td>10</td>
</tr>
<tr>
<td>Would like to quit using ST</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>Father/Male guardian lifetime cigarette use</td>
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</tr>
<tr>
<td>Father/Male guardian lifetime ST use</td>
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<tr>
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<td>Would use ST if offered</td>
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<tr>
<td>Chance of using cigarettes in next 6 months</td>
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<td>Chance of using ST in next 6 months</td>
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<tr>
<td>Would like to quit smoking</td>
<td>7</td>
</tr>
<tr>
<td>Would like to quit using ST</td>
<td>10</td>
</tr>
<tr>
<td>Would like to quit using ST</td>
<td>3</td>
</tr>
<tr>
<td>Mother/Female guardian lifetime cigarette use</td>
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</tr>
<tr>
<td>Mother/Female guardian lifetime ST use</td>
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</tr>
<tr>
<td>Father/Male guardian lifetime cigarette use</td>
<td>8</td>
</tr>
<tr>
<td>Father/Male guardian lifetime ST use</td>
<td>10</td>
</tr>
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<tr>
<td>Mother/Female guardian lifetime ST use</td>
<td>17</td>
</tr>
<tr>
<td>Father/Male guardian lifetime ST use</td>
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</tr>
</tbody>
</table>
Qualitative Results

Using the methods described above, we created a process model that describes the factors that participants said influenced their decisions to use ST. In constructing the process model we found that male and female participants reported different experiences in their introduction to ST and motivations for trying and using ST. Following initiation of ST use, male and female participants went through similar processes to evaluate continued use and cessation of ST. This process occurred in six phases: First Awareness of ST, Initial Experience with ST, First Evaluation of ST Use, Continued Use of ST, Re-evaluation of ST Use, and Discontinuation of ST Use. Figure 1 shows each of the phases in this process and is presented below and described in further detail in the following sections.

Figure 1: Process Model Describing Adolescents’ Decisions to Use ST

<table>
<thead>
<tr>
<th>Mother/Female guardian currently smokes</th>
<th></th>
<th></th>
<th></th>
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<tbody>
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<td>10</td>
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<td>No</td>
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<table>
<thead>
<tr>
<th>Father/Male guardian currently smokes</th>
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<th></th>
<th></th>
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<tbody>
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<td>6</td>
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</tr>
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</table>

<table>
<thead>
<tr>
<th>Mother/Female guardian currently uses ST</th>
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<tbody>
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<td>0</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>15</td>
<td>3</td>
</tr>
<tr>
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</table>

<table>
<thead>
<tr>
<th>Father/Male guardian currently uses ST</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>8</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>11</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Does not apply</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
First Awareness of ST

Four major factors arose that influenced participants’ first awareness of ST: observation of ST use around them, identification with role models who use ST, perception and identification of a masculine culture around ST, and lack of a knowledge base regarding ST and associated risks. Most male participants said that they first became aware of ST through observing adult males using it at home or in the community. Male participants reported seeing their fathers or male guardians, male family members, male family friends, and peers’ fathers use ST. Eight of the male participants (57%) had adult male guardians who had used ST daily.

Observation of ST use: Male participants noted that observing adults using ST created the first images that they associated with ST.

I always wanted to try it because I saw my dad using it and I heard him talking about it with his friends. So I knew what it was. I just wanted to see what it was like. (14-year-old male)

Well my dad chews so I’ve been around it my whole life. Ever since I can remember he’s chewed. So I’ve kind of always known about it and kind of always wanted to try it. (15-year-old male)

Before I tried chew I just thought of it as something you saw older people doing, like parents and stuff. Every day pretty much you see them at work and they’ll probably have a chew in. I didn’t think anything about it. I didn’t think they were bad people. They were just normal. (18-year-old male)

Identification with adult role models who use ST: Male participants described adult ST users as men whom they “looked up to” and “liked” because they were close to those men and did fun activities with them. Participants said that they viewed adult ST users as positive influences in their lives and believed that their use was an indication that ST was generally accepted in their community. Participants also acknowledged that seeing men whom they look up to and view as role models use ST made them curious to try it in the future. None of the male participants described the male adults who used ST as being ostracized or disliked because they used ST. This was particularly true for male participants who had family members who used ST. Male participants said that many of their family members, including fathers, uncles, and grandfathers, used ST and this indicated to them that their families accepted ST use.

I think that if a parent chews then it’s like an 80 percent chance that their kid is going to chew because he thinks “Oh it’s perfectly fine, my dad is doing it.” I think that’s how most kids start. (18-year-old male)

I feel like you start looking up to your parents and then you see them doing it and you just start. You just want to do it. You see your dad doing it when you’re younger and you see your dad as a father figure and when he’s doing it you just think, “OK, it’s not that bad.” (17-year-old male)
Perception of masculine culture of ST: Male participants emphasized that watching older men use ST created a culture around ST that they described as distinctly masculine. Male participants’ descriptions of their first memories of noticing adults use ST were almost always in masculine social settings, such as outdoor work and ranching (e.g. branding cattle, baling hay, and fixing fences), hunting, and fishing.

I saw my dad and all of my dad’s buddies using chew. My uncle has chewed for my whole life. My dad’s buddies all chew, six or seven of them, and they’re all ranchers. So we’d go to these brandings where they’d gather up cattle and brand them and there was just chewing all around there. That’s where I saw it mostly. (18-year-old male) (A13 614 – 632)

My dad’s friends chewed. They always took us hunting and stuff, and they would chew in the duck blind and stuff like that and we always thought it was cool. (15-year-old male)

This is kind of a ranch community. A lot of the guys who own ranches, all of their dads, their uncles, their grandpas—they all chew. So, when they’re out there on the ranch with those guys all day, nine times out of ten they’re getting a chew. (17-year-old male)

Lack of knowledge regarding ST consequences: Some of the male participants said that their fathers told them that ST use was “a bad habit,” but that their early knowledge of ST did not extend beyond that. Adult ST users did not, however, tell participants about the health consequences that can result from ST use. Few participants thought that they had a clear understanding of what ST is before they tried it. Male participants said that, although they recognized that ST may be a bad habit, they also thought that because so many adults were long-term ST users, it must not be “that bad for you” or particularly harmful.

All I really knew about chew was you put it somewhere in your mouth and you go from there. I never knew. I’d always seen my dad doing it, but I never really knew for sure what it was. I thought it was like food or something. My dad told me it was like his cigarettes, so I thought it was just a bad habit. I never knew much more than what my parents told me. (18-year-old male)

I didn’t have any clue what it was. I just knew everybody did it, I guess. I knew it wasn’t good for you because the label said, “Can cause cancer” and “Not a safe alternative to cigarettes” but all my dad’s friends had used it for a while. So, I wasn’t scared of getting cancer or anything. (15-year-old male)

When I was growing up my dad used to rope horses all the time and all of his friends chewed. I thought it was gross because they were spitting all the time and their teeth were kind of gross looking. But I didn’t know what it did. I just thought they did it. I didn’t know it was addicting or anything like that. (17-year-old male)
I didn’t really know what it was. I thought it was like candy or something that my uncle always had. And I wanted to be just like my uncle. (18-year-old male)

Female participants were more likely to first become aware of ST later in their adolescence. They described first learning about ST by observing their male peers use ST in social settings such as parties, camping trips, and during outdoors activities. Only one female participant recalled becoming first aware of ST through her male parent. Female participants also commented on the masculine culture around ST among their peers. However, this deterred them from use rather than encouraged them.

I didn’t really know a lot about it except stereotypes, like that cowboys do it, and it makes them have a fat lip, and they look cool, and they have a ring in their pocket. I found out about it from a guy friend of mine who was a cowboy and rode horses with me; I’d seen him do it a lot. (16-year-old female)

I’d been around it so much because pretty much everyone older than me had at least tried—my older cousin, my older brother—it was all over school…I didn’t know the effects of it or what was in it or anything like that though. (18-year-old female)

Initial Experience with ST

Peer use and peer role models were the two important factors that influenced participants’ initial experience with ST. Male participants had their first experience with ST at younger ages than female participants (see Table 1, Demographic data).

Peer use: Most male participants regarded their first time trying ST as the first time they used it with friends. Even those participants who recalled tasting or using a very small amount of ST at young ages (as young as 4 to 6 years old) did not regard their early childhood experiences as their first “true experience” with ST.

The first time I tried chew I was in seventh grade, hanging out with my friend and his older brother. They were going to go chew anyway and asked me if I wanted one so I said, “Yeah.” I’d tasted it before when I was little. My dad offered my cousin one, but he spit it out, so my dad said, “Watch. My little boy can do it better than you.” (14-year-old male)

The first time I took a chew I was really young, five years old or something, and just grabbed a little bit of my dad’s and put it under my tongue. Then tried it with my buddy. We went out to his barn and just started chewing. It was pretty nasty and we were gagging everywhere, but we just started chewing, thinking we were cool. (18-year-old male)

Typically, male participants’ initial experiences were with older male friends who used ST or male friends of the same age who had been using ST for a long time. Male participants often tried ST in social situations with only males. A common example was
during the freshman year of high school before and after football practice, when participants spent a significant amount of time with older males who used ST.

The first time I tried it was after football practice, everyone was chewing, a lot of the older guys, so I started. My friend asked me if I wanted a chew and everyone else was doing it, so I thought it was no big deal. I just took one. (18-year-old male)

Identification with peer role models who use ST: Many of the male participants said that, when they tried ST, they looked up to their older peers who used ST and wanted to “be like them” because they were older, played sports, and were “cool.” Younger male participants described older adolescent ST users as role models, similar to their descriptions of the adults whom they observed using ST in the First Awareness phase. Older peers would often talk male participants through what their first experience with ST would feel like and encouraged them to use ST.

I was with my brother and his friend, they’re older than me and they were both chewing, so I decided to try it. I just wanted to feel cool around my brother because I always hung out with the older kids. I just didn’t want to be the only one that was left out. (14-year-old male)

It was freshman year during football season. I was hanging out with the quarterback and a couple of other football players; they all chewed and were juniors and seniors. My friend and I were both freshmen, so we thought we were, you know, really cool because we were hanging out with these guys. So we wanted to try chew because they were doing it and they were pretty cool. (17-year-old male)

My buddy and I didn’t really want to do it, but we [chewed] anyway. We were like, “We have to. We can’t disappoint the older kids.” (18-year-old male)

All of the female participants had their first experience in social settings with male peers who were established ST users. Their main reason for trying ST was to satisfy curiosity regarding why all of their male friends liked it. Female participants also said that they wanted to “look tough” and impress their male friends and boys that they were attracted to by using ST. Retrospectively, female participants recognized that male friends were not usually impressed when they tried ST.

A lot of the girls try it because they have to go above and beyond to get guys that they like to like them back. It’s like we have to prove something. (18-year-old female)

I was with my boyfriend, we were at the river, and I decided that if he was going to chew then I was going to chew, too. I was curious about it, it was summertime, we were fishing, so I tried it with him. (17-year-old girl)
First Evaluation of ST Use

After trying ST for the first time, participants went through a phase of first evaluation, during which they considered continuing to use ST. The length of this evaluation period varied among participants—from days to months—and led overwhelmingly to continued ST use. Participants evaluated perceived risks and benefits of their first experience with ST when deciding whether or not to continue using ST. The effects of ST are primarily divided into physical and social effects.

Physical effects: Nearly all of the participants, both male and female, described the physical effects of their first experience with ST as a negative one. ST caused a number of negative physical effects such as nausea, vomiting, and dizziness. This was usually due to swallowing the nicotine-laden saliva or the tobacco. Because they had never used ST before, participants also did not have the oral dexterity to hold the ST product in their mouth and properly use it. Participants said that they felt embarrassed or uncomfortable during this first experience because they “didn’t know what [they] were doing.” Those participants who did not get sick during their first experience described feeling proud. Some participants said that, despite feeling nauseated and dizzy, they enjoyed the nicotine rush that they experienced from the ST.

It kind of felt like a headache almost. I got dizzy, lightheaded. But I liked it. I liked the taste because it was wintergreen flavor. And I like the head rush it gave me. (17-year-old male)

I was fine at first, just sitting and spitting. I didn’t swallow it or throw up. But I had to walk back to my house. As soon as I stood up I got super lightheaded. I felt terrible. I thought I was going to die. It was the worst feeling I had ever had in my life. I got back to my house and just passed out for the rest of the day. I thought to myself, “I’m never going to do this again, ever. This is horrible.” And then I didn’t try it again for a month or two. (17-year-old male)

Social benefits: The social effects of the first experience with ST primarily were positive. One of the most common benefits that participants described was the feeling of “fitting in” with peers, especially older adolescents who already were using ST. Several participants said that they felt peer pressure to use ST and that by trying it they felt they were able to impress their friends. Participants said that this pressure was very high because they estimated that anywhere from 40 to 90 percent of high school students in their community had tried ST. This was consistent with participants’ experiences of seeing older adolescents and peers use ST during their initial experience.

I thought it was pretty nasty after that first time. I didn’t think that I was going to keep doing it, but then a lot of the older classmen they chewed a lot. So we wanted to hang out with them and chewing came with them. I guess we just wanted to be cool and have the older kids accept us and want to hang out with us. (18-year-old male)
It made me feel cool because I was younger and I was hanging out with older kids. They were doing it and then I did it, too. I was fitting in with them. They were impressed because I took a chew, too. (14-year-old male)

It felt like a little bit of acceptance, you know? We were hanging out with older people and it felt like you kind of had to impress everybody or something like that. It was kind of like peer pressure. (17-year-old male)

Participants also felt that by using ST they were doing something rebellious, either against expectations of them, usually set by their parents, or against society, because of the illegality of underage ST use. Many of them said that they felt “cool” because they were rebelling against adults and established rules.

I guess it’s like, using chew, you’re doing something wrong, which is cool. Whenever you break the law, it’s kind of thrilling. I felt kind of cool I guess. Like I was doing something bad and I felt cool about it. Kind of like I was fitting in now. I was showing them that I’m not the little teacher’s daughter. I’m showing that I’m not afraid. (16-year-old female)

Male participants also described how using ST made them feel “manly” because they had watched so many male adults and older male adolescents use ST in the past. They also equated feeling more masculine with feeling more mature, because they were able to fit in with older adolescents who used ST. This was consistent with the masculine culture around ST that youth had established early in their first awareness of ST through adult males.

Continued Use of ST

Participants continued to use ST if they felt that the social benefits of using ST, as described in the First Evaluation phase, outweighed the negative physical experience of their first use. Social benefits that male participants felt were most important included fitting in with their peers, feeling “rebellious,” acquiring elevated social status, and feeling masculine. Female participants said that they continued to use ST because they wanted to fit in with and impress male peers. Only one participant discontinued using ST after evaluating his first experience because he did not enjoy the physical experience and stated that it “just wasn’t [his] thing.”

Ease of access and peer use: Both male and female participants described how continued use of ST was facilitated by the easy accessibility and availability of ST. The most common way that participants gained regular access to ST was through older friends and acquaintances who provided and purchased ST for them. Initially, participants obtained ST from friends who already used ST and only during social situations. Because most female participants did not go on to use ST regularly, this was the most common way that they accessed ST. Once participants started using ST regularly, they accessed ST by asking people over the age of eighteen to purchase ST for them. It was necessary for underage ST users to have someone to buy ST for them because storekeepers in town were strict about not selling to minors and, because of the small size of the town, storekeepers knew who was underage. However, participants emphasized that the small size of their community also facilitated finding someone to
purchase ST for them because they often already had friends and acquaintances from the senior high school or outside of school, who were of age. Participants also talked about how prevalent ST use is among youth and adults in the small community, making it extremely easy to know someone who used ST and was willing to purchase it for adolescents.

In the beginning, I mostly got chew from friends. They had it so I’d always just take it from their cans. But when I left the high school, where all of those kids could supply me, I started asking people that are 18 to buy for me. That works pretty well, especially because I have close friends who are 18 and of age. (15-year-old male)

Everybody has friends that are older. When you’re younger and you’re in a small town it’s really easy to get chew. Really easy. Everybody knows everybody. Everybody’s really close with everybody. So, a lot of people do anything for someone they know. I don’t think that they really think about the consequences of it. (18-year-old female)

Some participants said that their parents and family friends were willing to provide them with ST. This was more common among older male participants who had been using ST for several years and whose parents had accepted that they used ST. Male adults, including guardians and family friends, were more likely to provide ST than were female adults, especially if they were also ST users. Participants stated that mothers who provided ST to adolescents did so because they believed that ST is a healthier choice than smoking cigarettes or doing other drugs.

Another way that I get my chew is from my dad. He always used to buy me chew when I couldn’t buy it. I think he started when I was about sixteen or seventeen. (18-year-old male)

Both my parents know that I chew. They both used to buy me chew if I needed it. A lot of parents do that. And if some kid’s parent doesn’t buy it, another parent more than likely will. It’s not really tough to get chew. It’s just simple. (18-year-old male)

My mom found out that I chewed and she said, ‘It’s alright. I’m OK with you chewing. There are a lot worse thing out there like smoking and drinking that you could do.’ So she started buying my cans for me. (17-year-old male)

Older participants who had been using ST for several years also talked about how they became the access point for underage adolescents to get ST. They recalled introducing younger classmates to ST in the same ways that they were introduced, such as after football practice or when out hunting. Most of these participants felt that experimenting with ST is a “normal part of being a teenager” but that they would only provide ST to kids that are the same age as they were when they tried ST for the first time. Some participants felt apprehensive about giving ST to people who had never used
ST before because they did not want to be the one who introduced them to a “bad habit” but also thought that it should be an individual’s “personal choice.”

If a kid is way younger than me, then I wouldn’t give him chew. I’d say, “No, that’s not a good idea.” But if they were older, like 12 or 13 when I tried it, I guess that would be my cutoff. Because junior high, that’s when you’re starting to get exposed to it, getting your jitters out. I think I’d rather have kids try chew in junior high when they can be around me and I can teach them how to do it right. (16-year-old female)

Re-Evaluation of ST Use

After using ST, both male and female participants went through a re-evaluation phase of their ST use. This re-evaluation process was more complicated than the first evaluation phase and contained three specific components. First, participants discussed acquiring a new knowledge base about the physical risks and consequences of ST use. Second, participants described weighing the social and physical consequences they experienced from ST use. Finally, most participants had also used cigarettes and considered cigarette use in addition to (dual use) or instead of ST.

Acquired knowledge base: Most participants said that they learned about the long-term health effects of ST after they had used it. The long-term health effects that participants described centered on the association between ST and mouth, throat, and stomach cancer. However, while all participants admitted to knowing that cancer is a risk of using ST and that they were fearful of cancer, few participants who were currently using ST felt that this was an adequate reason to quit.

Another thing I think about is cancer. Some brands out there put fiberglass or something like that in their chew to cut into your gums to make it get into your system faster. But I don’t worry about it getting into my system and really messing me up. All my friends that chew say it takes longer to get cancer from using dip. I guess one out of five people end up losing their lip or end up getting cancer. But that doesn’t really cross my mind...it never comes into my mind when I chew that I could get cancer. (15-year-old male)

I know it can kill me. Cancer. But I found out you can get cancer, basically, from everything. Just walking around and breathing the air that we breathe, you can get cancer. So, it’s not like you’re safe. So, I mean—you only live once, right? It’s kind of scary to think about how I could lose half my face, but, I know it sounds arrogant, but I feel like that won’t happen to me. It’s just one in a few. (17-year-old male)

Participants reported learning about health effects from ST through primarily schools and friends. They described how the schools in the community encouraged students to learn about and understand the long-term consequences of using ST. Some participants described their teachers in health and science classes assigning projects related to the health effects of ST. Almost all participants spoke about a school assembly in which a former ST user who had experienced mouth and throat cancer and surgical removal of his
jaw came to speak to them about his experience. Participants described this experience as “scary” and “eye-opening,” and many participants reported that it inspired them to quit using ST for short periods of time.

*I took a biology class last year and we talked about cancer and we all had to do a cancer project and mine was lip cancer. The teacher chose it for me. So I kind of psyched myself out for a little bit. But, I mean, we’re all going to die someday, right? And then we had a guy come to the high school and he had gotten lip cancer or mouth cancer. He told us that if we absolutely can’t quit chewing, then if we have a sore for more than a few days, then we need to go to a doctor. (17-year-old male)*

Participants did not describe getting information about ST from their doctors and dentists. Nor did participants believe that they would turn to their health care providers as resources in the future if they wanted to learn more about the risks of using ST. One participant said that doctors “don’t really know what they are talking about [in regards to] cancer.” (17-year-old male)

When participants did talk to health care providers about using ST, they said that the conversations were usually very short and that they were not told how ST can affect their health or given resources for ST cessation. Even further, participants said that they were often afraid to disclose their ST use to their physicians because parents accompanied them to the visit, sometimes even sitting in on the appointment, or because they feared the doctor would divulge their use to their parents.

*When I was at the doctor for my foot the other day, they asked if I smoked or chewed and I told them that I chewed, but that was it. And they told me to quit chewing. They didn’t tell me why. It was just a nurse. She just said to quit chewing. (14-year-old male)*

*I don’t talk to my doctor about it. I’ve chewed and then I’ve gone to a dentist appointment and they’ve never said anything to me. I feel like they don’t know. They don’t say anything, so I don’t feel like it’s a big deal. And every time my doctor has asked me if I chew I’ve been in a room with my parents, so I’ve lied to him. (17-year-old male)*

*At first I was afraid to tell my doctor, like when I would get my physicals for sports and stuff. I told my doctor and there is nothing they can do about it, but they can tell me to stop. My dentist knows. He just said to try not to keep it in one place too long because it wears down your gums or whatever. My doctor just said to slow down, try not to do it as much. (17-year-old male)*

**Perception of social and physical outcomes:** After prolonged use, participants weighed the adverse effects and the benefits that they had experienced from prolonged ST use. The effects they described are divided into physical consequences, social consequences, and psychological consequences of ST use.
Male participants were more likely than female participants to report adverse physical effects from prolonged ST use because they tended to use for longer periods of time. The most common adverse physical effects that male participants experienced from prolonged ST use were gum loss, tooth decay, and oral lesions or “sores.” Although male participants admitted to feeling worried about these issues, they also recognized that they were normal consequences of using ST because they had seen other ST users experience them, including friends and adults. Male participants also emphasized that they were not particularly worried about more serious long-term consequences of ST use because they had not seen any of the adults ST users in their community experience any significant health consequences from ST use (e.g. head, neck, or stomach cancer).

*Sometimes it wears my lip down or something and then I’ll just move it to a different spot for a while. And it’s like the lower part of my lip, but it’s not hurting me. I’m sure it will affect me if I chew for a long time, but hopefully I won’t chew forever. And nothing ever has happened to my dad from chewing and he’s been chewing since he was 10. Just solid. And nothing’s happened...something might. I don’t think about it really, honestly on a daily basis. (18-year-old male)*

*Of course if you’re chewing you get little sores on your tongue or your lip or whatever, but they all go away eventually. When I first started I got them every once in a while. Now I don’t get them a super lot. Every once in a while. And it doesn’t affect my chewing habits either. I just kind of deal with it. It just hurts. At first I would stop when I got the sores until they went away. Then yeah, eventually I just kept chewing with them in and they would be fine usually. They were gone in a couple of days or so. (17-year-old male)*

Female participants more often reported adverse physical effects early on in their use, particularly that they felt unattractive and had minor gum pain; this may have contributed to the fact that they were less likely to use for prolonged periods of time. Female participants also talked about seeing their male friends who used ST experience negative physical effects from use, describing it as “gross” and “unattractive” and a reason to not use ST.

*I don’t like the nicotine rush that it gives you because it’s really strong, it’s straight to my head. And it tastes really bad. And it’s inconvenient. And it looks gross. I would never want to kiss somebody with a dip in. And it was hard on my gums, which I didn’t like, it hurt my gums. (16-year-old female)*

All participants reported a nicotine rush in their initial experience with ST and in the early periods of their use. This was often described as an early physical benefit that positively influenced their decision to continue using ST. However, during re-evaluation of ST use, many participants reported that they no longer experienced the nicotine rush as a physical benefit because it had diminished or gone away entirely with prolonged use.
You get lightheaded the first time, and you get that head rush or whatever. Then it doesn’t really come back. It starts getting slower and slower, so you feel like you need to chew more and more and then you never end up getting it again. I feel like that’s what makes you end up getting addicted, but I don’t know. (17-year-old male)

Participants discussed social benefits and costs that accompanied prolonged ST use, in addition to the social benefits that they described after their initial experience with ST (fitting in with peers, feeling rebellious, and feeling masculine and mature).

Participants said that most of the negative social effects from ST use were the result of adults’ negative reactions to adolescents using ST. Male participants in particular related that adults, specifically parents, teachers and sports coaches, reacted negatively to their use of ST early-on. When a male participant’s parents first became aware of the adolescent’s use, they most often reacted by grounding the participant or forcing them to “eat the whole can” of ST as ways to deter future use.

The first time [my dad] ever caught me chewing was probably halfway through my 7th grade year. I walked into his room while he was sleeping and his can of chew was on the nightstand, but he wasn’t asleep. I thought he was asleep so I grabbed his can of chew and walked out, went in my room, and threw one in. Then he snuck up to my door real quiet and he just walked in and busted me with a can in my hand and made me put a bunch in my mouth. That ended up with me in the toilet. (18-year-old male)

Teachers more often punished adolescents who used ST at school by enforcing in-school suspension (the school policy regarding ST use on campus). Sports coaches often punished male ST users in informal ways, such as extra workouts or “benching players” for a game, rather than enforcing the school policy. Male participants said that these punishments did not significantly deter them from continuing to use ST.

My football coach caught me with chew. Sophomore year, before football practice, I set down my pants and I didn’t pay attention, put my pads and stuff on, tying my cleats, and my coach said, “Get you pants out of the damn walkway.” And he kicked them and a can of chew went flying out. He grabbed it and just smiled at me and made me run for about three hours. Just wind sprints. He called off practice, actually, for everyone else. It didn’t get out of the locker room. He didn’t tell any of the kids why practice was called off. He just said, “Go home, you guys. I’ve got to discipline [Name].” With my coach it didn’t get out to the principal or the athletic director.” (18-year-old male)

However, participants did worry that being known as an ST user detrimentally affected their reputation with adults, especially teachers, sports coaches, and other adults in the community that they respected.

I won’t chew in front of teachers just because I don’t want to give them that idea—that I chew. I don’t want them thinking that I’m one of those
kids chewing in their class or one of those kids that they have to look out for. Just a kid that they have to deal with. I think a lot of them wouldn’t get kids in trouble for chewing, but they have to. But they don’t like to get kids in trouble. At our school everyone knows everyone. They like these kids and they don’t want to get them in trouble. So they don’t want kids chewing in their class. It’s just disrespectful, I guess. And I don't want them to have less respect for me so I don’t chew in front of them. (18-year-old male)

Male participants also described problems with girlfriends because of their ST use. Many male participants said that their past girlfriends pressured them to quit and that they had trouble with dating because of their ST use.

My ex-girlfriend thought it was disgusting. I think all the girls just think it’s disgusting and they’d always give me crap about it, like, “Your jaw is going to fall off. No one is ever going to want to kiss you.” They just think it’s gross. (18-year-old male)

Female participants did not describe as many negative social consequences from ST use. However, several male and female participants described girls who regularly used ST as “weird,” “gross,” and “trying too hard” to fit in with their male peers and the male culture around ST. Female participants did not experience as many adverse social effects from ST use because they did not use ST for long enough periods of time to get in trouble for their use. Female participants also tended to keep their use much more private than did male ST users. For example, female participants did not use ST at school, while most male participants said that they regularly used ST during school hours.

There are like one or two girls that chew. It’s pretty gross. There’s something about that. It’s kind of like a girl smoking a cigar. It’s weird. I’m not being sexist, but women shouldn’t chew or smoke cigars. It’s just something weird that’s always been in my mind. Like when you see someone that’s pretty and it’s like, “You shouldn’t chew or smoke or anything.” It’s just my mindset. (18-year-old male)

I know one girl that chews regularly, but I know girls that have tried it because they were with a bunch of guys. They think that it’s cool but they just don't do it afterwards. Except that one girl. She’s like a cowgirl, so she thinks that she's cool. But it’s gross. It’s hypocritical, but chew in [a girl’s] teeth...it’s just gross. (17-year-old male)

Male participants perceived additional social benefits from prolonged ST use more than did female participants. In particular, male participants said that ST was a good way to socialize with friends and that using ST became a social activity that brought friends together. Male participants also described continued ST use as a way to bond with males in their community, including friends, parents, and other adults in their lives. These bonding experiences most often occurred while male participants were taking part in male-dominated activities such as ranch and outdoor work, hunting, fishing, and outdoor
recreation. Several of them described ST use as a way to fit in with the rural culture. This view was confirmed by the eventual acceptance of some participants’ ST use by adults in the community.

I work for my dad at his store and eventually everybody knew and some of them would tell me to stop and some of them would say, “Good job, you’re a man now.” Then people that would come in would know and they wouldn’t really care. (17-year-old male)

Often, after initially punishing participants for using ST, parents would go on to accept adolescent ST use. This usually followed a typical pattern of permissiveness (i.e., not punishing use) followed by facilitation of use (i.e., purchasing ST for adolescents). Fathers and male guardians were much more likely to facilitate use than were mothers and female guardians. Female guardians and school personnel, such as teachers, were more likely to remain permissive. Both male and female participants emphasized that many teachers and other school personnel “just didn’t care” that students use ST during school. Participants believed that parents and school personnel were permissive of their use for various reasons – they did not view ST as something deserving of punishment, they believed ST use to be safer than cigarettes, or they did not like to punish the adolescents. However, most participants said that they did not use ST around individuals who might find their ST use objectionable, out of respect.

Honestly, some of the teachers know kids chew in school and they just don’t...well, one teacher in particular, she doesn’t do anything. It’s like this group of kids—they’re so blatant about it that [the teachers] just give up, I suppose. But I chew in class and stuff at school. I chew before school. My friend and I would always go sit down by the gym and take a chew before school. And you go and put a small one, like snuff, that you know you can hide and you can’t tell at all. (18-year-old male)

[My dad] found out when I was sixteen or seventeen. He found my can of chew and he said, “So you chew.” I said, “No. That’s not mine. It’s my buddy’s.” And he told me to stop lying so I admitted it was mine. There was one other time, but that time he reacted—he kind of just said, “All right,” and tossed me my can back. He didn’t really react bad about it. He just said, “I just don’t want to see you with it in. I don’t want to see it around you.” And then about a few months later he just didn’t care. I’d ask him for a dip and he’d give it to me. (18-year-old male)

Participants also described psychological effects from ST use. The most prominent negative psychological consequence of ST use that adolescents described was addiction to ST. However, while many of the participants described symptoms of nicotine dependence and withdrawal (e.g., irritability, jitteriness, and increased stress upon cessation), few actually believed that they were addicted to ST. Participants viewed addiction as a negative consequence of ST use and many expressed a desire to quit using ST if they ever felt that they were addicted to it.

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The longest I quit was for like two months. By the end of that two months, I was just like OK, this isn’t worth it. I literally would just think about it all of the time. And I’d be sitting in class and I just couldn’t even concentrate. I just wanted a dip so bad and I would just be really angry and I would wake up angry. And the more I thought about it the worse it got, too. So after that I just needed a dip and it was fine after that. (17-year-old male)

Participants who were regular ST users viewed ST use as a way to relieve daily stress from family, school, and relationships. They viewed the stress-relieving capabilities of ST as a psychological benefit of use, but did not say that they thought it was a result of being addicted to nicotine.

[Chew] just settles me down pretty much. If I’m having a stressful time or something, I’ll go outside to my truck and take a dip and sit there and relax, kick back. Pretty much that’s it. It just helps me relax and function. Like if I’m working, I like to have a chew in my mouth. It occupies me. And like when me and my girlfriend get in an argument or my parents or I just get mad about something. It just makes me want to go have a chew, a nicotine fix. (18-year-old male)

Whenever I use [chew] it’s because of stress. It’s stress-related. It’s school. If there’s a final coming up, heck yeah I’m going to chew. If I start getting problems with my family, yeah I’m going to chew. Like it’s just a stress reliever. (17-year-old male)

Cigarette use and ST use: All but one of the participants had used both ST and cigarettes. Female participants were more likely to use cigarettes as their primary source of nicotine while male participants used ST more frequently.

Male participants said that they preferred ST as their primary source of nicotine to cigarettes because it allowed them to stay in good physical condition for athletics. Many of the male adolescents in the community participate in sports year-round, so this was a commonly cited reason for preferring ST to cigarettes. ST users also said that they believed ST was more acceptable in the community and to adults because it was less offensive to others and does not “look as bad” as cigarettes. Both male and female participants said that ST was easier to use during outdoor activities, such as hunting, fishing, and riding horses. All participants said that ST is much easier to conceal from adults, both at home and in school, so that ST users were able to use ST more often than if they smoked cigarettes.

Yeah, I smoke cigarettes, but not as much as chew, but with my friends or something. I like chew more. It’s just easier. You don’t have to worry about it. You just forget about it there. You have one when you need one. It’s just more convenient to chew than smoking. I’d rather chew anyway, because I’m not inhaling smoke. Because I play football, basketball, and baseball and I can tell if I smoke the day before and I go running. I can definitely tell. (18-year-old male)
Ranch owner, farmers, or manual labor workers chew, because we have cattle so I have to go fix fences and stuff and if I go out there and I want a cigarette it’s so hard to fix a fence while holding a cigarette. So you have to sit down and smoke your cigarette and waste time. But if you put a chew in, you can still work like it’s nothing. It doesn’t bother you. You can do whatever. If you’re getting hay ready, you can’t smoke. You’ll light the hay on fire. Things will go bad. So you have a chew in and it’s not really going to bother anything. So I think it’s just easier to chew than to smoke. (16-year-old male)

While male participants were more likely to use ST in their day-to-day lives, they said that they were more likely to use cigarettes when they were at parties and drinking alcohol or when they did not readily have access to ST and needed “a nicotine fix.” Most participants who regularly used ST said that they only smoked cigarettes when they drank alcohol at parties and that they otherwise would not smoke cigarettes at all. Participants acknowledged that smoking cigarettes causes lung cancer but did not specify whether this was a greater threat than the cancers caused by ST.

When I go to parties, I smoke. I bring two packs of cigarettes because I smoke a lot, like chain smoke when I drink. After that I start wheezing really bad, so I’ve been using chew to cut down on smoking because you know you’re getting bad when you start wheezing. (16-year-old male)

I don’t smoke. Smoking I’m definitely more quiet about. I don’t let people know that I smoke. Smoking just makes you look like a hoodlum. Sometimes, if I have a pack [of cigarettes] and I don’t have a chew, I’ll definitely smoke. At parties, if I’m drinking I’ll smoke more. I went to a concert the other day down in the city and I smoked there a lot just because I was drinking. For some reason, my friends, too, if we’re drinking we want a cigarette. I don’t know what it is. (18-year-old male)

Female participants were more likely to regularly use cigarettes than male participants. Both male and female participants believed this was because ST use is a more “manly” activity and cigarette smoking is “more feminine, attractive, and sexy.” Most male participants said that they personally did not want to use cigarettes because they made them smell bad, stained their teeth and fingers, and hurt their lungs. Paradoxically, they found female cigarette users much more attractive than female ST users.

I see more guys chewing and I see more girls smoking cigarettes. Some people think smoking cigarettes is like sexy I guess. Like you see commercials and there’s like the hot girl sitting on the couch smoking a cigarette. It seems like smoking’s more feminine almost, to me. (16-year-old female)
Discontinuation of ST Use

After re-evaluating continued ST use, participants would either decide to continue or discontinue use of ST. For most male participants, discontinuation of ST was short-term, ranging from days to months. Only five participants (2 male, 3 female) were no longer using ST at the time of the study. Of these, only one male and one female had used regularly in the past.

Negative consequences of ST use: Cessation of ST was usually in response to the negative consequences participants experienced during continued use. Male participants’ main reasons for short-term discontinuation were experiencing negative physical consequences from ST, receiving punishment from parents or school personnel, having relationship problems with girlfriends over their ST use, gaining new knowledge of negative long-term consequences from ST use, and feeling inconvenienced by the need to conceal ST use.

There have been times where, when I’m using Copenhagen long cut, it stays in a specific area and then it’ll just kind of burn and you can’t feel it after a while. And you keep chewing in that same spot and you’ll get little, I don’t want to say sores, that’s gross—but pretty much a sore from it just getting raw in there. Then I just won’t chew for a week until that gets better. (18-year-old male)

I have tried to quit for a couple girlfriends and it’s actually really hard for me. I get like stomach cramps and I’m just mad all of the time, like just the littlest thing will make me mad. I get all sweaty and I just think about it all of the time, and so I just told myself I wasn’t going to quit anymore because that just wasn’t fun. So I guess that that’s kind of being addicted, but I don’t know. (17-year-old male)

Duration of cessation: Male participants often expressed the belief that because they were able to quit using ST for these discrete, short-term periods they would be able to easily permanently quit in the future. When asked if they would ever ask for assistance from anyone, including a health care provider or parent for assistance, most participants expressed a desire to quit “cold turkey” and “on their own,” believing they would not need assistance with quitting.

I think if I wanted to stop I could. With something to occupy my mind, probably gum. I think I could stop by myself. (18-year-old male)

Discontinuation and relapse: Most participants who were currently using ST believed that they “probably should quit” or expressed a desire to quit using ST at some point in time. However, most felt that they did not have a “good reason” to quit. Some participants felt that they did not have enough support from their parents and friends to quit using ST. Other participants said that they felt they “just couldn’t” quit, believing that they might be addicted to ST or stating that they were addicted. However, it was rare that ST users admitted to being addicted.
I still think [chew’s] bad. Sometimes I’ll wake up and put a chew in and think, “Yeah, this probably isn’t good to chew in the morning,” really anytime. I don’t think I’m addicted. I’ve never really tried to stop, but I’ve taken pauses from it, like, “Oh, I’m not going to chew for this week,” or something. But I’ve never really had the urge to stop. I’m sure I’m going to want to stop here in the future. I don't want it to get out of control and lose something from cancer. (18-year-old male)

Female participants typically discontinued ST use because they did not enjoy the experience of using ST (often preferring to smoke cigarettes), felt that using ST looked “unattractive” or “gross,” or they believed the long-term risks of ST use were too great to continue using ST.

After discontinuing ST use for a short period of time, current users would often re-evaluate the benefits and adverse consequences of using ST with those of ST cessation. If they felt that using ST was more beneficial to them than no longer using, they would return to using ST.

**Discussion**

This is one of the first [24,30] qualitative studies of the social, interpersonal, and individual factors that influence ST initiation, continued use, and cessation among adolescents in rural communities. By understanding these factors, we can better address the disproportionate use of ST by youth in rural communities in the United States. We found that ST plays an important role in rural culture. ST is also important in the establishment of masculine identity for rural youth and gender is a major influence on adolescents’ introduction to and continued use of ST. In addition, we found that adolescents lack sufficient knowledge of the health risks of using ST. Health care providers could address this by providing education targeting prevention and cessation of ST use among rural youth.

**ST as an established aspect of rural culture**

Participants described cultural beliefs regarding ST including how ST is an integral part of rural culture and activities. Cultural norms have been found to play an important role in adolescent decision-making, influencing both willingness and intentions to engage in risky behaviors [28]. Adult ST users model patterns of ST use for youth at an early age, particularly during activities that become typical settings for ST use in the rural community, such as hunting, ranching, and other outdoor activities central to rural life. Because ST use is associated with activities that are closely tied to rural culture, ST becomes part of the culture itself.

Although both male adult and peer ST users influenced male adolescents to use ST, our study found that adults mediated male adolescents’ primary exposure to ST and played a more important role in increasing their interest and desire to try ST than did peers. This is in contrast with the smoking literature that shows that, while both parental smoking status and peer smoking status influence adolescents’ future smoking habits, peers tend to have a greater effect than parents or adults [31-34]. It will be important in future studies to examine further how the influence of adults and peers affect rural adolescents’ decisions to use ST.
ST use is also seen as a rite of passage into male adulthood. These findings are similar to those described by Nemeth and colleagues in their description of influences of Appalachian adolescent ST use [24]. In addition to serving as prototypes of ST users, adults solidify cultural norms regarding ST by passively and actively facilitating adolescent ST use. Adults, including parents and authority figures like teachers and sports coaches, passively facilitate ST use by relaxing prohibitions on adolescent ST use or tolerating adolescent ST use. By accepting adolescent ST use, adults effectively recognize the “inevitability” of ST use among youth in their community. This reinforces adolescents’ view of ST as part of their culture and effectively encourages ST use.

Adults also actively facilitate ST use by permitting adolescents to access ST through them, sometimes even purchasing ST on the adolescent’s behalf or sharing ST with them. Providing ST encourages continued use and allows the adolescent to participate in an adult activity with an adult, thereby reinforcing the image of ST use as a rite of passage into adulthood in the rural community.

Existing studies on ST packaging and point of sale advertising [24,30] and non-rural-focused studies show the importance of advertising and media on tobacco use. Tobacco advertising has utilized aspirational images (e.g., sexy women smoke, a tough cowboy chewing) to encourage positive images of tobacco users [35,36]. In addition, tobacco advertising on the internet and through social media has been used to market non-cigarette products, including ST, increasing youth exposure to tobacco products [37]. However, the adolescents in this rural community did not report that ST advertising or other media, such as television or film, influenced their ST use or purchasing choices. Rather, youth described the influences on their use as embedded in the community, such as parents, family members, and peers. This suggests that ST use within the rural community has greater influence on adolescent ST use than do external forces such as advertising.

**ST as a marker of masculinity in rural culture**

Participants described ST as an important marker of masculinity in rural communities. For most rural adolescents, adult males serve as the first image of a “typical” ST user. Gerrard and colleagues [28] describe the importance of image risk-prototypes (e.g., a “typical” smoker or drinker) in influencing adolescents’ willingness to engage in risk-taking behavior, including tobacco use. Other existing literature on risk-taking behaviors supports the risk-prototype theory, showing that the degree to which an adolescent sees a risk-prototype as positive or negative influences their willingness to engage in that risky behavior [38-40]. Because adolescents often view these male adult ST users positively, as seen in the First Awareness phase of ST use in our model, adolescents are more likely to be willing to engage in future ST use. In addition to adult ST users, older male peers serve as ST user prototypes, particularly surrounding an adolescent’s first experience with ST.

Both adult and peer ST user prototypes are predominantly male, thus, adolescents associate ST use with masculinity. One of the major benefits of ST use is the establishment of masculine social networks; using ST allows male adolescents to fit in with their peers, and bond with older male users. ST use even becomes a social activity on its own for males.
Gender differences in ST use

Male and female adolescents had different patterns of ST and cigarette use. Female participants initiated ST use at much older ages than their male peers, but tried cigarettes at approximately the same age. In contrast to male youth, female participants described their peers as their major influence for ST initiation and did not describe adults as playing a role in their exposure to ST. In addition, we found that female adolescents are less likely to use ST than their male peers, largely because the image of ST use as a masculine activity often influences females to instead choose to use cigarettes as their primary form of tobacco.

Knowledge and the role of healthcare providers in rural adolescent ST use

Most of our participants had little to no knowledge of the health risks of ST before they tried it. Instead, they were primarily influenced to initiate ST use by positive user prototypes (adults and peers), which lead to a drastically skewed view of ST use as mostly beneficial. In contrast, most of the participants who used ST had a strong understanding of the health consequences of cigarette use. However, many ST users, who were accustomed to tobacco use through ST, while not identifying as “smokers,” presented cigarettes as a “back up” to ST and as a time- and place-dependent alternative (e.g., while at a party, drinking alcohol) to ST use.

Participants also indicated that healthcare professionals did not address their current ST use, talk to them about the health risks associated with ST, or actively discourage or deter future ST use. This is significant because most participants said that they see a healthcare professional at least once per year for their annual physical for school and athletics. Participants indicated that health care providers do not play a significant role in promoting adolescent tobacco prevention or cessation. Nor did participants see healthcare providers as a resource that they would use to help them quit using ST. Adolescents also lacked a basic understanding of addiction and reported that they could “easily quit” using ST or quit “before they became addicted,” despite showing signs of current addiction to ST.


**Suggested Public Health and Clinical Implications**

Results from this study have significant public health and clinical implications. Despite the high prevalence of ST use among adolescents in rural communities, there is little public health or health care provider focus on promoting ST cessation and prevention among this population. To be effective, future public health campaigns and interventions targeting rural ST use should focus on rural-specific factors, such as the role of ST in rural activities, the culture of masculinity around ST, and the general acceptance of ST use in these small communities. Rural adolescents would benefit from education from rural physicians regarding the health effects of ST and preventive services. Physicians would be well-advised to include specific screening for ST use during adolescent health appointments. Cessation strategies should be offered to current ST users, addressing adolescents understanding of addiction, temporary cessation due to oral lesions caused by ST use, and prior attempts at cessation. Health care providers must also address the confidentiality issues that are specific to small, tightly knit rural communities. Creating trust between adolescent patients and their providers will make it more likely that youth will utilize providers for guidance regarding cessation, increasing their likelihood of permanent discontinuation.

**Limitations**

This study used a small sample from one rural community in California. We only interviewed adolescents who had tried ST, although we did not purposefully exclude adolescents who had not tried ST. This may be due to selection bias during recruitment—adolescents who had tried ST may have been more interested in participating in the study than were adolescents who had never tried ST or our recruitment population may have had more ST users. Future studies should expand on our findings and include multiple rural communities to make comparisons between regions and potentially rural communities in multiple states. We also did not speak to influential adults (including parents, coaches, and teachers) about their perceptions of adolescent use and their role in influencing adolescent use. Future research on adult perceptions of adolescent use and adult perceptions of their role would help elucidate this missing piece.

**Conclusions**

Smokeless tobacco is clearly an established aspect of rural culture, perhaps even a normal and defining aspect of male adulthood in rural communities. This study indicates that prevention and intervention strategies for ST use among rural adolescents must target not only ST use among adolescents but also within the larger community. Intervention and prevention strategies will need to change cultural perceptions of ST use in rural communities. Adult cessation of ST use is particularly important to limit male adolescents’ exposure to adult use. Parents, teachers, sports coaches, and other adults in the community must continually discourage ST use rather than becoming accustomed to adolescent use and permitting or promoting it. In addition, healthcare providers should be encouraged to discuss ST use with adolescents, dissuade adolescents from trying and using ST, and provide them with education about addiction and resources for cessation.

Rural youth lack basic knowledge of the health risks of ST use before they initiate ST use. As such, it will be important for future studies and prevention strategies to assess adolescents’ understanding of the health effects of ST and to encourage earlier
knowledge of the major health risks of ST use. ST users, despite having knowledge of the health risks of cigarette use, often use cigarettes in addition to their regular ST use (i.e., dual use). This indicates that ST could lead to increased tobacco use, both in the form of ST and cigarettes. In addition, because of the prevalence of dual ST and cigarette use, our study suggests that the use of ST as a harm-reduction strategy for current cigarette smokers may only increase the amount of tobacco being consumed by providing cigarette smokers with an alternative form of tobacco when cigarettes are unavailable.

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