

5-16-2014

A Comparison of Smokeless Tobacco Usage in Two NCAA Baseball Programs

Andrew Farrey

Follow this and additional works at: http://scholarworks.gsu.edu/iph_theses

Recommended Citation

Farrey, Andrew, "A Comparison of Smokeless Tobacco Usage in Two NCAA Baseball Programs." Thesis, Georgia State University, 2014.

http://scholarworks.gsu.edu/iph_theses/334

This Thesis is brought to you for free and open access by the School of Public Health at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Public Health Theses by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact scholarworks@gsu.edu.

A comparison of smokeless tobacco usage in two NCAA baseball programs

By

Andrew Farrey

B.A., Political Science
Oglethorpe University

A Thesis Submitted to the Graduate Faculty
Of Georgia State University in Partial Fulfillment
Of the
Requirements for the Degree

MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA
30303

TABLE OF CONTENTS

ACKNOWLEDGMENTS	iv
LIST OF TABLES.....	v
APPROVAL PAGE.....	vi
ABSTRACT.....	vii
AUTHOR’S STATEMENT.....	viii
NOTICE TO BORROWERS.....	ix
INTRODUCTION.....	1
1.1 Background.....	1
1.2 Purpose of the Study.....	3
1.3 Research Questions.....	3
REVIEW OF THE LITERATURE.....	5
2.1 Pharmacodynamics of Smokeless Tobacco (ST).....	5
2.2 Health Effects of ST.....	8
2.3 ST Use in Baseball.....	13
METHODS AND PROCEDURES.....	17
3.1 Context and Rationale of Study.....	17
3.2 Study Instrumentation and Study Population.....	17
3.3 Study Measures.....	18
3.4 Statistical Analysis.....	20
RESULTS.....	21
4.1 Study Population.....	21
4.2 Age and ever-use of ST.....	21
4.3 Race/Ethnicity and ever-use of ST.....	22
4.4 Current year of collegiate eligibility and ever-use of ST.....	22
4.5 Position player or pitcher and ever-use of ST.....	23
4.6 Age and habitual ST use.....	24
4.7 Race/Ethnicity and habitual ST use.....	25
4.8 Current year of collegiate eligibility and habitual ST use.....	25
4.9 Position player or pitcher and habitual ST use.....	26
4.10 School and Opinion of ST.....	27

DISCUSSION AND CONCLUSION.....	29
5.1 Discussion of Research Questions.....	29
5.2 Study Strengths and Limitations.....	33
5.3 Recommendations for Future Research.....	35
5.4 Conclusion.....	36
REFERENCES.....	38
APPENDICES.....	44

Acknowledgements

I would like to thank my thesis chair, Dr. Sterling, and the other member of my thesis committee, Dr. Eriksen. Their guidance was helpful and greatly simplified the process for me. I'd also like to thank my family and Julie for making sure I was working on this document when I was supposed to be, and providing support while I was researching and awaiting IRB approval.

List of Tables

Number	Title	Page
3.1	Modified Labels	19
4.1	Total Ever-use of ST by School	23
4.2	Chi-Square Tests for Ever-use of ST	24
4.3	Total Habitual ST Use by School	26
4.4	Chi-Square Tests for Habitual ST Use	27
4.5	Opinion of ST stratified by School	28

APPROVAL PAGE

A comparison of smokeless tobacco usage in two NCAA baseball programs

By

Andrew Farrey

Approved:

Committee Chair

Committee Member

Committee Member

Date

ABSTRACT

TITLE: A comparison of smokeless tobacco usage in two NCAA baseball programs

INTRODUCTION: Smokeless tobacco (ST) is commonly associated with baseball.

The purpose of this paper is to examine and compare the ST usage patterns on an NCAA Division I baseball team and an NCAA Division III baseball team. The collected data will be compared to patterns of use from similar age groups in a national survey. The health effects of ST will be examined, along with the background of ST and baseball.

METHODS: An online survey was used to distribute and administer the questionnaire to willing participants on the two college baseball teams. The survey was open from October 29th, 2013 to February 1st, 2014, at which point the data was collected and analyzed for patterns of use in SPSS. The results were then compared to smokeless tobacco use rates in baseball players and student-athletes on the whole found by the NCAA Student-Athlete Substance Abuse Surveys from 1997, 2001, and 2009.

RESULTS: The NCAA Division I baseball team had substantially higher rates of use, both in terms of ever-use and habitual use when compared to the NCAA Division III baseball team. On the Division I team, 75% of players reported ever-use and 62.5% of players reported habitual use. On the Division III team, 35.7% of players reported ever-use, while only 14.3% of players reported habitual use.

DISCUSSION: The survey found that the Division I team reported higher rates of use than the Division III team, other NCAA student-athletes generally (75% ST ever-use and 62.5% habitual ST use compared to 17.4% of other student-athletes reporting past 12 month ST use) and higher use than other NCAA baseball players (75% ST ever-use and 62.5% habitual ST use compared to 52.3% of other NCAA baseball players reporting past 12 month ST use), while the Division III team only reported only higher ever-use than NCAA student-athletes on the whole reported use in the last 12 months, (35.7% compared to 17.4%). The Division III team reported quite a bit less use than other NCAA baseball players (35.7% ST ever-use and 14.3% habitual ST use compared to 52.3% past 12 month ST use in other NCAA baseball players). This is an awkward comparison given the difference in definitions of use ever-use and habitual use versus past 12 month use.

The major issue with the study was the lack of a large sample size, so the data should be used cautiously. The rates on both teams would likely be closer had more players responded to the survey. There was some difficulty in comparing this data with the NCAA data given the different operational definitions smokeless tobacco use. The NCAA asked about use in the last 12 months, while this survey asked about ever-use and habitual use as determined by regularity and frequency of use.

Author's Statement Page

In presenting this thesis as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this thesis may be granted by the author or, in his/her absence, by the professor under whose direction it was written, or in his/her absence, by the Associate Dean, College of Health and Human Sciences. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this dissertation which involves potential financial gain will not be allowed without written permission of the author.

Signature of Author

Notice to Borrowers Page

All theses deposited in the Georgia State University Library must be used in accordance with the stipulations prescribed by the author in the preceding statement.

The author of this thesis is:

Student's Name: Andrew Farrey

Street Address: 3850 Ashford Trail

City, State, and Zip Code: Atlanta, GA 30319

The Chair of the committee for this thesis is:

Professor's Name: Dr. Kimberle Landrum Sterling

Department: Institute of Public Health

College: Health and Human Sciences

Georgia State University
P.O. Box 3995
Atlanta, Georgia 30302-3995

Users of this thesis who not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulation by signing below. Libraries borrowing this thesis for the use of their patrons are required to see that each user records here the information requested.

NAME OF USER	ADDRESS	DATE	TYPE OF USE (EXAMINATION ONLY OR COPY)

Chapter I

INTRODUCTION

1.1 Background

Smokeless tobacco use has long been associated with baseball in the United States; particularly with Major League Baseball (MLB). The practice has been commonplace in the MLB since the 1880s when players used smokeless tobacco to keep their mouths moist on the dry, dusty fields of the era (Connolly, Orleans, & Blum, 1992). Though ever present, the use of ST increased in the 1970s and 1980s as the risks of cigarette smoking became commonly known and ST companies began an aggressive marketing campaign targeting professional baseball players (Severson, Klein, Liechtenstein, Kaufman, & Orleans, 2005). This association has trickled down to amateur levels of baseball, including National Collegiate Athletic Association (NCAA) baseball.

In the campaign against tobacco use, smokeless tobacco (ST) is often neglected or forgotten. Smokeless tobacco (ST) is any form of tobacco that is consumed without combustion. The two main types are moist snuff and chewing tobacco. Snuff is finely cut or ground tobacco that is usually moist and typically packaged in a can or “tin.” It comes in different types of cut (long cut, fine cut) and a variety of flavors. While usually in loose form, snuff can also be found in the form of pouches with a pre-portioned amount inside or in the form of dissolvable lozenges and strips. Chewing tobacco is available as loose leaves, plugs (similar to a brick of tobacco that a users cut pieces off for chewing), and twists of rope made of tobacco leaves. It is either chewed or held in place on one side of the mouth, and the excess saliva produced is either spit or swallowed (NCI Smokeless Tobacco Fact Sheet, 2010). It is far more visible than snuff and usually

forms the distinctive cheek bulge that is thought of when one thinks of the smokeless tobacco baseball players use.

A newer type of ST called snus has become available in the United States, though it has long been available in Scandinavian countries. It is similar to snuff in that it can be moist or dry and comes loose or in small pouches, but is pasteurized and is cured using steam or a combination of steam and fire instead of fire alone, which considerably reduces the levels of carcinogenic Tobacco-specific *N*-nitrosamines (TSNAs) present (Lee, 2013). Other types of smokeless tobacco exist elsewhere in the world, such as the Sudanese Toombak, Afghani Naswar, and Indian Gutka, and at least statistically, are far more carcinogenic and harmful than the types of ST used in baseball. These types of ST often include other additives (industrial lime, betel quid, etc.) that appear to create a synergistic carcinogenic effect (Health, 1986). The types of ST presented here are the ST products commercially available in the United States, with the focus being on moist snuff and chewing tobacco, the two types of ST used almost exclusively in Major League Baseball (MLB) (Boffetta, Hecht, Gray, Gupta, & Straif, 2008, Euromonitor International, 2013).

Smokeless tobacco and baseball have a long and storied history. Many great players were ST users such as Tony Gwynn and Babe Ruth, and many, like Chase Utley, Nick Swisher, and Dan Uggla, still are. Major League Baseball now publicly discourages its use and has put restrictions on its use in public in front of fans (autograph signings and other public off-field appearances) but this has not stopped professional players from continuing to use ST. Recent estimates of the prevalence of ST use in the MLB have approached as high as 40-50%, though these rates do appear to be steadily declining over

time (Cooper, Ellison, & Walsh, 2003). An outright ban on ST in the minor leagues has not led to a substantial decrease in ST users in professional baseball either. Seeing professional players use ST has long provided at least some influence on adolescent baseball players to begin using; once beginning to use ST these new users can influence their peers as well, thus perpetuating the cycle of smokeless tobacco and baseball (Connolly, Orleans, & Blum, 1992, Eaves, 2011). MLB players should remember that they are role models to a large number of children, who emulate behaviors of the people they look up to. Hopefully, if enough professional players stop using ST or never start, then the behavior will cease to trickle down and over time ST use and baseball will no longer be associated with one another.

1.2 Purpose of Study

The purpose of this study is to measure and quantify patterns of ST use on an NCAA Division I baseball team and an NCAA Division III baseball team, then compare the data looking for differences between the two teams. After this comparison, this data will be compared with survey responses from other NCAA student athletes.

1.3 Research Questions

- How many players use ST on the NCAA Division I baseball team and how many players use ST on the NCAA Division III baseball team? Does one team have more ST users proportionately than the other? What percentage overall of each team uses ST?
- Are NCAA baseball players that play a particular position more likely to use ST?

- How do the collected survey results compare to other NCAA athlete survey responses? Do the baseball players on these two teams use ST more or less than other NCAA baseball players around the country?
- How do the ST usage rates from the two surveyed teams compare to NCAA student-athlete data from years past?

Chapter II

REVIEW OF THE LITERATURE

In this chapter, support for this study's research questions is synthesized from the scientific literature.

2.1 Pharmacodynamics of Smokeless Tobacco (ST)

ST is any kind of tobacco that is consumed orally without combustion. The most common types available in the US and the two used in (and the types covered by this document) include: moist snuff or "dipping tobacco" that comes in finely shredded form or in pre-portioned pouches, chewing tobacco, which comes in loose leaf form, plugs (a "brick" of tobacco), and braided ropes of tobacco. As mentioned above, there are a wide variety of other ST products around the world, but this document is limited in scope to the two types sold in the continental United States most often used in MLB, moist snuff and chewing tobacco (Boffetta, et al., 2008, Cooper, Ellison, & Walsh, 2003). ST, like other forms of tobacco, is highly addictive due to the presence of nicotine.

Nicotine is specifically classified as a euphoriant that produces dose-dependent changes in mood and feeling. Nicotine, like other addictive drugs, causes perceptible neurological changes that are appealing to the user, thus reinforcing the nicotine-administering behavior, subsequently resulting in addiction. Over time, nicotine causes neuroadaptation that leads to much higher tolerance and severe physiological dependence, regardless of the route of nicotine administration. Users of ST appear to be as addicted, if not more addicted, to nicotine than cigarette users. This is thought to be due in part to the proximity of the buccal mucosa to the brain (Health, 1986).

Once placed in the mouth, the nicotine from the smokeless tobacco is rapidly absorbed into the bloodstream from the buccal mucosa, at levels as much as twice as high as after smoking one cigarette (Fant, Henningfield, Nelson, & Pickworth, 1999). Fant et al. (1999) assumed users of ST use approximately 2.5 grams per use, thus it is safe to assume that many ST users use portions that differ in size from the doses studied in Fant's et al. controlled conditions. This means it is possible that more nicotine is delivered than in even two cigarettes. Based on the author's observations during his collegiate baseball career, many users of ST use two or more pouches of ST at once instead of only one at a time.

Nicotine is most easily absorbed in its unionized form, which is PH dependent; as PH rises, the unionized nicotine is more readily absorbed by the buccal mucosa. Thus, not only the total nicotine content of a ST product is important, but the PH of the product and the proportion of the total nicotine in unionized form are as well. The PH of ST increases the longer it is exposed to saliva, thus increasing the amount of nicotine absorbed by the user. After entering the bloodstream, the nicotine causes an increase in heart rate, diastolic blood pressure, and systolic blood pressure. The increase in heart rate ceases or begins to decline after approximately 15 minutes of nicotine absorption (Fant et al., 1999).

Besides nicotine, ST contains a variety of harmful compounds, the most notable being Tobacco-specific nitrosamines (TSNAs). TSNAs form during the curing and processing of the tobacco leaves, as well as from the formation of nitrate and nitrite by bacteria endemic to tobacco (Rodu & Jansson, 2004). The TSNAs 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (abbreviated to NNK) and N'-

nitrosonornicotine (NNN) are believed to play a role in the development of a variety of tobacco-related cancers, including cancers of the lung, esophagus, oral cavity, and pancreas (Hecht, Carmela, Foiles, Murphy, & Peterson, 1993). Levels of TSNAs in ST are unrelated to total nicotine, un-ionized nicotine, moisture, price, or market share (Richter, Hodge, Stanfill, Zhang, & Watson, 2008). Levels of TSNAs have fallen considerably since the 1986 Surgeon General's report, and continue to decrease due to improved production, storing, and fermentation methods. It is interesting to note that unlike levels of TSNAs which have decreased over time, nicotine content has remained the same or increased since the Surgeon General's report (Health, 1986, Brunnemann, Qi, & Hoffmann, 2002). Whether the reductions in TSNAs will have an observable effect at the population level remains to be seen.

Other harmful compounds include a variety of polycyclic aromatic hydrocarbons (PAHs), which after TSNAs are the strongest carcinogens in ST, followed by trace amounts of Polonium 210 (^{210}Po) (Stepanov et al., 2010). PAHs are carcinogens formed during the tobacco curing process, and traditionally from the incomplete combustion of organic matter. Chemicals classified as PAHs include Benzo[a]pyrene (BaP), naphthalene, acenaphthylene, anthracene, and fluorene (Stepanov et al., 2010). The Polonium, along with other trace amounts of carcinogens like lead, formaldehyde, cadmium, and Uranium 235 (^{235}U) are thought to be absorbed by the tobacco roots and leaves from both the fertilizer and soil used during the growing of the tobacco before being processed into ST (Brunnemann & Hoffmann, 1992).

2.2 Health Effects of ST

In addition to the potent carcinogens present in ST, its use causes changes in oral anatomical structures at the cellular level. A 1992 study by Daniels et al. found four types of changes in 142 biopsy specimens from 133 professional baseball players that were regular ST users. The four types of changes were hyperparakeratosis, hyperorthokeratosis, pale surface staining, and basal cell hyperplasia. Hyperparakeratosis is the more technical term for leukoplakia, a white, premalignant plaque that often forms in the mouths of ST users. Leukoplakia also often presents with hyperorthokeratosis, an abnormal thickening of granular keratohyaline cells in the orthokeratin layer of the buccal mucosa. Pale surface staining is a discoloration of the visible enamel on teeth; it usually is yellowish or brownish in users of tobacco. Basal cell hyperplasia is an abnormal thickening of basal cells in a given area of epithelium; this is typically in the area of the mouth the user places the ST (Daniels et al., 1992).

While chemical and histological analyses are important, substantial research has been done at the population level to determine the strength of the association between ST and many varieties of cancer and cardiovascular disease. Older research (before 1990), and research by a subset of specific authors (Boffetta and Winn, for example) have found much higher correlations between ST use and cancer than newer studies have. In the oldest studies, this is due, at least in part, to several factors: they often did not have control groups, and if they did; there were no attempts to control for confounding (Rosenfeld & Callaway, 1963, Landy & White, 1961, Wilkins & Vogler, 1957).

Once modern epidemiologic methods became standard practice, the accepted format of case-control studies and retrospective cohort studies became common for

studying the health risks of ST. In what has been considered the “landmark” study on ST, Winn et al. (1981) found a remarkably increased RR for oral cancer in snuff dippers in a case-control study done on North Carolina women. They found that the RR for female snuff dippers that were nonsmokers was 4.2 (CI=2.6-6.7), and that among female, long-term (>50 years), chronic users, the RR was increased by nearly 50 times. They concluded that non snuff-dipping-related oral cancers resulted from the combination of cigarette smoking and alcohol consumption (Winn et al., 1981). This nearly 50-fold relative risk increase has since been generalized to all types of ST, all forms of oral cancer, and this statistic became the status quo that has been repeated since.

Zhou et al. (2013) found a non-significant elevated risk for ever having used ST and head and neck Squamous cell carcinoma (HNSCC) (OR 1.2, CI=0.67-2.16). They also found a significant elevated risk for long term (>10 years) users of ST (OR 4.06, CI=1.31-12.64). And most importantly, they found an elevated risk in ever-users of ST compared to never cigarette smokers (OR 4.21, CI=1.01-17.57), suggesting that long-term ST use increases the risk for developing HNSCC and oral cancer (Zhou et al., 2013). In another study, Alquacil and Silverman (2004) conducted a case-control study by interview with residents of Atlanta, Detroit, and 10 counties in New Jersey. They found a moderately increased risk of pancreatic cancer in subjects that used >2.5 ounces of ST a week (OR 3.5, CI=1.1-11), and an increased risk in long-term ST users (OR 1.5, CI=0.6-4.0), though the latter statistic was non-significant (Alquacil & Silverman, 2004).

Large retrospective studies have also been done to attempt to quantify the risks of ST use. Bjelke and Schuman (1982) published one of the earliest of the large cohort studies; they found that in cohorts of 12,945 Norwegian men and 16,930 American men,

there was an increased risk of dying from oral, pharyngeal, and esophageal cancers (RR 2.6-31, no CI reported), as well as an increased risk of developing pancreatic cancer (RR 2.9, no CI reported). Boffetta, Aagnes, Weiderpass, & Andersen (2005) retrospectively examined a cohort of 10,136 Norwegian men that used snus and found the relative risk (RR) of pancreatic cancer was 1.67 (CI=1.12-2.50), the RR of oral and pharyngeal cancer was 1.10 (CI= 0.50-2.41), the RR of esophageal cancer was 1.40 (CI=0.61-3.24), and the RR of stomach cancer was 1.11 (CI=0.83-1.48). Luo et al. (2007) also found an increased risk of pancreatic cancer in a retrospective cohort of 125,576 Swedish males that were construction workers from 1978-1992. They calculated a RR of 2.0 (CI=1.2-3.3) compared with never users of tobacco (Luo et al., 2007).

Several case-control studies have found ST users have comparable or very slightly increased risk of developing heart disease to never-users of ST, but the studies have not been of large enough scale to confidently conclude that ST users experience no increased risk over never-users (Huhtasaari, Lundberg, Eliasson, Janlert & Asplund (1999). A handful of studies have found a moderately increased risk for cardiovascular mortality, but there are fewer of these studies than studies finding no increased risk or even a slightly decreased risk of cardiovascular mortality in ST users compared to never-users (Bolinder, Alfredsson, Englund, & de Faire, 1994). Regardless of the impact ST has on risk of cardiovascular mortality compared to never-users, researchers do agree that ST confers a significantly smaller risk of a fatal cardiovascular event than does smoking (Asplund, 2003).

Despite the findings of the aforementioned studies, there are a small but significant number of researchers that believe ST is definitely not as bad as smoking and its health effects should be re-evaluated taking modern studies and improved ST manufacturing methods into account (Rodu & Cole, 2002, Waterbor et al., 2004, Rodu 2011, Kozlowski 2007, Gartner & Hall, 2010). There are also those in the public health field that are unwilling to openly admit any form of tobacco is less harmful, but are willing to consider the possibility (Hatsukami, Lemmonds, & Tomar, 2004, Mejia, Ling, & Glantz, 2010).

The prevailing school of thought is based on research collected and published by the Surgeon General in a report on the health effects of ST in 1986 (Health, 1986), and more specifically, on the aforementioned paper published in 1981 by Winn et al that found a 50-fold increased risk of a particular type of oral cancer associated with dry snuff in long-term (>50 years) female dry snuff users that used the product an average of 21 hours per day for 50 years or more (Winn et al., 1981).

A recent and extensive meta-analysis found little to no statistically significant correlation between ST and cancer, though the meta-analysis was funded by the European Smokeless Tobacco Council (Lee & Hamling, 2009). Lee & Hamling (2009) performed a meta-analysis of 62 American and 18 Scandinavian studies and found statistically significant increased risks only for oropharyngeal (OR 1.36 CI=1.04-1.77, n=19) and prostate (OR 1.29 CI=1.07-1.55, n=4) cancers; though the association between ST and oropharyngeal cancer disappeared in studies published since 1990 (OR 1.00 CI=0.83-1.20, n=14), and in studies that adjusted for alcohol (OR 1.07 CI=0.84-1.37, n=10). Lee & Hamling (2009) also calculated that of 142,205 smoking-related male

deaths in 2005, 1,102 (1.1%) would have been attributable to ST if as many men used ST as smoked, and 2,081 (2.0%) if every man had used ST instead of smoking.

In the same year, Lee & Hamling (also 2009) published a commentary on the differences in RR estimates reported by Boffetta et al. in their 2008 study and Lee & Hamling's own meta-analysis. The two analyses appeared to contain very similar bodies of research, but Lee & Hamling found significantly lower RR estimates than Boffetta and his colleagues did for ST use overall and several different cancer sites. Lee & Hamling (2009) used pre-defined criteria and included all studies that met the inclusion criteria (Boffetta et al. did not), as well as reporting separate RR estimates with studies that adjusted for smoking and those that did not (Boffetta et al did not). Using the same studies as Boffetta et al. (2008), Lee & Hamling (2009) found estimated RR increases of <15% for esophageal, pancreatic, and lung cancers (Boffetta et al. found a non-significant increased risk of <20% for lung cancer and found statistically significant increased risks of 60-80% for esophageal, pancreatic, and oral cancers), and an increase of 36% for oral cancer.

These findings suggest there has been some publication bias in the field of ST research. When all applicable studies are considered, the purported increased risk of developing cancer due to ST use possibly approaches that of never-users of ST, though this is controversial at best. The oft-reported 50-fold increased risk taken of oral cancer from Winn et al. (1981) also approaches that of non-users when only studies performed since 1990 are considered; this also is indicative of either shoddy epidemiology or some sort of bias, but influence from the tobacco industry cannot be entirely ruled out in some recent studies. Though older studies found significantly increased risk for developing

cancer with ST use, newer studies and meta-analyses have found minimal or no increased risk of oral cancer, other forms of head and neck cancer, or pancreatic cancer (Rodu & Cole, 2002, Bouquot & Meckstroth, 1998, Weitkunat, Sanders, & Lee, 2007). More research is needed to more conclusively determine the risks of ST use; though in the meantime, professional and amateur baseball players alike will likely continue to use ST regardless of the potential health risks.

2.3 ST Use in Baseball

Smokeless tobacco (ST) and professional baseball, Major League Baseball (MLB), have been almost synonymous for over a century. ST was first used in professional baseball to keep the player's mouths moist during games as fields were significantly dustier than present fields (Eaves, 2011). Even after fields became professionally groomed, the practice of using ST during baseball games continued. Baseball offers the ideal environment for an ST user as the risk of physical injury or physical contact while playing baseball is comparatively low when other sports are considered. Combined with the stopping and starting nature of baseball, this creates an environment where ST is accepted and even encouraged by peer reinforcement, superstition, and other ritualistic behavior unique to baseball. In college athletes especially, this can translate to increased ST usage off the field (Eaves, 2011).

At the end of the 19th century and the beginning of the 20th, using ST was not as uncommon or socially unacceptable as using ST now. ST usage in the US used to be significantly higher; until 1918 it was the predominant form of tobacco use in the US (Boffetta et al., 2008). After a decline in use due to the rise in cigarette smoking because

of the development of automated cigarette production, ST rose in popularity again during the 1960s and 1970s after the dangers of cigarette smoking became more apparent and publicly known (Boffetta et al., 2008). It was during this period that ST companies began providing free ST to professional baseball teams and initiated an aggressive marketing campaign targeting professional baseball players (Eaves, 2011).

The first epidemiological studies investigating the prevalence of ST usage in MLB and other levels of play began to appear during the next several decades. Studies have shown that the prevalence of ST use appears to rise with age, or the longer a player has played baseball (from high school to college, from college to professional). Davis et al. (1997) took a survey of 1200 male high school athletes and found that 21% chew tobacco and 18% used moist snuff. Walsh, Ellison, Hilton, Chesney, & Ernster (2000) found that 15% of the surveyed California public school baseball players were current ST users, and 46% were considered “ever-users.” These numbers are significantly higher than ST usage in high school age groups on the whole; Agaku, Vardavas, Ayo-Yusuf, Alpert, & Connolly (2013) reported that 7.1% (CI=5.5-8.6%) of 15-17 year-olds and 10.1% (CI=7.4-12.8%) of all 18 year-olds surveyed reported using ST in 2011. It is also possible that the numbers presented in studies of high school students are conservative; the data are potentially impacted by high school players more unwilling to admit to purchasing and using tobacco than college or professional populations because ST is illegal to purchase until age 18 and its use is unequivocally illegal in all high school sporting events.

Studies of collegiate baseball players have found comparable or higher rates of ST use on baseball teams than in high school. Gingiss & Gottlieb (1991) found

approximately 53% of varsity baseball players and 25.9% of intramural baseball players surveyed used either chewing tobacco or moist snuff. Walsh, Hilton, Ernster, Masouredis, & Grady (1994) found that 52% of varsity collegiate baseball players surveyed in their study (N=1,328) were current users of ST, and 41% of these users initiated use in high school. The NCAA National Study of Substance Use Trends Among NCAA Student-Athletes (2012) found that 41.5% of surveyed varsity collegiate baseball players used ST in 2005, and in 2009, 52.3% used ST (Bracken, 2013). Additional recent studies are sparse and do not seem to be available, leaving a considerable gap in the ST literature for the last ten years.

This scarcity has not been present for studies about ST use in professional baseball. Studies about the prevalence of ST use and the health effects it has had on the players started being published in the mid 1980s. A study administered during spring training in 1987 surveyed 265 players from seven different MLB teams and found that 34% of players were current ST users (Connolly, Orleans, & Kogan, 1988). Wisniewski and Bartolucci (1989) surveyed 528 MLB players on 25 of the 26 MLB teams during spring training the same year (1987) and reported that 46% were current ST users. Other peer-reviewed literature from 1988-1997 found rates of ST usage of 44%, 40%, 35%, 41%, and 35% respectively, in samples of MLB players (Ernster et al., 1990, Green et al., 1992, Green, Walsh, & Masouredis, 1994).

More recent studies have found encouraging results compared to the studies in the late 80s and 90s. Sinusas and Coroso (2006) found a marked decrease in the overall prevalence of ST use in a sample of Major League Baseball players over a ten year period (1991-2000), from 41.1% in the first year to 25.6% in the tenth year. Another six year-

long study from 1998-2003 found MLB players' self-reported ST use drop from 31.7% in 1998 to 24.8% in 2003 (Severson et al., 2005). Over time it seems the campaigns to reduce tobacco use in the professional baseball ranks have been somewhat successful, though ST usage rates in the MLB are still far too high.

Chapter III

METHODS AND PROCEDURES

3.1 Context and Rationale of Study

There are a multitude of studies about ST use in baseball at the professional level, but there are relatively few studies about ST use in baseball at the collegiate level. ST in general, needs far more research before an educated view about its health effects can be made, and baseball teams provide a population that is likely to contain a sizable percentage of ST users. The purpose of this study is to add to the small body of research about the prevalence of ST use in collegiate baseball.

3.2 Study Instrumentation and Study Population

After obtaining Institutional Review Board approval from Georgia State University (GSU) and Oglethorpe University (OU), the attached survey (see Appendix A) about ST use was administered online to volunteer participants from GSU's varsity baseball team and OU's varsity baseball team, along with a waiver of documentation of consent (see Appendix B). The survey was written by the author, with input from his thesis advisor and is based on his personal experience in collegiate baseball. It is designed to investigate patterns, origins, and cultural norms of ST use in collegiate baseball. It consists of 26 items, and was administered on Qualtrics' website (Qualtrics.com) and a unique link to the team's respective survey was sent to each player. Participation was voluntary and anonymous, and the data obtained from both GSU players and OU players was hosted on secure, off-campus servers, and were tallied and examined separately, before being combined into a single data set for analysis.

Both surveys were activated on October 29, 2013. Players from both teams were given approximately three months to complete the survey during which time a school-specific email invitation (see Appendix C) and two reminders to complete the survey were sent. On February 1st, the survey was closed and the data was compiled and analyzed.

3.3 Study Measures

As this is a prevalence study, the main variables of interest are the demographic variables and whether or not survey respondents have ever used ST, and whether they consider themselves to be habitual users of ST. The variables chosen indicate a rough estimate of the prevalence of ST use on each team along with common demographic characteristics.

Age was defined as the present age of the survey participant at the time of the survey based on the participant's answer to "How old are you?" Race/Ethnicity was defined as the race indicated by survey participants on the question, "What ethnic group do you consider yourself to be a part of?" Current year of NCAA athletic eligibility was defined as the survey participant's indicated year of collegiate athletic eligibility on the question, "What is your current year of college eligibility?" Under normal circumstances, student-athletes are given four years of athletic eligibility in which they can compete. There can be a fifth or even sixth year granted due to injury or personal hardship. This question was asked to determine if status or length of time within the baseball program impacted the likelihood of a player to use ST without factoring in age. The last demographic variable, Position player or pitcher, was determined by the survey

participant’s answer to the question, “Are you a position player or pitcher (if both, which do you consider to be your primary role)?” Pitchers tend to have more downtime when compared to position players given the nature of their role in the game of baseball. This question was asked to determine whether or not this added downtime had any impact on ST use. The last variable that was focused on was Opinion of ST, which was defined as the survey participants’ answer to the question, “Does ST use bother or offend you in any way?” The variable question labels were altered so as to make statistical analysis more practical, and charts more readable, as shown below (Table 3.1).

Table 3.1 Modified labels

“How old are you?” = Age
“What ethnic group do you consider yourself a part of?” = Race/Ethnicity
“What is your current year of college eligibility?” = Current year of eligibility
“Are you a position player or pitcher (if both, which do you consider to be your primary role)? = Position player or pitcher
“Does ST use bother or offend you in any way?” = Opinion of ST

“Have you ever used ST?” or ever-use of ST, was defined as having ever (even once) used ST under any circumstances and was indicated by the player’s answer to that survey question. “Do you consider yourself to be a habitual ST user?” or Habitual ST use, was defined by the author as daily ST use or ST use on most days. Habitual ST use was determined based on the player’s answer to that particular survey question.

3.4 Statistical Analysis

The data from Qualtric's secure servers was downloaded and exported to SPSS (Statistical Package for the Social Sciences), where the statistical analysis was performed. Cross tabulations, frequency tables, and descriptive statistics were run to look for patterns of ST use on each team and any associations present between demographic variables and whether or not a respondent used ST. During the analysis, Chi square tests with p values of 0.05 were utilized to determine statistical significance between groups, if applicable. Though assessing ST prevalence was the primary aim of the study, players were also assessed based on their opinions and attitudes about or towards ST use. Player responses to the question "Does ST use bother or offend you in any way?" were compared by school, and Age, Race/Ethnicity, Current Year of College Eligibility, and Position Player or Pitcher as defined above were each run against "Have you ever used ST?" and "Do you consider yourself to be a habitual ST user?" These demographic measures compared to ST use, along with the prevalence of ST use were the primary interests of administering the survey. The following section presents the aforementioned cross tabulations along with the pertinent Chi square values where applicable, though the full results from the survey can be found in Appendix E.

Chapter IV

RESULTS

The following section will describe the findings of this cross-sectional prevalence study and address the following research questions:

4.1 Study Population

In total, 31 varsity baseball players were contacted by email about the survey at GSU and 35 varsity baseball players were contacted about the survey at OU. Player information was obtained from the student directory for each school respectively. There were 9 responses from GSU, giving a 29% response rate, and 15 from OU, giving a 42.85% response rate, though one survey from each school was incomplete and thus omitted from the analysis.

4.2 Age and ever-use of ST

The age distribution was nearly uniform in OU survey respondents (Table 4.1). Of these respondents, 20-year-olds were the most likely to report ever-use of ST (66.7%), followed by participants that were 22 and older (50%). There was no statistically significant association between any age and ever-use of ST in respondents from OU (Table 4.2) ($\chi=3.471$, $p=.482$). The age distribution of GSU survey respondents was less uniform (Table 4.1). Like OU players, GSU 20-year-olds had the highest prevalence of ever-use of ST, with 100% of them reporting ever-use. There was no age associated with an increased likelihood of being an ever-user of ST in GSU players either (Table 4.2) ($\chi=2.597$, $p=.627$). Overall, 11 survey respondents in total reported ever-use of ST, meaning 50% of the study population reported ever-use of ST.

4.3 Race/Ethnicity and ever-use of ST

All respondents from both schools identified themselves as White (14 from OU, eight from GSU, shown in Table 4.1). 35.7% of respondents from OU identified as ever-users of ST and 75% of respondents from GSU identified as ever-users of ST. There was not a valid Chi-Square value as Race/Ethnicity was a constant. Overall, all 11 survey participants that reported ever-use of ST were White.

4.4 Current year of eligibility and ever-use of ST

Three freshmen, four sophomores, two juniors, three seniors, and two other responded to the survey invitation from OU for a nearly even distribution. Players with fewer years of eligibility remaining were more likely to report ever-use of ST, with the exception of the “other” group (50% of sophomores, 50% of juniors, and 66.7% of seniors) (Table 4.1). None of these values were statistically significant (Table 4.2) ($\chi=5.662$, $p=.229$).

The distribution of year of eligibility was similar in survey respondents from GSU. Like OU, the distribution of current years of eligibility in GSU respondents was very nearly uniform. Of the GSU players that responded, 50% of freshmen, 100% of sophomores, 100% of juniors, 0% of seniors, and 100% of others identified themselves as ever-users of ST at GSU (Table 4.1). Like OU, there was not a statistically significant association present in GSU players (Table 4.2) ($\chi=2.597$, $p=.667$). Seven of the 11 total players that indicated ever-use of ST were juniors or above (Table 4.1).

4.5 Position player or pitcher and ever-use of ST

Ten survey respondents identified themselves as position players and four survey respondents identified themselves as pitchers from OU (Table 4.1). Pitchers from OU were more likely to report ever-use of ST, with 30% of position players and 50% of pitchers identifying themselves as ever-users of ST. Neither of these values was statistically significant (Table 4.2) ($\chi^2=.052$, $p=.819$). By comparison, five survey respondents from GSU identified themselves as position players and three survey respondents from GSU identified themselves as pitchers (Table 4.1). Thus position players from GSU were more likely to report ever-use of ST; though pitchers were still very likely to report ever-use of ST as well (80% of position players and 66.7% of pitchers identified themselves as ever-users of ST). There was not a statistically significant correlation in GSU players (Table 4.2) ($\chi^2=.637$, $p=.425$). Of the 11 total players that indicated ever-use of ST, more position players reported ever-use of ST than pitchers (seven versus four) (Table 4.1).

Table 4.1 – Ever-use of ST by School

	GSU (n=8)		OU (n=14)		Total (N=22)	
	N	Percent of School	N	Percent of School	N	Percent of Total
Age						
18	1	12.5%	0	0%	1	4.5%
19	0	0%	1	7.1%	1	4.5%
20	3	37.5%	2	14.3%	5	22.7%
21	0	0%	1	7.1%	1	4.5%
22 or older	2	25%	1	7.1%	3	13.6%
Race						

White	6	75%	5	35.7%	11	50%
Year of Athletic Eligibility						
Freshman	1	12.5%	0	0%	1	4.5%
Sophomore	1	12.5%	2	14.3%	3	13.6%
Junior	2	25%	1	7.1%	3	13.6%
Senior	0	0%	2	14.3%	2	9.1%
Other (Redshirted)	2	25%	0	0%	2	9.1%
Position						
Position Player	4	50%	3	21.4%	7	31.7%
Pitcher	2	25%	2	14.3%	4	18.2%

Table 4.2 – Chi-Square Tests for Ever-use of ST

All variables stratified by school	Have you ever used ST?		Value	df	Asymp. Sig. (2-sided)
Age	Yes	Pearson Chi-Square	3.471	4	.482
	No	Pearson Chi-Square	2.597	4	.627
Current Year of Eligibility	Yes	Pearson Chi-Square	5.622	4	.229
	No	Pearson Chi-Square	2.597	4	.627
Position	Yes	Pearson Chi-Square	.052	1	.819
	No	Pearson Chi-Square	.637	1	.425

4.6 Age and habitual ST use

The differences in habitual use between the two teams were striking but not statistically significant. OU players reported less habitual ST use than GSU players. There was one 20-year-old OU player and one OU player that was 22 or older that self-identified as habitual ST users, giving OU players an overall rate of 14.3% (two out of 14) for habitual ST use (Table 4.3). Somewhat surprisingly, these values were not statistically significant (Table 4.4) ($\chi^2=.875$, $p=.646$).

GSU players reported more habitual ST use than OU players. Overall, 62.5% of GSU players that completed the survey reported habitual ST use, dwarfing the 14.3% of

OU players reporting habitual ST use (Table 4.3). Also surprising was the lack of a statistically significant association with GSU players (Table 4.4) ($\chi=6.0$, $p=.199$).

20-year-olds reported more habitual use than any other age group. Seven players total reported habitual use, while six players reported use, but not habitual use, leaving no observable patterns (Table 4.3).

4.7 Race/Ethnicity and habitual ST use

Table 4.6 shows habitual ST use stratified by Race/Ethnicity on the two teams. All respondents from both teams that completed the survey self-identified as White. As mentioned above, a far greater percentage of GSU players indicated habitual use; only 14.3% of OU players compared to 62.5% of GSU players that completed the survey identified themselves as habitual ST users (Table 4.3). Race/Ethnicity was a constant so Chi square values were not calculated.

4.8 Current year of eligibility and habitual ST use

There were only two OU players that reported habitual ST use out of the 14 players that completed the survey; a sophomore and a senior (Table 4.3). This gave OU players a non-significant overall prevalence of habitual ST use of 14.3% (Table 4.4) ($\chi=4.55$, $p=.337$). Of GSU players, one freshman, one sophomore, two juniors, and one player that had redshirted indicated habitual ST use (Table 4.3). This gave GSU players an overall prevalence of 62.5%, much higher than the 14.3% reported by OU players. There was not a statistically significant association present in GSU players either (Table 4.4) ($\chi=6.0$, $p=.199$). Overall, seven players indicated habitual ST use, and six indicated ever-

use of ST. There were not any perceivable patterns in Current year of eligibility when the teams were compared side by side, though sophomores and juniors were more likely to have reported habitual use than other classes.

4.9 Position player or pitcher and habitual ST use

One OU position player out of ten that responded (10%) and one pitcher out of four that responded (25%) identified themselves as habitual ST users, meaning OU pitchers were more likely to report habitual ST use than position players, albeit not by a large or statistically significant margin (Table 4.4) ($\chi^2=.058$, $p=.809$). Three out of five of GSU position players (60%) that responded and two out of three GSU pitchers (66.7%) identified themselves as habitual ST users, meaning GSU pitchers were slightly more likely to report habitual ST use than position players (Table 4.3). There was not a statistically significant association present in GSU players either (Table 4.4) ($\chi^2=.600$, $p=.439$). Between both teams, one more position player than pitcher reported habitual ST use, though there did not appear to be any perceptible patterns (Table 4.3).

Table 4.3 – Habitual ST use by School

	GSU (n=8)		OU (n=14)		Total (N=22)	
	N	Percent of School	N	Percent of School	N	Percent of Total
Age						
18	1	12.5%	0	0%	1	4.5%
19	0	0%	0	0%	0	0%
20	3	37.5%	1	7.1%	4	18.2%
21	0	0%	0	0%	0	0%
22 or older	1	12.5%	1	7.1%	2	9.1%
Race						
White	5	62.5%	2	14.3%	7	31.8%
Year of Athletic						

Eligibility						
Freshman	1	12.5%	0	0%	1	4.5%
Sophomore	1	12.5%	1	7.1%	2	9.1%
Junior	2	25%	0	0%	2	9.1%
Senior	0	0%	1	7.1%	1	4.5%
Other (Redshirted)	1	12.5%	0	0%	1	4.5%
Position						
Position Player	3	37.5%	1	7.1%	4	18.2%
Pitcher	2	25%	1	7.1%	3	13.6%

Table 4.4 – Chi-Square Tests for Habitual ST Use

All variables stratified by school	Have you ever used ST?		Value	df	Asymp. Sig. (2-sided)
Age	Yes	Pearson Chi-Square	.875	2	.646
	No	Pearson Chi-Square	6.000	4	.199
Current Year of Eligibility	Yes	Pearson Chi-Square	4.550	4	.337
	No	Pearson Chi-Square	6.000	4	.199
Position	Yes	Pearson Chi-Square	.058	1	.809
	No	Pearson Chi-Square	.600	1	.439

4.10 School and opinion about ST

GSU players were less likely to be bothered or offended by ST use than OU players. 87.5% of GSU players surveyed were not bothered or offended by ST use, while only 57.1% of OU players surveyed were not bothered or offended by ST use (Table 4.9). Overall, 68.2% of players surveyed from both schools were not bothered or offended by ST use, but there was not a statistically significant association present ($\chi=2.986$, $p=.225$).

Table 4.9 School stratified by opinion about ST

Does ST use bother or offend you in any way? * School Crosstabulation					
			School		Total
			GSU	OU	
Does ST use bother or offend you in any way?	Yes	Count	0	4	4
		% within School	0.0%	28.6%	18.2%
	Not Sure	Count	1	2	3
		% within School	12.5%	14.3%	13.6%
	No	Count	7	8	15
		% within School	87.5%	57.1%	68.2%
Total	Count	8	14	22	
	% within School	100.0%	100.0%	100.0%	

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.986	2	.225

Chapter V

DISCUSSION AND CONCLUSION

5.1 Discussion of Research Questions

How many players use ST on the NCAA Division I baseball team and how many players use ST on the NCAA Division III baseball team? Does one team have more ST users proportionately than the other? What percentage overall of each team uses ST?

The survey results showed that six out of eight players that responded from GSU have ever used ST, giving a prevalence rate of 75%, while only five out of 14 players that responded from OU used ST, giving a prevalence rate of 35.7%. More players said they had ever used ST on the NCAA Division I baseball team both proportionately and in absolute terms than the NCAA Division III baseball team (6/8 versus 5/14). The results were more polarized when habitual ST use was concerned; five out of eight (62.5%) players that responded from GSU identified themselves as habitual ST users, while only two out of 14 (14.3%) players that responded from OU identified themselves as habitual ST users. Self-identified habitual ST use was far more likely and prevalent on the NCAA Division I baseball team than on the NCAA Division III baseball team, though the Chi square values did not indicate any statistically significant associations on either team.

The variables Age, Race/Ethnicity, Current year of collegiate eligibility, and Position player or pitcher were not statistically significantly associated with ever-use of ST or habitual use of ST. While ST use can certainly begin during collegiate baseball, many players start before they come to college and continue during their collegiate

careers as well, which is why age was not expected to show a statistically significant association with either ever-use of ST or habitual use of ST. Given the survey demographics, every player that responded from both teams identified themselves as White. This is not surprising given the numbers of that particular racial group on both teams, but it was surprising that no Black players or Hispanic/Latino players responded at all.

Year of collegiate eligibility was not associated with ever-use of ST or habitual use; this was interesting in that the older one gets, the more likely one is to use ST in competitive baseball. It was expected that the higher rates of ST ever-use or ST habitual use on each team would have been present in juniors, seniors, or redshirt juniors/seniors.

This was surprising because the Division III team was expected to have a higher percentage proportionately of ST users than the Division I team based on the author's personal experience having played both NCAA Division I baseball and NCAA Division III baseball. The data is likely misleading though, as the prevalence rate of ST use on the GSU, the NCAA Division I team is unlikely to be as high as 75%. Had more players responded to the survey, the prevalence of ST use found on each team likely would have been much closer, while still being much higher than the prevalence rate of ST use in the general population.

Are NCAA baseball players that play a particular position more likely to use ST?

Position players from OU were somewhat less likely to have ever used ST (three out of 10; 30%) than pitchers (two out of four; 50%). GSU position players on the other hand were somewhat more likely to have ever used ST (four out of five, 80%) than

pitchers (two out of three, 66.7%). OU position players were less likely (one out of ten; 10%) to self-identify as habitual ST users than pitchers (one out of four; 25%). GSU position players (three out of five; 60%) and pitchers (two out of three; 66.7%) were comparably likely to self-identify as habitual ST users. None of the Chi square values were statistically significant, but based on the player responses, position players appear to be somewhat more likely to have ever used ST and habitually use ST than pitchers. This perception is certainly influenced by the small number of players that responded to the survey and the small sample size generally.

These results were interesting because position players have substantially less downtime than pitchers, so it was thought that pitchers might be more likely to have used or habitually use ST. Unless a pitcher is physically on the pitching mound, pitching in the game, he is more than likely sitting down watching on the bench or in the bullpen for hours at a time, with generally very little to do. This would lead one to believe that pitchers might be more inclined to use ST, but according to the data collected from the OU and GSU players, that would not seem to be the case.

How do the collected survey results compare to other NCAA athlete survey responses? Do the baseball players on these two teams use ST more or less than other NCAA baseball players around the country?

The most recent available data collected by the NCAA is from 2009 and it reported that 27.2% of male student-athletes reported some form of ST use in the last 12 months. If both genders of student-athletes are considered, 17.4% report ST use in the past 12 months. When only baseball players are considered, 52.3% of NCAA student-

athletes reported ST use in the past 12 months (Bracken 2013). Based on this data, OU baseball players were less likely than other NCAA varsity baseball players to have used ST. GSU baseball players were equally likely or even more likely to have used ST than other NCAA varsity baseball players.

It should be noted that the NCAA asked about past 12 month use of ST, while this survey asked about ever-use, past 30 day use, and habitual use of ST. So when comparing the rates of ST use found in this survey, the rates of habitual ST use reported by GSU and OU were used for comparison with the past 12 month ST usage rates found in 2009 by the NCAA (see Study Strengths and Limitations below).

How do the ST usage rates from the two surveyed teams compare to NCAA student-athlete data from years past?

Previous NCAA student-athlete substance abuse studies (1997, 2001) have found lower rates than their most current study has (2009). Overall ST use in all NCAA student-athletes was 22.5% in 1997, and fell to 17.4% in 2001. The NCAA Substance Abuse studies in 1997 and 2001 found that 45.6% and 41% of varsity collegiate baseball players reported ST use in the past 12 months respectively (NCAA, 1997, NCAA, 2001). Compared to the past two NCAA student-athlete substance abuse studies, overall student-athlete ST use remained unchanged at 17.4%, but baseball-specific ST use rose to 52.3% in the 2009 study (Bracken, 2013).

GSU baseball players were more likely to use ST habitually than NCAA student-athletes generally and baseball players specifically, on average than in the past studies in 1997 in 2001. OU baseball players were quite a bit less likely to use ST habitually than

NCAA student-athletes generally and baseball players specifically, on average than in the past studies in 1997 in 2001 as well. As mentioned above, these NCAA surveys asked about past 12 month use, while this survey asked about ever-use, past 30 day use, and habitual use. Subsequently, the rates of habitual ST use in GSU and OU players measured by this survey were used to compare with the past 12 month rates of ST use found in the previous two NCAA student-athlete substance abuse studies (See Study Strengths and Limitations below).

5.2 Study Strengths and Limitations

A very significant limitation of this study was that the sample size of this study was too small for the results to be statistically stable or significant. There is a considerable possibility that some of the results were distorted given the small number of survey respondents. The observed patterns in the data were likely not indicative of the overall prevalence rates of the two teams; GSU's baseball team is unlikely to have as high a prevalence of ST use as was found in the survey, and OU's baseball team is likely to have somewhat higher prevalence of ST use than was found in the survey. As measured by the survey, GSU's baseball team was well above the national average for varsity collegiate baseball programs and OU's baseball team was well below the national average for varsity collegiate baseball programs. One survey response from each school was incomplete and omitted from the final analysis. If these two responses had been completed they likely would have influenced the final results to an extent as well.

Another limitation from the analysis is that the results are not generalizable to the general population. This may be a strength of the study when considering collegiate

athletes or collegiate baseball players specifically, but those populations are not representative of the public. This data may help contribute to the relatively small pool of data on ST use in collegiate baseball players, and may be more accurate to an extent in the sense that players may feel more comfortable being honest about their ST habits to someone not affiliated specifically with the governing body of the sport they participate in, the NCAA.

As mentioned above, an oversight regarding survey question design occurred; the NCAA Student-Athlete Substance Abuse studies asked all student-athletes whether they had used ST in the past 12 months, while the survey administered to GSU and OU players did not ask about past 12 month use. Given the difference in the survey questions asked by this survey and by the NCAA, it was thought that the rates of Habitual ST use found by this study would most likely include the past 12 month interval chosen by the NCAA. During the writing of this survey, past 12 month use was not an amount of time thought of as a relevant interval, as one-time users could very well be pooled with regular users, the demographic of concern when trying to measure the overall prevalence of this type of behavior. Counting a player that tried ST one time in the fall while off season but did not continue to use it should not be considered the same as a player that used ST multiple times daily, like in the NCAA surveys. This survey asked about the two scenarios separately, meaning the results from each question were more specific. Asking about past use in the last 12 months is useful for other substances; anabolic steroids, for example. It was only after the fact that the difficulty in accurately comparing habitual use or past 30-day use to use in the last 12 months became apparent. If the survey

utilized in this study was used again, past 12 month use of ST would be added as a question.

Another limitation is the lack of incentive to participate in the survey; more players would likely have responded to the survey invitations had there been a monetary reward or some other sort of reward attached to survey participation. More players also might have responded if baseball was “in-season,” though this is unclear as baseball players practice year-round. There is baseball in the fall, followed by “unofficial practices” in the winter, then the season beginning in the spring.

Lastly, there was a discrepancy in the survey data regarding ever-use and habitual use in OU players. Two OU players changed their answer from never-use to some use, but not habitual use when asked about habitual use. The different answers did not change the statistical significance, but should be noted nevertheless.

5.3 Recommendations for Future Research

In general, there should be more research on the long-term health effects of ST, but this research should strictly control for other risk factors of disease, include every study that meets the predefined inclusion criteria, and not attempt to fit data to support a preexisting belief about ST. Researchers should at least consider the population effects of a large number of smokers switching to ST and the potential for different outcomes at the population level. If a researcher was to follow collegiate baseball players that habitually used ST over the long-term, it might give the scientific community a study representative of the least serious health outcomes in a population since athletes tend to

be in far better physical shape than the rest of the population, and are potentially less likely to also use cigarettes concurrently.

This study would have worked better on a far larger scale with many more teams, preferably in different geographic locations or even multiple teams in the same conference but different locations. Far more survey participants are needed for the data to have the stability needed to be taken as representative of the collegiate baseball student-athlete population. Repeating this survey with a good sample size would likely produce interesting results. A viable sample size might be all of the Division I and Division III teams in Georgia, or all of the Division I teams in the NCAA Southeastern Conference compared to all of the Division I teams in the NCAA Pacific-12 Conference, along with two comparable conferences in Division III baseball, though an even larger sample size would be even better.

5.4 Conclusion

ST and baseball have been associated with each other for over a century. This proclivity to use ST filters down by age, beginning (at least in terms of what has been researched) in high school, continuing and increasing in college, and finally at the professional level in MLB, where all of these players likely learned about ST use in the first place. There has been a strong and vocal campaign against ST use in MLB and its affiliate minor leagues by a multitude of different parties, varying in strength from grassroots organizations all the way up to a discussion in congress. The campaigns appear to have been somewhat successful, as rates of ST use in the MLB ranks have

fallen from 40-45% to 25.6% in the last two decades (Wisniewski & Bartolucci, 1989, Sinusas & Coroso, 2006).

The trend does not appear in younger players; rates of ST use in amateur baseball players appear to rise with age. Studies have shown high school baseball player ST use varied between 15-21% (Davis et al., 1997, Walsh et al., 2000). Multiple studies have found rates of ST use in varsity collegiate baseball players that vary from between 50-52% (Bracken, 2013, Gingiss & Gottlieb, 1991, Walsh et al., 1994). The data collected from GSU and OU presented here fall on either side of the approximately 50% estimates; ever-use and habitual use is far higher on GSU, the NCAA Division I baseball team (75% & 62.5%, respectively), than on OU, the NCAA Division III baseball team (35.7% & 14.3%, respectively). These numbers are most certainly affected by the small sample size (GSU, N=8, OU, N=14) and that reduces their statistical power considerably, as it is not possible to definitively determine the prevalence of ST use on either team based on such a small sample. Regardless of the true prevalence of ST use in the study population and in collegiate baseball on the whole, the best chance public health professionals have to potentially reduce the number of ST users in collegiate baseball is by continuing to discourage ST use in the MLB. Then hopefully as more professional players quit or never begin using ST in the first place, the effect will seep down the skill levels so that it is no longer a major part of baseball culture.

References

- Agaku IT, Vardavas CI, Ayo-Yusuf OA, Alpert HR, & Connolly GN. (2013). Temporal trends in smokeless tobacco use among us middle and high school students, 2000-2011. *JAMA*, 309(19), 1992–1994. doi:10.1001/jama.2013.4412.
- Alguacil, J., & Silverman, D. T. (2004). Smokeless and other non-cigarette tobacco use and pancreatic cancer: a case-control study based on direct interviews. *Cancer epidemiology, biomarkers & prevention: a publication of the American Association for Cancer Research, cosponsored by the American Society of Preventive Oncology*, 13(1), 55–58.
- Asplund, K. (2003). Smokeless tobacco and cardiovascular disease. *Progress in Cardiovascular Diseases*, 45(5), 383–394. doi:10.1053/pcad.2003.00102.
- Bjelke, E., and Schuman. L.M. Chewing tobacco and use of snuff: Relationships to cancer of the pancreas and other sites in two prospective studies. *Proceedings of the 13th International Congress on Cancer*, 1982. p. 207.
- Boffetta, P., Hecht, S., Gray, N., Gupta, P., & Straif, K. (2008). Smokeless tobacco and cancer. *The lancet oncology*, 9(7), 667–675. doi:10.1016/S1470-2045(08)70173-6.
- Boffetta, P., Aagnes, B., Weiderpass, E., & Andersen, A. (2005). Smokeless tobacco use and risk of cancer of the pancreas and other organs. *International Journal of Cancer*, 114(6), 992–995. doi:10.1002/ijc.20811.
- Bolinder, G., Alfredsson, L., Englund, A., & de Faire, U. (1994). Smokeless tobacco use and increased cardiovascular mortality among Swedish construction workers. *American Journal of Public Health*, 84(3), 399–404.
- Bouquot, J. E., & Meckstroth, R. L. (1998). Oral cancer in a tobacco-chewing US population--no apparent increased incidence or mortality. *Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics*, 86(6), 697–706.
- Bracken, Nicole. (2013). National Study of Substance Use Trends Among NCAA College Student-Athletes. Indianapolis, IN. Retrieved from National Collegiate Athletics Association website: <http://www.ncaapublications.com/productdownloads/SAHS09.pdf>.
- Brunnemann, K.D. & Hoffmann, D. (1992) Chemical composition of smokeless tobacco products. In: *Smokeless Tobacco or Health. An International Perspective* (Smoking and Tobacco Control Monograph No. 2; NIH Publ. No. 93-3461), Bethesda, MD, National Cancer Institute.

- Brunnemann, K. D., Qi, J., & Hoffmann, D. (2002). Chemical profile of two types of oral snuff tobacco. *Food and Chemical Toxicology*, 40(11), 1699–1703. doi:10.1016/S0278-6915(02)00134-5.
- Connolly, G. N., Orleans, C. T., & Kogan, M. (1988). Use of Smokeless Tobacco in Major-League Baseball. *New England Journal of Medicine*, 318(19), 1281–1285. doi:10.1056/NEJM198805123181918.
- Connolly G., Orleans, C.T., & Blum, A. (1992). Snuffing tobacco out of sport. *American Journal of Public Health*, 82, 351-353.
- Cooper, J., Ellison, J. A., & Walsh, M. M. (2003). Spit (smokeless)-tobacco use by baseball players entering the professional ranks. *Journal of Athletic Training*, 38(2), 126-132.
- Davis, T. C., Arnold, C., Nandy, I., Bocchini, J. A., Gottlieb, A., George, R. B., & Berkel, H. (1997). Tobacco use among male high school athletes. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*, 21(2), 97–101.
- Daniels, T. E., Hansen, L. S., Greenspan, J. S., Grady, D. G., Hauck, W. W., Greene, J. C., & Ernster, V. L. (1992). Histopathology of smokeless tobacco lesions in professional baseball players. Associations with different types of tobacco. *Oral surgery, oral medicine, and oral pathology*, 73(6), 720–725.
- Eaves, T. (2011). The Relationship Between Spit Tobacco and Baseball. *Journal of Sport & Social Issues*, 35(4), 437–442. doi:10.1177/0193723511429826.
- Ernster, V. L., Grady, D. G., Greene, J. C., Walsh, M., Robertson, P., Daniels, T. E., Hauck, W. W. (1990). Smokeless tobacco use and health effects among baseball players. *JAMA: the journal of the American Medical Association*, 264(2), 218–224.
- Fant, R. V., Henningfield, J. E., Nelson, R. A., & Pickworth, W. B. (1999). Pharmacokinetics and pharmacodynamics of moist snuff in humans. *Tobacco Control*, 8(4), 387–392. doi:10.1136/tc.8.4.387.
- Gartner, C., & Hall, W. (2010). Harm reduction policies for tobacco users. *The International journal on drug policy*, 21(2), 129–130. doi:10.1016/j.drugpo.2009.10.008.
- Gingiss, P. L., & Gottlieb, N. H. (1991). A comparison of smokeless tobacco and smoking practices of university varsity and intramural baseball players. *Addictive Behaviors*, 16(5), 335–340.

- Green, J.C., Ernster, V.L., Grady, D.G., Robertson, P.B., Walsh, M.M., Stillman, L.A. Oral mucosal lesions: clinical findings in relation to smokeless tobacco use among U.S. baseball players. *Smokeless Tobacco or Health: an International Perspective*, Chap 2, NIH Publ No 92-3461, 1992, pp 41-50.
- Greene JC, Walsh MM and Masouredis C, Report of a pilot study: A program to help major-league baseball players quit using spit tobacco. *J Am Dent Assoc* 125:559-68, 1994.
- Hatsukami, D. K., Lemmonds, C., & Tomar, S. L. (2004). Smokeless tobacco use: harm reduction or induction approach? *Preventive medicine*, 38(3), 309–317. doi:10.1016/j.ypmed.2003.10.006.
- Health, U. S. B. of M. and C. H. and R. D. O. of M. and C. (1986, April). The Health Consequences of Using Smokeless Tobacco. *NIH Publication No. 86-2874*. Official reports. Retrieved October 3, 2013, from <http://profiles.nlm.nih.gov/ps/retrieve/ResourceMetadata/NNBBFC>.
- Hecht, S. S., Carmella, S. G., Foiles, P. G., Murphy, S. E., & Peterson, L. A. (1993). Tobacco-specific nitrosamine adducts: studies in laboratory animals and humans. *Environmental Health Perspectives*, 99, 57–63.
- How is Swedish snus manufactured? - Swedish Match. (2014, March 17). Swedish Match. Retrieved March 18, 2014, from <http://www.swedishmatch.com/en/Global/FAQ/Snuff/Swedish-snus/Manufacture/How-is-Swedish-snus/>.
- Huhtasaari, F., Lundberg, V., Eliasson, M., Janlert, U., & Asplund, K. (1999). Smokeless tobacco as a possible risk factor for myocardial infarction: a population-based study in middle-aged men. *Journal of the American College of Cardiology*, 34(6), 1784–1790.
- International Agency for Research on Cancer. *Smokeless Tobacco and Some Tobacco-Specific N-Nitrosamines*. Lyon, France: World Health Organization International Agency for Research on Cancer; 2007. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 89.
- Kozlowski, L. T. (2007). Effect of Smokeless Tobacco Product Marketing and Use on Population Harm from Tobacco Use: Policy Perspective for Tobacco-Risk Reduction. *American Journal of Preventive Medicine*, 33(6, Supplement), S379–S386. doi:10.1016/j.amepre.2007.09.015.
- Landy, J.L., and White, H.J. Buccogingival carcinoma of snuff dippers. *Arm Surg*.27: 442-447, 1961.

- Lee, P. N. (2013). Epidemiological evidence relating snus to health – an updated review based on recent publications. *Harm Reduction Journal*, 10(1), 36. doi:10.1186/1477-7517-10-36.
- Lee, P. N., & Hamling, J. (2009). Systematic review of the relation between smokeless tobacco and cancer in Europe and North America. *BMC medicine*, 7, 36. doi:10.1186/1741-7015-7-36.
- Lee, P. N., & Hamling, J. (2009). The relation between smokeless tobacco and cancer in Northern Europe and North America. A commentary on differences between the conclusions reached by two recent reviews. *BMC cancer*, 9, 256. doi:10.1186/1471-2407-9-256.
- Luo, J., Ye, W., Zendehdel, K., Adami, J., Adami, H.-O., Boffetta, P., & Nyrén, O. (2007). Oral use of Swedish moist snuff (snus) and risk for cancer of the mouth, lung, and pancreas in male construction workers: a retrospective cohort study. *The Lancet*, 369(9578), 2015–2020. doi:10.1016/S0140-6736(07)60678-3.
- Mejia, A. B., Ling, P. M., & Glantz, S. A. (2010). Quantifying the effects of promoting smokeless tobacco as a harm reduction strategy in the USA. *Tobacco control*, 19(4), 297–305. doi:10.1136/tc.2009.031427.
- NCAA Study of Substance Use and Abuse Habits of College Student-Athletes. (1997, September). Presented at the The National Collegiate Athletic Association Committee on Competitive Safeguards and Medical Aspects of Sports. Retrieved from <http://www.ncaapublications.com/productdownloads/SAHS97.pdf>.
- NCAA Study of Substance Use and Abuse Habits of College Student-Athletes. (2001). *Clinical Journal of Sport Medicine*. Retrieved March 15, 2014, from http://journals.lww.com/cjsportsmed/Fulltext/2001/01000/NCAA_Study_of_Substance_Use_and_Abuse_Habits_of.9.aspx.
- Richter, P., Hodge, K., Stanfill, S., Zhang, L., & Watson, C. (2008). Surveillance of moist snuff: total nicotine, moisture, pH, un-ionized nicotine, and tobacco-specific nitrosamines. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 10(11), 1645–1652. doi:10.1080/14622200802412937.
- Rodu, B. (2011). The scientific foundation for tobacco harm reduction, 2006-2011. *Harm Reduction Journal*, 8, 19. doi:10.1186/1477-7517-8-19.
- Rodu, B., & Cole, P. (2002). Smokeless tobacco use and cancer of the upper respiratory tract. *Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics*, 93(5), 511–515.

- Rodu, B., & Jansson, C. (2004). Smokeless Tobacco and Oral Cancer: A Review of the Risks and Determinants. *Critical Reviews in Oral Biology & Medicine*, 15(5), 252–263. doi:10.1177/154411130401500502.
- Rosenfeld, L., and Callaway, J. Snuff dipper's cancer. *Am. J. Surg. L&C* 840-844, 1963.
- Rosenfeld, L., and Callaway, J. Squamous cell carcinoma of the oral cavity. *South. Med. J.* 56: 1394-1399, 1963.
- Severson, H., Klein, K., Lichtenstein, E., Kaufman, N., & Orleans, C. T. (2005). Smokeless tobacco use among professional baseball players: Survey results, 1998-2003. *Tobacco Control*, 14(1), 31-36.
- Sinusas, K., & Coroso, J. G. (2006). A 10-yr study of smokeless tobacco use in a professional baseball organization. *Medicine and Science in Sports and Exercise*, 38(7), 1204–1207. doi:10.1249/01.mss.0000227303.80783.46.
- Smokeless Tobacco and Cancer. (2010, October 25). *National Cancer Institute: Smokeless Tobacco Fact Sheet*. Retrieved September 30, 2013, from <http://www.cancer.gov/cancertopics/factsheet/Tobacco/smokeless#r1>.
- Smokeless Tobacco in the US. (2014, March 17). Euromonitor Interactonal. Retrieved March 18, 2014, from <http://www.euromonitor.com/smokeless-tobacco-in-the-us/report>.
- Stepanov, I., Villalta, P. W., Knezevich, A., Jensen, J., Hatsukami, D., & Hecht, S. S. (2010). Analysis of 23 polycyclic aromatic hydrocarbons in smokeless tobacco by gas chromatography-mass spectrometry. *Chemical research in toxicology*, 23(1), 66–73. doi:10.1021/tx900281u.
- Walsh, M. M., Ellison, J., Hilton, J. F., Chesney, M., & Ernster, V. L. (2000). Spit (smokeless) tobacco use by high school baseball athletes in California. *Tobacco control*, 9 Suppl 2, II32–39.
- Walsh, M. M., Hilton, J. F., Ernster, V. L., Masouredis, C. M., & Grady, D. G. (1994). Prevalence, patterns, and correlates of spit tobacco use in a college athlete population. *Addictive Behaviors*, 19(4), 411–427.
- Waterbor, J. W., Adams, R. M., Robinson, J. M., Crabtree, F. G., Accortt, N. A., & Gilliland, J. (2004). Disparities between public health educational materials and the scientific evidence that smokeless tobacco use causes cancer. *Journal of Cancer Education: The Official Journal of the American Association for Cancer Education*, 19(1), 17–28. doi:10.1207/s15430154jce1901_08.

- Weitkunat, R., Sanders, E., & Lee, P. N. (2007). Meta-analysis of the relation between European and American smokeless tobacco and oral cancer. *BMC Public Health*, 7, 334. doi:10.1186/1471-2458-7-334.
- Wilkins, S.A., and Vogler, W.R. Cancer of the gingiva. *Surg. Gynecol. Obstet.* 10.5: 145-152, 1957.
- Wisniewski, J. F., & Bartolucci, A. A. (1989). Comparative patterns of smokeless tobacco usage among major league baseball personnel. *Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology*, 18(6), 322–326.
- Winn, D. M., Blot, W. J., Shy, C. M., Pickle, L. W., Toledo, A., & Fraumeni, J. F., Jr. (1981). Snuff dipping and oral cancer among women in the southern United States. *The New England journal of medicine*, 304(13), 745–749. doi:10.1056/NEJM198103263041301.
- Zhou, J., Michaud, D. S., Langevin, S. M., McClean, M. D., Eliot, M., & Kelsey, K. T. (2013). Smokeless tobacco and risk of head and neck cancer: Evidence from a case–control study in New England. *International Journal of Cancer*, 132(8), 1911–1917. doi:10.1002/ijc.27839.

Appendices

A. IRB Approval Documents

B. Documentation of Waivers of Consent

C. Invitation Emails

D. Survey

E. Full Survey Results

Appendix A – OU IRB Approval



OGLETHORPE UNIVERSITY

Date: August 21, 2013
To: Andrew Farrey, Principal Investigator
Oglethorpe University
From: Brad Stone, Ph.D., Chair
Oglethorpe University Institutional Review Board for Research with Human Participants
Re: A comparison of smokeless tobacco usage (ST) in two NCAA baseball programs and the National College Health Assessment smokeless tobacco data

Dear Mr. Farrey:

I am writing in regards to your study, “A comparison of smokeless tobacco usage (ST) in two NCAA baseball programs and the National College Health Assessment smokeless tobacco data,” for which you requested an expedited review. My review of your proposal convinced me that your study involves no more than minimal risk to participants, no unreasonable deception, and no additional ethical concerns that would warrant a full board meeting. Consequently, I approved the expedited review and proceeded to examine the proposed methodology, evaluating it vis-à-vis the ethical standards presented in the DHHS Federal Code of Regulations Title 45, Part 46, the Belmont Report, and the Office for Human Research Protections.

Based upon my review I concluded that your study poses minimal risk for participants, that your protocol is straightforward and involves no unreasonable deception, and that you have taken adequate steps to guarantee the confidentiality of all potential participants.

Based on the information you have provided, I am confident that your study meets or exceeds best practices in safeguarding the rights of human research participants. I hereby grant you permission to proceed with your study with the following conditions: (1) If you become aware of any unintended ethical problems with your study, you will contact the IRB immediately; (2) If someone files a formal complaint to you regarding your study, you will inform the IRB immediately; (3) Your written and verbal informed consents include a statement about to whom participants should report any questions or concerns about your study – first would be to you, then the chair of the IRB’s at Oglethorpe ; (4) If you intend to alter your methodology in a manner that might reasonably affect a matter of research ethics, you will first submit a proposal for the change(s) to the IRB; and (5) The permission granted is for one year – following which you may submit a request for extended approval if you would like to continue the study. Once your study has concluded, the IRB would like a brief letter for our records that summarizes how the study concluded and attests to whether or not there were any complaints raised by participants during the study in order for us to comply with federal regulations.

I wish you well with your data collection and thank you for your well organized approval request form and accompanying materials. If you have any questions or concerns, do not hesitate to contact me, Dr. Brad Stone.


Sincerely,

Dr. Brad Stone
Chair, Oglethorpe University Institutional Review Board for Research with Human Participants
Phone: 404-364-8344; Email: bstone@oglethorpe.edu

Appendix A continued - GSU IRB Approval

Completed Submissions

Study Status:	Approved
Principal Investigator:	Sterling, Kymberle
IRB Number:	H14093
Study Title:	A comparison of smokeless tobacco (ST) use between two NCAA baseball programs
Expiration Date:	11/12/2016

Reference Number	Request Type	Review Board	View Outcome Letters	Review Process	Meeting Date	Review Outcome	Date Received
324217	Initial Review Submission Form						
	 Initial Review Submission Form	IRB Review Board Committee		Exempt	11/21/2013	Approved	09/09/2013 12:00:00 AM EDT

Appendix B – Documentation of Waiver of Consent

Georgia State University
School of Public Health

Informed Consent

Title: A comparison of smokeless tobacco usage in two NCAA baseball programs

Principal Investigator: Dr. Kimberle Sterling, Andy Farrey

I. Purpose:

You are invited to participate in a research study. The purpose of the study is to investigate and compare the patterns of and attitudes toward smokeless tobacco (dip) usage on an NCAA Division I baseball team and an NCAA Division III baseball team. You are invited to participate because you are a member of the varsity baseball team. A total of approximately 40-50 participants will be recruited for this study between the two teams. Participation will require 15 minutes of your time.

II. Procedures:

If you decide to participate, you will be asked to fill out a survey on Qualtrics's website. Qualtrics specializes in academic research surveys. The survey may be taken anywhere you choose, but should be taken in a private place and you should close the browser window upon completing the survey. Please complete it by October 25, 2013. It is a one-time survey and you have no other obligations upon completing it. You will not be asked to have any interaction with anyone as a part of the study.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life. All possible steps will be taken to ensure the confidentiality of the data, and the data will be stored on a third party firewall-protected and encrypted server.

IV. Benefits:

Participation in this study may not benefit you personally. Overall, we hope to gain information about patterns of smokeless tobacco use on collegiate baseball teams.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. Whatever you decide, there are no consequences.

VI. Confidentiality:

We will keep your records private to the extent allowed by law. Only the study's Principal Investigator Dr. Kimberle Sterling and Student Investigator Andy Farrey will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board, the Office for Human Research Protection (OHRP)). We will not ask for your name so it will not be on study records. The information you provide will be stored on Qualtric's firewall-protected and encrypted servers under a strict privacy and security policy. They are maintained by a third party that specializes in protecting sensitive data and are regularly checked for intrusions. Please be aware that information sent over the internet might not be secure, but the only potentially personally identifying information will be your IP address and we will not collect that information. Georgia State University will not have access to the survey data. Any information that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VII. Contact Persons:

Contact Dr. Kimberle Sterling at 404-413-1129 or ksterling@gsu.edu or Andy Farrey at 678-591-0079 or afarrey1@student.gsu.edu if you have questions, concerns, or complaints about this study. You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information, or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

VIII. Copy of Consent Form to Subject:

You may print a copy of the consent form for your records.

If you are willing to volunteer for this research, please take the survey at your convenience by February 1, 2014.

Appendix C – Invitation Emails

OU-

Subject Line: Smokeless tobacco survey for Oglethorpe University baseball players

Dear Oglethorpe University baseball player,

You are invited to participate in an online survey as part of a research study. You are receiving this email because you are listed on the varsity roster of the Oglethorpe University baseball team. Your email address was obtained from the campus directory.

The title of this study is, “A comparison of smokeless tobacco usage in two NCAA baseball programs and the National College Health Assessment smokeless tobacco data.” The Principal Investigator is Dr. Kimberle Sterling and the Principal Student Investigator is Andy Farrey.

This study will look at the usage of smokeless tobacco on Oglethorpe University’s varsity baseball team and Georgia State University’s varsity baseball team. It will attempt to examine patterns and frequency of smokeless tobacco use on each team, past history of smokeless tobacco use, and attitudes toward its use in users and non-users and compare those values to the National College Health Assessment measurements of smokeless tobacco use in comparable age groups that are not athlete-specific.

This survey is voluntary and will take less than 15 minutes. The data collected is confidential and will not be examined by anyone except Dr. Sterling and Andy Farrey, and names and IP addresses are not being recorded. If you decide to participate, please read the attached waiver of documentation of consent, then click on the link below and complete the survey on Qualtric’s website.

If you have questions, do not hesitate to contact Dr. Kimberle Sterling at 404-413-1129 or ksterling@gsu.edu, or Andy Farrey at 678-591-0079 or afarrey1@student.gsu.edu.

Thank you!

(Link)

GSU-

Subject Line: Smokeless tobacco survey for Georgia State University baseball players

Dear Georgia State University baseball player,

You are invited to participate in an online survey as part of a research study. You are receiving this email because you are listed on the varsity roster of the Georgia State University baseball team. Your email address was obtained from the Campus Directory.

The title of this study is, “A comparison of smokeless tobacco usage in two NCAA baseball programs and the National College Health Assessment smokeless tobacco data.” The Principal Investigator is Dr. Kimberle Sterling and the Principal Student Investigator is Andy Farrey.

This study will look at the usage of smokeless tobacco on Georgia State University’s varsity baseball team and Oglethorpe University’s varsity baseball team. It will attempt to examine patterns and frequency of smokeless tobacco use on each team, past history of smokeless tobacco use, and attitudes toward its use in users and non-users and compare those values to the National College Health Assessment measurements of smokeless tobacco use in comparable age groups that are not athlete-specific.

This survey is voluntary and will take less than 15 minutes. The data collected is confidential and will not be examined by anyone except Dr. Sterling and Andy Farrey, and names and IP addresses are not being recorded. If you decide to participate, please read the attached waiver of documentation of consent, then click on the link below and complete the survey on Qualtric’s website.

If you have questions, do not hesitate to contact Dr. Kimberle Sterling at 404-413-1129 or ksterling@gsu.edu, or Andy Farrey at 678-591-0079 or afarrey1@student.gsu.edu.

Thank you!

(Link)

Appendix D – Survey Instrument

GSU –

Smokeless Tobacco (ST) Use in Collegiate Baseball

Please answer the following questions. I am a Master's of Public Health candidate at Georgia State University and I am collecting data for my thesis about use of ST in collegiate baseball. I am looking for patterns of use and will compare this data to an identical survey given at Oglethorpe University to their baseball program. If you have any questions feel free to email me at afarrey11@yahoo.com. Information obtained from this survey is completely **confidential**, and participation is voluntary. Please complete the survey in a private environment and close the browser window when finished. Please answer **honestly**.

HISTORY OF SMOKELESS TOBACCO (ST) USE

1. Have you **ever** used ST?
 - a. Yes
 - b. No

2. How long have you been using ST?
 - a. I have never used ST
 - b. 6 months or less
 - c. 7 months to a year
 - d. A year or two
 - e. More than two yearsOther: _____

3. Have you used ST at least once in the past 30 days?
 - a. I have never used ST
 - b. Yes
 - c. No

4. Would you classify yourself as a “dipper?” A “dipper” is defined as someone who uses ST often or regularly.
 - a. I have never used ST
 - b. Yes
 - c. No
 - d. Maybe/Not Sure

5. Do you consider yourself to be a habitual (daily use or use on most days) ST user?
 - a. I have never used ST
 - b. Yes
 - c. No

6. Within the last 30 days, on how many days did you use ST??
 - a. I have never used ST
 - b. Have used, but not in the last 30 days
 - c. 1-2 days
 - d. 3-5 days
 - e. 6-9 days
 - f. 10-19 days
 - g. 20-29 days
 - h. All 30 days

7. If you use ST regularly, how long does it take you to finish one can?
 - a. I have never used ST
 - b. I do not use enough to buy my own cans
 - c. <1 day
 - d. 1-2 days
 - e. 3-5 days
 - f. 6-9 days
 - g. 10-19 days
 - h. 20-29 days
 - i. All 30 days

BRANDS AND TYPES OF ST USE

1. What type of ST do you use/prefer?
 - a. I have never used ST
 - b. Long cut
 - c. Fine cut
 - d. Snuff
 - e. Whole leaves- “chew”
 - f. Pouches
 - g. Snus

2. What brand of ST do you typically use?
 - a. Skoal/Copenhagen
 - b. Grizzly/Kodiak
 - c. Timberwolf
 - d. Red Man/Beech-nut
 - e. Redwood/Kayak
 - f. Marlboro/Camel/Triumph/Skoal Snus
 - g. Other:_____

BASEBALL AND ST USE

1. At what types of baseball events do you typically use ST?
 - a. I do not use ST
 - b. At practices and games
 - c. At practices only
 - d. At games only

2. Is there a team policy about ST? This could be from coaches, training staff, etc.
 - a. Yes
 - b. No
 - c. Not Sure
 - d. Yes but not enforced

3. Have you ever heard of or seen any disciplinary actions taken against any player because of ST use?
 - a. Yes
 - b. No
 - c. Not sure

4. Does ST use bother you or offend you in any way?
 - a. Yes
 - b. No
 - c. I'm indifferent to ST use

5. Has a teammate (on any team) ever offered ST to you?
 - a. Yes
 - b. No
 - c. Not Sure

6. Has a coach (on any team) ever offered ST to you?
 - a. Yes
 - b. No
 - c. Not Sure

7. Is ST use part of your college baseball team's culture? Specifically, is there ST use on the field, at parties, meetings, etc.? Please circle all that apply.
 - a. On field (games and practices)
 - b. Just practices
 - c. Just games
 - d. At team meetings
 - e. At parties/just hanging out
 - f. No
 - g. Other: _____

8. Do the coaches of your current baseball team care about player ST use?
 - a. Yes
 - b. No
 - c. Not sure/Hadn't noticed
 - d. They know about it but don't mention it
 - e. They use it too
 - f. Other: _____

9. Does the NCAA ban on ST affect your ST use?
 - a. I do not use ST
 - b. Yes
 - c. No
 - d. Hadn't thought about it

ST PRACTICES AND BELIEFS ABOUT ST USE

1. Are you secretive about your ST use?
 - a. I do not use ST
 - b. Yes
 - c. No
 - d. Never thought about it

2. Are you concerned about the long-term risk often associated with ST?
 - a. Yes
 - b. No
 - c. Hadn't thought of it

3. Are you concerned about the long-term risk associated with tobacco use generally?
 - a. Yes
 - b. No
 - c. Hadn't thought of it

4. Do you consider your oral hygiene more important because you use ST?
As in do you make sure to brush your teeth more frequently than you might otherwise since you use ST?
 - a. I do not use ST
 - b. Yes
 - c. No
 - d. Not Sure/Hadn't thought about it

DEMOGRAPHIC INFORMATION

1. How old are you?
 - a. 18
 - b. 19
 - c. 20
 - d. 21
 - e. 22 or older

2. What ethnic group do you consider yourself a part of?
 - a. White
 - b. Black
 - c. Hispanic/Latino
 - d. Asian

e. Other: _____

3. What is your current year of college eligibility?

a. Freshman

b. Sophomore

c. Junior

d. Senior

e. Other: _____

4. Are you a position player or a pitcher (If both, which do you consider your primary role)?

a. Position player

b. Pitcher

c. Decline to answer

OU-

Smokeless Tobacco (ST) Use in Collegiate Baseball

Please answer the following questions. I am a Master's of Public Health candidate at Georgia State University and I am collecting data for my thesis about use of ST in collegiate baseball. I am looking for patterns of use and will compare this data to an identical survey given at Georgia State University to their baseball program. If you have any questions feel free to email me at afarrey11@yahoo.com. Information obtained from this survey is completely **confidential**, and participation is voluntary. Please complete the survey in a private environment and close the browser window when finished. Please answer **honestly**.

HISTORY OF SMOKELESS TOBACCO (ST) USE

1. Have you **ever** used ST?
 - a. Yes
 - b. No

2. How long have you been using ST?
 - a. I have never used ST
 - b. 6 months or less
 - c. 7 months to a year
 - d. A year or two
 - e. More than two yearsOther: _____

3. Have you used ST at least once in the past 30 days?
 - a. I have never used ST
 - b. Yes
 - c. No

4. Would you classify yourself as a “dipper?” A “dipper” is defined as someone who uses ST often or regularly.
 - a. I have never used ST
 - b. Yes
 - c. No
 - d. Maybe/Not Sure

5. Do you consider yourself to be a habitual (daily use or use on most days) ST user?
 - a. I have never used ST
 - b. Yes
 - c. No

6. Within the last 30 days, on how many days did you use ST??
 - a. I have never used ST

- b. Have used, but not in the last 30 days
 - c. 1-2 days
 - d. 3-5 days
 - e. 6-9 days
 - f. 10-19 days
 - g. 20-29 days
 - h. All 30 days
7. If you use ST regularly, how long does it take you to finish one can?
- a. I have never used ST
 - b. I do not use enough to buy my own cans
 - c. <1 day
 - d. 1-2 days
 - e. 3-5 days
 - f. 6-9 days
 - g. 10-19 days
 - h. 20-29 days
 - i. All 30 days

BRANDS AND TYPES OF ST USE

1. What type of ST do you use/prefer?
 - a. I have never used ST
 - b. Long cut
 - c. Fine cut
 - d. Snuff
 - e. Whole leaves- “chew”
 - f. Pouches
 - g. Snus

2. What brand of ST do you typically use?
 - a. Skoal/Copenhagen
 - b. Grizzly/Kodiak
 - c. Timberwolf
 - d. Red Man/Beech-nut
 - e. Redwood/Kayak
 - f. Marlboro/Camel/Triumph/Skoal Snus
 - g. Other:_____

BASEBALL AND ST USE

1. At what types of baseball events do you typically use ST?
 - a. I do not use ST
 - b. At practices and games
 - c. At practices only
 - d. At games only

2. Is there a team policy about ST? This could be from coaches, training staff, etc.
 - a. Yes
 - b. No
 - c. Not Sure
 - d. Yes but not enforced

3. Have you ever heard of or seen any disciplinary actions taken against any player because of ST use?
 - a. Yes
 - b. No
 - c. Not sure

4. Does ST use bother you or offend you in any way?
 - a. Yes
 - b. No
 - c. I'm indifferent to ST use

5. Has a teammate (on any team) ever offered ST to you?
 - a. Yes
 - b. No
 - c. Not Sure

6. Has a coach (on any team) ever offered ST to you?
 - a. Yes
 - b. No
 - c. Not Sure

7. Is ST use part of your college baseball team's culture? Specifically, is there ST use on the field, at parties, meetings, etc.? Please circle all that apply.
 - a. On field (games and practices)
 - b. Just practices
 - c. Just games
 - d. At team meetings
 - e. At parties/just hanging out
 - f. No
 - g. Other: _____

8. Do the coaches of your current baseball team care about player ST use?
 - a. Yes
 - b. No
 - c. Not sure/Hadn't noticed
 - d. They know about it but don't mention it
 - e. They use it too
 - f. Other: _____

9. Does the NCAA ban on ST affect your ST use?
 - a. I do not use ST
 - b. Yes
 - c. No
 - d. Hadn't thought about it

ST PRACTICES AND BELIEFS ABOUT ST USE

1. Are you secretive about your ST use?
 - a. I do not use ST
 - b. Yes
 - c. No
 - d. Never thought about it

2. Are you concerned about the long-term risk often associated with ST?
 - a. Yes
 - b. No
 - c. Hadn't thought of it

3. Are you concerned about the long-term risk associated with tobacco use generally?
 - a. Yes
 - b. No
 - c. Hadn't thought of it

4. Do you consider your oral hygiene more important because you use ST? As in do you make sure to brush your teeth more frequently than you might otherwise since you use ST?
 - a. I do not use ST
 - b. Yes
 - c. No
 - d. Not Sure/Hadn't thought about it

DEMOGRAPHIC INFORMATION

1. How old are you?
 - a. 18
 - b. 19
 - c. 20
 - d. 21
 - e. 22 or older

2. What ethnic group do you consider yourself a part of?
 - a. White
 - b. Black
 - c. Hispanic/Latino
 - d. Asian
 - e. Other: _____

3. What is your current year of college eligibility?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
 - e. Other: _____

4. Are you a position player or a pitcher (If both, which do you consider your primary role)?
 - a. Position player
 - b. Pitcher
 - c. Decline to answer

Appendix E – Full Survey Results

Table of Demographics, History of ST Use, and Brands/Types of ST Use

DEMOGRAPHICS								
			School				Total	
			GSU N=8; % of GSU		OU N=14; % of OU		N=22/% of Total	
Age	18	Count / %	2	25%	3	21.4%	5	22.7%
	19	Count / %	0	0%	3	21.4%	3	3.6%
	20	Count / %	3	37.5%	3	21.4%	6	77.3%
	21	Count / %	0	0%	3	21.4%	3	13.6%
	22 or older	Count / %	3	37.5%	2	14.3%	5	22.7%
Race/Ethnic Group	White	Count / %	8	100%	14	100%	22	100.0%
Current Year of Athletic Eligibility	Freshman	Count / %	2	25%	3	21.4%	5	22.7%
	Sophomore	Count / %	1	12.5%	4	28.6%	5	22.7%
	Junior	Count / %	2	25%	2	14.3%	4	18.2%
	Senior	Count / %	1	12.5%	3	21.4%	4	18.2%
	Other (Red-shirted for example)	Count / %	2	25%	2	14.3%	4	18.2%
Position Player or Pitcher	Position player	Count / %	5	62.5%	10	71.4%	15	68.2%
	Pitcher	Count / %	3	37.5%	4	28.6%	7	31.8%
HISTORY OF ST USE								
Have you ever used ST?	Yes	Count / %	6	75%	5	35.7%	11	50%
	No	Count / %	2	25%	9	64.3%	11	50%
How long have you been using ST?	I have never used ST	Count / %	2	25%	9	64.3%	11	50%
	7 months to a year	Count / %	0	0%	1	7.1%	1	4.5%
	A year or two	Count / %	2	25%	1	7.1%	3	13.6%
	More than two years	Count / %	4	50%	2	14.3%	6	27.3%
	Other	Count / %	0	0%	1	7.1%	1	4.5%
Have you used ST once in the past 30 days?	Yes	Count / %	5	62.5%	2	14.3%	7	31.8%
	No	Count / %	1	12.5%	5	35.7%	6	27.3%
	I have never used ST	Count / %	2	25%	7	50%	9	40.9%
Do you consider yourself to be a habitual (daily use or use on most days) ST user?	Yes	Count / %	5	62.5%	2	14.3%	7	31.8%
	No	Count / %	1	12.5%	5	35.7%	6	27.3%
	I have never used ST	Count / %	2	25%	7	50%	9	40.9%
Within the last 30	I do not use ST	Count / %	3	37.5%	9	64.4%	12	54.3%

days, on how many days did you use ST?	Have used, but not in the last 30 days	Count / %	0	0%	3	21.4%	3	13.6%
	20-29	Count / %	2	25%	0	0%	2	9.1%
	All 30 days	Count / %	3	37.5%	2	14.3%	5	22.7%
If you use ST regularly, how long does it take you to finish one can?	I have never used ST	Count / %	2	25%	9	64.3%	11	50%
	I do not use enough to buy my own cans	Count / %	1	12.5%	2	14.3%	3	13.6%
	1-2 days	Count / %	3	37.5%	1	7.1%	4	18.2%
	3-5 days	Count / %	0	0%	1	7.1%	1	4.5%
	6-9 days	Count / %	1	12.5%	0	0%	1	4.5%
	10-19 days	Count / %	1	12.5%	1	7.1%	2	9.1%
BRANDS AND TYPE OF ST USE								
What type of ST do you use/prefer?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Long cut	Count / %	3	37.5%	4	28.6%	7	31.8%
	Pouches	Count / %	2	25%	0	0%	2	9.2%
What brand of ST do you typically use?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Copenhagen	Count / %	2	25%	2	14.3%	4	18.2%
	Grizzly/Kodiak	Count / %	3	37.5%	2	14.3%	5	22.7%

Table of Baseball and ST Use

BASEBALL AND ST USE								
			School				Total N=22/% of Total	
			GSU N=8; % of GSU		OU N=14; % of OU			
At what types of baseball events do you typically use ST?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	At practices and games	Count / %	4	50%	3	21.4%	7	31.8%
	At practices only	Count / %	1	12.5%	1	7.1%	2	9.1%
Is there a team policy about ST?	Yes	Count / %	2	25%	4	28.6%	6	27.3%
	No	Count / %	0	0%	2	14.3%	2	9.1%
This could be from coaches, training staff, etc.	Not sure	Count / %	1	12.5%	2	14.3%	3	13.6%
	Yes, but not enforced	Count / %	5	62.5%	6	42.9%	11	50%
Have you ever heard of or seen	Yes	Count / %	0	0%	5	37.5%	5	22.7%
	No	Count / %	8	100%	8	57.1%	16	72.7%

any disciplinary actions taken against any player because of ST use?	Not sure	Count	0	0%	1	7.1%	1	4.5%
Does ST use bother or offend you in any way?	Yes	Count / %	0	0%	4	28.6%	4	18.2%
	Not Sure	Count / %	1	12.5%	2	14.3%	3	13.6%
	No	Count / %	7	87.5%	8	57.1%	15	68.2%
Has a teammate (on any team) ever offered ST to you?	Yes	Count / %	8	100%	12	87.5%	20	90.9%
	Maybe	Count / %	0	0%	1	7.1%	1	4.5%
	No	Count / %	0	0%	1	7.1%	1	4.5%
Has a coach (on any team) ever offered ST to you?	Yes	Count / %	2	25%	2	14.3%	4	18.2%
	No	Count / %	5	62.5%	11	78.6%	16	72.7%
	Not sure	Count / %	1	12.5%	1	7.1%	2	9.1%
Is ST use part of your college baseball team's culture?	On field (games/practices)	Count / %	6	75%	12	87.5%	18	81.8%
	Just Practices	Count / %	1	12.5%	2	14.3%	3	13.6%
	Just Games	Count / %	0	0%	0	0%	0	0%
	At team meetings/functions	Count / %	5	62.5%	8	8	13	59.1%
	At parties/ just hanging out	Count / %	7	87.5%	11	57.1%	18	81.8%
	No	Count / %	1	12.5%	1	7.1%	2	9.1%
	Other	Count / %	1	12.5%	1	7.1%	2	9.1%
Do your current coaches care about player ST use personally?	No	Count / %	2	25%	8	57.1%	10	45.5%
	Not sure/Hadn't noticed	Count / %	2	25%	3	21.4%	5	22.7%
	They know about it but don't mention it	Count / %	2	25%	3	21.4%	5	22.7%
	They use it too	Count / %	2	25%	0	0%	2	9.1%
Does the NCAA ban on ST affect your ST use?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Yes	Count / %	1	12.5%	0	0%	1	4.5%
	No	Count / %	4	50%	3	21.4%	7	31.8%
	Hadn't thought about it	Count / %	0	0%	1	7.1%	1	4.5%

Table of ST Practices and Beliefs about ST Use

ST PRACTICES AND BELIEFS ABOUT ST USE								
			School				Total N=22/% of Total	
			GSU N=8; % of GSU		OU N=14; % of OU			
Are you secretive about your ST use?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Yes	Count / %	1	12.5%	0	0%	1	4.5%
	Only during games/practices	Count / %	1	12.5%	0	0%	1	4.5%
	No	Count / %	3	37.5%	4	28.6%	7	31.8%
Are you concerned about the possible long-term health risks associated with ST?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Yes	Count / %	3	37.5%	2	14.3%	5	22.7%
	No	Count / %	0	0%	1	7.1%	1	4.5%
	Hadn't thought about it	Count / %	2	25%	1	7.1%	3	13.6%
Are you concerned about the long-term health risks associated with tobacco generally?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Yes	Count / %	4	50%	4	28.6%	8	36.4%
	Hadn't thought about it	Count / %	1	12.5%	0	0%	1	4.5%
Do you consider your oral hygiene more important because you use ST?	I do not use ST	Count / %	3	37.5%	10	71.4%	13	59.1%
	Yes	Count / %	4	50%	2	14.3%	6	27.3%
	No	Count / %	0	0%	1	7.1%	1	4.5%
	Hadn't thought about it	Count / %	1	12.5%	1	7.1%	2	9.1%