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The purpose of this research was to examine the attitudes, beliefs, and behaviors of North Carolina High School Baseball Coaches with regard to spit tobacco (ST) use. The study evaluated (a) the difference in the theory of planned behavior components of behavioral intention between coaches who use ST and coaches who do not use ST; (b) the correlation between the planned behavior components and actual behavioral intention in all of the coaches; and (c) which of the planned behavior components were the strongest predictors of actual behavioral intentions for tobacco use in coaches, as well as enforcement of tobacco use rules by coaches. Ninety-three male high school baseball coaches participated in the study by completing a questionnaire on spit tobacco use and behavioral intentions.

A Chi Square analysis revealed that perceived power was significantly different between the ST user coaches and non-user coaches, that analyses of differences of assessment of behavior outcomes and control beliefs between the ST user and non-user coaches were inconclusive, and that behavioral beliefs, normative beliefs, and motivation to comply were not significantly different between the ST user coaches and non-user coaches.

A Spearman rho analysis of the correlation between behavioral beliefs and behavioral intention was inconclusive, while the analysis revealed that assessment of behavior outcomes, normative beliefs, motivation to comply, control beliefs, and perceived power were not correlated with behavioral intention. However, a visual

inspection of the data found that assessment of behavior outcomes and control beliefs may be related to behavioral intention in practice.

A discriminant function analysis revealed that behavioral beliefs was a significant predictor of intention to use ST versus control beliefs and perceived power which showed some potentially important, but non-significant predictive capacity of coach intention to use ST. Also, the discriminant function analysis revealed that perceived power, behavioral beliefs, assessment of behavior outcomes, and normative beliefs were significant predictors of coach intention to enforce tobacco use rules. Control beliefs was not a significant predictor of behavioral intention to enforce tobacco use rules.

SPIT TOBACCO USE AND BEHAVIORAL INTENTIONS IN NORTH  
CAROLINA HIGH SCHOOL BASEBALL COACHES

By

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## CHAPTER I

### INTRODUCTION

Use of spit (smokeless) tobacco (ST) has become increasingly prevalent throughout the past forty years--rising to a consistent annual consumption of more than 115 million pounds in the United States alone (Burak, 2001; Federal Trade Commission [FTC], 2009; Shopland, 1997; Siegel, Benowitz, Ernster, Grady, & Hauck, 1992). ST is a scientifically identified health hazard, causing negative health consequences such as oral cancer, pancreatic cancer, oral leukoplakia (a premalignant lesion), dental caries, gingival recession, and nicotine addiction; as well as lesser known effects such as hypertension and cardiovascular disease (Cooper, Ellison, & Walsh, 2003; Tomar, 2007; Walsh, Ellison, Hilton, Chesney, & Ernster, 2000). When ST use is combined with alcohol consumption--a common pattern found in users--the risk for oral, pharyngeal, esophageal, and pancreatic cancer has been shown to increase (Connolly, Orleans, & Blum, 1992; International Agency for Research on Cancer [IARC], 2007).

A National Collegiate Athletic Association (NCAA) study (2005) reported that 16.4% of collegiate athletes used ST on a regular basis. This widespread use is occurring in spite of an NCAA regulation, in effect since 1994, that bans the use of ST products in practice and competition (Burak, 2001). The highest percentage of ST users came from baseball, a sport long known for heavy consumption. The NCAA survey (2005) found that 42% of collegiate baseball players were using ST regularly.

There are many reasons why baseball players tend to use ST at such high levels when compared to other athletes. First of all, the sport of baseball, because of the lulls in activity and a decreased risk of contact or collision, is an activity that allows for increased consumption of ST by players while they are competing (Walsh, Hilton, Ernster, Maouredis, & Grady, 1994).

There is also a certain social expectation among baseball players that ST use is acceptable and even 'mandated' in ritualistic or superstitious manners (Gingiss, & Gottlieb, 1991; Walsh, et al, 1994). Baseball athletes experience intensive role modeling through the visible ST use of professional players, sports-centered advertising, and promotional programs with free samples (Walsh, et al, 1994). Sport-specific use and role-modeling are evident with research reporting that 59% of collegiate baseball athletes in one study predominately used ST during the competitive baseball season or used it dramatically more during the season than out-of-season (Walsh, et al, 1994).

In order to change the current situation, coaches must be actively involved in efforts to decrease ST consumption in baseball. These individuals are capable of playing a substantial role in the prevention, rules enforcement, and referral for treatment of addiction for their athletes (Walsh, et al, 1994). Coaches can be an integral aspect of this effort because they are often a role model for athletes, have access to the athletes at the different stages of ST use (initiation, experimentation, and regular use), and have an enormous influence over their team (Chakravorty, Buchanan, & Osfeldt, 1997; Gansky, Ellison, Kavanagh, Isong, & Walsh, 2002). Despite the potential opportunity to

spearhead the effort to decrease ST use in baseball, coach-driven interventions appear to be relatively uncommon.

There are numerous potential reasons for this lack of coach initiatives, including athletes' perception that coaches are indifferent about ST use on the team, a lack of awareness about the level of ST use among athletes, or personal use by the coaches (Eaves, Schmitz, & Siebel, 2009; Gansky, Ellison, Rudy, Bergert, Letendre, Nelson, Kavanagh, & Walsh, 2005; Horn, Maniar, Dino, Gao, & Meckstroth, 2000). Additionally, there is little known about ST use patterns in coaches themselves or their personal beliefs about the use of tobacco products. Only three studies to date have evaluated the prevalence of use among baseball coaches with findings that reported a range between 13% and 18.5% of respondents were current ST users, a lower prevalence rate than that seen in baseball athletes, but still a significant percentage that is much higher than the national average (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000).

What is generally known about coaches and their personal use of ST or their attitude toward use is often derived from athletes' perceptions. Players often believe that coaches are indifferent about the individual athlete's ST use (Epps, Lynn, & Manley, 1998; Levenson-Gingiss, Morrow, & Dratt, 1989). Also, athletes are often confused and surprised by the mixed messages conveyed by coaches who are chewing tobacco at sporting events or practice (National Federation of Intercollegiate Coaches Association [NFICA], 1995).

Coaches should recognize that their own use, knowledge, behaviors, attitudes, or indifferences toward ST might have a powerful influence on their athletes (Davis, Arnold, Nandy, Bocchini, Gottleib, Geroge, & Berkel, 1997; Horn, et al, 2000). Research has demonstrated that ST use in baseball players was three times higher on a team where the coach also was a user (Walsh, et al., 2000). Therefore, it is essential that coaches reconsider any personal ST use while also utilizing available baseball-specific intervention techniques to minimize or eliminate tobacco use in their athletes.

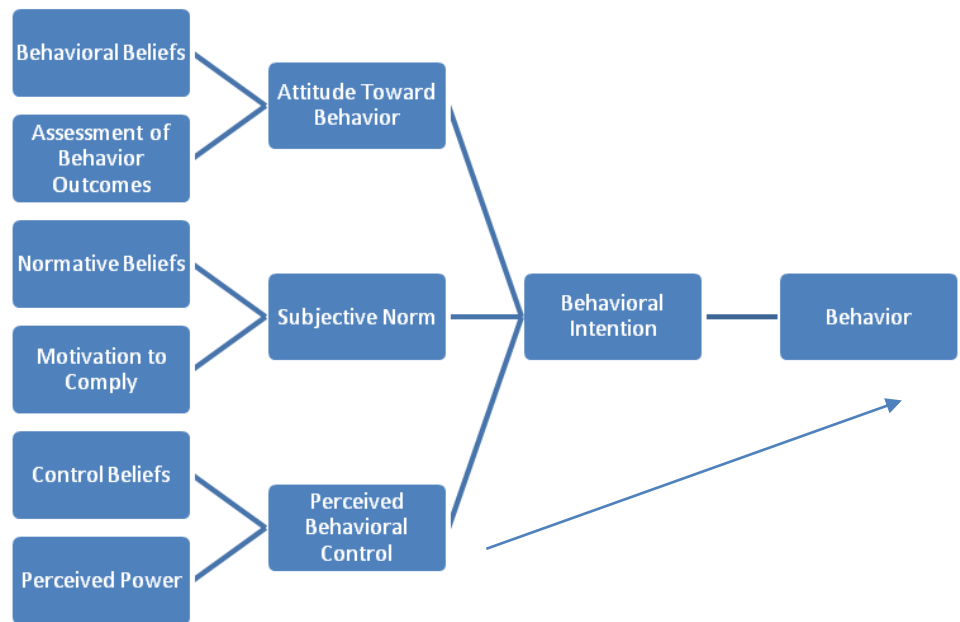
To examine the attitudes, beliefs, and behaviors of coaches with regard to ST use, either personal use or among their athletes, is a good starting point for preliminary inquiry into this topic. The theory of planned behavior, when used to predict the intention to perform a specific health behavior, is capable of providing a host of information that is extremely useful in the attempt to understand these behaviors, or to implement interventions that will be effective in changing the behavior (Ajzen, 1991). Each of the components of the theory of planned behavior reveals a different aspect of a behavior, and each can serve as a focal point in attempts to change the performance of the behavior. The underlying foundation of beliefs that is present in the theory of planned behavior provides the detailed description necessary to gain substantive information about a behavior's determinants. These beliefs allow researchers to learn about the unique factors that induce an individual to engage in the behavior of interest and to prompt another to follow a different course of action (Ajzen, 1991).

All of the above provided a reasonable fit for the framework needed to evaluate the use of ST among baseball coaches (and athletes). It supports work which focuses on

the impact that the sport of baseball has on ST use, the role that referent groups within the sport may play in the decision to use ST, the effect that being a role model for student-athletes may have on a coach's decision to use ST, and the specific intervention techniques that have the highest probability of success in decreasing ST use among baseball coaches and athletes.

By using the first six components of the model of the theory of planned behavior (see Figure 1) to support the beginning research questions, the investigator started to learn about factors which connect directly to behavioral intention in a rather robust way. The study of behavioral intention components permitted the investigator to differentiate between the intention of coaches who use ST and those who do not. Determining these differences provided a better understanding of the behavioral intention components and possibly "real" behavior and can lead to the development of training/intervention programs specifically focused on changing coaches' behavior relative to the first six (basic) components of the model.

Also, it was important to know whether or not each of the six components correlated with behavioral intention and which components were the strongest predictors of behavioral intention for coaches. Therefore, three specific research questions with sub-problems regarding components of behavioral intention, correlation between components of behavioral intention and actual behavioral intention, and the predictors of behavioral intention are partitioned into three separate sections below.



**Figure 1. Theory of Planned Behavior**

### Differences Between ST Users and Non-Users

The first research question asked whether there was a difference in components of behavioral intention regarding ST use between North Carolina high school baseball coach ST users and non-users. Answers to the following six sub-problems, based on the model above, helped to answer the research question.

**Sub- Problem A.1:** Are there differences in behavioral beliefs regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.1:** There will be a statistically significant difference in behavioral beliefs regarding ST use between North Carolina high school baseball coach users and non-users.

**Rationale for hypothesis A.1:** Prior research supports differences in behavioral beliefs regarding ST use between baseball coach users and non-users (Ajzen, 1991).

**Sub- Problem A.2:** Are there differences in the assessment of behavior outcomes regarding ST use between baseball coach ST users and non-users?

**Hypothesis A.2:** There will be a statistically significant difference in assessment of behavior outcomes regarding ST use between North Carolina high school baseball coach users and non-users.

**Rationale for hypothesis A.2:** Prior research supports differences in assessment of behavior outcomes regarding ST use between baseball coach users and non-users (Ajzen, 1991).

**Sub- Problem A.3:** Are there differences in normative beliefs regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.3:** There will be a statistically significant difference in normative beliefs regarding ST use between North Carolina high school baseball coach users and non-users.

**Rationale for hypothesis A.3:** Prior research supports a difference in normative beliefs regarding ST use between baseball coach users and non-users (Ajzen, 1991; Rise, Kovac, Kraft, & Moan, 2008).



**Sub- Problem A.4:** Are there differences in motivation to comply regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.4:** There will be a statistically significant difference in motivation to comply regarding ST use between North Carolina high school baseball coach users and non-users.

**Rationale for hypothesis A.4:** Prior research supports a difference in motivation to comply regarding ST use between baseball coach users and non-users (Ajzen, 1991; Rise, et al, 2008).

**Sub- Problem A.5:** Are there differences in control beliefs regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.5:** There will be a statistically significant difference in control beliefs regarding ST use between North Carolina high school baseball coach users and non-users.

**Rationale for hypothesis A.5:** Prior research supports a difference in control beliefs regarding ST use between baseball coach users and non-users (Ajzen, 1991; Armitage & Conner, 2001; McMillan & Conner, 2003).

**Sub- Problem A.6:** Are there differences in perceived power regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.6:** There will be a statistically significant difference in perceived power regarding ST use between North Carolina high school baseball coach users and non-users.

**Rationale for hypothesis A.6:** Prior research supports a difference in perceived power regarding ST use between coach users and non-users (Ajzen, 1991; Armitage & Conner, 2001; McMillan & Conner, 2003).

#### Correlational Analysis

The second research question asked whether the six behavioral intention components were correlated with behavioral intention for all of the coaches. The following six sub-problems, based on the model above, helped to answer this research question.

**Sub-Problem B.1:** Is there a correlation between behavioral beliefs and behavioral intention?

**Hypothesis B.1:** There will be a statistically significant correlation between behavioral beliefs and behavioral intention.

**Rationale for hypothesis B.1:** Prior research supports a correlation between behavioral beliefs and behavioral intention with regard to health behaviors (Ajzen, 1991).

**Sub-Problem B.2:** Is there a correlation between assessment of behavior outcomes and behavioral intention?

**Hypothesis B.2:** There will be a statistically significant correlation between assessment of behavior outcomes and behavioral intention.

**Rationale for hypothesis B.2:** Prior research supports a correlation between assessment of behavior outcomes and behavioral intention with regard to health behaviors (Ajzen, 1991).

**Sub-Problem B.3:** Is there a correlation between normative beliefs and behavioral intention?

**Hypothesis B.3:** There will be a statistically significant correlation between normative beliefs and behavioral intention.

**Rationale for hypothesis B.3:** Prior research supports a correlation between normative beliefs and behavioral intention with regard to health behaviors (Ajzen, 1991).

**Sub-Problem B.4:** Is there a correlation between motivation to comply and behavioral intention?

**Hypothesis B.4:** There will be a statistically significant correlation between motivation to comply and behavioral intention.

**Rationale for hypothesis B.4:** Prior research supports a correlation between motivation to comply and behavioral intention with regard to health behaviors (Ajzen, 1991).

**Sub-Problem B.5:** Is there a correlation between control beliefs and behavioral intention?

**Hypothesis B.5:** There will be a statistically significant correlation between control beliefs and behavioral intention.

**Rationale for hypothesis B.5:** Prior research supports a correlation between control beliefs and behavioral intention with regard to health behaviors (Ajzen, 1991).

**Sub-Problem B.6:** Is there a correlation between perceived power and behavioral intention?

**Hypothesis B.6:** There will be a statistically significant correlation between perceived power and behavioral intention.

**Rationale for hypothesis B.6:** Prior research supports a correlation between perceived power and behavioral intention with regard to health behaviors (Ajzen, 1991).

#### Prediction Analysis

The third research question asked which of the behavioral intention components were the strongest predictors of behavioral intentions for tobacco use in coaches and enforcement of tobacco use rules by coaches. The following two sub-problems, based on the model above, helped to answer this research question.

**Sub-question C.1:** Which behavioral components are the strongest predictors of behavioral intention for tobacco use in coaches?

**Hypothesis C.1:** The strongest predictors of behavioral intention to use spit tobacco will be the control beliefs and the perceived power components.

**Rationale for hypothesis C.1:** Prior research supports that the sub-components of perceived behavioral control will be the greatest predictors of behavioral intention (Ajzen, 1991).

**Sub-Problem C.2:** Which behavioral components are the strongest predictors of behavioral intention for enforcement of tobacco use rules by coaches?

**Hypothesis C.2:** The strongest predictors of behavioral intention will be the control beliefs and the perceived power components.

**Rationale for hypothesis C.2:** Prior research supports that the sub-components of perceived behavioral control will be the greatest predictors of behavioral intention (Ajzen, 1991).

## Definitions of Terms

**Spit Tobacco (ST)**-a tobacco product that is placed in the mouth and sucked or chewed to release the nicotine content into the oral cavity and then spit out the tobacco juices that are generated. There are two forms of spit tobacco-moist snuff and chewing tobacco. (Centers for Disease Control and Prevention [CDC], 2007; Cooper, Ellison, & Walsh, 2003)

**Moist Snuff**-a form of ST that is finely ground or shredded and sold in small round tins. It is the most popular form of ST available today. (CDC, 2007)

**Chewing Tobacco**-a coarsely cut form of ST that is sold in loose-leaf, plug, or twist form. (CDC, 2007)

**Initiation of use**-the first-time use of spit tobacco among all persons who had not previously used it. (Substance Abuse and Mental Health Services Administration [SAMHSA], 2009)

**Cessation**-a temporary or final ceasing as of an action. (Merriam-Webster Dictionary, 2009)

**Peer Mentoring**- a sustained (long-term), usually formalized (i.e. program-based), developmental relationship. The relationship is "developmental" in that the older peer's goal is to help guide the younger mentee's development in domains such as interpersonal skills, self-esteem and conventional connectedness and attitudes. (Dubois & Karcher, 2005)

**Intervention**-an action or ministrations that produces an effect or that is intended to alter the course of a pathologic process. (Stedman's Concise Medical Dictionary, 1997)

**Behavioral Beliefs**- An individual's belief about consequences of particular behavior.

(Ajzen, 1991)

**Assessment of Behavior Outcomes**-The likelihood of a health consequence actually

occurring. (Ajzen, 1991)

**Attitude Toward Behavior**- An individual's positive or negative evaluation of self-

performance of the particular behavior. The degree that the behavior is positively or

negatively valued. (Ajzen, 1991)

**Normative Beliefs**- An individual's perception about the particular behavior, which is

influenced by the judgment of significant others. (Ajzen, 1991)

**Motivation to Comply**- What is the primary reason that an individual is willing to

change a health behavior. (Ajzen, 1991)

**Subjective Norm**- The perceived social pressure to engage or not to engage in a

behavior. (Ajzen, 1991)

**Control Beliefs**- The perceived presence of factors that may facilitate or impede

performance of a behavior. (Ajzen, 1991)

**Perceived Power**- The power of each control factor to impede or facilitate performance

of the behavior. (Ajzen, 1991)

**Perceived Behavioral Control**- An individual's perception of his/her ability to perform

a given behavior. (Ajzen, 1991)

**Behavioral Intention**- An indication of an individual's readiness to perform a given

behavior based on the three primary categories (attitude toward behavior, subjective

norms, and perceived behavioral control). (Ajzen, 1991)

**Behavior**- An individual's observable response in a given situation with regard to a specific target. (Ajzen, 1991)

#### Delimitations

Only baseball coaches who were currently employed by public and private high schools in the state of North Carolina were invited to participate in this study. Coaches of other sports or from other states were not included in this project. The coaches were asked to complete the study questionnaire at the annual North Carolina Baseball Coaches' Association meeting in Chapel Hill, North Carolina on January 22, 2010. Those coaches who did not attend this meeting were not sampled at a later date. Therefore, they were not included as part of this study. Also, the central purpose of this study was to learn about coaches' ST use, not to generate data about player ST use.



## CHAPTER II

### REVIEW OF LITERATURE

#### Background

Spit, or smokeless, tobacco (ST) consists of two primary varieties--moist snuff and chewing tobacco. Moist snuff is a finely ground or shredded tobacco leaf that is commonly sold in a small round tin. Snuff users place a 'dip' or pinch of snuff between their lower lip and gum where it stays until it is removed (CDC, 2007; Cooper, Ellison, & Walsh, 2003). While the tobacco is between the lower lip and gum, the users suck on the tobacco and spit out the tobacco juice and saliva mixture, which is why it is often referred to as spit tobacco (CDC, 2007). Chewing tobacco, on the other hand, is a more coarsely cut tobacco and is packaged in loose or plug form in pouches. Chewing tobacco users place a 'chew' or wad of tobacco in their cheek and chew it until it is removed.

The use of ST became widely recognized as a major public health problem in the mid-1980s (Henningfield, Fant, & Tomar, 1997; Nelson, Mowery, Tomar, Marcus, Giovino, & Zhao, 2006). The recognition and awareness came as a result of several factors including: increased understanding of the carcinogenicity of the product, the changing demographics of users, the increasing number of users, and a wide-scale advertising and marketing campaign initiated by the smokeless tobacco industry (Henningfield, Fant, & Tomar, 1997; Nelson, et al, 2006). By 1986, Congress had enacted a legislative ban on television and radio advertising of ST products, as well as

requiring a warning label be placed on these products (Nelson, et al, 2006).

Also in 1986, the US Surgeon General concluded that ST was addictive and that it shared many characteristics with drugs such as cocaine, heroin, and alcohol (Henningfield, Fant, & Tomar, 1997). The report concluded that there was sufficient scientific evidence that the use of smokeless tobacco was carcinogenic, could cause cancer in humans, and was not a safe alternative to smoking (Boonn, 2007; Tomar, 2007). A follow-up report in 1993 by the Surgeon General advocated the use of the term spit tobacco instead of smokeless tobacco--a term that was created by the tobacco industry--to prevent the erroneous belief in users that 'smokeless meant harmless' (Cooper, Ellison, & Walsh, 2003; Walsh, et al, 1994). The report also found that nicotine in cigarettes and smokeless tobacco was itself a drug and should fall under the review and regulation of the Food and Drug Administration, although Congress did not require that tobacco products be regulated by the government agency until 2009 (Campaign for Tobacco-Free Kids, 2010).

The publicity that was garnered by the ST industry in the mid-1980s was far different than that seen in the previous decade. The smokeless tobacco industry was essentially near extinction in 1970 as the primary users of the product--adults aged 65 and older--were not being replaced with new users (Henningfield, Fant, & Tomar, 1997). In 1970, adult males aged 65 and over had the highest prevalence of use (12.7%) and chewing tobacco was the primary form of ST. Since 1970, ST has gone from a product used mostly by older men to one that is predominantly used by young men and boys (Boonn, 2008). This trend occurred as a result of new product development (mainly moist

snuff products) and aggressive marketing campaigns (Boonn, 2008; Henningfield, Fant, & Tomar, 1997; Masouredis, Hilton, Grady, Gee, Chesney, Hengl, Ernster, & Walsh, 1997).

Currently, men aged 18-24 were more likely to use ST than older men (8.4 % to 5.6%) with an even higher prevalence rate seen in high school boys (13.6%) (Boonn, 2008; CDC, 2007; Henningfield, Fant, & Tomar, 1997). Of the 12-14 million ST users in the United States, one third are younger than 21 with more than half of them initiating their habit before the age of 13 (Morrison, Krugman, & Park, 2008). In fact, the only demographic group nationwide that has shown a significant increase in prevalence of use since 2002 is males aged 12 to 17, who have increased their level of use from 3.4 to 4.4% (SAMSHA, 2009). This early initiation age and high level of prevalence is concerning because of the risk for sustained exposure and use throughout the lifetime of the ST user (Alberta Alcohol and Drug Abuse Commission [AADAC], 2008)

Adolescent ST users, whose use has helped to make moist snuff the only tobacco product in the United States with an increase in sales for almost every year since the early 1970s, are far more likely to use moist snuff products than are older adults. ST sales have increased from 17.2 million pounds in 1972 to approximately 115 million pounds in 2006 (Burak, 2001; FTC, 2009; Henningfield, Fant, & Tomar, 1997; Shopland, 1997; Siegel, et al, 1992). For adolescents in the United States, ST use is seen most often in older adolescents, boys, Caucasians, Native Americans/Alaska Natives, and residents of the south, midwest, and west (Nelson, et al, 2006).

Despite recent reports of declines in use, ST remains a serious concern as tobacco companies promote new products, including flavored products and spit-less options that come in small pouches called ‘sachets’ (Stepanov, Jensen, Hatsukami, & Hecht, 2008). These products, known as ‘snus’ (the Swedish word for smokeless tobacco), are being considered as a viable alternative to cigarettes for smokers who are inconvenienced by increasingly restrictive bans on smoking in workplaces and public institutions such as restaurants and bars (Boonn, 2006; Stepanov, et al, 2008). While traditional ST, which generates excess saliva and requires either spitting or swallowing the generated mixture of saliva and tobacco juice, is not generally a popular alternative to cigarettes by smokers, these new products are gaining popularity in the geographic areas where they are available (Stepanov et al, 2008).

In conjunction with the development of these new products, tobacco companies are emphasizing all types of ST as a healthy tobacco option because it is generally considered to be less dangerous and deadly than smoking because of considerably lower concentrations of toxicants and carcinogens that form during smoking as a result of the combustion found with the habit (Hecht, Carmella, Murphy, Riley, Le, Luo, Mooney, & Hatsukami, 2007). The decreased levels of carcinogens in ST--as opposed to smoking--lead to lower risks for mortality and morbidity with use, which has led many tobacco companies, public health organizations, and other groups to recommend ST products as harm reduction or reduced exposure products for smokers who are unable or unwilling to quit using tobacco (Hecht, et al, 2007; Tomar, 2007). While ST may have fewer cancer-causing agents than cigarettes, it is far from a ‘safe’ alternative to smoking because of the

presence of 28 identified carcinogens, which include tobacco-specific *N*-nitrosamines, *N*-nitrosamino acids, volatile *N*-nitrosamines, and aldehydes, that arise mainly from the post-harvest processing of the tobacco and the numerous health risks that are associated with exposure to those carcinogens (Boffetta, Hecht, Gray, Gupta, & Straif, 2008; Boonn, 2008; IARC, 2007).

The other concern with considering ST products as a reduced exposure product is the current lack of regulation of the ST products that are produced and sold in the United States. Because of this lack of regulation, there is nothing to prevent a tobacco company from altering the content of an ST product in ways that would make it more toxic, including altering the level of nitrosamines, pH, and moisture content, which all may affect the level of nicotine that is available to the user and the level of carcinogenicity of the product (Boonn, 2008; Stepanov, et al, 2008).

#### Harm Reduction

A recent strategy shift that recommends the use of ST as a method to assist with smoking cessation has developed in both tobacco companies and public health organizations. This strategy, known as harm reduction, promotes and encourages the use of ST as an alternative to cigarettes because of lower risks for morbidity or mortality and less severe adverse health consequences (Gansky, Ellison, Kavanagh, Isong, & Walsh, 2009; Savitz, Meyer, Tanzer, Mirvish, & Lewin, 2006; Tomar, 2007). Although the exact magnitude of reduction in risk that is gained from substituting ST for cigarettes is not easily quantified, a panel of experts has estimated that total mortality would decrease by 90-95% (Savitz, et al, 2006).

Because the general approach that has been advocated by regional and national public health organizations has included preventing initiation, facilitating smoking cessation, and promoting abstinence from all tobacco products, a harm reduction strategy would seem counterintuitive for these groups. However, policymakers believe that harm reduction through a ‘harmful but safer’ campaign might provide better cessation results with smokers who are unable or unwilling to stop using tobacco products (Savitz, et al, 2006).

If this harm reduction strategy were ultimately utilized and was successful, the expected pattern would be: 1) an increased prevalence of ST use among adults over 35 years old in conjunction with an increased prevalence of smoking cessation in that age group; 2) a lower prevalence of smoking among states with a higher prevalence of ST use; 3) higher smoking cessation rates in treatment groups that utilize ST as a cessation tool in randomized clinical trials; and 4) higher smoking cessation rates in observational studies (Tomar, 2007). At this time, there are no published randomized clinical trials that have utilized ST as a smoking cessation tool. Prospective cohort studies have been utilized to determine the effect of ST use on smoking initiation and cessation, but these studies have found that ST use is predictive of concurrent or subsequent smoking rather than acting as a deterrent (AADAC, 2008; Tomar, 2007).

The primary concerns with harm reduction strategies include a potential increase in ST use among adolescents who misinterpret the campaign to mean ‘smokeless is harmless’, a potential increase in the promotion or adoption of tobacco use by non-users or active smokers who are capable of quitting, an increase in sales of high nicotine ST

products that improve the risk for initiation or maintenance of addiction, and the undermining of the public health effort to achieve total tobacco product cessation (AADAC, 2008; Gansky, et al, 2006; Hecht, et al, 2007; Savitz, et al, 2006). Since it is not possible to isolate and market ST as a harm reduction method to only the group of smokers who would benefit from this program, there may be a net harm derived from using this policy (Savitz, et al, 2006).

Given the uncertainties associated with ST use in a harm reduction strategy, the World Health Organization (WHO) and other public health governing bodies have, to this point, determined that, regardless of the specific levels of harm caused by ST use--the overall inherent risks associated with ST products do not support the use of a harm reduction strategy (AADAC, 2008). Any harm reduction strategy that is suggested should garner the same rigorous assessment and critical evaluation that is given to any other policy intended to advance public health (Savitz, et al, 2006). Therefore, until concrete scientific evidence that the marketing and promotion of ST products as alternatives to smoking provide an effective strategy for reducing cigarette use or societal harm from tobacco use, it will be difficult to utilize the harm reduction strategy successfully without incurring the unintended consequences listed above (Tomar, 2007).

### Advertising

In 1998, the major cigarette producers in the United States committed to a Master Settlement Agreement (MSA) that called for major changes in the advertising programs for cigarettes. The MSA required the elimination of outdoor advertising not associated with retail business, transit advertising, the use of cartoons in marketing campaigns,

product placement in the media, and tobacco merchandising (Morrison, Krugman, & Park, 2008).

The major ST company in 1998, The US Smokeless Tobacco Company, which represented 58% of the ST market at that time, also committed to a Master Settlement Agreement that included similar advertising provisions as were seen in the cigarette MSA (Morrison, Krugman, & Park, 2008). However, because the ST industry is dramatically smaller than the cigarette industry, it has received little attention when it comes to monitoring advertising protocols and its potential exposure and impact on adolescents (Morrison, Krugman, & Park, 2008).

From 1998--when the MSA was signed and approved--until 2005, the total advertising and marketing expenditures of the top-five ST companies in the US increased by 72.4% (Boonn, 2008). In 2005, these five ST companies spent more than \$250 million on advertising and marketing for their products (Boonn, 2008; Boonn 2008a; CDC, 2007). These funds have helped to make ST a very lucrative enterprise--earning \$2.13 billion dollars in revenue (McKee & Gilmore, 2007). The advertising and marketing have also helped the industry become an attractive part of the American landscape and allowed the ST companies to influence the perception of ST use among adolescents (Morrison, Krugman, & Park, 2008).

In a study of the attitudes of middle and high school students on tobacco use, it was found that adolescents tend to have fewer negative images of the consequences of ST use than they do of cigarette smoking (Morrison, Krugman, & Park, 2008). The study also found that these students associated ST use with athletics and masculinity, and that



they considered ST use to be a safer alternative to smoking (Morrison, Krugman, & Park, 2008). ST advertising strategies have helped to normalize behavior and create images that are highly appealing to youths by communicating that use of these products is desirable, socially acceptable in peer relations, and prevalent in the younger populations (Morrison, Krugman, & Park, 2008; Tomar & Giovino, 1998).

In spite of the MSA, which placed a ban on direct advertising to adolescent populations, the study found that tobacco companies could reach nearly two thirds of adolescents by placing a single advertisement in each of fourteen adult magazines--magazines that are typically associated with sports or outdoor themes--that also have a high youth readership (Morrison, Krugman, & Park, 2008). The researchers for this study found that in spite of the MSA provisions for ST advertising there has been an increase in exposure of advertising for ST products to adolescents since 2000. Therefore, although marketing expenditures for ST advertising is much smaller than that seen with cigarette manufacturers (\$11.2 billion in 2005), ST advertising--especially in popular magazines with a high adolescent readership--should be closely monitored so that the exposure to adolescents can be minimized or eliminated (Morrison, Krugman, & Park, 2008).

#### Spit Tobacco Use in the United States

ST consumption in the United States is at a current rate of 3.3% of adults nationally (CDC, 2007; SAMSHA, 2009). Current ST users are those people who state that they have used the product at least once in the past thirty days. The majority of users tend to be male (6% of the male adult population), Native American/Alaska Natives (9%), or Caucasian (4%) (CDC, 2007). Many ST users also tend to be adolescents or

young adults with several studies conducted in high risk environments placing the prevalence rate of high school males between 8% and 14% and the prevalence rate in adults 18-24 between 5% and 8.7% (Boonn, 2008b; Ebbert, Rowland, Montori, Vickers, Erwin, & Dale, 2003; Lamkin, Davis, & Kamen, 1998; Stepanov, et al, 2008; Walsh, Hilton, Ellison, Gee, Chesney, Tomar, & Ernster, 2003).

There are numerous other sociocultural and psychosocial variables that are associated with ST use other than age, race, and gender. Having one or no parent in the household, lower parental education, blue-collar parental or personal occupations, rural environment, lower academic performance, previous cigarette smoking, having friends who use ST, living with adults who use ST, and/or concurrent alcohol or marijuana use all have been associated with an increased risk for initiation and continuation of use (Ebbert, et al, 2006; Morrell, Cohen, Bacchi, & West, 2005; SAMSHA, 2009; Tomar & Giovino, 1998).

ST use, especially in adolescents, has become such an important topic nationally, that intervention and cessation objectives have been included in both *Healthy People 2000* and *Healthy People 2010* as a component of the tobacco use focus points (Hilton, Walsh, Masouredis, Drues, Grady, & Ernster, 1994; Lamkin, Davis, & Kamen, 1998). Decreasing the initiation and prevalence of use in males aged 12 through 24 by more than 4% was a significant objective in *Healthy People 2000*. This goal was not achieved and has been re-introduced in the updated version for 2010 (Lamkin, Davis, & Kamen, 1998). The goal in the most recent document is to reduce overall use to 0.4% and reduce adolescent use to 1% of the population, while also attempting to increase the average age

of initiation for ST use (Office of Disease Prevention and Health Promotion [ODPHP], 2000).

The age of initiation is an important factor to consider because high school seniors who view themselves as regular users report that they tried ST for the first time by the sixth grade (23%), eighth grade (53%), or ninth grade (75%), which suggests that prevention and cessation programs need to be implemented at the middle school level if the goals and objectives of *Healthy People 2010* are to be met (Boonn, 2007; Lamkin, Davis, & Kamen, 1998; Newman & Shell, 2005).

#### Spit Tobacco Use in North Carolina

While ST use is a nationwide issue, especially among adolescents and young adults, it is an even more challenging issue in southern states with a long history of tobacco farming, production, and use--such as North Carolina, Virginia, West Virginia, and Kentucky. In fact, 8 of the 10 states with the highest rates of ST use were found in the south with prevalence of use ranging from 7.7% in West Virginia (the highest prevalence of use in the United States) to 4.3% in North Carolina (Bell, Spangler, & Quandt, 2000). In fact, a study conducted in Pitt County, North Carolina--the leading tobacco producing county in the United States--found that 40% of men and 9% of women were current ST users, which led to an overall rate of use of 24% (Bell, Spangler, & Quandt, 2000). These percentages of use are much higher than the national prevalence rate of 3% and demonstrate that the southern states are an important region to utilize for ST analysis and the development of prevention and cessation programs.

These states have a strong, and lengthy, association with tobacco both as a cash crop and as a primary headquarters and production site for many of the largest tobacco companies. ST use in the southern states is often seen as a cultural norm with an economic and social tie to the tobacco plant itself, which makes prevention and cessation programs difficult to implement in the face of a high level of resistance (Bell, Spangler, & Quandt, 2000). Because these states also have a higher prevalence of rural settings and a higher Caucasian and Native American populace with lower overall educational experience, they are more apt to have a population that is at high risk for the initiation and continuance of use of ST (Bell, Spangler, & Quandt, 2000).

In order to ensure that a successful program is developed and implemented, it is important to consider the tobacco culture of the region and the societal demographics when developing a prevention and cessation program in the southern states. Without an appropriate assessment of use in these states, ST rates may be greatly underestimated. If they are based on the national prevalence rates, there could be an underestimation that will dramatically affect the scope and scale of a prevention and cessation program. With the numerous detrimental health effects that are associated with ST use, it is essential that a prevention and cessation program be created and implemented appropriately for the population that is affected by the intervention.

#### The Health Effects of Spit Tobacco Use

Drawing conclusions about the health effects of ST use is complicated because of the wide range of products that fall into this category and by the variety of compounds which may have been mixed with the tobacco during production--some of which are

harmful by themselves (Boffetta, et al, 2008; McKee & Gilmore, 2007). Numerous studies have found that there are negative oral health effects, as well as detrimental systemic health effects that may occur as a result of continued use of ST.

The initial health effect that is often seen with ST use is oral leukoplakia, which is described as a premalignant lesion found in the oral mucosa--typically in the location where the dip is kept while it is being used. Clinically, oral leukoplakia is defined as a white, opaque, leathery-appearing, slightly raised, and irregularly corrugated change in the mucosa and is classified on a scale from 1 (slight change in color and texture) to 4 (no normal color, severe texture change, and heavy thickening) (Robertson, Walsh, & Greene, 1997). Users of snuff were found to have a significantly higher risk for oral leukoplakia than both non-users and chewing tobacco users, with snuff users also having significantly more severe lesions (Robertson, Walsh, & Greene, 1997). Several studies have found that between 50% and 79% of current ST users have clinically significant oral lesions that are associated with leukoplakia and are located in the general area that the ST wad is kept during use (Boonn, 2008c; Gansky, et al, 2009; IARC, 2007; Robertson, Walsh, & Greene, 1997; Walsh, et al, 2003). The prevalence and severity of the oral leukoplakia was positively correlated with the amount of tobacco used, the recency of use, and the consistency of the habit in the ST user (Robertson, Walsh, & Greene, 1997).

Other oral health effects associated with ST use include tooth stains, plaque, gingivitis, peridontitis, and tooth decay and loss. Each of these oral health effects is progressive as long as ST use is continued. All of the health effects that are found in the oral cavity are reversible if the ST user is successful in his or her cessation attempt.

Gingivitis, gingival recession, and bleeding are also prevalent in the ST population; however, it is more often seen in individuals who have a previous history of oral issues irrespective of ST use (Robertson, Walsh, & Greene, 1997).

The most serious oral health effect that is positively correlated with ST use is oral cancer (Boffetta, et al, 2008; Tomar, 2007). Oral cancer may be caused by any of the 28 known carcinogens found in spit tobacco. The most dangerous carcinogen found in ST is tobacco-specific nitrosamines because of the combination of abundance and strong carcinogenicity that is present in ST products (Stepanov, et al, 2008). Tobacco companies can limit the formation of nitrosamines during the tobacco processing phase and some have even decreased nitrosamine levels significantly in their products. However, even the lower amounts of nitrosamines found in ST products are 100 to 1,000 times higher than nitrosamine levels in other products, such as food or beer (Gansky, et al, 2005; Stepanov, et al, 2008).

Numerous research studies have found that there is a substantial risk for oral cancer associated with use of all types of ST (Boffetta, et al, 2008; IARC, 2007; Tomar, 2007). In fact, 90% of all cases of oral cancer worldwide are estimated to be caused by tobacco use (AADAC, 2008). The risk for developing oral cancer with ST use has been found to be 2 to 14 times more likely than the risk for non-users (Boffetta, et al, 2008; IARC, 2007). The risk for oral cancer has a distinct dose-response relationship between increased duration of use and the risk for cancers in the oral mucosa, meaning the more that a person uses ST; the more likely it is that cancer will develop (IARC, 2007). Oral

cancer is the most deadly health effect associated with ST use--with a mortality rate of 54% at five years' post-diagnosis (Chakravorty, Buchanan, & Osfeldt, 1997).

There are other types of cancer that are also found in ST users, including esophageal, pharyngeal, laryngeal, stomach, and pancreatic cancer (Boonn, 2008c; Boffetta, et al, 2008; IARC, 2007; Stepanov, 2008; Tomar, 2007). Studies have found that there is a fivefold increase in the risk of developing esophageal cancer in ST users as compared to non-users (IARC, 2007). There was an excess risk for pancreatic and stomach cancer in ST users, even when the researchers controlled for smoking and alcohol consumption, which have also been associated with stomach and pancreatic cancer (AADAC, 2008; Cooper, Ellison, & Walsh, 2003; IARC, 2007; Stepanov, 2008). While oral cancer is associated with the location of the dip in the mouth of an ST user, the other types of cancer are more closely associated with the juice that is generated while using the tobacco products, especially with ST users who either intentionally or unintentionally swallow the juice (Boyle, Jensen, Hatsukami, & Severson, 1995). Those users are primarily the individuals who are the most addicted to the product and swallow the tobacco juice for the increased buzz that occurs as a result of the action.

There are several systemic diseases or illnesses that occur as a result of ST use--specifically cardiovascular disease, sexual impotence, and female reproductive health effects (Cooper, Ellison, & Walsh, 2003; Siegel, et al, 1992; Tomar, 2007; Walsh, et al, 2000). The increased risk for cardiovascular disease that is found as a result of ST use includes higher levels of hypertension, increased cardiovascular mortality, and increased risk for myocardial infarction (Cooper, Ellison, & Walsh, 2003; Siegel, et al, 1992;

Tomar, 2007; Walsh, et al, 2000). These risks are increased because of the nicotine absorption that occurs during use and has been found to be similar to those observed in smokers (Siegel, et al, 1992). Sexual impotence and female reproductive health effects are similar in that they both affect the procreation abilities of ST users. The reproductive health effects that may concern women who use ST are low birth weight for a baby born to an ST user, preterm delivery, increased risk for pre-eclampsia (a complication of pregnancy associated with high blood pressure and protein in the urine), and an increase in stillbirths (Tomar, 2007).

The final, and arguably the most significant, health effect that is associated with ST use is nicotine addiction (Boffetta, et al, 2008; Henningfield, Fant, & Tomar, 1997; Walsh, et al, 2003). Both moist snuff and chewing tobacco are manufactured according to elaborate processes which begin with specific curing techniques that affect flavor and alkalinity; precision cutting techniques that affect nicotine bioavailability; and the addition of a variety of substances that alter flavor, minimize decomposition, and control nicotine dosing through pH levels (Henningfield, Fant, & Tomar, 1997). The nicotine dosing capabilities of ST are determined by three factors: the concentration of nicotine in the product, the pH level of the product, and the size of the tobacco cuttings (Henningfield, Fant, & Tomar, 1997).

The concentration of nicotine in the product is determined during production and has been found to range from 7.5 mg/g to 11.4 mg/g, levels that are comparable to that seen with smoking (Hecht, et al, 2007; Henningfield, Fant, & Tomar, 1997). The products with the lower nicotine levels are often labeled starter products because of the



lower levels of nicotine, which decreases the unfavorable, toxic reaction that may occur with initial use. These starter products often come in a multitude of flavors and are marketed toward younger, less-experienced tobacco users (Henningfield, Fant, & Tomar, 1997). Once the nicotine tolerance level has increased in an ST user, he or she tends to move up to a stronger brand with a higher level of nicotine, which allows the user to regain that initial nicotine buzz that does not occur once a tolerance has developed (Henningfield, Fant, & Tomar, 1997). It is twice as common for ST users to switch from a lower nicotine dose brand to a higher dose brand as from higher to lower doses. Users of the higher dose brands also report substantially more withdrawal symptoms and difficulty with quitting than those who use lower dose brands (Henningfield, Fant, & Tomar, 1997).

The pH of the product is important because nicotine most readily crosses the oral mucosa into the bloodstream in an un-ionized form. The amount of nicotine that is found in an un-ionized form is dependent on the pH levels in the tobacco. In unprocessed tobacco, the pH is less than six, which means that less than 1% of nicotine would be free for rapid absorption (Henningfield, Fant, & Tomar, 1997). However, when pH is increased during production (to levels ranging from 6.9 to 8.6), the amount of nicotine in an un-ionized form and therefore available to rapid absorption, increases to nearly 50% (Henningfield, Fant, & Tomar, 1997). Not coincidentally, the brands with the higher pH levels tend to be used by the more experienced ST user, while the products with lower pH levels tend to be those products that are also heavily flavored and preferred by new users (Henningfield, Fant, & Tomar, 1997).

The size of the tobacco cuttings is the primary determinant in why moist snuff is considered more dangerous than chewing tobacco. Snuff is a more finely ground tobacco leaf, which presents a greater surface area for nicotine to diffuse from the tobacco into the bloodstream (Cooper, Ellison, & Walsh, 2003). The increased level of nicotine that diffuses into the bloodstream leads to a greater prevalence of addiction in moist snuff users than that seen with chewing tobacco (Cooper, Ellison, & Walsh, 2003).

The use of ST leads to the development of a tolerance, which causes the user to use more, and stronger, products to generate the same effects as the addiction progresses (Henningfield, Fant, & Tomar, 1997). Tolerance is the tendency for a given dose of any drug to produce less of an effect after repeated doses, which then requires an increase in intake over time of use to achieve the desired effect. Tolerance is important to consider when discussing health effects because developing a tolerance to tobacco's properties and effects may lead to an increased level of toxin and carcinogen intake, which can lead to an increase in disease risk (Henningfield, Fant, & Tomar, 1997).

Withdrawal from a nicotine addiction is extremely difficult with studies demonstrating that withdrawal is similar between ST and cigarettes (Henningfield, Fant, & Tomar, 1997). Withdrawal symptoms are a collection of signs and symptoms that accompany the discontinuation of use of a specific drug (Henningfield, Fant, & Tomar, 1997). There are a number of characteristic signs and symptoms that result from withdrawal from tobacco products including: cravings, irritability, anxiety, difficulty concentrating, restlessness, headache, drowsiness, gastrointestinal distress, and changes in heart rate and blood pressure (Henningfield, Fant, & Tomar, 1997).

These symptoms begin within a few hours of cessation, peak within a few days, and persist for up to four weeks. The symptoms typically are exacerbated by the abrupt removal of nicotine from the system and are often determined by the length and amount of use in each individual. Most people who relapse and begin to use ST products again after a quit attempt are likely to do so within the first week, when the withdrawal symptoms are at their highest levels. After that, withdrawal symptoms and the risk for relapses decrease consistently throughout the cessation attempt (Henningfield, Fant, & Tomar, 1997).

Nicotine addiction may be considered the most significant health effect of ST use because it is the reason that ST users continue the habit in spite of the knowledge about or presence of detrimental health effects. There are other, safe alternatives for the delivery of nicotine that may be utilized during tobacco cessation attempts that allow the user to taper the amount of nicotine that is delivered to the body and decrease the intensity of withdrawal symptoms. These other options should be considered during cessation because they do not include the risk for serious health consequences that ST use contains.

#### Spit Tobacco Use in Baseball

The use of ST is often associated with athletics at all levels (Castrucci, Gerlach, Kaufman, & Orleans, 2004; Connolly, Orleans, & Blum, 1992; Cooper, Ellison, & Walsh, 2003; Davis, et al, 1997; Gansky, et al, 2005; Gingiss & Gottlieb, 1991; Hilton, et al, 1994; Horn, et al, 2000; Tomar & Giovino, 1998; Walsh, et al, 1994; Walsh, Hilton, Masouredis, Gee, Chesney, & Ernster, 1999). A National Collegiate Athletic Association

(NCAA) study conducted in 2005 reported that 16% of collegiate athletes used ST on a regular basis (Eaves, Schmitz, & Siebel, 2009; NCAA, 2005). This widespread use occurred in spite of an NCAA regulation, in effect since 1994, that bans the use of ST products in practice and competition (Burak, 2001; Eaves, Schmitz, & Siebel, 2009; Gansky, et al, 2005). Studies of high school athletes have found current use rates between 6 and 21% (Horn, et al, 2000; Severson, Klein, Lichtenstein, Kaufman, & Orleans, 2005). And, studies of athletes in professional sports have found that ST usage can be as high as 50% on teams in select sports, specifically baseball, which occurs in spite of a ban in minor league baseball that was enacted in 1993 for all on-field personnel (Connolly, Orleans, & Blum, 1992; Severson, et al, 2005; Sinusas & Coroso, 2006). Baseball athletes specifically have shown a prevalence rate of ST use ranging from 6-21% in high school, 42% in the NCAA, and 50% in the professional ranks (Cooper, Ellison, & Walsh, 2003; NCAA, 2005; Sinusas & Coroso, 2006; Walsh, et al, 1994).

The sport of baseball has a long history and connection with the use of ST at all levels from as young as little league--where a bubble gum product called Big League Chew prepares young mouths for the use of chewing tobacco--to the minor and major league teams (Chiamulera, Leone, & Fumagalli, 2007; Connolly, Orleans, & Blum, 1992; Cooper, Ellison, & Walsh, 2003; Severson, et al, 2005; Siegel, et al, 1992; Walsh, et al, 1994). The custom of using ST in baseball began more than a century ago when players on dusty baseball fields used the product to keep their mouths moist during games (Connolly, Orleans, & Blum, 1992; Ranalli & Cianflone, 1996). It became more popular in the 1970s and 1980s in response to an aggressive marketing and promotion campaign

targeted toward professional baseball players (Severson, et al, 2005). This practice continued through the years because baseball is an activity that allows ST use through unique practice/game situations, including the opportunity to use ST products during competition with less concern for hazardous conditions (Eaves, Schmitz, & Siebel, 2009; Walsh, et al, 1994). The lulls in activity and a decreased risk of contact and/or collision allow for increased ST consumption during games (Eaves, Schmitz, & Siebel, 2009).

There is often a social norm associated with baseball players that ST use is acceptable and even ‘mandated’ by ritualistic and superstitious manners (Eaves, Schmitz, & Siebel, 2009; Gingiss & Gottlieb, 1991; Walsh, et al, 1994). Baseball athletes, especially at the high school and collegiate level, experience intensive role modeling through the visible use of ST by professional players, sports-centered advertising, and promotional programs with free samples (Eaves, Schmitz, & Siebel, 2009; Walsh, et al, 1994). Sport-specific use and role modeling are evident with research reporting that more than 50% of high school, collegiate, and professional baseball players predominantly used ST during the competitive baseball season or used it dramatically more during the season than out of season (Eaves, Schmitz, & Siebel, 2009; Siegel, et al, 1992; Walsh, et al, 1994).

Given the prominent place that baseball has in the culture of the United States, the potential influence that athletes can have on young people, and that sports are often the vehicle by which we pass on many of our treasured national ideals and values to the younger generations, it is important to continue the effort to help players at all levels quit (Connolly, Orleans, & Blum, 1992; Severson, et al, 2005). It is also important to change

the policy, environmental influences, and social norms that sanction and support ST use in baseball and make it a prominent cultural component of the game (Cooper, Ellison, & Walsh, 2003; Severson, et al, 2005).

Athletes at all levels of baseball are role models for young people, especially boys, and should take advantage of that role and act as a positive role model for fans through diminished or complete cessation of use and participation in public education campaigns against the use of ST (Connolly, Orleans, & Blum, 1992; Cooper, Ellison, & Walsh, 2003; Gingiss & Gottlieb, 1991). Prevention programs created specifically for baseball athletes should highlight the number of professional players that do not use ST and focus on discovering effective strategies that convince student-athletes of their personal vulnerability to health risks associated with ST use and override what they see as the positive aspects of use, including peer approval (Cooper, Ellison, & Walsh, 2003; Severson, et al, 2005).

#### Spit Tobacco Use in Baseball Coaches

There are many factors that support the use of ST among young baseball players, including the sale of tobacco to minors, parental acceptance of ST use, ST use by family members, and perceptions of use by baseball-associated role models--specifically professional players and coaches at all levels (Cooper, Ellison, & Walsh, 2003). Coaches especially should understand the impact that their attitudes, perceptions, and personal use of ST may have a significant influence on the use of ST in young athletes (Davis, et al, 1997). Coaches and administrators, especially at the high school level, have a rare opportunity to instill values, ethics, and sportsmanship in their athletes, which makes it

incumbent upon them to present a wholesome and positive image to their athletes (NFICA, 1997).

Coaches also have an obligation and a professional responsibility to take action against ST use and enforce existing regulations that prohibit the use of all tobacco products on athletic fields and in everyday life (Ranalli & Cianflone, 1996). The fact that current tobacco-free policies in all 115 North Carolina public high school districts and most private high schools in the state, the majority of public high school districts and private schools in other states, the NCAA, and in minor league baseball have not eliminated ST use by some baseball athletes may reflect a lack of support from the coaches, either through negative role modeling or reticence to enforce the ban (Chakravorty, Buchanan, & Osfeldt, 1997; North Carolina Tobacco Free Schools, 2010; Walsh, et al, 1994; Walsh, et al, 2000). This suggests that effective in-service programs for baseball coaches should be implemented at all levels to gain their support for policy-level interventions targeting athletes and promoting positive role modeling by the coaches (Gansky, et al, 2005; Walsh, et al, 1994; Walsh, et al, 2000).

Coaches must be actively involved in efforts to decrease ST consumption in baseball. These individuals are capable of playing a substantial role in the prevention, rules enforcement, and referral for treatment of addiction for their athletes (Eaves, Schmitz, & Siebel, 2009; Gansky, et al, 2005; Walsh, et al, 1994). Coaches can be an integral aspect of this effort because they have access to the athletes at the different stages of ST use (initiation, experimentation, and regular use) and have an enormous

influence over their team (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Gansky, et al, 2005; Horn, et al, 2000).

Despite the potential opportunity to spearhead the effort to decrease ST use in baseball, coach-driven initiatives are relatively uncommon. There are numerous potential reasons for this lack of coach initiatives including: athletes' perception that coaches are indifferent about ST use on the team, personal use by the coaches, or a lack of awareness about the level of ST use among athletes (Eaves, Schmitz, & Siebel, 2009; Gansky, et al, 2005; Horn, et al, 2000).

Most coaches report that intervention efforts on their part were verbal and included information about the harmful effects of ST. The coach-led intervention programs did not include educational materials, use of peer modeling or mentoring, or an oral exam conducted by a dental professional--all of which are important components of cessation programs (Gansky, et al, 2005; Horn, et al, 2000). Developing and utilizing coach-driven interventions could dramatically decrease the use of ST in baseball athletes at all levels.

However, before initiating coach-led interventions, it is important to determine the prevalence of ST use in baseball coaches because it will be difficult to initiate an intervention program for athletes if the coach is a current user of ST. Since the majority of baseball coaches have previously played the sport at some level and the prevalence of use in players' ranges from 34-50% at all levels of baseball, there is a strong possibility that coaches in the sport will have a high prevalence of ST use as well. There have not been many research studies that have assessed the prevalence of use in baseball coaches;



however, the three studies that have assessed this population have found 13%, 16%, and 18.5% of respondents are current ST users, a lower prevalence rate than that seen in baseball athletes, but still a significant percentage that is much higher than the national average (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000).

Coaches should recognize that their own use, knowledge, attitudes, or indifferences toward ST might have a powerful influence on their athletes (Gansky, et al, 2005; Horn, et al, 2000; Walsh, et al, 1994). Research has demonstrated that ST use in baseball players was three times higher on a team where the coach also was a ST user (Walsh, et al., 2000). Because of these concerns it is essential that coaches reconsider any personal ST use and how it may be perceived by their athletes while also developing an awareness of athletes who use ST and those who may be at risk (Eaves, Schmitz, & Siebel, 2009).

Developing an understanding in baseball coaches that they can be positive role models for their athletes is essential in the effort to rid the sport of ST addiction and the positive perception of use (Eaves, Schmitz, & Siebel, 2009). If the coaches would utilize tacit and explicit efforts to guide the athletes on their team away from ST use, baseball would be better able to decrease adolescent and collegiate athlete addiction to this dangerous drug (Eaves, Schmitz, & Siebel, 2009; Gansky, et al, 2005).

#### Measuring Spit Tobacco Use in Baseball Coaches

After a review of the literature on ST use in baseball, only three studies were found that specifically evaluated the prevalence of use of ST in coaches (Chakravorty,

Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000). Each of the three studies utilized a questionnaire instrument to collect prevalence data on coaches' use and assess what intervention techniques were used for athletes to prevent or minimize ST use in sports. The studies were completed by 140, 509, and 566 coaches respectively with response rates varying from 85% to 17% (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000).

Two of the studies evaluated coaches of all sports (Chakravorty, Buchanan, & Osfeldt, 1997; Horn, et al, 2000), while the third focused on baseball coaches only (Eaves, Schmitz, & Siebel, 2009). Two of the studies evaluated coaches from across the country including regions that do not have high ST prevalence rates in the general population (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009). The other study evaluated prevalence of use only in the state of West Virginia--the state with the highest ST prevalence rate in the United States (Horn, et al, 2000).

Each of the questionnaires utilized in the three studies was divided into several categories with a common focus on ST prevalence, team demographics, and intervention techniques (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000). Each study also evaluated unique items such as coaches' perception of the NCAA ban on the use of tobacco products, the health effects of ST use, and attitudes toward ST use.

Overall, the studies found 13-18.5% of respondents are current ST users, a lower prevalence rate than that seen in baseball athletes (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000). The studies also found that

12%, 11.5%, and 4.1% of respondents were former users (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000). The former users are important role models for the athletes because they have been through the cessation process and can describe to adolescent users the trials and progression that will be faced while attempting to quit ST use.

### Cessation Protocols

The application of cessation strategies for ST users is a relatively new process even though smokers have utilized proven intervention protocols such as the 5As technique for many years. The 5As technique consists of: Ask (about tobacco habits); Advise (all users to quit); Assess (the readiness level of the user to quit); Assist (with education about tobacco use); and Arrange (for referrals to specialists) (Gordon, Lichtenstein, Severson, & Andrews, 2006). While this technique has a proven effectiveness with smokers, it has not been utilized in a widespread manner with ST users. This is surprising considering that ST-associated oral health problems are visually detectable by dentists and dental hygienists who are in a prime position to identify users and to provide the 5As cessation advice and treatment (Gansky, et al, 2002; Gansky, et al, 2009; Masouredis, et al, 1997). However, dental care practitioners are a largely untapped resource for providing advice and brief counseling, although these techniques have been proven successful when utilized (AADAC, 2008; Bell, Spangler, & Quandt, 2000; Gansky, et al, 2002).

Each of the dental professions plays an integral role in the 5As technique within the dental setting. The dentist, who has the most influence within the practice, makes the

decision as to whether or not tobacco cessation services will be incorporated into routine care and has the authority necessary to provide meaningful advice and information to patients (Gordon, et al, 2006).

The dental hygienists and dental assistants, who spend more time with the patients, are best positioned to deliver brief cessation counseling. This type of education fits well with the other health behavior messages delivered during the visit (i.e., brushing and flossing). The routine cleaning also provides ample time for education and feedback on any oral health findings that are discovered, which offers a teachable moment for the dental staff to use with the patient (Gansky, et al, 2009; Gordon, et al, 2006). The front-office staff can also assist by maintaining tobacco-related documents in patients' charts, which can act as a prompt for discussion of tobacco use at each visit. In general, the dental professionals are excited to learn the cessation techniques and utilize them in practice.

Finally, the dentist and other members of the dental team can offer educational materials, discuss self-help tips, and provide community-based resource information for those users who request or require added assistance (Gordon, et al, 2006). When established in this manner and developed as a team approach that distributes the workload across the practice staff, this technique has proven to be effective in increasing the rate and success of cessation attempts, while not adding a significant burden to any one member of the practice (Gordon, et al, 2006).

While the use of dental professionals has been proven as an effective strategy with significant odds of success--as measured by continued abstinence, there are other

successful techniques that may also be utilized. These techniques include: brief counseling and behavioral interventions conducted by cessation professionals (either in person, over the phone, or on the internet); nicotine replacement therapies such as gum, patches, and prescription medication; peer mentoring and peer-led educational sessions; printed educational materials that discuss the short and long-term effects of ST use; graphic images of oral health issues; and telephone or web-based intervention programs (Ebbert, et al, 2003; Gansky, et al, 2002; Gansky, et al, 2005; Tomar & Giovino, 1998; Walsh, et al, 2000).

An effective technique that is new to cessation programs is the use of web-based cessation interventions. Although only two studies have examined the effectiveness of ST cessation web-based interventions, the results of these studies and randomized controlled trials on web-based smoking cessation programs have verified that the reach and convenience of this medium is particularly appropriate in today's society because of the lack of universal availability of clinic-based ST cessation programs--particularly in rural areas (Danaher, Smolkowski, Seeley, & Severson, 2008; Gala, Pesek, Murray, Kavanagh, Graham, & Walsh, 2008). The strengths of a web-based cessation program for ST use are the direct access to a high-risk population through referral from dental professionals; the elimination of geographic, financial, and other access barriers to treatment; the ability to individually tailor the program to participants; and the level of participant engagement that can be created on the web site (Danaher, et al, 2008; Gala, et al, 2008).

The use of on-line tools for self-monitoring behaviors and assessing changes in self-efficacy were particularly successful in the clinical trials of web-based ST cessation

programs (Danaher, et al, 2008; Gala, et al, 2008). The ability to generate individualized e-mails tailored to each specific participant and each step in the cessation process allows for an improvement in the quality of intervention provided for the participants by these sites as opposed to the static web sites that have been previously used for smoking cessation (Danaher, et al, 2008; Gala, et al, 2008). Another useful aspect of the web-based programs is the anonymity it provides to participants, especially those that would like to seek help but are uncomfortable with face-to-face interventions.

An important design aspect of the trial sites that could be a benefit or detriment to this form of cessation therapy is the spontaneity the web sites allow, including the ability to skip from one part of the site to another without a rigid process that must be followed by all participants. The ability to create one's own cessation program is useful because it allows the program to be tailored to the individual, but it may be detrimental because it decreases program exposure and may allow the ST user to avoid important but difficult steps in the cessation process (Danaher, et al, 2008; Gala, et al, 2008). The use of chat rooms, peer testimonials, graphic images of oral health issues, and other interactive material might be especially useful if working with adolescent participants who tend to be more computer-savvy and more prone to distraction than adults.

The components of web-based programs have not been evaluated thoroughly enough to determine if their use is reliable and if the programs improve the rate of cessation of ST use; however, future research into these components could help to further develop a successful web-based cessation protocol (Danaher, et al, 2008; Gala, et al, 2008). Future research should also evaluate if web sites may be tailored for select at-risk

groups, such as athletes, rural adolescent males, or Native Americans/Alaska Natives, to determine if a program tailored to the needs of each at-risk group would be more successful than one over-arching program for all ST users.

Each of the discussed cessation techniques may be effective with select groups of ST users; however, the most successful strategy may be utilizing a multi-component approach that incorporates several strategies that are tailored to the individual's tobacco use history and goals for cessation (Klesges, DeBon, VanderWeg, Haddock, Lando, Relyea, Peterson, & Talcott, 2006). This can be especially true for adolescents with a short period of use or athletes who are members of a team. When a team atmosphere is present, it offers a distinct opportunity to utilize the coach--a role model for the athletes-- as an active member of the cessation team, develop peer leadership with team captains and other influential players, establish a support structure that can encourage tobacco users to quit and quitters to maintain their cessation attempts (Hilton, et al, 1994; Horn, et al, 2000; Walsh, et al, 1994; Walsh, et al, 2003).

Finally, there is the potential for team protocols to modify the social norms that are present in baseball (Hilton, et al, 1994; Walsh, et al, 1994, Walsh et al, 2000). The social norm that ST is an important aspect of the sport can be eliminated by emphasizing the fact that most baseball players do not use ST and by addressing conditions in the social environment that make athletes vulnerable to tobacco initiation. It has been suggested that the effect of social influence on ST use behavior is the direct reinforcement experienced by athletes as a result of receiving social approval, or observing others receive approval, for using ST (Walsh, et al, 2000). Changing the social

norms for the team and in the sport in general is an essential aspect of any tobacco cessation program implemented in a baseball environment. Without changing the social norms associated with use, cessation protocols will not be successful.

### Background Theory Undergirding Past Work

There are several theories that have been utilized as the foundation for previous ST prevalence and cessation research. The primary theories that have been employed are: the diffusion of innovation theory, Bandura's social learning theory, the health belief model, the transtheoretical theory on the stages of change, and the theory of reasoned action (Burak, 2001; Cooper, Ellison, & Walsh, 2003; Gansky, et al, 2005).

The diffusion of innovation theory suggests that changes in norms and behavior are often initiated by a relatively small group of opinion leaders in the population (Gansky, et al, 2005). Once an innovation is visibly modeled and accepted by the opinion leaders, then the innovation diffuses throughout the rest of the population. The diffusion of innovation theory, with regard to ST research in baseball athletes, is often used in unison with Bandura's social learning theory, which asserts that those who have status within a specific peer group tend to be considered credible role models (Burak, 2001).

While the baseball athlete's peer group is generally considered to be members of the team or classmates in school, this descriptor can be extended to include coaches. During high school, most adolescents have an inherent weakening in the bond between themselves and those that they consider to be authority figures--specifically parents and teachers. However, that bond is generally maintained or made stronger between athletes and coaches even during adolescence (Flay, Hu, Siddiqui, Day, Heddeker, Petraitis,



Richardson, & Sussman, 1994; Gansky, et al, 2005). Coaches play an important role in the baseball athlete's peer group and are capable of acting as a credible role model for healthy living for their athletes. However, despite the coaches' integral role as an opinion leader on the team, it is also essential to involve student leaders in prevention and cessation programs. Numerous research studies have shown the important role that is played by student leaders in either the initiation or prevention of ST use (Burak, 2001; Cooper, Ellison, & Walsh, 2003; Flay, et al, 1994; Gansky, et al, 2005; Walsh, et al, 1994; Walsh, et al, 2003; Walsh, et al, 2000).

The benefit of utilizing Bandura's social learning theory is that it integrates the cognitive, behavioral, physiological, and social environmental determinants of behavior change (Gala, et al, 2008). The concept of self-efficacy (the belief in one's own ability to quit), that is an important component of Bandura's theory, has proven to be a critical mediator of tobacco cessation and the overall behavior change that has to occur for cessation to be maintained (Gala, et al, 2008; Prochaska & DiClemente, 1982).

The health belief model states that before one adopts a new behavior, there needs to be a 'cue to action' that initiates that new behavior (Cooper, Ellison, & Walsh, 2003). Again, baseball is a sport that often provides that 'cue to action' with its long history and association with ST use. Athletes and coaches at all levels of baseball also provide a 'cue to action' when they are seen using ST products during games, thereby reinforcing the social norm of ST use in baseball to fans of all ages. This theory, as do the others discussed previously, verifies the importance of athletes and coaches being positive role

models for fans who watch baseball games and look to emulate their favorite members of the team.

The transtheoretical model on the stages of change was first introduced in 1977 by Prochaska and Di Clemente. This model was initially developed to use with smoking cessation, but has since been revised to be an effective cessation tool for many other addictive drugs, including ST (Prochaska & DiClemente, 1982; Prochaska & DiClemente, 1983). The transtheoretical model involves 10 processes of change that are differentially applied throughout five stages of change (Prochaska & DiClemente, 1983). The ten processes are: consciousness-raising, self-liberation, social liberation, self-reevaluation, environmental reevaluation, counter conditioning, stimulus control, reinforcement management, dramatic relief, and helping relationships (Prochaska & DiClemente, 1982; Prochaska & DiClemente, 1983). The five stages of change include: precontemplation, contemplation, preparation, action, and maintenance (Prochaska & DiClemente, 1982; Prochaska & DiClemente, 1983). Occasionally, a sixth stage of change, termination, can be added.

In smoking or ST cessation, the stages of change can be described as: precontemplation-a stage that is present when a tobacco user has no interest in quitting or does not plan to quit in the next six months. Contemplation occurs when a tobacco user is interested in quitting within the next six months but is not sure how to properly quit. In the preparation stage, the tobacco user plans to quit within the next thirty days and is developing a quit plan. The action stage is in effect when the tobacco user is actively using the predetermined quit plan to stop using the tobacco products. The maintenance

stage occurs once the tobacco user has actively quit using tobacco products for at least six months and is having few if any urges to use again. And, the termination stage exists once the tobacco user has quit use for a lengthy period of time--ranging from several years to a lifetime--and no longer has the urge to use tobacco (Prochaska & DiClemente, 1982; Prochaska & DiClemente, 1983).

The change processes are applied to those stages at different times throughout the quit attempt. For instance, precontemplators tend to be defensive and avoid changing their thinking or behavior, the change processes would be rarely used in this stage. Since contemplators are actively thinking about a lifestyle change, they will utilize the consciousness raising process the most in order to gather information about their tobacco use while weighing the positives and negatives of the habit. The preparation stage is one that actively uses the social liberation and environmental reevaluation processes to prepare for the dramatic life change upon which the tobacco user is about to embark (Prochaska & DiClemente, 1982; Prochaska & DiClemente, 1983). The self-reevaluation process appears to act as a bridge between the preparation and action stages. And since subjects in the action stage are the most committed to creating behavioral changes, they will utilize the self-liberation, counter-conditioning, stimulus control, and reinforcement management processes the most. Finally, the maintenance stage requires that dramatic relief and helping relationships be a component of the stage in order to ensure that the behavior change becomes a permanent aspect of the individual's lifestyle (Prochaska & DiClemente, 1982; Prochaska & DiClemente, 1983).

The theory of reasoned action is similar to the diffusion of innovation theory in that it uses social norms as a determinant of intention to perform a select behavior. The theory of reasoned action states that one's perception of general social norms regarding a particular behavior will dictate the intent to perform that behavior (Cooper, Ellison, & Walsh, 2003). This is especially important in baseball, which is a sport with a long history of tobacco use as a social norm. If athletes are provided with the perception that ST is inappropriate in general or in the context of sports competition, then the intent to utilize ST will be minimized and should limit the use that is seen in adolescents. Again, coaches play an important role in this theory with their ability to establish social norms at the team level and provide the appropriate guidance for their athletes.

#### Theory of Planned Behavior

While all of the above mentioned theories provide interesting foundations for ST research, one theory tends to be especially appropriate for research into specific health behaviors such as ST use. The theory of planned behavior is one of the most widely applied models for predicting and understanding health behaviors in relation to social psychology (Ajzen, 1991; McMillan & Conner, 2003; Rise, et al, 2008). The theory of planned behavior is an extension of the theory of reasoned action that adds a measure of perceived behavioral control--a variable that has been utilized often in social cognition models which are designed to predict health behaviors (Ajzen, 1991; Armitage & Conner, 2001). The extension of the theory of reasoned action that led to the creation of the theory of planned behavior was necessitated by the original theory's limitation in dealing with behaviors over which people do not have complete volitional control (Ajzen, 1991).

While the theory of reasoned action could adequately predict behaviors that were straightforward, it was less successful in predicting behavior in situations where there were constraints on action. By including perceived behavioral control, the theory of planned behavior provides explanation for why intentions do not always predict behavior (Armitage & Conner, 2001).

The central component of the theory of planned behavior is the individual's intention to perform a given behavior. The intention to perform is expected to include the motivational factors that influence the behavior being investigated. Intention is an indicator of how hard a person is willing to try or how much effort they are planning to exert to perform the behavior. The general rule for the theory is the stronger the intention to engage in a behavior, the more likely the behavior will be performed (Ajzen, 1991; Armitage & Conner, 2001).

In the theory of planned behavior, intention is subdivided into three categories: the attitude towards performing the behavior, the subjective norm, and the degree of perceived behavioral control (Ajzen, 1991; Armitage & Conner, 2001; McMillan & Conner, 2003; Rise, et al, 2008). The attitude towards behavior construct refers to the degree to which a person has a favorable or unfavorable evaluation of the behavior in question (Ajzen, 1991). The theory of planned behavior further divides the attitude construct into two subcategories--behavioral beliefs and outcomes assessment (See Figure 2). Behavioral beliefs refer to a person's beliefs about the likelihood of salient outcomes that result from performing a behavior, while the outcomes assessment

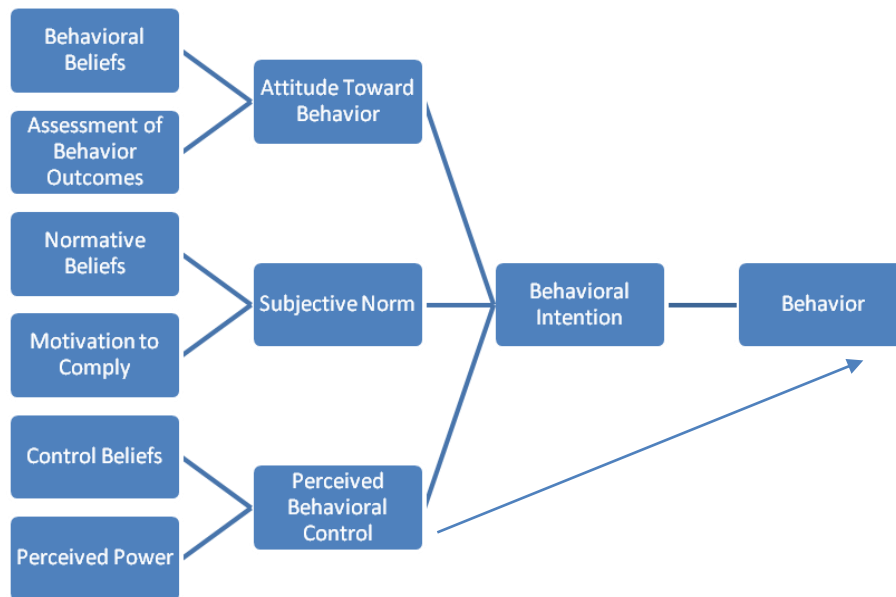
subcategory includes an analysis of whether a person thinks that the salient outcomes are positive or negative (McMillan & Conner, 2003).

Subjective norms, the second category in the theory of planned behavior, refers to a person's perceptions of general social pressure to perform (or not perform) the behavior. If an individual perceives that significant others approve (or disapprove) of the behavior, they are more (or less) likely to intend to perform it (Armitage & Conner, 2001). The subjective norm component is further subdivided into normative beliefs and motivation to comply (See Figure 2) (McMillan & Conner, 2003). Normative beliefs reflect whether an individual believes certain referent groups think that he or she should or should not perform the behavior. The motivation to comply subcategory includes whether or not a person feels that he or she should do what the various referent groups think should be done. In other words, is there a motivation to agree with the selected referent groups' preference when it comes to performing the behavior (McMillan & Conner, 2003)?

Finally, the perceived behavioral control component, reflecting the integral difference between the theory of planned behavior and its predecessor--the theory of reasoned action, is defined as the perceived ease or difficulty in performing a behavior. Perceived behavioral control is expected to be based in part on past experiences, as well as anticipated barriers and facilitators (McMillan & Conner, 2003). The perceived behavioral control construct, as opposed to actual behavioral control, which includes the resources and opportunities available for a person to conduct the behavior, is very similar to the self-efficacy concept found in Bandura's health behavior model (Ajzen, 1991).

Self-efficacy, which is the belief in one's ability to complete a task, can influence an individual's choice of activities, preparation for an activity, effort expended during performance, and thought patterns and emotional reactions to the activity (Ajzen, 1991). In the theory of planned behavior, the perceived behavioral control construct, in conjunction with behavioral intention, can be used to directly predict behavioral achievement (Ajzen, 1991).

As with the other two constructs, there are two subcategories that dictate perceived behavioral control--control beliefs and perceived power of factors (See Figure 2) (McMillan & Conner, 2003). Control beliefs refer to the perceived presence of factors that may facilitate or impede performance of a behavior. The factors tend to be specific to each individual and dictate how much perceived control is available to help the person decide to perform (or not perform) the given behavior. The perceived power subcategory focuses on the power of each control factor to impede or facilitate performance of the behavior. This power is often dictated by how much emphasis is placed on each control factor by the individual with regard to the selected behavior.



**Figure 2. Theory of Planned Behavior**

When evaluating a behavior through the theory of planned behavior, it is generally believed that the more favorable the attitude toward behavior and subjective norms with respect to a certain behavior and the greater the perceived behavioral control, the stronger an individual's intention will be to perform the specific behavior (Ajzen, 1991). While perceived behavioral control is given special significance in this theory, each of the three constructs--attitude towards behavior, subjective norms, and perceived behavioral control--may have a significant role in predicting intention. The relative importance of each construct varies across behaviors and situations. Though, it is essential that all three constructs are evaluated every time an individual's intention to perform a behavior is assessed (Ajzen, 1991).



The theory of planned behavior, when used to predict the intention to perform a specific health behavior, is capable of providing a host of information that is extremely useful in the attempt to understand these behaviors, or to implement interventions that will be effective in changing the behavior (Ajzen, 1991). Intention, perception of behavioral control, attitude toward behavior, and subjective norms each reveal a different aspect of a behavior, and each can serve as a focal point in attempts to change the performance of the behavior. The underlying foundation of beliefs that is present in the theory of planned behavior provides the detailed description necessary to gain substantive information about a behavior's determinants. These beliefs allow researchers to learn about the unique factors that induce an individual to engage in the behavior of interest and to prompt another to follow a different course of action (Ajzen, 1991).

All of the above provides a reasonable fit for the framework needed to evaluate the use of ST among baseball coaches (and athletes). It supports work which focuses on the impact that the sport of baseball has on ST use, the role that referent groups within the sport may play in the decision to use ST, the effect that being a role model for student-athletes may have on a coach's decision to use ST, and the specific intervention techniques that have the highest probability of success in decreasing ST use among baseball coaches and athletes.

### Summary

Spit tobacco consists primarily of two varieties-moist snuff and chewing tobacco. Moist snuff is a finely ground tobacco leaf sold in small cans and popular in sports such

as baseball. Chewing tobacco is a more coarsely cut tobacco that is sold in pouches or plug form. Chewing tobacco was more popular prior to the 1970s and among older populations to this day, although moist snuff is currently more popular--especially in adolescents and young adults. All forms of ST cause serious health issues such as gingivitis, tooth decay, cardiovascular disease, sexual impotence, female reproductive issues, and several forms of cancer. Oral cancer is the most serious health effect that has been linked to ST use with a 54% mortality rate five years after diagnosis.

The sport of baseball has a long history and connection with the use of ST. Baseball is an activity that allows ST use because of unique practice/game situations, including the opportunity to use ST products during competition with less concern for hazardous conditions. There are many factors that support the use of ST among young baseball players, including the sale of tobacco to minors, parental acceptance of ST use, ST use by family members, and perceptions of use by baseball-associated role models--specifically professional players and coaches at all levels.

Coaches in particular must be actively involved in efforts to decrease ST consumption in baseball. They possess a better opportunity to lead and mentor student-athletes than almost anyone else in the adolescents' lives. Developing an understanding in baseball coaches that they can be positive role models for their athletes is essential in the effort to rid the sport of ST use/addiction and the positive perception of use. Compared to other theories, the theory of planned behavior provides a reasonable platform for use in attempting to understand behavioral intention relative to ST use

among baseball coaches and in selecting interventions which might later affect behavioral change.

## CHAPTER III

### METHODS

#### Participants and Setting

Subjects in this study were members of the North Carolina Baseball Coaches Association (NCBCA) and current coaches of baseball teams in high schools in the state. The coaches were required to attend an annual meeting in Chapel Hill, North Carolina in January. The annual meeting took place prior to the start of the baseball season and was intended as a learning opportunity where guest speakers came to discuss sport-specific strategy, motivational techniques, and rules changes.

Prior to this meeting, the investigator contacted the NCBCA by phone and e-mail in the fall of 2009 and requested permission to be added to the agenda (see Appendix A). A follow-up phone call was made in December 2009 to ensure that the requested time had been allotted and the opportunity to speak to the coaches remained available. Being on the agenda allowed the investigator the opportunity to present the questionnaire and informed consent to the coaches in a face-to-face meeting, as well as provide the coaches with time to complete the informed consent form and questionnaire while the investigator was in the room. Institutional review board approval was requested and granted for the completion of this study from the University of North Carolina at Greensboro Office of Research Compliance. A copy of the approval letter may be found in Appendix B.

The questionnaire was completed by coaches during the meeting with the investigator present, which ensured that there was no need for follow-up with non-respondents. Completing the questionnaire in one sitting provided an acceptable response rate for this study. There were 151 coaches present at the conference. Of those coaches, 93 completed the questionnaire and returned it to the investigator, which is a 62% response rate. While the response rate does not meet the guidelines for exceptional response rate (80% and higher), it does meet established guidelines for acceptable response rate in questionnaire research (Groves, Fowler, Couper, Lepkowski, Singer, & Toruangeau, 2004; Huck, 2007).

#### Subject Demographics

The 93 coaches who completed the questionnaire were all male and predominantly Caucasian (92 Caucasian, 1 Hispanic). The respondents' ages ranged from 22 to 64 years old. Head coaches comprised 51.6 % of the respondents with the remainder (48.4%) being assistant coaches. Of the coaches who completed the questionnaire, 67.7% had a baccalaureate degree while 20.4% had completed a graduate degree. The playing experience of the respondents varied with 40.9% having played in high school only, 47.3% continuing on to play in junior college or college, and 7.6% continuing on to the minor leagues. The coaches represented high schools in all types of geographic locations with 16.1% of the respondents working in high schools in a large city (population over 100,000), 33.3% of the respondents were from a medium-sized city (population between 25,000 and 100,000), 31.2% of the respondents resided in a small city (5,000 to 25,000), and 18.3% were from a rural setting (fewer than 5,000 residents).

### Collection Process

Embedded in the questionnaire directions were an explanation of informed consent and a discussion of the importance of answering questions honestly. This was reinforced through complete separation of the informed consent form and questionnaire, which allowed for comprehensive anonymity for respondents. There was no way to track a questionnaire to a given coach once it was completed and returned.

In summary, after the investigator discussed and read the instructions and informed consent oral script and answered any questions about the directions for participation, the coaches completed the questionnaire and returned it to the investigator before leaving the room. Each coach who completed the questionnaire had an opportunity to win a gift card from a national retail store. This opportunity resulted from a drawing upon completion of the questionnaires by the coaches. At the end of the session, the investigator drew three names from the completed informed consent forms and provided a \$25 gift card to those coaches whose names were selected.

### Initial Questionnaire Development

The initial questionnaire (see Appendix C) that was utilized for this study was developed using the theory of planned behavior as a foundation for each question. The theory of planned behavior has long been utilized for direct assessment of the effects of behavioral intention components on health behaviors such as tobacco and alcohol use. These previous studies and other information published by the originators of the theory provided a guide for creating specific questions that evaluated the impact of six components of behavioral intention (behavioral beliefs, assessment of behavioral

outcomes, normative beliefs, motivation to comply, control beliefs, and perceived power) on the actual behavior of using ST (Ajzen, 2006; Rise, et. al., 2008).

Therefore, the questionnaire for this study was created by the investigator using the previously developed theory framework as a guide along with the addition of extra questions that have been utilized in previous research on spit tobacco (NCAA, 2006). The reason for including these extra questions is discussed below in the data analysis section. A pilot study was conducted to ensure that the newly constructed questionnaire was reliable and contained the proper content (See Appendix D).

#### Pilot Study of Questionnaire

The pilot study was conducted with the assistance of seven tobacco and questionnaire methodology experts and 26 baseball coaches who work outside of the state of North Carolina and were therefore not involved in the final study. Each of the experts and coaches reviewed the initial questionnaire to determine if the questions were clear, were appropriate for the audience, and were appropriate for the category that was being discussed. A checklist divided into categories was completed by each coach and expert, which allowed the respondent to state whether the questions met the above requirements and any suggested revisions that may be suitable (See Appendix E). A review of the pilot questionnaire was utilized to determine percent of agreement between the respondents regarding whether each question was appropriate to answer the hypotheses posed for the final study, and whether each question was written appropriately for the target audience.

The percent of agreement provided by the experts and coaches was analyzed to determine if each of the questions and the questionnaire as a whole reached a reasonable

level of content validity for use in the final study (Groves, et. al., 2004; Thomas & Nelson, 1996). The answers to the questions provided by the coaches were then assessed to determine if the questions showed the consistency and reliability that were needed for use in this project. A Cronbach's alpha and item-total correlation analysis were conducted to help verify reliability (Groves, et. al., 2004).

The percent of agreement was calculated by determining how many coaches and experts felt that a given questionnaire item met the approved standard of being clear, appropriate for the target audience, and appropriate for the selected category. If a respondent answered yes to the above information, then he/she was considered to be in agreement for that item. The percent of agreement calculations for the coaches indicated that of the 36 items in the questionnaire, 28 of them received 100% approval. The other eight questions had a percent of agreement ranging from 83-96%. The percent of agreement calculations for the experts indicated that of the 36 items in the questionnaire, 9 items received 100% approval. The other 27 items had a percent agreement ranging from 42-86%. These data are displayed in Table 22 of Appendix D.

The Cronbach's alpha and item-total correlation statistics were used to evaluate reliability and internal consistency. The cut-off score for Cronbach's alpha was set at .60 as suggested by Groves, et al. (2004). The Cronbach's alpha scores for the six theoretical components that comprised the questionnaire ranged from .674 to .973. Table 23 in Appendix D demonstrates that the questions that represent behavioral beliefs, assessment of behavior outcomes, normative beliefs, motivation to comply, and control beliefs showed an acceptable internal consistency. The cut-off value for item-total correlations



for each of the sections representing the six theory components was set at .30 (Groves, et. al., 2004). All of these values ranged from .437 to .987. The alphas and item-total correlations are displayed in Table 23 in Appendix D.

For the purpose of this study, the item-total correlations were utilized primarily because the six primary theory components listed above will be utilized separately in future research and for the creation of educational materials for use in future in-service education programs for high school baseball coaches in North Carolina by the investigator. Somewhat related to this and concerning some of the behavioral components of interest, it was more useful and will ultimately be more powerful for future research and educational program delivery to utilize one specific straightforward question to determine a coaches' opinion about a given component rather than attempting to use multiple questions in the form of a scale to learn about coaches' beliefs regarding each component.

The revisions that were recommended by both groups ranged from grammatical and semantic alterations to whether or not selected items should be included in the questionnaire. Every change that was suggested by both groups was evaluated and addressed by the investigator so that the questionnaire would have the most practical reliability and content validity possible for information collection for this project. The final questionnaire (see Appendix F) utilized for this project had several changes from the pilot study questionnaire--all of which were initiated based on the feedback from the coaches and experts and, secondarily, using the statistical analysis of the questionnaire.

Question 6 was changed to include a *choose all that apply* descriptor. Question 8a was changed to offer the unsure option second instead of third. Question 10 was changed to offer different time ranges which better reflect questions used in other tobacco research. Question 11 was changed to include 6<sup>th</sup> grade in the first option as a way to better clarify the time frame. Question 14 was changed to include an unsure option in case the coach was not positive if the players on his/her team were aware of tobacco use. Question 18b was changed to use the word *calming* rather than *relaxing* so that the sensation would be clearer. Question 20 was changed to include *either positive or negative* as a descriptor for health effects. This was included to ensure that the questionnaire remained neutral and did not seem biased toward negative opinions of ST use. Question 22 was changed to include *either impairing or improving* as a descriptor for performance effects to again ensure that the questionnaire was neutral and unbiased. Question 24 in the pilot questionnaire was changed by removing *inside of baseball* and replacing it with *in baseball* to allow for better clarity within the question.

All of the question revisions were made prior to their inclusion in the final questionnaire because either the percent agreement for those questions was low or the coaches and experts specifically suggested alterations in their review of the questionnaire. It should be noted, however, that the item-total correlations were acceptable for all of the questions concerning each theoretical component, whether they were revised or not (range=.437-.987).

Questions 23 and 31 in the pilot study questionnaire were removed from the final questionnaire because, although they each had high percents of agreement, the statistical analyses of those questions demonstrated that they had very low correlations as a given component. The investigator, in this instance, thought the statistical analysis should be weighted more heavily. In fact the Cronbach's alpha score for the assessment of behavior outcomes increased from .407 to .750 when question #23 was removed. The final Cronbach's alpha scores without including questions 23 and 31 are found in table 23. In the end, due to the high percent of agreement between the coaches and experts, the reasonable results of the Cronbach's alpha scores and item-total correlations, and the final changes made to the pilot questionnaire, the resulting final questionnaire (see Appendix F) appeared adequate for the purposes of this study.

#### Data Analysis-Differences between ST Users and Non-Users

The first research question asked whether there was a difference in components of behavioral intention regarding ST use between North Carolina high school baseball coach ST users and non-users. Answers to previously stated six sub-problems, based on the six components of behavioral intention (behavioral beliefs, assessment of behavior outcomes, normative beliefs, motivation to comply, control beliefs, and perceived power) helped to answer the research question.

**Scoring:** Each sub-problem/behavioral intention component included between one and five questions on the questionnaire. Each of those questions was coded so that the negatively worded endpoints had the lower score. Therefore, the lower scores for the behavioral beliefs questions coincided with negative health and performance

effects/sensations while higher scores corresponded with positive health and performance effects/sensations. The lower scores for assessment of behavior outcomes coincided with disagreement that health and performance effects were important to the respondent while higher scores corresponded with agreement that those effects were important. The lower scores for the normative beliefs questions coincided with significant others in and outside of baseball thinking that the respondent should not use ST while higher scores corresponded with the significant others thinking that the respondent should use ST. The lower scores for motivation to comply coincided with disagreement that the approval/disapproval of significant others was important to the respondent while higher scores corresponded with agreement that the approval/disapproval of significant others was important to the respondent. The lower scores for control beliefs coincided with the belief that factors in baseball or outside of the respondent's control did not have any control over the decision to use/not use ST while high scores corresponded with the belief that those factors had complete control over the decision to use/not use ST. Finally, the lower score for perceived power coincided with the belief that ST use/non-use was not at all under the respondent's personal control while higher scores corresponded with complete personal control over the decision to use/not use ST. Each question and the combined answers for each sub-component were analyzed to determine if there was a significant difference between ST users and non-users.

To assist in solving the sub-problems for this study for differences between ST users and non-users, it was originally proposed to use a parametric statistical treatment (Univariate Analysis of Variance) to analyze data presumed to be on an ordinal scale of

measurement. As the planning progressed, three faculty members in kinesiology and educational research with expertise in research design/statistics were consulted along with a statistician outside of the university. The consensus was that it was more appropriate to conceptualize the dependent variable (responses) as categorical information versus ordinal data. Also, the data appeared to be unevenly distributed. Therefore, a non-parametric statistic (independent samples Chi-Square test) was used to evaluate differences relative to each sub-problem because assumptions required for parametric analysis use were not met. The .05 level of significance was utilized.

#### Data Analysis-Correlational Analysis

The second research question asked whether the six behavioral intention components were correlated with behavioral intention for all of the coaches. The six sub-problems regarding behavioral beliefs, assessment of behavior outcomes, normative beliefs, motivation to comply, control beliefs, and perceived power helped to answer this research question.

**Scoring:** For each question, the items were coded so that the negatively worded endpoints had the lower score. Each question was analyzed separately and then was combined with the other questions within the sub-component to determine an overall sub-component score. Both the individual question and the total sub-component scores were then analyzed to determine if they correlated with the behavioral intention component. Since behavioral intention was measured with only one question, the answer to that question was utilized in the correlation analysis.

To assist in solving the sub-problems for this study for the correlational analysis section regarding whether or not each of the six behavioral intention components correlated with overall behavioral intention, treatment of data with a Pearson Product Moment Coefficient was originally planned. In line with the expert rationale mentioned above, a Spearman Rho statistical analysis was used instead to non-parametrically examine the potential relationship between each component and behavioral intention. Acceptable correlation for this study was set at a correlation of .30 or better. However, correlations with a statistically significant  $p$ -value of  $<.05$  are also highlighted with the inclusion of an asterisk in the correlation chart found in Table 15.

#### Data Analysis-Prediction Analysis

The third research question asked which of the behavioral intention components were the strongest predictors of both the behavioral intentions for tobacco use in coaches and for the enforcement of tobacco use rules by coaches.

**Scoring:** For the analysis of these sub-problems, the responses to the behavioral intention questions (#30 for intention to use and #31 for intention to enforce tobacco use rules) were partitioned into two categories-low intenders and high intenders. Low intenders included the respondents who answered 1,2, or 3 to the two questions while high intenders included the respondents who answered 5,6, or 7 to the two intention questions. Anyone who answered 4 for either question was excluded from this analysis because an answer of 4 for these questions was considered to be neutral and opinions in one direction or the other were more important to this analysis.

To assist in solving the sub-problems for this study and in line with the rationale above, a two-group discriminant function analysis was used to compare the two behavioral intention groups instead of a regression analysis.

#### Supplementary Data

In addition to all of the above, supplementary data were collected with extra questions while the population was available and in the process of completing the questionnaire. These supplementary data were not used to address the central questions of this study, but are being used to provide a valuable context in relation to using the information from this work to educate and intervene with coaches in the future. These data are reported and discussed in a narrative-descriptive format.

## CHAPTER IV

### RESULTS

SPECIAL NOTE: Chapter four is divided into two sections. The first major section contains two types of results relative to whether the hypotheses for each sub-problem should be upheld or rejected. One type of information displayed is the statistical analysis summary for each hypothesis and corresponding table. Visual inspection of the responses was used to follow-up the chi square statistical analyses to better understand the responses. The second major section contains descriptive results from the demographic and supplementary questionnaire questions that were not used to test the hypotheses, but are important later in the discussion of the results.

#### Quantitative Data Analysis-Differences between ST Users and Non-Users

The first research question asked whether there was a difference in components of behavioral intention regarding ST use between North Carolina high school baseball coach ST users and non-users. Answers to the following six sub-problems, based on the model above, helped to answer the research question.

**Sub-Problem A.1:** Are there differences in behavioral beliefs regarding ST use between North Carolina high school baseball coach ST users and non-users?



**Hypothesis A.1:** There will be a statistically significant difference in behavioral beliefs regarding ST use between North Carolina high school baseball coach users and non-users.

**Statistical Result:** This hypothesis was rejected. The chi square analyses showed that there was no overall statistically significant difference found between current users and non-users for the results from the three questions on the questionnaire (18, 19 and 21) in this category. However, results for one part of one question (Question 18b) did reach statistical significance with a chi square of 15.762 ( $p < 0.015$ ). See tables 1-5 below.

ST	No	% No	Yes	% Yes	Total	% Total
1	54	78%	15	62.5%	69	74%
2	5	7%	1	4%	6	6.5%
3	3	4%	3	12.5%	6	6.5%
4	1	1%	2	8%	3	3%
5	1	1%	1	4%	2	2%
6	2	3%	0	0%	2	2%
7	2	3%	1	4%	3	3%

( $\chi^2$  (6, N = 91) = 6.783,  $p = 0.341$  NS,  $\bar{x} = 1.66$ , SD= 1.5)

**Table 1. Question 18a-harmful/beneficial**

ST	No	% No	Yes	% Yes	Total	% Total
1	39	56.5%	6	25%	45	48%
2	9	13%	2	8%	11	12%
3	1	1%	2	8%	3	3%
4	10	7%	2	8%	12	13%
5	2	3%	2	8%	4	4%
6	2	3%	2	8%	4	4%
7	3	4%	5	21%	8	9%

( $\chi^2$  (6, N = 87) = 15.762,  $p < 0.015$ ,  $\bar{x} = 2.4$ , SD= 2.1)

**Table 2. Question 18b-agitating/calming**

ST	No	% No	Yes	% Yes	Total	% Total
1	42	61%	7	29%	49	53%
2	7	10%	2	8%	9	10%
3	6	9%	1	4%	7	7.5%
4	5	7%	4	16%	9	10%
5	1	1%	1	4%	2	2%
6	3	4%	2	8%	5	5%
7	3	4%	3	12.5%	6	6.5%

( $\chi^2$  (6, N = 87) = 8.853,  $p = 0.182$  NS,  $\bar{x} = 2.2$ , SD= 1.97)

**Table 3. Question 18c-unpleasant/pleasant**

ST	No	% No	Yes	% Yes	Total	% Total
1	53	77%	18	75%	71	76%
2	9	13%	1	4%	10	9%
3	4	6%	1	4%	5	5%
4	1	1%	3	12.5%	4	4%
6	1	1%	0	0%	1	1%
7	1	1%	1	4%	2	2%

( $\chi^2$  (5, N = 93) = 7.416,  $p = 0.192$  NS,  $\bar{x} = 1.5$ , SD= 1.2)

**Table 4. Question 19-types of health effects**

ST	No	% No	Yes	% Yes	Total	% Total
1	19	27.5%	5	21%	24	26%
2	8	12%	2	8%	10	11%
3	13	19%	4	16%	17	18%
4	23	33%	11	46%	34	37%
5	2	3%	1	4%	3	3%
6	1	1%	0	0%	1	1%
7	2	3%	1	4%	3	3%

( $\chi^2$  (6, N = 92) = 1.802,  $p = 0.937$  NS,  $\bar{x} = 2.9$ , SD=1.5)

**Table 5. Question 21-types of performance effects**

**Sub-Problem A.2:** Are there differences in the assessment of behavior outcomes regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.2:** There will be a statistically significant difference in assessment of behavior outcomes regarding ST use between North Carolina high school baseball coach users and non-users.

**Statistical Result:** The results were inconclusive regarding this hypothesis. The chi square analyses showed that the first question (20) in this category produced a statistically significant result with a chi square of 18.98 ( $p < 0.004$ ), but analysis of the second question (22) produced a non-significant result. See tables 6 and 7 below for the chi square analysis.

ST	No	% No	Yes	% Yes	Total	% Total
1	12	17%	5	21%	17	18%
2	2	3%	2	8%	4	4%
3	1	1%	1	4%	2	2%
4	2	3%	7	29%	9	10%
5	3	4%	0	0%	3	3%
6	11	16%	1	4%	12	17%
7	37	54%	8	33%	45	48%

( $\chi^2$  (6, N = 92) = 18.98,  $p < 0.004$ ,  $\bar{x} = 5$ , SD=2.4)

**Table 6. Question 20-health effects importance**

ST	No	% No	Yes	% Yes	Total	% Total
1	10	15%	5	21%	15	16%
2	1	1%	1	4%	2	2%
3	3	4%	0	0%	3	3%
4	19	27.5%	11	46%	30	32%
5	4	6%	0	0%	4	4%
6	9	13%	0	0%	9	10%
7	21	30%	6	25%	27	29%

( $\chi^2$  (6, N = 90) = 8.702,  $p = 0.191$  NS,  $\bar{x} = 4.4$ , SD= 2.2)

**Table 7. Question 22-performance effects importance**

**Sub-Problem A.3:** Are there differences in normative beliefs regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.3:** There will be a statistically significant difference in normative beliefs regarding ST use between North Carolina high school baseball coach users and non-users.

**Statistical Result:** This hypothesis was rejected. The chi square analyses showed that there was no overall statistically significant difference found between current users and non-users for the results from the two questions on the questionnaire (23 and 24) in this category. See tables 8 and 9 below for the chi square analysis.

ST	No	% No	Yes	% Yes	Total	% Total
1	25	36%	10	42%	35	38%
2	8	12%	2	8%	10	11%
3	12	17%	0	0%	12	13%
4	16	23%	12	50%	28	30%
5	3	4%	0	0%	3	3%
6	3	4%	0	0%	3	3%
7	1	1%	0	0%	1	1%

( $\chi^2$  (6, N = 92) = 11.094,  $p = 0.086$  NS,  $\bar{x} = 2.6$ , SD= 1.6)

**Table 8. Question 23-people in baseball's opinion of ST use**

ST	No	% No	Yes	% Yes	Total	% Total
1	54	78%	15	62.5%	69	74%
2	6	9%	2	8%	8	9%
3	3	4%	3	12.5%	6	6.5%
4	2	3%	3	12.5%	5	5%
5	1	1%	0	0%	1	1%
6	1	1%	0	0%	1	1%
7	1	1%	0	0%	1	1%

( $\chi^2$  (6, N = 91) = 6.606,  $p = 0.359$  NS,  $\bar{x} = 1.5$ , SD= 1.2)

**Table 9. Question 24-people outside of baseball's opinion of ST use**

**Sub-Problem A.4:** Are there differences in motivation to comply regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.4:** There will be a statistically significant difference in motivation to comply regarding ST use between North Carolina high school baseball coach users and non-users.

**Statistical Result:** This hypothesis was rejected. The chi square analyses showed that there was no overall statistically significant difference found between current users and non-users for the results from the two questions on the questionnaire (25 and 26) in this category. See tables 10 and 11 below for the chi square analysis.

ST	No	% No	Yes	% Yes	Total	% Total
1	19	27.5%	5	21%	24	26%
2	7	10%	2	8%	9	10%
3	4	6%	3	12.5%	7	7.5%
4	6	9%	5	21%	11	12%
5	4	6%	1	4%	5	5%
6	6	9%	2	8%	8	9%
7	20	29%	5	21%	25	27%

$(\chi^2 (6, N = 89) = 4.178, p = 0.653 \text{ NS}, \bar{x} = 3.8, \text{SD} = 2.5)$

**Table 10. Question 25-approval of people in baseball**

ST	No	% No	Yes	% Yes	Total	% Total
1	18	26%	3	12.5%	21	23%
2	4	6%	2	8%	6	6.5%
3	3	4%	2	8%	5	5%
4	8	12%	8	33%	16	17%
5	4	6%	2	8%	6	6.5%
6	8	12%	3	12.5%	11	12%
7	22	32%	3	12.5%	25	27%

( $\chi^2$  (6, N = 90) = 9.789,  $p = 0.134$  NS,  $\bar{x} = 1.5$ , SD= 1.2)

**Table 11. Question 26-approval of people outside of baseball**

**Sub-Problem A.5:** Are there differences in control beliefs regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.5:** There will be a statistically significant difference in control beliefs regarding ST use between North Carolina high school baseball coach users and non-users.

**Statistical Result:** The results were inconclusive regarding this hypothesis. The chi square analyses showed that the first question (27) in this category produced a significant result with a chi square of 16.271 ( $p < 0.006$ ), but analysis of the second question (28) produced a non-significant result. See tables 12 and 13 below for the chi square analysis.



ST	No	% No	Yes	% Yes	Total	% Total
1	47	68%	12	50%	59	63%
2	7	10%	1	4%	8	9%
3	3	4%	2	8%	5	5%
4	3	4%	8	33%	11	12%
5	2	3%	0	0%	2	2%
7	7	10%	1	4%	8	9%

( $\chi^2$  (5, N = 93) = 16.271,  $p < 0.006$ ,  $\bar{x} = 2.15$ , SD= 1.9)

**Table 12. Question 27-influence of factors beyond my control**

ST	No	% No	Yes	% Yes	Total	% Total
1	38	55%	7	29%	45	48%
2	3	4%	1	4%	4	4%
3	4	6%	3	12.5%	7	7.5%
4	5	7%	7	29%	12	13%
5	8	12%	2	8%	10	9%
6	2	3%	1	4%	3	3%
7	9	13%	3	12.5%	12	13%

( $\chi^2$  (6, N = 93) = 10.434,  $p = 0.107$  NS,  $\bar{x} = 2.95$ , SD= 2.2)

**Table 13. Question 28-influence of factors within baseball**

**Sub-Problem A.6:** Are there differences in perceived power regarding ST use between North Carolina high school baseball coach ST users and non-users?

**Hypothesis A.6:** There will be a statistically significant difference in perceived power regarding ST use between North Carolina high school baseball coach users and non-users.

**Statistical Result:** This hypothesis was upheld. The chi square analyses showed that there was a statistically significant difference found between current users and non-users for the results from the one question on the questionnaire (29) in this category with a chi square of 16.32 ( $p < 0.006$ ). See table 14 below for the chi square analysis.

ST	No	% No	Yes	% Yes	Total	% Total
1	53	77%	14	58%	67	72%
2	4	6%	0	0%	4	4%
4	1	1%	6	25%	7	7.5%
5	3	4%	1	4%	4	4%
6	2	3%	0	0%	2	2%
7	6	9%	3	12.5%	9	10%

$$(\chi^2 (5, N = 93) = 16.32, p < 0.006, \bar{x} = 5.9, SD = 2.0)$$

**Table 14. Question 29-personal control over ST use**

## Quantitative Data Analysis-Correlational Analysis

The second research question asked whether the six behavioral intention components were correlated with behavioral intention for all of the coaches. The following six sub-problems, based on the model above, helped to answer this research question.

**Sub-Problem B.1:** Is there a correlation between behavioral beliefs and behavioral intention?

**Hypothesis B.1:** There will be a statistically significant correlation between behavioral beliefs and behavioral intention.

**Statistical Result:** The results for this hypothesis were inconclusive because the Spearman rho analysis of two parts of one question (18b-agitating/calming and 18c-pleasant/unpleasant) in this category produced statistically significant results (0.40 and 0.39 respectively), while the other part of that question and the two other questions (18a-harmful/not harmful, 19-health effects, and 21-performance effects) were not significant. See Table 15 for the correlation chart.

**Sub-Problem B.2:** Is there a correlation between assessment of behavior outcomes and behavioral intention?

**Hypothesis B.2:** There will be a statistically significant correlation between assessment of behavior outcomes and behavioral intention.

**Statistical Result:** This hypothesis was rejected. The Spearman rho analysis showed there was no overall statistically significant correlation between assessment of behavioral outcomes and behavioral intention for the questions in this category (20 and 22). See Table 15 for the correlation chart.

**Visually Inspected Data Result:** These results do not confirm the statistical results for these questions. This is because 58 out of 83 subjects (70%) thought that the effects on health related to ST use were important to them and only 25 out of 83 subjects (30%) thought the effects on health were unimportant. Also, 40 out of 59 subjects (68%) thought that effects on performance related to ST use were important to them, while only 19 out of 59 subjects (32%) thought that effects on performance were unimportant to them.

**Sub-Problem B.3:** Is there a correlation between normative beliefs and behavioral intention?

**Hypothesis B.3:** There will be a statistically significant correlation between normative beliefs and behavioral intention.

**Statistical Result:** This hypothesis was rejected. The Spearman rho analysis showed that there was no overall statistically significant correlation between normative beliefs and behavioral intention for the questions in this category (23 and 24). See Table 15 for the correlation chart.

**Sub-Problem B.4:** Is there a correlation between motivation to comply and behavioral intention?

**Hypothesis B.4:** There will be a statistically significant correlation between motivation to comply and behavioral intention.

**Statistical Result:** This hypothesis was rejected. The Spearman rho analysis showed that there was no overall statistically significant correlation between motivation to comply and behavioral intention for the questions in this category (25 and 26). See Table 15 for the correlation chart.

**Sub-Problem B.5:** Is there a correlation between control beliefs and behavioral intention?

**Hypothesis B.5:** There will be a statistically significant correlation between control beliefs and behavioral intention.

**Statistical Result:** This hypothesis was rejected. The Spearman rho analysis showed that there was no overall statistically significant correlation between control beliefs and behavioral intention for the questions in this category (27 and 28). See Table 15 for the correlation chart.

**Visually Inspected Data Result:** These results do not confirm the statistical results for these questions. This is because 72 out of 82 subjects (88%) thought that ST use was not influenced by factors beyond their control, while only 10 out of 82 subjects (12%) thought that ST use was influenced by factors beyond their control. Also, 56 out of 81 subjects (69%) thought that ST use was not influenced by factors within the baseball

environment, while 25 out of 81 subjects (31%) thought that ST use was influenced by factors within the baseball environment.

**Sub-Problem B.6:** Is there a correlation between perceived power and behavioral intention?

**Hypothesis B.6:** There will be a statistically significant correlation between perceived power and behavioral intention.

**Statistical Result:** This hypothesis was rejected. The Spearman rho analysis showed that there was no overall statistically significant correlation between perceived power and behavioral intention for the question in this category (29). See Table 15 for the correlation chart.

**Table 15. Correlation Chart**

Cor	beh1a	beh1b	beh1c	beh2	out1	beh3	out2	nor1	nor2	mot1	mot2	con1	con2	con3	int1	int2	behcom	ascom	normcom	motcom
beh 1b	0.43*																			
beh 1c	0.50*	<b>0.89*</b>																		
beh 2	0.47*	0.17	0.14																	
out 1	0.00	-0.05	-0.01	0.06																
beh 3	0.16	0.23*	0.23*	0.23*	0.04															
out 2	-0.07	-0.04	-0.09	0.07	0.32*	-0.04														
norms1	0.08	0.11	0.11	0.20	0.02	0.26*	0.05													
norms 2	0.30*	0.38*	0.39*	0.45*	-0.03	0.27*	0.03	0.50*												
mot 1	0.07	0.13	0.14	0.01	0.20*	0.11	0.37*	-0.07	0.06											
mot 2	0.08	0.19	0.16	0.03	0.24*	0.26*	0.33*	-0.05	0.04	<b>0.82*</b>										
con 1	0.17	0.10	0.06	0.33*	-0.02	-0.11	-0.04	-0.08	0.12	-0.03	-0.01									
con 2	0.18	0.21*	0.16	0.28*	0.05	0.19*	0.07	-0.02	0.10	0.11	0.19	0.54*								
con3	0.14	-0.00	0.05	0.05	-0.13	0.01	-0.24*	-0.09	0.06	-0.05	-0.13	0.10	-0.21*							
<b>INT 1</b>	0.12	0.40*	0.39*	0.09	-0.17	0.21*	-0.12	0.11	0.17	-0.04	-0.01	0.01	0.21	-0.09						
<b>INT 2</b>	0.04	0.20	0.21*	-0.03	-0.15	0.15	-0.29*	0.05	-0.13	-0.12	-0.07	0.02	0.06	0.29*	0.12					
beh com	<b>0.71*</b>	<b>0.85*</b>	<b>0.86*</b>	0.49*	0.00	0.51*	-0.06	0.20	0.51*	0.14	0.22*	0.14	0.28*	0.07	0.38*	0.18				
assess com	-0.04	-0.05	-0.06	0.08	<b>0.83*</b>	0.00	<b>0.79*</b>	0.05	0.00	0.35*	0.35*	-0.04	0.07	-0.23*	-0.18	-0.27*	-0.03			
norm com	0.21*	0.20	0.25*	0.32*	-0.15	0.28*	-0.05	0.69*	<b>0.71*</b>	0.01	0.02	0.12	0.13	-0.03	0.19	-0.21*	0.35*	-0.13		
mot com	0.08	0.17	0.15	0.02	0.23*	0.19	0.37*	-0.06	0.05	<b>0.96*</b>	<b>0.95*</b>	-0.02	0.15	-0.09	-0.03	-0.10	0.18	0.37*	0.02	
pbc com	0.10	0.15	0.08	0.27*	0.08	0.04	0.13	-0.01	0.08	0.06	0.16	0.67*	<b>0.86*</b>	0.44*	0.15	0.19	0.18	0.13	0.10	0.11

0 - .29 Weak correlation

.30 - .69 Moderate correlation

**.70 – 1.00 Strong correlation**

\* signifies *p-values* <.05

### Quantitative Data Analysis-Prediction Analysis

The third research question asked which of the behavioral intention components were the strongest predictors of behavioral intentions for tobacco use in coaches and enforcement of tobacco use rules by coaches. The following two sub-problems, based on the model above, helped to answer this research question.

**Sub-Problem C.1:** Which behavioral components are the strongest predictors of behavioral intention for tobacco use in coaches?

**Hypothesis C.1:** The strongest predictors of behavioral intention for tobacco use will be the control beliefs and the perceived power components.

**Statistical Result:** This hypothesis was rejected. The discriminant function results showed that while perceived power loaded high as a predictor, it was not statistically significant. Control beliefs neither loaded high nor were statistically significant. In support of this, these two components did not correlate with intention in the sub-problems above.

However, the discriminant function analysis did yield a standardized discriminant function coefficient for behavioral beliefs of .767 (similar to a beta weight in regression analysis). This coefficient, when tested for significance, yielded a significant F ratio ( $F=9.711$ ,  $df_1=1$ ,  $df_2=85$ ,  $p<0.002$ ). The n for the low intender group was 71 respondents, while the n for the high intender group was 16 respondents. See Table 16, 17, and 18 below for those results.



**Sub-Problem C.2:** Which behavioral components are the strongest predictors of behavioral intention for enforcement of tobacco use rules by coaches?

**Hypothesis C.2:** The strongest predictors of behavioral intention for enforcement of tobacco use rules will be the control beliefs and the perceived power components.

**Statistical Result:** The results for this hypothesis were inconclusive. Control beliefs were not predictive and did not have a significant standardized coefficient or a significant F ratio. However, perceived power showed a strong predictive ability for this hypothesis with a standardized discriminant function coefficient of .576 (similar to a beta weight in regression analysis) and yielded a statistically significant F ratio ( $F=7.122$ ,  $df_1=1$ ,  $df_2=84$ ,  $p<0.009$ ).

It is interesting to note that the discriminant function analysis also yielded a standardized discriminant function coefficient for behavioral beliefs of  $-.389$ . This coefficient, when tested for significance, yielded a significant F ratio ( $F=4.194$ ,  $df_1=1$ ,  $df_2=84$ ,  $p<0.044$ ). Assessment of behavioral outcome also yielded a statistically significant standardized discriminant function coefficient of  $.419$ . This coefficient, when tested for significance, yielded a significant F ratio ( $F=5.016$ ,  $df_1=1$ ,  $df_2=84$ ,  $p<0.028$ ). Finally, normative beliefs also yielded a statistically significant standardized discriminant function coefficient of  $-.406$ . This coefficient, when tested for significance, yielded a significant F ratio ( $F=5.147$ ,  $df_1=1$ ,  $df_2=84$ ,  $p<0.026$ ). The n for the low intender group

was 23, while the n for the high intender group was 64. See Table 19, 20 and 21 below for those results.

	Wilks' Lambda	F	df1	df2	Sig.
perceivedpower	.974	2.248	1	85	.137
behbeliefs	.897	9.711	1	85	.002
ABO	.969	2.714	1	85	.103
normbeliefs	.960	3.547	1	85	.063
mottocomply	.998	.175	1	85	.677
Controlbeliefs	.990	.881	1	85	.351

**Table 16. Tests of Equality of Group Means-Hypothesis C.1**

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.806	17.683	6	.007

**Table 17. Wilks' Lambda-Hypothesis C.1**

	Function
	1
perceivedpower	.601
behbeliefs	.767
ABO	-.445
normbeliefs	.207
mottocomply	-.183
Controlbeliefs	.034

**Table 18. Standardized Canonical Discriminant Function Coefficients-Hypothesis C.1**

	Wilks' Lambda	F	df1	df2	Sig.
perceivedpower	.922	7.122	1	84	.009
behbeliefs	.952	4.194	1	84	.044
ABO	.944	5.016	1	84	.028
normbeliefs	.942	5.147	1	84	.026
mottocomply	.996	.315	1	84	.576
Controlbeliefs	.998	.143	1	84	.706

**Table 19. Tests of Equality of Group Means-Hypothesis C.2**

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.824	15.646	6	.016

**Table 20. Wilks' Lambda-Hypothesis C.2**

	Function
	1
perceivedpower	.576
behbeliefs	-.389
ABO	.419
normbeliefs	-.406
mottocomply	.037
Controlbeliefs	-.041

**Table 21. Standardized Canonical Discriminant Function Coefficients-Hypothesis C.2**

Demographic and Supplementary Question Descriptive Analysis

The additional questions that were included in the questionnaire produced the following results. Ninety-six percent of the respondents stated that their school currently has a tobacco use policy. Of the schools that have policies, 87% of the respondents stated that there is no tobacco use allowed on school grounds at any time, and 87% of the respondents stated that the policy has been in place for six years or less. Seventy-three percent of the coaches stated that they actively enforce the school’s tobacco use policy all of the time, while 19% stated that they sometimes enforce the policy.

When asked about current or former spit tobacco use, the respondents were relatively evenly distributed between the three categories with 42% of the coaches having never used spit tobacco, 32% of the coaches having used spit tobacco (but are not currently using), and 26% of the coaches currently using spit tobacco. Therefore,

seventy-four percent were current non-users and 26% are users. Of the coaches who have quit using spit tobacco, 18% of them have been quitters for more than five years. The initiation age for coaches who have ever used spit tobacco varied with 3% beginning in junior high school or before, 26% beginning in high school, 13% beginning in the first year after high school (18-19 years old), and 11.8% beginning after the age of 19. Of the coaches who are currently using spit tobacco (26%), 54% used at least occasionally at practice and 42% used occasionally at games. Finally, 50% of the current users stated that their players were aware of their spit tobacco use.

All of the respondents, whether current users or non-users, were asked if they allowed their athletes to use spit tobacco at either practices or games. Eighty-six percent of the coaches stated that they did not allow their athletes to use spit tobacco at practice, 10% of all coaches (and 25% of current users) allowed their players to use spit tobacco some of the time, and 4% of the population (and 8% of current users) allowed their players to use at practice any time. The coaches were less likely to allow their athletes to use spit tobacco at games with 96% of all respondents not allowing use, 2% allowing use sometimes, and 2% routinely allowing spit tobacco use.

Finally, the respondents were asked to report approximately how many of their athletes used spit tobacco. Thirty-three percent of all coaches (29% of current users) stated that none of their athletes used spit tobacco. Thirty-two percent of the respondents (38% of current users) stated that very few athletes (1-2) used spit tobacco. Twenty-two percent of coaches (21% of current users) stated that some athletes (3-5) used spit

tobacco. Eleven percent of respondents (13% of current users) stated that many athletes (6-15) used spit tobacco, and 2% of respondents (0% of current users) felt that most athletes (16-25) on their team used spit tobacco regularly.

## CHAPTER V

### DISCUSSION OF RESULTS AND IMPLICATIONS FOR INTERVENTIONS

#### Differences between ST Users and Non-Users

The first research question asked whether there was a difference in components of behavioral intention regarding ST use between North Carolina high school baseball coach ST users and non-users.

**Results:** In general, the hypotheses that there would be a significant difference in each of the six sub-components of behavioral intention between ST users and non-users were rejected. Only perceived power was significantly different, while assessment of behavior outcomes and control beliefs results were inconclusive.

**Discussion of Results:** While there have been numerous studies that have examined and validated all six of the sub-components of the theory of planned behavior, it has also been found that the relative importance of each sub-component for the prediction of intentions varies depending on the behavior and the target population (Ajzen & Fishbein, 2004; Sharma, 2007). Previous research into tobacco use behaviors--specifically smoking and smoking cessation behaviors--has found that behavioral beliefs (an individual's belief about the consequences of a particular behavior) may not be as

significant of a predictor of intention to use tobacco as perceived behavioral control (and occasionally subjective norms--the perceived social pressure to engage or not to engage in a behavior) because of a lack of volitional control in the intention to use tobacco (Armitage & Conner, 2001; Gottlieb, Gingiss, & Weinstein, 1992; Hagger, Chatzisarantis, & Biddle, 2002; McMillan & Conner, 2003; Rise, et. al., 2008). Therefore, there may be no significant difference between coaches who use ST and those who do not possibly because of the lack of volitional control over use.

Also, previous research with this target population has determined that baseball coaches (whether they are ST users or non-users) are well-informed and understand the health risks and potential diseases that are associated with the use of spit tobacco (Eaves, Schmitz, & Siebel, 2009; Horn, et al., 2000). In spite of this understanding of the health risks associated with using spit tobacco, a significant number of baseball coaches still choose to use spit tobacco.

There was one part of a question in behavioral beliefs that demonstrated a significant difference between ST users and non-users (question 18b). This question assessed an individual's belief whether ST use was either agitating or calming. While most non-users felt that ST use was agitating, ST users were almost evenly split between the two choices.

The second sub-component--assessment of behavioral outcomes (the likelihood of a health consequence actually occurring)--is similar to behavioral beliefs in that it has not consistently shown a significant difference between users and non-users (Armitage &



Conner, 2001; Gottlieb, Gingiss, & Weinstein, 1992; Hagger, Chatzisarantis, & Biddle, 2002; McMillan & Conner, 2003; Rise, et. al., 2008). The hypothesis for assessment of behavior outcomes was neither upheld nor rejected because one of the two questions reached statistical significance while the other question did not. The question that was statistically significant (question 20) asked the respondents whether the health effects--either positive or negative--of using ST were important to them. As with the question in behavioral beliefs, the non-users in this study were consistent in their belief that the health effects were important to them, while the users were split in their determination of whether the effects were important to them or not.

The question in this sub-component that did not reach statistical significance evaluated whether the respondents felt that the performance effects of ST use were important to them. Since there is no known positive or negative performance effect associated with ST use, it is no surprise that the coaches were not different in their opinion of the importance of the effects, whether they were ST users or non-users. It is promising that the respondents to this questionnaire (as with other studies) did not believe there were positive performance effects associated with ST use, which is a common misperception (Eaves, Schmitz, & Siebel, 2009; Horn, et. al., 2000).

The normative beliefs sub-component of the theory of planned behavior (an individual's perception about the particular behavior, which is influenced by the judgment of significant others) has been found to be either an integral element of the theory, or an unnecessary aspect that seems to have no role in predicting intention or

behavior (Sharma, 2007). While the research is inconclusive on the necessity and utility of the normative beliefs sub-component, there were several studies evaluating smoking initiation and cessation that have found that normative beliefs are important in the prediction of smoking preferences, which led to the hypothesis that there would be a significant difference between ST users and non-users (Hagger & Chatzisarantis, 2009; Rise, et. al., 2008). The questionnaire questions within the normative beliefs sub-component focused on the opinion about ST use of people both in and outside baseball who are important to the respondent. These questions were selected because research has shown that people will tend to conform to the wishes of important people because the significant others are acting in the best interests of the coaches and supporting their autonomy (Gottlieb, Gingiss, & Weinstein, 1992; Hagger & Chatzisarantis, 2009; Hilton, et al., 1994).

Because of the close relationship between ST use and the sport of baseball, it was hypothesized that the respondents who used ST would have people inside the sport who would be more supportive of ST use, which would lead to a significant difference between the users and non-users. The hypothesis was rejected, which suggests that both users and non-users probably report similar expectations from people in and outside of baseball about the use of ST. The data found that the respondents (both users and non-users) consistently thought that people who were important to them felt that they should not use ST.

This is an interesting finding considering that previous research placed so much emphasis on significant others and respondents conforming to their wishes because of the perception that significant others are acting in their best interest (Gottlieb, Gingiss, & Weinstein, 1992; Hagger & Chatzisarantis, 2009). However, in this study, the ST users continued use in spite of the belief that important people both in and outside of baseball did not approve of use. Therefore, this study appears to reinforce the other previous studies that have found a lack of a significant role for the normative beliefs sub-component rather than confirming the role of normative beliefs within the theory of planned behavior.

As with normative beliefs, the motivation to comply hypothesis (the primary reason that an individual is willing to change a health behavior) was not supported. There was no significant difference between ST user and non-user coaches. The motivation to comply questions focused on whether the approval or disapproval of significant others--both in and outside of baseball--is important to the respondents. The hypothesis for this sub-component was rejected, which again seems to confirm the lack of a significant role for subjective norms in ST use.

In reviewing the data, both ST users and non-users provided wide-ranging answers throughout the seven selections for the questions, which suggest that there is no definitive answer to the questions in this sub-component that can be associated with either ST users or non-users within the target population. Therefore, the questions within this sub-component may not be useful in finding out about intention for ST use and will

be of limited utility in developing an intervention/education program for baseball athletes and coaches. In general, the subjective norms components of the theory of planned behavior (normative beliefs and motivation to comply) appear to have little importance in assessing the health behavior studied in this work.

The theory of planned behavior was developed as an extension of the theory of reasoned action that includes the addition of control beliefs and perceived power, which are sub-components of perceived behavioral control. Perceived behavioral control was an important addition to social cognition models that attempt to predict health behaviors because it allows for the prediction of behaviors that are not under complete volitional control (Armitage & Conner, 2001). The perceived behavioral control component provides information about potential constraints on action as they are perceived by the respondents and helps to explain why intentions do not always predict behavior (Armitage & Conner, 2001). In fact, in certain cases where volitional control is minimal, perceived behavioral control may independently predict behavior--sidestepping intention entirely (Armitage & Conner, 2001).

For this study, the hypothesis for control beliefs (the perceived presence of factors that may facilitate or impede performance of a behavior) was inconclusive with one question demonstrating statistical significance while the other question did not. The statistically significant question focused on whether or not ST use (or choice to not use) was influenced by factors beyond the respondent's control. The coaches who used ST were more likely to feel that the choice to use was beyond their control than those

coaches who did not use ST. These results confirm the lack of complete volitional control that is associated with any addictive, risky behavior.

The influence of nicotine addiction on the ability to choose whether or not to use ST is a very important factor--especially when discussing consistent use rather than experimentation. The addictive nature of all tobacco products makes it more difficult to personally control the desire to use the products. Volitional control not only requires making a determined decision to not use ST, but also requires controlling the urges that result from nicotine withdrawal and occur daily--or even hourly for chronic users--causing users to want to maintain use even if a quit attempt is underway.

As with control beliefs, perceived power (the power of each control factor to impede or facilitate performance of the behavior) is a sub-component of the larger construct known as perceived behavioral control. The sub-components of perceived behavioral control are expected to be a significant determinant of health behaviors when there is a decrease in volitional control--as is seen with tobacco product use. For this study, perceived power was analyzed with one question, which demonstrated statistical significance between ST users and non-users. The question sought to determine if the respondents' use/non-use of ST was under their personal control.

In this case, while the simple majority of ST users felt that their choice to use was completely under their control, there were a significant number who did not feel they had control of ST use. Again, this can be related to the addictive nature of tobacco products and the physical and psychological attachment that is found with nicotine, which makes it

much more difficult to control the desire to use ST, especially in chronic users. The withdrawal symptoms that are associated with not using are often difficult to ignore and lead many users to continue ST use, not for the benefits related to use, but rather to avoid the withdrawal symptoms associated with not using. The hypothesis for this sub-component was upheld, which confirms previous studies that found the predictive role of the sub-components of perceived behavioral control is increased when volitional control decreases (Armitage & Connor, 2001).

**Clinical Implications:** When reviewing the results of this study, the overall significance of the research—statistical and practical—was based on the goal of developing an education/intervention program focused on baseball coaches and players. Therefore, each sub-component and each sub-problem was reviewed to assess the clinical implications of the findings.

It is possible that when utilizing these components of behavior and behavioral intention to develop a future education/intervention program to minimize or eliminate ST use in baseball coaches, that focusing on behavioral beliefs and the fact that ST use does not provide a calming effect, and, in fact, often causes an agitating or irritating sensation if not used frequently enough, could lead to positive results in the intervention and decreased ST use. The education can then focus on emphasizing the negative psychological responses that are related to ST use, and the benefits that are gained from eliminating use.

It is essential to utilize this new data-based information in an intervention program because each individual coach may be swayed by a different fact or nugget of information. One never knows what will resonate with an individual and lead to the decision to stop using ST. Utilizing all possible advantages in an intervention program is sensible and prudent. Therefore, in spite of the fact that there is no statistically significant finding for behavioral beliefs, knowing that ST users are split in their belief that ST use is either agitating or calming is useful in the future development of an intervention program for this target audience.

As with behavioral beliefs, the assessment of behavior outcomes finding is important for the future development of cessation programs focused on this target population. The knowledge that baseball coaches who are also ST users do not feel that the health effects associated with ST use will have the same impact on them is an important finding because it demonstrates that while the coaches who use ST are aware of the health effects, they do not feel that those health effects are important to them. This could demonstrate a sense of invincibility in these respondents that is often ascribed to young adults and athletes, or it could demonstrate a situation where the ST users were in a somewhat state of denial in that despite the health risks that are associated with ST use, these coaches did not feel that they would suffer from any of the illnesses. The current study did not assess the rationale for the coaches' answers, which could be a focus for future research.

ST use does not provide an ergogenic or performance-enhancing benefit for athletes, a fact that is important for coaches to be aware of and acknowledge so that their athletes are not initiating or continuing ST use for the sole purpose of improving athletically. Had the respondents demonstrated that they believed a performance benefit was present in use and that it was important to them, there could have been a significant concern that coaches would advocate use for the purpose of athletic enhancement. Having the coaches be aware of the lack of a performance benefit is advantageous for intervention programs because it is a topic that does not have to be discussed in detail, which allows for more time to discuss other issues of importance.

The question in the control beliefs sub-component that did not achieve statistical significance focused on the influence of factors within the baseball environment on ST use or non-use. This question seeks to determine if coaches who use ST are impacted by their association with the sport of baseball. Because of the close connection between ST use and baseball and the high rates of use in baseball players, this study--in indirect ways--assessed if there was an inherent connection that has been established between playing the sport and using ST. This component of the hypothesis though was rejected, which suggests that there is no defined link between ST use and factors within baseball.

This is one of the most important findings because it demonstrates that an intervention program does not have to overcome intrinsic factors within the sport to be successful. While not impossible, it would be extremely difficult for any intervention



program to combat both the lure of ST use and the sport of baseball itself. Interventions are much more likely to be successful when fewer impediments are present.

The significant difference found with the perceived power sub-component is quite useful in the development of a future intervention program because it provides an avenue that may be useful in decreasing or eliminating ST use in baseball coaches. If there is a genuine concern that there is a lack of volitional control with regard to ST use, then the intervention could focus on the addiction component of tobacco products and techniques that can be used to overcome this addiction. With a population that enjoys being in complete control, such as athletic coaches, a loss of control can be especially infuriating. Using the need for control as powerful leverage with the coaches provides an increased opportunity for success for the intervention program.

### Correlational Analysis

The second research question asked whether the six behavioral intention components were correlated with actual behavioral intention for all of the coaches.

**Results:** An interesting feature of the correlational results is that the sub-components of the theory of planned behavior, by and large, did not correlate with intention. Only the results of one sub-problem were found to be inconclusive and that was the one which addressed behavioral beliefs. The other sub-components of behavioral intention did not correlate well with behavior intention.

**Discussion of Results:** This finding could be because people who use ST (just like people who do not use ST) typically understand the risks associated with use, yet they still intend to use and initiate the behavior regularly. Previous research has found that the target population utilized for this study has a well-defined understanding of the direct health risks associated with ST use, such as oral cancer (Eaves, Schmitz, & Siebel, 2009). The level of knowledge for health risks does decrease when the diseases become more systemic (e.g. something that is not directly related to the oral cavity), or something which cannot be demonstrated with a graphic image, such as cardiovascular disease; however, coaches do seem to be aware at least that use of ST increases the risk for developing life-threatening illnesses (Eaves, Schmitz, & Siebel, 2009). The knowledge of the risks of the behavior makes ST users different from subjects who intend to initiate other behaviors that have been studied using the theory of planned behavior--such as exercise behavior, alcohol use, or condom use. Other subjects may have less knowledge of the health risks/benefits of their selected risky behaviors, which may explain why there is a stronger correlation between the components of the theory and intention to initiate those behaviors.

Therefore, the theory of planned behavior, which is predicated on the belief that these components correlate well with the intention to initiate a behavior, might not be appropriate for evaluating ST use, a concern which should be taken into consideration in future studies. This is the first known study that utilized this theory to investigate ST use, which may be because previous studies found similar results and did not report them or

utilized other theories for follow-up research. Other forms of tobacco use, alcohol use, other risky behaviors--such as condom use, and positive behavioral change--such as initiation of exercise programs--may be more appropriately grounded in the theory of planned behavior because of a stronger correlation between the components and intention, which may be possible because of differences between ST users and people who intend to initiate or continue any of the behaviors mentioned above and others like them.

The result for the behavioral beliefs hypothesis was inconclusive because several sections of one question (questions 18b and 18c) were found to have a moderate correlation with behavioral intention while the other questions in this sub-problem were not significant (questions 18a, 19, & 21). It was surprising that there was such little correlation between the behavioral beliefs and intention questions because previous research has generally found a strong correlation between each of the sub-components of the theory of planned behavior and behavioral intention (Ajzen, 1991). Although the data in the previous studies demonstrated moderate to strong correlation in each component, the correlation scores were generally reported as an overall correlation between all of the sub-components and intention. This method of reporting may suggest that the correlation of the theory as a whole may be stronger than the correlation of any of the individual parts in relation to behavioral intention.

Another consideration for why the correlations between behavioral beliefs and intention were weak is the limited volitional control associated with ST use. When

volitional control is restricted in a health behavior, then the ability of the theory to relate to or even predict behavioral intention is compromised (Ajzen, 1991). This could explain the weak correlation found in this study because the use of ST is closely connected with the addictive nature of nicotine. When a person uses ST regularly, there becomes a physical and psychological dependence on nicotine, which is difficult to overcome and often beyond the control of the user. This loss of volitional control affects the utility of the theory for certain health behaviors and the ability to correlate components with intention.

Other theories or behavioral components may be used in conjunction with the study questionnaire as a more successful method for associating with intention. Studies that have previously assessed the predictors of ST use and ST initiation have used gender, participation in sports, prior experimentation, peer use, geographic region, and cigarette use to better estimate the likelihood of future ST use and initiation (Ebbert, et. al., 2006; Morrell, et. al., 2005; Newman & Shell, 2005; Rhodes & Courneya, 2003; Scott, Eves, French, & Hoppe, 2007; Tomar & Giovino, 1998). The utilization of these other correlates in unison with the sub-components of the theory of planned behavior may provide a better opportunity for researchers to determine if baseball coaches will begin or continue to use ST products.

The visual inspection data analysis for the assessment of behavior outcomes sub-component did not confirm the statistical results. Instead, these data suggested that the majority of both users and non-users felt that both the health and performance-related

effects of ST use were important to them. In this case, the lack of correlation may be related to the fact that coaches regardless of whether or not they use ST are concerned about the health and performance effects associated with ST use. This finding reinforces the previous research that found that baseball coaches, in general, were aware of the health risks associated with use (Eaves, Schmitz, & Siebel, 2009). However, in spite of knowing the risks of ST use, coaches who used ST still continued their habit, which underscores the addictive nature of tobacco use and the lack of volitional control that is associated with nicotine addiction. Even though the coaches who used ST felt that the health risks that they faced as a result of use were important, they still either did not or could not quit tobacco use.

With regard to the normative beliefs and motivation to comply sub-components, the lack of a statistical association between normative beliefs and behavioral intention could indicate that behavioral intention is influenced more by personal factors than by the social factors that comprise this sub-component (Rivis & Sheeran, 2003). When risky health behaviors are concerned, personal factors may include salience and enjoyment moderators that will affect the individual's attitude toward continued use of ST, which will not be influenced as much by other people's opinions of tobacco use (Rivis & Sheeran, 2003). When personal factors outweigh social factors in the mind of the coach who uses ST, then the association between normative beliefs and intention will decrease. In this case, it may be more appropriate to use social approval, social motives, and utility

of behavior as potential moderators of behavior rather than using normative beliefs (Manning, 2009).

Also, the theory of planned behavior is intended to study a specific point in time in an almost cross-sectional format. This focus on one moment in time can decrease correlational validity in research that studies risky health behavior because of the potential for instability in behavior that is related to new information or the current environment (Palmer, Burwitz, Dyer, & Spray, 2005). This rationale could be especially true for coaches in the baseball setting because there are domain-specific variables associated with the sport and its participants that seem to inherently link with ST use. When these domain-specific variables--or the personalities of individual coaches--are taken into consideration, there is a potential for a loss of correlational validity in any sub-component of the theory of planned behavior (Armitage, Norman, & Conner, 2002).

The motivation to comply sub-component is especially susceptible to environment and domain-specific variability because the sub-component is measuring the importance of other people's opinions on ST use--both inside and outside of baseball. The respondents may feel that the importance of those people's opinions is different depending on the specific time of the year (in-season versus off-season). Because the questionnaire was administered prior to the start of the season, the respondents may have had a different estimation of other people's opinions when they completed the questionnaire than would have been present at a later time--such as during the season. This is very important for future research and the time considerations that potential

studies must consider. It may be prudent for future researchers to assess behavioral intention either during or immediately after the season to determine if the time of assessment does indeed affect responses and opinions.

Finally, low correlational validity, such as was seen with motivation to comply, can often be found with people who have good intentions but are unable to transfer those intentions to behavior (Palmer, Burwitz, Dyer, & Spray, 2005; Rhodes & Matheson, 2005). Coaches who use ST and are addicted to the nicotine that is found in tobacco products may wish to decrease or stop use, but they are unable to take the important step from those good intentions to enacting a quitting behavior. This is true even if the coaches are aware that the people who are important to them--both inside and outside of baseball--do not approve of ST use. If this is true, the correlational ability of this sub-component is therefore going to be decreased because the coaches are unable to transfer the intention to quit into actual cessation behavior.

The hypothesis for the control beliefs sub-sub-component was rejected as well. However, the fact that this sub-problem did not correlate well with behavioral intention is more surprising than the others because the sub-components of perceived behavioral control are supposed to be the best predictors of and correlate the most closely with behavioral intention (Ajzen, 1991). The fact that control beliefs did not correlate at all with behavioral intention reinforces the investigator's belief that the theory of planned behavior is not an entirely viable and successful option to utilize when assessing ST use. Perhaps the lack of volitional control is the primary explanation for the lack of correlation

found in this study, or it may be that the other potential variables utilized in previous ST research are more feasible options with this particular health behavior.

The visual inspection data analysis of this sub-component did not confirm the statistical findings. Instead, the visually inspected data suggested that the majority of coaches, regardless of ST use preference, believed that their decision whether or not to use ST was not influenced by factors beyond their control or factors within the baseball environment. This suggests that the coaches believed that the decision that they made to use or not use ST was a personal one and not a decision that was influenced by outside forces. While this may be true and factors outside of the control of the coach or factors within the baseball environment may not impact the decision to use or not use tobacco products, it would still be appropriate to evaluate other potential variables that may or may not have affected the initial decision to use or not use ST and the rationale for continued use in coaches who are current tobacco consumers.

**Clinical Implications:** The lack of volitional control associated with ST use could be important in the creation of future intervention/education programs because it recognizes the impact that nicotine addiction has on continued ST use. Future interventions that do not take addiction into account will ultimately fail because there are factors at work that are beyond the control of the participants. Interventions must provide successful techniques and methods to minimize the physiological and psychological effects of withdrawal that will occur when addicted coaches attempt to quit ST use.



The question of whether personal factors outweigh social factors for baseball coaches is an important consideration for future interventions because many current tobacco cessation protocols attempt to utilize other people's opinions of tobacco use as a small, but essential, component in the quit attempt (Burak, 2001; Cooper, Ellison, & Walsh, 2003; Flay, et al., 1994; Gansky, et al., 2009; Manning, 2009; Wium, Breivik, & Wold, 2006). If these personal relationships cannot be utilized to minimize or eliminate ST use, then normative beliefs should not be included in the intervention program. This would also seem to reduce the use of other coaches (both at the professional and collegiate level) as role models for non-use in a social norm campaign to eliminate ST use in the sport. If social pressures do not produce the desired decrease in intention, then role modeling or social norm campaigns would seem to be unnecessary and irrelevant for the future intervention program.

Finally, the use of gender, participation in sports, prior experimentation, peer use, geographic region, and cigarette use as predictive variables for future ST use and initiation may be more appropriate than the sub-components that comprise the theory of planned behavior (Ebbert, et. al., 2006; Morrell, et. al., 2005; Newman & Shell, 2005; Rhodes & Courneya, 2003; Scott, Eves, French, & Hoppe, 2007; Tomar & Giovino, 1998). This is important because a future intervention/education program that is based on these variables would look very different from one that focused on the sub-components of the theory of planned behavior. Focusing on sports participation--with the coach as an

integral component of the intervention--and peer pressure would provide interesting options that may offer a unique opportunity to decrease ST use throughout baseball.

### Prediction Analysis

The third research question asked which of the behavioral intention components were the strongest predictors of behavioral intentions for tobacco use in coaches and enforcement of tobacco use rules by coaches. The correlational analysis and the discriminant function analysis are linked closely together because the correlation of the sub-components to behavioral intention is utilized to determine the predictive power of the sub-components with regard to behavioral intention.

**Results:** The discriminant function analysis for the behavioral intention to use ST suggested that only behavioral beliefs was a significant predictor of ST use. The other five sub-components were not significant and were not strong predictors of ST use. The analysis of the behavioral intention to enforce tobacco use rules revealed that perceived power, behavioral beliefs, assessment of behavior outcomes, and normative beliefs were significant predictors of coach intention to enforce tobacco use rules. The other sub-components were not a significant predictor of behavioral intention to enforce tobacco use rules.

**IMPORTANT NOTE:** Although the discriminant function analysis results are intriguing and possibly of some importance for consideration in the development of future education/intervention programs, it is essential to bear in mind that these data may be less

reliable than the correlational analysis data. There are a number of reasons to review the discriminant function data with a considerable level of suspicion. First of all, the way the data were partitioned into low and high intenders for the discriminant function analysis may have adversely affected the outcome of the analysis because it utilizes a different grouping than the correlational analysis used. Second, the respondents' answers to the two behavioral intention questions appeared to be skewed, especially with regard to the intention to enforce tobacco use rules question. The vast majority of coaches stated that they strongly intend to enforce the tobacco use rules all of the time, which could skew the data toward the high intender category and affect the results of the analysis. Finally, the fact that the correlational analysis and the discriminant function findings are so disparate should lead to skepticism of the results, especially the results from the discriminant function. Future investigators should use both correlational and discriminant function analyses with their data to determine if the findings of this study can be replicated, which would then validate the findings regarding which sub-components have the greatest predictive power for behavioral intention to use ST and to enforce tobacco use rules.

**Discussion of Results:** Research into the theory of planned behavior has consistently found that the perceived behavioral control component possesses the greatest prediction potential of all of the components in this theory (Ajzen, 1991; Armitage & Conner, 2001). In fact, the primary difference between the original theory of reasoned action and its offshoot theory on planned behavior is the inclusion of perceived behavioral control and the individual's real or perceived control over the health behavior

that is being studied (Ajzen, 1991). In the theory of planned behavior, the perceived behavioral control component has a direct link to behavior, which suggests that perceived behavioral control by itself can lead to the completion/initiation of some forms of health behavior.

With that in mind, the hypothesis for this sub-problem was that the two sub-components of perceived behavioral control (control beliefs and perceived power) would be the strongest predictors of behavioral intention. However, the hypothesis for this sub-problem was rejected. The perceived power component did demonstrate a high discriminant function coefficient for the prediction of behavioral intention, but it was not the sub-component with the highest co-efficient--and therefore the best predictor, nor was it statistically significant. Control beliefs did not achieve either a high discriminant function coefficient or statistical significance, which would suggest that it may not be a strong predictor of behavioral intention for ST use.

On the other hand, behavioral beliefs might be considered a strong predictor of ST use intention because it had the highest discriminant function coefficient (.767) and was statistically significant ( $p < 0.002$ ). It is interesting that behavioral beliefs would be a significant predictor of behavioral intention because questions within this sub-component have both proven useful in demonstrating differences between ST users and non-users and shown the highest correlation scores of all of the sub-components in the theory of planned behavior. It appears from this analysis that, as far as ST use in baseball coaches is concerned, behavioral beliefs may be the most appropriate sub-component to use both

to predict intention and as a guide in the development of an intervention program specific to this population.

While it is surprising that behavioral beliefs might be a stronger predictor of intention than either sub-component in the perceived behavioral control component, it has been previously suggested that the relative importance of each sub-component for the prediction of intentions varies depending on the behavior and the target population (Ajzen & Fishbein, 2004; Sharma, 2007). Therefore, it would seem likely that a future intervention program for ST use in high school baseball coaches should consider emphasizing behavioral beliefs as a primary method for decreasing or eliminating ST use in coaches. Focusing on negative health effects and the effects on performance would appear to provide an opportunity to be successful as a cessation program.

An interesting side note that was discussed with regard to the correlation scores of the sub-components and behavioral intention is that previous research has shown that ST users are quite knowledgeable about the adverse health effects associated with consistent use, especially direct effects--such as oral cancer (Eaves, Schmitz, & Siebel, 2009). With that in mind, it would seem that behavioral beliefs would not be a strong predictor of intention because behavioral beliefs is based on the understanding, or lack thereof, of the potential health consequences that are associated with initiating or continuing to partake of the measured health behavior. However, this study found the opposite--that the behavioral beliefs sub-component may be the best predictor of ST use intention in this population.

The hypothesis for the sub-problem focused on the predictive power of the six sub-components of the theory of planned behavior with regard to the intention to enforce tobacco use rules was again based on the fact that perceived behavioral control has been found to be the strongest predictor of intention across a wide range of health behaviors (Ajzen, 1991; Armitage & Conner, 2001). The results for this hypothesis were inconclusive with control beliefs having neither a high discriminant function coefficient nor statistical significance, and perceived power demonstrating both the highest coefficient (.576) and statistical significance ( $p < 0.009$ ). This suggests that the perceived power sub-component may be a useful predictor in assessing the likelihood that high school baseball coaches will enforce the tobacco use rules with their athletes. Several other sub-components in the theory of planned behavior also demonstrated high discriminant function coefficients and statistical significance, including behavioral beliefs (-.389,  $p < 0.044$ ), assessment of behavioral outcome (.419,  $p < 0.028$ ), and normative beliefs (-.406,  $p < 0.026$ ).

Each of these sub-components might be strong predictors of the likelihood that coaches will enforce the tobacco use ban established by the school system within the athletes on their team. While understanding what predicts the intention to use ST in high school baseball coaches is important in the effort to minimize or eliminate ST use in this population, it is even more important to determine what predicts the intention to enforce the tobacco use ban because this intention will affect the ability of the athletes to use ST during team-sponsored events. This in turn may decrease or eliminate overall ST use

among adolescent baseball athletes and the initiation of an ST use habit in athletes who are new to the team. It is essential that high school baseball coaches enforce the tobacco use bans that are already present in all North Carolina public school districts and numerous private schools to protect adolescent athletes from a dangerous and addictive health behavior.

**Clinical Implications:** Future research should continue the investigation of the predictive power of the six sub-components of the theory of planned behavior on behavioral intention to determine if other samples within this target population demonstrate the same results. A consistent reporting of these results might allow future intervention programs to be developed with behavioral beliefs as a cornerstone in the attempt to minimize initiation and use of ST in baseball coaches, and by extension, their athletes. Current interventions have utilized graphic images of ST-related diseases, dental examinations, and frank discussions of the health risks that are associated with ST use. These techniques, which focus on behavioral beliefs, are good starting points for future education programs. Other aspects that could be included are the effects of nicotine addiction, the physical sensations and reactions that occur with use, and the effects on performance in baseball or healing of sports-related injuries.

While the intention to enforce tobacco use bans is not directly related to the planned intervention/education program geared toward the target population, there is still relevance in determining which of the sub-components of the theory of planned behavior were the strongest predictors of intention to enforce a tobacco use ban. This could be a

useful element in either the intervention program or an annual in-service program for coaches that would provide useful information that may be utilized in coaches' efforts to minimize or eliminate ST use among the athletes on their teams. The predictors of intention that demonstrated high discriminant function coefficients and statistical significance could be included to increase the likelihood that the intention to enforce the tobacco use bans would increase in the high school coaches.

Creating this element of an intervention program or developing an in-service dedicated to tobacco ban enforcement based on the significant sub-components of the theory of planned behavior would provide the necessary scientific foundation that is needed to assist the coaches with the most appropriate techniques to enforce the tobacco use ban, thereby increasing their intention to attempt to enforce the ban. Utilizing the sub-components that were significant in this study (behavioral beliefs, assessment of behavioral outcomes, normative beliefs, and perceived power)--after replication work is completed--in future intervention programs may provide a solid foundation of knowledge that can be used to educate the coaches who may then take the information and present it to their teams. Different individuals will connect better with certain facts and information. Because of this, the intervention program should offer a broad range of data that can be used to improve each coach's ability to enforce ST use bans with their athletes.



### Discussion of Supplementary Results

The prevalence of spit tobacco use in baseball coaches has been reviewed in three previous studies with use rates ranging from 13-18.5% (Chakravorty, Buchanan, & Osfeldt, 1997; Eaves, Schmitz, & Siebel, 2009; Horn, et al, 2000). Results of the current study show a much higher prevalence rate (26%) among North Carolina high school baseball coaches than what was found in the previous studies. Also, there were a significant number of former ST users among the study subjects (32%), which demonstrates that more than half of the subjects have used ST at some point in their lives. This is an extremely high rate of use for ST, which may be explained in part by the regional location of the study--North Carolina ranks among the top ten states in ST use rates annually.

Considering the regional penchant for ST use and in conjunction with a sport which is known for high use (baseball has the highest prevalence of ST use among high school, collegiate, and professional sports), the high prevalence rates found in this study seem reasonable. Additionally, it is possible these results are an underestimate of actual ST use since some of the subjects in this study may have been untruthful when filling out the questionnaire, or the non-respondents may include a significant number of ST users, which could be what led the non-respondents to not complete the questionnaire in the first place. There was no follow-up in this study with non-respondents to determine their rationale for not completing the survey, although this could be a consideration when conducting future research.

Finding that 58% of the study subjects have used ST at some time in their lives was quite alarming considering the role model potential for coaches with their athletes. This is especially important considering that all of the coaches who participated in the study worked at the high school level, which has consistently been found to be the age range that has the highest rates of initiation of ST use. The connection between high school-aged adolescents and the ST initiation age finding was reinforced with this study since 26% of the respondents who had ever used ST began tobacco use during their high school years. With the high initiation rates for ST use found in the high school setting, it is even more important for high school coaches to act as appropriate role models for their athletes. Unfortunately, the respondents to this study demonstrated that they did not consistently provide that appropriate role modeling for their athletes, even in a school activity-related setting such as baseball practices and games and when it was against school district policy.

Fifty-four percent of the current ST users stated that they used at least occasionally during team practices, while 42% stated that they used at least occasionally during team games. Also, 50% of the ST users stated that they felt the athletes were aware of their ST use. This use during team functions reinforces the connection between baseball and ST that has been long established in the professional ranks. When impressionable youth athletes see the coaches using ST during baseball activities, the potential role modeling opportunity for the coaches is reversed and provides the athletes with the impression that baseball and ST use are an acceptable and even fundamental

combination. Therefore, future intervention/education programs should focus not only on decreasing or eliminating use in coaches, but also reminding them of the role modeling aspect that comes with coaching adolescent athletes in a sport known for ST use. Coaches must realize the importance of their role in the lives of the athletes and be willing to learn appropriate role modeling techniques--all of which could be included in the intervention.

Role modeling is extremely important in the early stages of development for an adolescent who is forming the core standards and beliefs that will be the foundation for his/her future character (Flay, et al., 1994; Gansky, et al., 2009; Manning, 2009; Wiium, Breivik, & Wold, 2006). Seeing or knowing that parents or other significant people in their lives (e.g. coaches) use tobacco products may constitute a powerful message to young people, which in turn will lead to a portrayal of tobacco use as safe and approved, what is common/normal, and an increase in the intention to use tobacco for the adolescent (Wiium, Breivik, & Wold, 2006). This continuous reinforcement of the positive side of tobacco use as a societal norm--or a baseball norm--and accepted among people adolescents aspire to be like, is precarious because it becomes common practice and is no longer considered to be dangerous or unhealthy. This positive norm and acceptance of tobacco use by adults and peers in the eyes of an adolescent will lead that youngster to believe the social pressure connected with using tobacco is in their best interest and that significant others will not disapprove of tobacco use. This will eventually lead to an inability or lack of desire to resist using ST. In fact, previous research supports that it is even more difficult for adolescents to not use tobacco when

they realize that their peers, or people whom they consider like themselves, also use tobacco (Wium, Breivik, & Wold, 2006).

The prevalence of ST use in high school baseball athletes has been found to range from 34-50% nationwide, which is in the same range as the 42% of collegiate baseball players and 35-50% of professional baseball players who use ST (Cooper, Ellison, & Walsh, 2003; NCAA, 2005; Sinusas & Coroso, 2006; Walsh, et al, 1994). With this significant number of users in the sport of baseball--use that occurs in spite of a ban on the use of all tobacco products at the high school, collegiate, and professional minor league levels--it is clear that coaches in this study have underestimated the prevalence of ST use in their athletes. This study found thirty-three percent of all coaches (29% of current users) stated that none of their athletes used spit tobacco. Thirty-two percent of the respondents (38% of current users) stated that very few athletes (1-2) used spit tobacco. Twenty-two percent of coaches (21% of current users) stated that some athletes (3-5) used spit tobacco. Eleven percent of respondents (13% of current users) stated that many athletes (6-15) used spit tobacco, and 2% of respondents (0% of current users) felt that most athletes (16-25) on their team used spit tobacco regularly.

With previous research finding that 34-50% of athletes use ST, it is interesting that only 13% of the respondents in this study believed that prevalence was at a similar level on their individual team. Either the prevalence rates are lower for the teams whose coaches responded to this questionnaire--which seems unlikely considering that the state of North Carolina has such a high prevalence rate throughout its population and the high

percentage of use in the sport in general, the coaches are under-representing the number of athletes who use ST on their teams--intentionally or unintentionally, or the coaches are unaware of the prevalence of use on their teams. This research did not assess which answer is correct, but if it is because of under-representation or lack of awareness, then it is important for any future education, prevention, and intervention programs to emphasize the documented athlete prevalence rates so that coaches understand the true extent of ST use. The ST use prevalence rates for both coaches and athletes should be emphasized--both during intervention programs and during annual coaching clinics--so that everyone involved with the sport is fully aware of the significance of the ST use problem. Full awareness of the issue should re-confirm the importance of the problem and lead to an increased emphasis on looking for and decreasing the levels of use for high school athletes.

The final step in the role of coaches in preventing ST use among their athletes--besides appropriate role-modeling and a thorough understanding the issue--is to enforce the tobacco use bans that are already in place. Ninety-six percent of respondents to this study stated that their schools had an established policy banning the use of tobacco products in some manner. Eighty-six percent of the respondents also stated that they did not allow ST use during practices and 96% of the respondents did not allow ST use during games, which suggests that the coaches appropriately enforce the ban that is already in place. However, further analysis of the data found that 14% of all subjects and 33% of ST users allowed use by their athletes during practice at least occasionally. This

would suggest that while the vast majority of coaches do not allow ST use during baseball activities, the coaches that do allow use tended to be predominately ST users themselves.

Therefore, these data suggest that if a coach is an ST user, he/she is more likely to allow athletes to use ST during baseball activities. Not only are the ST users demonstrating poor role modeling techniques for their adolescent athletes on their teams, they are also not enforcing the bans on ST use in their school districts, which likely will increase both the risk for tobacco-related illness in current athlete users, as well as increase peer pressure to use ST on the non-using athletes. This finding may suggest that coaches who use ST do not take tobacco use bans and the health risks associated with use seriously, which is a dangerous stance to take with impressionable adolescents. It also may suggest that coaches who use ST do not feel comfortable banning a product that they themselves use, whether or not they use ST at baseball-related activities. Finally, it may suggest that some coaches do not seriously consider themselves to be influential components of a prevention/intervention program regarding ST and their athletes. This reinforces statistical results from another study which suggested that coaches who use ST may not believe they play as important a role in preventing ST use as coaches who do not use ST (Eaves, Schmitz, & Siebel, unpublished raw data). No matter what the true rationale is, it is important for all coaches to engage in these prevention/intervention programs and be active partners in the effort to minimize or eliminate ST use in adolescent baseball players. Future educational interventions should focus first on

reminding or reinforcing the fact that coaches are very influential role models for their athletes. Because of this role, the coaches must focus on acting as a healthy role model for their teams, and then emphasize the importance of consistent enforcement of ST use bans so that the athletes receive the appropriate message every time they are involved with the sport.

### Limitations

The primary limitation regarding this study is similar to what is typically seen in research that uses the theory of planned behavior to frame it—the use of self-report/subjective data. There is always worry when self-report data are used for analysis because of potential bias that may occur when using a convenience sample (Ajzen & Fishbein, 2004; McMillan & Conner, 2003; Sharma, 2007). While it is virtually impossible to obtain and utilize objective measures when assessing health behaviors, which is especially true when using the theory of planned behavior constructs, it would be useful to collect an objective measure of ST use, such as an oral swab to analyze nicotine levels, and assess the true power of the theory in predicting behavioral measures (McMillan & Conner, 2003).

However, the cost of such an analysis would be significantly more than the cost of collecting self-report data, and previous research has shown that self-report data tends to be quite accurate (Ajzen & Fishbein, 2004). There are instances where self-report data for socially desirable behaviors (i.e. habits of exercise or physician visits) may be skewed because respondents tend to overstate the incidence or performance of these socially

desirable behaviors. However, studies investigating risky health behaviors--such as condom, alcohol, or tobacco use, have shown that self-report data can be rather reliable. Unfortunately though, without objective data, it is difficult to determine the true reliability of these data.

The second limitation associated with this study also involves possible sample bias that may be found when using a convenience sample. The study was conducted at an annual high school baseball coach's clinic and business meeting. The sample did not include the entire target population--even though all coaches in the state were invited--and was not randomized to ensure an unbiased and representative sample of the population. The original intent was to capture the entire population, not a sample. While this did not occur, the resulting sample did include respondents of all ages ranging from 22 to 64 and relatively similar numbers of coaches from a wide variety of school location sizes, including rural (18%), small city (31%), medium city (33%), and large city (16%). The diversity seen in age and school locations is fairly representative of the overall population of baseball coaches in North Carolina, and therefore should be a fair depiction of the target population in this state. While sample bias may still exist, the conference group that was selected for data capture was chosen because of the availability of a representative sample of coaches.

Finally, a third limitation regarding this study is the lack of research into this specific health behavior (ST use) using the theory of planned behavior as a guide. The hypotheses that were created for this study were based on research into other risky health



behaviors, such as cigarette use, alcohol use, and condom use. While the model was supported in many of those studies, it was not upheld as successfully in this study. Because ST use has not been reviewed with this theory previously--at least in published research--it was difficult to support hypotheses that were specific to oral tobacco use habits. Future investigators may be able to utilize data from this study to provide a more solid foundation or baseline for creating better supported hypotheses than were used for this study.

#### Suggestions for Future Research

This study should serve as an exploratory analysis of behavioral intentions in high school baseball coaches in North Carolina, and as a good initial preparation for developing a future intervention program geared specifically toward high school baseball coaches in that state. Future research should expand on this preliminary data by studying other states and groups of coaches and assess if the prevalence of ST use in high school coaches in other states is accurately depicted in this study and if using the components of the theory of planned behavior is the best method to frame this type of research. Other states should also be involved in future studies to ensure that the results found in this state are not specific to just one locale. It is recommended that subsequent research focus on states that have the highest prevalence of ST use in the general population or that are found in the regions with a high prevalence of use (the South and Midwest regions specifically) because of the benefits that would arise from determining the prevalence of ST use and initiating the intervention program in high use areas. High use regions would

be most appropriate for prevalence research because it would allow for a suitable allocation of resources to the regions where future intervention programs are most needed.

Future research in the field of ST use in baseball coaches and athletes may also want to utilize a mixed-methods approach to delve deeper into the differences between users and non-users and determine if there are potential issues with ST use enforcement for coaches. A research protocol that includes questionnaire data followed up by focus group interviews would provide an opportunity to gain further insight into the mentality of the target group. This increased insight will benefit both the quality of future research and the potential success of the proposed interventions geared toward high school baseball coaches.

Data collected in future research can then be utilized to develop and test an intervention program that is geared specifically to high school baseball coaches. Because of the high rate of initiation seen during the high school years, both in this study and in previous research, the population demographic that has the most access to adolescents at this stage of life would have the best opportunity for limiting initiation and/or continuation of ST use for athletes. An intervention program that could be developed for high school baseball coaches would need to be focused on decreasing the prevalence of ST use in this population and providing useful techniques for discussing the issue with their athletes in an attempt to minimize use in athletes. Therefore, the intervention program that would be created would have a multi-faceted focus--minimizing ST use in

high school baseball coaches and demonstrating appropriate techniques for the coaches to use to minimize ST use in their athletes. Research would then need to be conducted to evaluate if the interventions were successful.

### Conclusion

This study provided a number of useful insights into the behavioral intentions of high school baseball coaches in North Carolina. While there were not as many significant results as hypothesized regarding the sub-components of the theory of planned behavior, those that did reach significance can provide a starting point for assessing intention to use ST and provide the necessary background for the development of an intervention/education program geared toward high school baseball coaches. Also, the non-significant and visually inspected data results can be equally valuable in the development of this intervention program.

The first six sub-problems in this study evaluated the differences between coaches who were ST users and non-users with regard to the six sub-components of the theory of planned behavior. The hypotheses for behavioral beliefs and perceived power were upheld, while the hypotheses for assessment of behavioral outcomes and control beliefs were inconclusive. The hypotheses for normative beliefs and motivation to comply were rejected, which validates previous research that questioned the role of normative beliefs and motivation to comply in the theory of planned behavior (Sharma, 2007).

The study also examined the correlations between the six sub-components of the theory of planned behavior and behavioral intention. One of the five hypotheses was found to be inconclusive (behavioral beliefs). The other five hypotheses were rejected because of a lack of even a moderately significant correlation with behavioral intention. As previously stated, the lack of correlation between the individual sub-components with intention is most likely related to the belief that the theory as a whole has a stronger relationship with intention than the individual sub-components. The lack of correlation in this instance could also be related to the lack of volitional control as seen in ST use related to nicotine addiction. Finally, the lack of correlation could be related to the fact that many baseball coaches who use ST are already aware of the adverse health effects associated with use and continue to use ST in spite of this knowledge. In this regard, future research should determine if the theory of planned behavior is an appropriate tool to utilize when assessing ST use.

Finally, the study evaluated the prediction ability of the sub-components of the theory concerning which one might be the most powerful predictor of future ST use and enforcement of a tobacco-use policy with the respondents' individual teams. Data for these sub-problems suggested that several of the sub-components showed power in predicting intention relative to future ST use and enforcement of the tobacco use policy. Knowing these sub-components and how to utilize them might be useful in the future development of an intervention program geared toward the target population. However, the prediction data results are suspicious as per the previous discussion about them.

All in all, this study has provided new, invaluable information on the prevalence of ST use in North Carolina high school baseball coaches and the connection of ST use/non-use with some of the behavioral components which make up the theory of planned behavior. Future research should attempt to replicate and extend these results and include more states/regions in the United States in an attempt to possibly produce data to support a national baseball-specific intervention program. This intervention program would help to minimize ST use in both the high school baseball coaches and adolescent athletes who comprise high school teams.

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# **APPENDIX A**

## **APPROVAL FOR STUDY FROM NORTH CAROLINA BASEBALL COACHES ASSOCIATION**

Institutional Review Board

University of North Carolina-Greensboro

Greensboro, NC

Please accept this letter as support for the doctoral project: Spit Tobacco Use and Behavioral Intentions in High School Baseball Coaches in North Carolina to be completed by Ted Eaves. In order to complete this study, I will offer Ted Eaves the opportunity to present his questionnaire to the baseball coaches at the 2010 annual meeting of the North Carolina Coaches' Association. Mr. Eaves will be provided with a place on the agenda and a dedicated amount of time to discuss the informed consent process for the questionnaire.

Sincerely,

Pete Shankle

North Carolina Baseball Coach Committee Chair

North Carolina Coaches' Association



**Subject:** Request to conduct study at your annual business meeting

**From:** Ted Eaves [ehaves@ncat.edu](mailto:ehaves@ncat.edu)

**Date:** August 5, 2009

**To:** Pete Shankle [pete.shankle@dpsnc.net](mailto:pete.shankle@dpsnc.net)

Coach Shankle,

My name is Ted Eaves, and I am an athletic trainer and doctoral student at the University of North Carolina at Greensboro. I am in the process of completing my dissertation on Spit Tobacco Use in High School Baseball Coaches and would like to see if it would be possible to come to your annual business meeting and ask the coaches who attend to complete a survey on spit tobacco use. The survey will be anonymous and should only take about 10 minutes for the coaches to complete. To conduct the survey, I will need about 5 minutes to introduce the survey, go over the consent process, and pass out the survey. After that, if I could have a table to sit at to collect the completed surveys, that would be very helpful. Thank you for your time and consideration. I look forward to talking with you soon and, hopefully, meeting with your group in January.

Sincerely,

Ted Eaves

**Subject:** Re: Request to conduct study at your annual business meeting

**From:** Pete Shankle [pete.shankle@dpsnc.net](mailto:pete.shankle@dpsnc.net)

**Date:** August 6, 2009

**To:** Ted Eaves [teaves@ncat.edu](mailto:teaves@ncat.edu)

TED.....CALL ME....919-560-3968

PETE

**APPENDIX B**

**INSTITUTIONAL REVIEW BOARD**

**APPROVAL LETTER**



**OFFICE OF RESEARCH COMPLIANCE**

2718 Beverly Cooper Moore and Irene Mitchell Moore  
Humanities and Research Administration Bldg.  
PO Box 26170  
Greensboro, NC 27402-6170  
336.256.1482  
Web site: [www.uncg.edu/orc](http://www.uncg.edu/orc)  
Federalwide Assurance (FWA) #216

**To:** William Karper  
Dept of Kinesiology  
258 HHP Building

**From:** UNCG IRB

---

Authorized signature on behalf of IRB

**Approval Date:** 12/08/2009

**Expiration Date of Approval:** 12/07/2010

**RE:** Notice of IRB Approval by Expedited Review (under 45 CFR 46.110)

**Submission Type:** Initial

**Expedited Category:** 7. *Surveys/interviews/focus groups*

**Study #:** 09-0415

**Study Title:** Spit Tobacco Use and Behavioral Intentions in North Carolina High School Baseball Coaches

This submission has been approved by the IRB for the period indicated. It has been determined that the risk involved in this research is no more than minimal.

**Study Description:**

This study is to investigate the use of spit tobacco in North Carolina high school baseball coaches using survey methodology during a face-to-face data collection session at a meeting of all the coaches.

**Investigator's Responsibilities**

Federal regulations require that all research be reviewed at least annually. It is the Principal Investigator's responsibility to submit for renewal and obtain approval before the expiration date. You may not continue any research activity beyond the expiration date without IRB approval. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.

When applicable, enclosed are stamped copies of approved consent documents and other recruitment materials. You must copy the stamped consent forms for use with subjects unless you have approval to do otherwise.

You are required to obtain IRB approval for any changes to any aspect of this study before they can be implemented (use the modification application available at <http://www.uncg.edu/orc/irb.htm>). Should any adverse event or unanticipated problem involving risks to subjects or others occur it must be reported immediately to the IRB using the "Unanticipated Problem/Event" form at the same website.

CC: Edward Eaves, Dr. Cathryne Schmitz, (UNCG IRB Chair), Non-IRB Review Contact

**APPENDIX C**

**INITIAL SURVEY**

**QUESTIONNAIRE**

## Initial Survey Questionnaire

### Demographic Information

1. Gender
  1. Male
  2. Female
  
2. How old were you on your last birthday? \_\_\_\_\_
  
3. Ethnic Group
  1. Hispanic
  2. African-American
  3. Native American
  4. Asian
  5. Pacific Islander
  6. Caucasian, non-Hispanic
  7. Other \_\_\_\_\_
  
4. Position (Choose one)
  1. Head Coach
  2. Assistant Coach
  3. Other \_\_\_\_\_
  
5. Education Level (Choose the highest level which applies to you)
  1. High School Diploma
  2. Associate Degree
  3. Baccalaureate Degree (4-year degree)
  4. Graduate Degree
  
6. Baseball Playing Experience
  1. High School
  2. Junior College/College
  3. Minor League (up to single-A)
  4. Minor League (AA or AAA)
  5. Major League
  6. No Baseball Playing Experience
  7. Other \_\_\_\_\_
  
7. How large is the region in which your school is located?
  1. Large-city (Population greater than 100,000)
  2. Medium-city (Population between 25,000 and 100,000)
  3. Small-city (Population between 5,000 and 25,000)
  4. Rural (Population less than 5,000)
  
- 8a. Does your school have a policy prohibiting or limiting tobacco use (including cigarettes and/or spit tobacco)?
  1. No
  2. Yes
  3. Unsure

## Initial Survey Questionnaire

- 8b. If your school does have a tobacco policy, what is it? (Choose all that apply)
1. No tobacco use allowed on school grounds at any time
  2. No tobacco use allowed during school hours
  3. No tobacco use allowed during school-sanctioned events at anytime
  4. No tobacco use allowed by students under the age of 18 anytime
  5. Other \_\_\_\_\_
- 8c. If your school does have a tobacco policy, how many years has it been in place? \_\_\_\_\_
- 8d. If your school does have a tobacco policy, do you make an active effort to enforce your school's tobacco use policy with your athletes?
1. No, never
  2. Sometimes
  3. All the time
  4. There is no policy

**Spit Tobacco Usage** (*It is very important to provide an honest assessment of the following issues. Your answers are anonymous and cannot be linked to you in any way.*)

9. Do you now, or have you ever used any form of spit tobacco (chewing tobacco or moist snuff)?
1. No, never
  2. Not now, but I have in the past
  3. Yes, currently

**IF YOU HAVE NEVER USED SPIT TOBACCO, PLEASE SKIP TO QUESTION NUMBER 15**

10. If you have quit, how long has it been since you last used spit tobacco?
1. Less than 1 month
  2. 1-6 months
  3. 7-12 months
  4. 1-3 years
  5. 3-5 years
  6. 5+ years
  7. I have never tried to quit
11. At what age did you start using spit tobacco?
1. 8<sup>th</sup> grade or before
  2. 9<sup>th</sup> to 12<sup>th</sup> grade/High School
  3. Freshman year of college (18-19 years old)
  4. After freshman year of college (19+ years old)
12. Do you use spit tobacco at team practices or scrimmages?
1. No
  2. Yes, Occasionally (less than three times per week)
  3. Yes, Often (three or more times per week)
13. Do you use spit tobacco at regulation games?
1. No
  2. Yes, Occasionally (less than three times per week)
  3. Yes, Often (three or more times per week)

## Initial Survey Questionnaire

14. Are your players aware that you use spit tobacco?

1. No
2. Yes

**Spit Tobacco Usage Information Regarding Players** (*It is very important to provide an honest assessment of the following issues. Your answers are anonymous and cannot be linked to you in any way.*)

15. Do you allow your athletes to use spit tobacco during practices?

1. No
2. Sometimes
3. Yes

16. Do you allow your athletes to use spit tobacco during games?

1. No
2. Sometimes
3. Yes

17. How many of your athletes use spit tobacco? (*Please provide your best estimate*)

1. None
2. Very few (1-2 athletes)
3. Some (3-5 athletes)
4. Many (6-15 athletes)
5. Most (16-25 athletes)
6. All of them

### Attitudes Toward Behavior

18. Using spit tobacco is

- |               |   |   |   |   |   |   |   |            |
|---------------|---|---|---|---|---|---|---|------------|
| a. Harmful    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Beneficial |
| b. Agitating  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Relaxing   |
| c. Unpleasant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Pleasant   |

19. What types of effects on health are likely to occur as a result of using spit tobacco?

- |                            |   |   |   |   |   |   |   |                         |
|----------------------------|---|---|---|---|---|---|---|-------------------------|
| a. Negative health effects | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Positive health effects |
|----------------------------|---|---|---|---|---|---|---|-------------------------|

20. The effects on my health that can result from spit tobacco use are important to me.

- |                      |   |   |   |   |   |   |   |                |
|----------------------|---|---|---|---|---|---|---|----------------|
| a. Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |
|----------------------|---|---|---|---|---|---|---|----------------|

21. What type of effect on athletic performance is likely to occur as a result of using spit tobacco?

- |                         |   |   |   |   |   |   |   |                      |
|-------------------------|---|---|---|---|---|---|---|----------------------|
| a. Impaired performance | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Improved performance |
|-------------------------|---|---|---|---|---|---|---|----------------------|

22. The effect on athletic performance that can result from spit tobacco use is important to me.

- |                      |   |   |   |   |   |   |   |                |
|----------------------|---|---|---|---|---|---|---|----------------|
| a. Strongly disagree | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Strongly agree |
|----------------------|---|---|---|---|---|---|---|----------------|



## Initial Survey Questionnaire

23. The overall benefits of using spit tobacco outweigh the overall costs or health risks for me.

a. Strongly disagree      1 2 3 4 5 6 7      Strongly agree

### Subjective Norms

24. Most people inside of baseball think that

a. I should not use spit tobacco      1 2 3 4 5 6 7      I should use spit tobacco

25. Most people, outside of baseball, who are important to me think that

a. I should not use spit tobacco      1 2 3 4 5 6 7      I should use spit tobacco

26. The approval/disapproval of people in baseball regarding my choice to use/not use spit tobacco is important to me.

a. Strongly disagree      1 2 3 4 5 6 7      Strongly agree

27. The approval/disapproval of people outside of baseball regarding my choice to use/not use spit tobacco is important to me.

a. Strongly disagree      1 2 3 4 5 6 7      Strongly agree

### Perceived Behavioral Control

28. Whether or not I use spit tobacco is influenced by factors beyond my control.

a. Not at all      1 2 3 4 5 6 7      Completely

29. Whether or not I use spit tobacco is influenced by factors within the baseball environment.

a. Not at all      1 2 3 4 5 6 7      Completely

30. Whether or not I use spit tobacco is under my personal control.

a. Not at all      1 2 3 4 5 6 7      Completely

31. Whether or not I use spit tobacco is influenced by a North Carolina high school tobacco policy.

a. Not at all      1 2 3 4 5 6 7      Completely

### Behavioral Intentions

32. I intend to use spit tobacco in the next 12 months.

a. Strongly disagree      1 2 3 4 5 6 7      Strongly agree

33. I intend to enforce a ban on spit tobacco use with my athletes throughout the upcoming baseball season.

a. Strongly disagree      1 2 3 4 5 6 7      Strongly agree

**APPENDIX D**

**PILOT STUDY**

## Methods

The pilot study of the survey questionnaire used for this project was conducted to assess the reliability and content validity of a self-created questionnaire. It was developed to collect data from high school baseball coaches on: demographic information, personal spit tobacco use, athlete spit tobacco use, behavioral intention, and the six sub-components of the Theory of Planned Behavior (behavioral beliefs, assessment of outcomes, normative beliefs, motivation to comply, control beliefs, and perceived power). The newly created questionnaire was based on selected questions from the NCAA study of substance use habits of college student-athletes (2006) and two questionnaire construction articles that were written to assist with the development of questionnaires specific to the theory of planned behavior (Ajzen, 2006; Francis, Eccles, Johnston, Walker, Grimshaw, Foy, Kaner, Smith, & Bonetti, 2004).

In order to assess the usefulness of the questionnaire, the investigator requested the assistance of both experts in the fields of tobacco prevention and survey methodology and high school baseball coaches outside of the state of North Carolina (to ensure that the target population for the dissertation project was not involved). The collection of data for the pilot study was conducted in October and November 2009 prior to the winter NCCA coaches meeting in January.

The seven tobacco prevention and survey methodology experts were tasked with assessing the content validity (and to some extent, the reliability) of the newly constructed questionnaire. They were contacted and asked to review the questionnaire to ensure that all items were clear and fulfilled the goal for each section listed above the

questionnaire items (See Appendix E). Also, they were asked to tell the investigator about any corrections they would make to any of the items. The percent of agreement regarding the validity of each item on the questionnaire among the seven experts was calculated and utilized to determine which specific questions warranted revision or possible removal from the questionnaire. Finally, each question was reviewed by these experts to determine if the items were appropriate for the intended target population.

Following the expert review, the questionnaire was pilot tested with high school baseball coaches outside of North Carolina to help establish the overall content validity and reliability of the questionnaire. Five hundred and fifteen high school coaches, from an American Baseball Coaches Association membership list used in previous research on coaches' spit tobacco use, were contacted via e-mail to request their assistance with the pilot testing. Of the 515 coaches who were initially contacted, 26 agreed to complete the questionnaire and answer the same questions the experts were asked. Each of the coaches who agreed to be a member of the pilot study group received a list of instructions for completion of their work, an informed consent form outlining the pilot study, a copy of the questionnaire, and a separate form that requested an analysis of each of the individual sections.

The coaches were asked to complete the questionnaire, answer the questions on the form relative to their opinion about each item and return everything to the investigator who then used the data to calculate the percent of agreement and Cronbach's Alpha (a statistic which indicates the degree of internal consistency among the questionnaire items).

## Results

The percent of agreement was calculated by determining how many coaches and experts felt that a given questionnaire item met the approved standard of being clear, appropriate for the target audience, and appropriate for the selected category. If a respondent answered yes to the above information, then he/she was considered to be in agreement for that item. The percent of agreement calculations for the coaches indicated that of the 36 items in the questionnaire, 28 of them received 100% approval. The other eight questions had a percent of agreement ranging from 83-96%. The percent of agreement calculations for the experts indicated that of the 36 items in the questionnaire, 9 items received 100% approval. The other 27 items had a percent agreement ranging from 42-86%. These data are displayed in Table 22.

The Cronbach's alpha and item-total correlation statistics were also used to help to evaluate content validity and reliability. The cut-off score for Cronbach's alpha was set at .60 as per Groves, et al. (2004). The Cronbach's alpha scores for the theoretical components that comprise the questionnaire ranged from .674 to .973. The cut-off values for item-total correlation for each of the sections were set at .30 (Groves, et. al., 2004). These values ranged from .437 to .987. The data for this analysis are displayed below in table 23.

The revisions that were recommended by both groups ranged from grammatical and semantic alterations to whether or not selected items should be included in the questionnaire. Every change that was suggested by both groups was evaluated and

addressed by the investigator so that the questionnaire would have the best possible reliability and content validity.

Question six was changed to include a *choose all that apply* descriptor. Question 8a was changed to offer the unsure option second instead of third. Question ten was changed to offer different time ranges which better reflect questions used in other tobacco research. Question eleven was changed to include 6<sup>th</sup> grade in the first option as a way to better clarify the time frame. Question fourteen was changed to include an unsure option in case the coach was not positive if the players on his/her team were aware of tobacco use. Question 18b was changed to use the word *calming* rather than *relaxing* so that the sensation would be clearer. Question twenty was changed to include *either positive or negative* as a descriptor for health effects. This was included to ensure that the questionnaire remained neutral and did not seem biased toward negative opinions of ST use. Question 22 was changed to include *either impairing or improving* as a descriptor for performance effects to again ensure that the questionnaire was neutral and unbiased. Question 24 in the pilot questionnaire was changed by removing *inside of baseball* and replacing it with *in baseball* to allow for better clarity within the question.

Questions 23 and 31 in the pilot study questionnaire were removed from the final questionnaire because, although they each had high percents of agreement, the statistical analyses of those questions demonstrated that they had very low correlations as a given component. The final Cronbach's alpha scores without including questions 23 and 31 are found in table 23.

**Table 22. Percent Agreement for Pilot Study**

Questions	% agreement coaches	# of coaches in agreement	% agreement experts	#of experts in agreement
1	100%	26	100%	7
2	100%	26	100%	7
3	100%	26	100%	7
4	100%	26	100%	7
5	100%	26	57%	4
6	100%	26	86%	6
7	100%	26	71%	5
8a	100%	26	42%	3
8b	100%	26	57%	4
8c	100%	26	57%	4
8d	100%	26	86%	6
9	100%	26	86%	6
10	94%	24	71%	5
11	100%	26	86%	6
12	100%	26	57%	4
13	100%	26	57%	4
14	100%	26	57%	4
15	100%	26	86%	6
16	100%	26	71%	5
17	100%	26	71%	5
18	100%	26	71%	5
19	100%	26	100%	7
20	100%	26	100%	7
21	83%	22	71%	5
22	83%	22	71%	5
23	83%	22	71%	5
24	100%	26	57%	4
25	100%	26	57%	4
26	94%	24	86%	6
27	94%	24	86%	6
28	96%	25	57%	4
29	96%	25	100%	7
30	100%	26	57%	4
31	100%	26	100%	7
32	100%	26	86%	6
33	100%	26	100%	7

**Table 23. Reliability Assessment**

<b>Category</b>	<b>Questions included</b>	<b>Cronbach's Alpha</b>	<b>Item-Total Correlation Range</b>
Spit Tobacco Use	9	xx	
Spit Tobacco Use	10 through 14	.973	.830-.987
Behavioral Beliefs	18-20, 22	.739	.437-.878
Assessment of Outcomes	21 and 22	.750	.611
Normative Beliefs	23 and 24	.675	.663
Motivation to Comply	25 and 26	.887	.797
Control Beliefs	27 and 28	.674	.535
Perceived Power	29	xx	<i>No correlation</i>
Behavioral Intention	30	xx	<i>available because</i>
Behavioral Intention	31	xx	<i>only one item used</i>



**APPENDIX E**

**PILOT STUDY CHECKLIST FOR SPIT  
TOBACCO SURVEY**

## **Pilot Study Checklist for Spit Tobacco Survey**

### **Section 1: Demographic information**

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes                      \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header?    \_\_\_yes    \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

### **Section 2: Spit Tobacco Usage Regarding Coaches**

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes                      \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header?    \_\_\_yes    \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 3: **Spit Tobacco Usage Regarding Players**

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 4: **Behavioral Beliefs** (*An individual's belief about consequences of particular behavior*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 5: **Assessment of Behavioral Outcomes** (*The likelihood of a health consequence actually occurring*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 6: **Normative Beliefs** (*An individual's perception about the particular behavior, which is influenced by the judgment of significant others*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 7: **Motivation to Comply** (*What is the primary reason that an individual is willing to change a health behavior*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes      \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes      \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 8: **Control Beliefs** (*The perceived presence of factors that may facilitate or impede performance of a behavior*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes      \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes      \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 9: **Perceived Power** (*The power of each control factor to impede or facilitate performance of the behavior*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

Section 10: **Behavioral Intentions** (*An indication of an individual's readiness to perform a given behavior*)

- 1) Does each question in this section make sense? Is each question clear and appropriate for the target audience? \_\_\_yes \_\_\_no
- a) If there is a question that does not make sense, or is not clear or appropriate for the target audience, please list the number of the question and any important observations below.

- 2) Does each question in this section fulfill the goals stated in the section header? \_\_\_yes \_\_\_no
- a) If there is a question that does not fulfill its stated goal, please list the number of the question and your observations below.

**APPENDIX F**

**STUDY QUESTIONNAIRE**

## Study Questionnaire

### Demographic Information

1. Gender
  1. Male
  2. Female
  
2. How old were you on your last birthday? \_\_\_\_\_
  
3. Ethnic/Racial Group
  1. Hispanic
  2. African-American
  3. Native American
  4. Asian
  5. Pacific Islander
  6. Caucasian, non-Hispanic
  7. Other \_\_\_\_\_
  
4. Position (Choose one)
  1. Head Coach
  2. Assistant Coach
  3. Other \_\_\_\_\_
  
5. Education Level (Choose the highest level which applies to you)
  1. High School Diploma
  2. Associate Degree
  3. Baccalaureate Degree (4-year degree)
  4. Graduate Degree
  
6. Baseball Playing Experience (Choose all that apply to you)
  1. High School
  2. Junior College/College
  3. Minor League (up to single-A)
  4. Minor League (AA or AAA)
  5. Major League
  6. No Baseball Playing Experience
  7. Other \_\_\_\_\_
  
7. How large is the region in which your school is located?
  1. Large-city (Population greater than 100,000)
  2. Medium-city (Population between 25,000 and 100,000)
  3. Small-city (Population between 5,000 and 25,000)
  4. Rural (Population less than 5,000)
  
- 8a. Does your school have a policy prohibiting or limiting tobacco use (including cigarettes and/or spit tobacco)?
  1. No
  2. Unsure
  3. Yes



## Study Questionnaire

- 8b. If your school does have a tobacco policy, what is it? (Choose all that apply)
1. No tobacco use allowed on school grounds at any time
  2. No tobacco use allowed during school hours
  3. No tobacco use allowed during school-sanctioned events at anytime
  4. No tobacco use allowed by students under the age of 18 anytime
  5. Other \_\_\_\_\_

- 8c. If your school does have a tobacco policy, how many years has it been in place?  
\_\_\_\_\_

- 8d. If your school does have a tobacco policy, do you make an active effort to enforce your school's tobacco use policy with your athletes?
1. No, never
  2. Sometimes
  3. All the time
  4. There is no policy

**Spit Tobacco Usage** (*It is very important to provide an honest assessment of the following issues. Your answers are anonymous and cannot be linked to you in any way.*)<sup>i</sup>

9. Do you now, or have you ever used any form of spit tobacco (chewing tobacco or moist snuff)?
1. No, never
  2. Not now, but I have in the past
  3. Yes, currently

**IF YOU HAVE NEVER USED SPIT TOBACCO, PLEASE SKIP TO QUESTION NUMBER 15**

10. If you have quit, how long has it been since you last used spit tobacco?
1. Less than 1 month
  2. 1-3 months
  3. 4-6 months
  4. 6-12 months
  5. 1-3 years
  6. 3+ years
  7. I have never tried to quit

11. At what age did you start using spit tobacco?
1. 6<sup>th</sup> to 8<sup>th</sup> grade or before
  2. 9<sup>th</sup> to 12<sup>th</sup> grade/High School
  3. Freshman year of college (18-19 years old)
  4. After freshman year of college (19+ years old)

12. Do you use spit tobacco at team practices or scrimmages?
1. No
  2. Yes, Occasionally (less than three times per week)
  3. Yes, Often (three or more times per week)

## Study Questionnaire

13. Do you use spit tobacco at regulation games?
1. No
  2. Yes, Occasionally (less than three times per week)
  3. Yes, Often (three or more times per week)
14. Are your players aware that you use spit tobacco?
1. No
  2. Unsure
  3. Yes

**Spit Tobacco Usage Information Regarding Players** (*It is very important to provide an honest assessment of the following issues. Your answers are anonymous and cannot be linked to you in any way.*)

15. Do you allow your athletes to use spit tobacco during practices?
1. No
  2. Sometimes
  3. Yes
16. Do you allow your athletes to use spit tobacco during games?
1. No
  2. Sometimes
  3. Yes
17. How many of your athletes use spit tobacco? (*Please provide your best estimate*)
1. None
  2. Very few (1-2 athletes)
  3. Some (3-5 athletes)
  4. Many (6-15 athletes)
  5. Most (16-25 athletes)
  6. All of them

### Attitudes Toward Behavior

18. Using spit tobacco is
- |               |   |   |   |   |   |   |   |            |
|---------------|---|---|---|---|---|---|---|------------|
| a. Harmful    | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Beneficial |
| b. Agitating  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Calming    |
| c. Unpleasant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Pleasant   |
19. What types of effects on health are likely to occur as a result of using spit tobacco?
- |                            |   |   |   |   |   |   |   |                         |
|----------------------------|---|---|---|---|---|---|---|-------------------------|
| a. Negative health effects | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Positive health effects |
|----------------------------|---|---|---|---|---|---|---|-------------------------|

## Study Questionnaire

20. The effects on my health (*either positive or negative*) that can result from spit tobacco use are important to me.
- a. Strongly disagree                      1 2 3 4 5 6 7                      Strongly agree
21. What type of effect on athletic performance is likely to occur as a result of using spit tobacco?
- a. Impaired performance                      1 2 3 4 5 6 7                      Improved performance
22. The effect on athletic performance (*either impairing or improving*) that can result from spit tobacco use is important to me.
- a. Strongly disagree                      1 2 3 4 5 6 7                      Strongly agree

### Subjective Norms

23. Most people in baseball think that
- a. I should not use spit tobacco                      1 2 3 4 5 6 7                      I should use spit tobacco
24. Most people, outside of baseball, who are important to me think that
- a. I should not use spit tobacco                      1 2 3 4 5 6 7                      I should use spit tobacco
25. The approval/disapproval of people in baseball regarding my choice to use/not use spit tobacco is important to me.
- a. Strongly disagree                      1 2 3 4 5 6 7                      Strongly agree
26. The approval/disapproval of people outside of baseball regarding my choice to use/not use spit tobacco is important to me.
- a. Strongly disagree                      1 2 3 4 5 6 7                      Strongly agree

### Perceived Behavioral Control

27. Whether or not I use spit tobacco is influenced by factors beyond my control.
- a. Not at all                      1 2 3 4 5 6 7                      Completely

## Study Questionnaire

28. Whether or not I use spit tobacco is influenced by factors within the baseball environment.

a. Not at all                            1 2 3 4 5 6 7                            Completely

29. Whether or not I use spit tobacco is under my personal control.

a. Not at all                            1 2 3 4 5 6 7                            Completely

### **Behavioral Intentions**

30. I intend to use spit tobacco in the next 12 months.

a. Strongly disagree                1 2 3 4 5 6 7                            Strongly agree

31. I intend to enforce a ban on spit tobacco use with my athletes throughout the upcoming baseball season.

a. Strongly disagree                1 2 3 4 5 6 7                            Strongly agree

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Note: Questions 11-13 were adapted from the NCAA Study of Substance Use Habits of College Student-Athletes with the e-mail permission of Mary Wilfert on May 20, 2009.