THE DEVELOPMENT OF A HABITS USE

QUESTIONNAIRE: RELATIONSHIP OF

CIGARETTE SMOKING, ALCOHOL,

CAFFEINE, AND CHEWING GUM

USE IN A COLLEGE

POPULATION

By

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THE DEVELOPMENT OF A HABITS USE
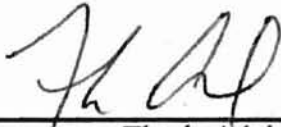
QUESTIONNAIRE: RELATIONSHIP OF

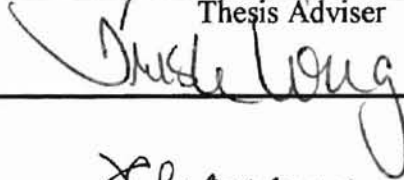CIGARETTE SMOKING, ALCOHOL,

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Drug use is a significant problem throughout the United States. Chronic drug use

can lead to serious medical problems, psychological difficulties, financial problems, and

even death. Understanding drug use is critical to successful treatment and cessation.

However, individuals who use drugs typically do not use them in isolation.

In addition to understanding drug use, attempts must be made to better understand

the roles drugs play. Drugs can serve to enhance the effects of other drugs. For example,

to a coffee-drinking smoker, coffee "tastes" better when accompanied by a cigarette.

Drugs can also replace other drugs when access to a particular drug is restricted. If

cigarette smoking is restricted or prohibited, alcohol intake may increase as a function of

smoking restrictions and serve as a substitute for alcohol.

Drug use is not limited to illegal drugs. In fact, the most commonly used drugs in

the United States are alcohol, tobacco, and caffeine. The present study will use a

comprehensive survey to assess a wide range of oral habits in a college population. In

particular, the study will focus on concurrent use of the above mentioned substances and

the relationships among them. In addition, the present study will examine the role of

alternative reinforcers (e.g., chewing gum) in relation to drug use.

The following literature review will first present prevalence rates, trends of college

students' consumption, problems associated with chronic use, and functions of alcohol,

tobacco, and caffeine. Second, the review will focus on research examining concurrent

use of alcohol, tobacco, and caffeine. This review will include data from epidemiological

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studies which describe the relationships among these substances in the general population, as well as laboratory studies which suggest that coffee consumption and alcohol can both serve as discriminative stimuli for the initiation of cigarette smoking. Possible links between these substances will also be discussed. Next, behavioral economic theory will be presented as an alternative model useful in the evaluation of this research. In particular, drug use can be described in terms of substitutable stimuli, complementary stimuli, and alternative reinforcers. Next, a review of the criteria for drug dependence will be presented, followed by a section on withdrawal symptoms. Next, prevalence rates, trends of college students' consumption, and functions of chewing gum are reviewed. This review suggests that it is possible that chewing gum may serve as an alternative reinforcer to cigarette smoking and possibly to other substances as well. Finally, specific hypotheses of the present study are presented.

Prevalence and Problems in College Students' Drug Use

The three most commonly used psychoactive substances in Western cultures today are alcohol, tobacco, and caffeine (Istvan & Matarazzo, 1984). Consumption of these three drugs varies widely. Caffeine is the most frequently consumed, followed by alcohol, then tobacco. All of these drugs are consumed at much higher levels than any illicit drug.

Alcohol

It is estimated that at least 66% of adults and adolescents living in the U.S. report using alcohol in the past year, and nearly 51% report consuming alcohol in the last month. Ninety-one percent of college students have some experience with alcohol (National Institute on Drug Abuse [NIDA], 1994), and 40% of students engage in heavy drinking (5

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or more consecutive drinks at least once in prior two weeks). The overall prevalence of heavy drinking is estimated to be as high as 49% (NIDA, 1994).

College students have slightly higher annual and monthly prevalence rates of alcohol consumption compared to their same aged peers, but lower daily rates of alcohol intake than their non-college peers (NIDA, 1994). Only 3.2% of college students consume alcohol on a daily basis compared to 4.3% of their non-college peers. This suggests that college students restrict much of their drinking to weekends, to times when they tend to drink heavily (NIDA, 1994). What is perhaps the most significant difference in alcohol consumption between these two groups is the prevalence of heavy drinking. Forty percent of college students engage in heavy drinking compared to 34% of their same aged peers. This difference appears primarily because heavy drinking is relatively low in non-college females (NIDA, 1994).

Nearly 6% of college males are daily drinkers compared to only 1.1% of college females. Substantial sex differences are evident in heavy drinking as well. Nearly 50% of college males engage in heavy drinking compared to 33% of college females. Although there have been relatively few changes since 1980 in sex differences in alcohol consumption, alcohol continues to be a significant concern for this population (NIDA, 1994).

Prolonged alcohol use is associated with significant medical problems, such as liver cirrhosis, throat cancer, pancreatitis, and neurological disorders (Center for Disease Control and Prevention [CDC], 1993). Heavy alcohol intake also seems to be correlated with higher death rates from certain cancers, accidents, and suicide (Istvan & Matarazzo, 1984). Forty-three percent of U.S. adults acknowledge the association between alcohol

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and throat cancer, yet over 50% of the U.S. population twelve years and older report consuming alcohol within the past month.

Misuse of alcohol has also been shown to be related to other health risk behaviors. It is estimated that alcohol is involved in nearly one-half of all automobile-related deaths (CDC, 1993). Over 12% of current drinkers report that they have driven a car at least once in the past year when they thought they had too much to drink (CDC, 1993). Alcohol has also been shown to be very costly to our society. It is estimated that the U.S. spent over one billion dollars in 1990 on alcohol / drug abuse services (Van Son, 1993).

Despite the adverse effects and high costs associated with alcohol, many individuals continue to drink. Perhaps this is because consumption of alcohol is reinforcing or rewarding to the individuals who drink it. Basic learning principles of psychology define reinforcement as present when behavior increases in frequency contingent upon the presence of the reinforcing stimulus. Applying this principle to alcohol consumption, the reinforcing effects of alcohol increase the frequency of alcohol consumption. The more reinforcing or rewarding alcohol is to an individual, the more alcohol will be consumed.

Research suggests that the primary reinforcing component in alcohol is ethanol (Cornwell & Cornwell, 1993). Ethanol has several effects that appear to contribute to its role as a reinforcer. Alcohol is known to lower inhibitions in many individuals, thus producing feelings of relaxation and reduction in anxiety (Cornwell & Cornwell, 1993). Low doses of alcohol can produce feelings of well-being or euphoria in many individuals (Cornwell & Cornwell, 1993). Alcohol is also culturally linked to various environmental situations, possibly used as a tool for social interaction (Cornwell & Cornwell, 1993). In

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addition, alcohol has been linked to diminished emotional reactivity (Levenson, 1986).
Using standardized mood inventories in his laboratory, Levenson (1986) found that
intoxicated subjects reported feeling more cheerful and pleasant than non-intoxicated
subjects.

Finally, some individuals consume alcohol for its self-medicating effects, positing
that alcohol is reinforcing for its medicinal purposes (Sulkunen, 1976). Patients of various
medical populations (e.g., chronic pain, psychiatric, geriatric) consume alcohol for its
assistance in relieving minor aches and pains. Thus, it appears that whatever functions
alcohol serves, it produces satisfying states of affairs in individuals who consume it.

Tobacco

It is estimated that 32% of Americans report smoking cigarettes in the past year,
and nearly 27% report smoking cigarettes in the past month (NIDA, 1994). Smokeless
tobacco use is much lower. Yearly smokeless tobacco use is estimated to be 4.9%,
compared to a monthly use of 3.5% (National Institute on Drug Abuse [NIDA], 1990).

Cigarette smoking trends show that daily smoking begins in grades 6-9. Few
individuals begin to smoke after high school, however, the amount smoked appears to
increase during adulthood. It is estimated that a large number of light as well as moderate
smokers are transformed to heavy smokers 1 to 2 years post high school (National
Institute on Drug Abuse [NIDA], 1993; NIDA, 1994). Twenty-one percent of young
adults 19-28 years old are daily smokers (NIDA, 1994).

The largest difference in drug taking behavior among college and non-college
individuals is cigarette smoking. Fifteen percent of college students smoke daily

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compared to 27% of their non-college peers. Only 9% of college students smoke half-a-pack per day, whereas 20% of their same aged peers smoke at this rate (NIDA, 1994).

Chronic cigarette smoking has been linked to serious medical illnesses. The correlations between smoking and various health related problems, such as lung cancer, emphysema, throat and esophagus cancers, stomach cancer, bladder cancer, coronary heart disease, stroke, and obstructive pulmonary heart disease are well documented (Epstein & Jennings, 1986). However, despite the recognition that smoking is a key factor (if not the major causal factor) in developing one of these diseases, many individuals continue to smoke. Smoking cessation could prevent a large number of deaths each year and delay the onset of a large number of these life-threatening illnesses.

Ninety-one percent of adults acknowledge that smoking increases one's chances of developing heart disease. Yet, 26% of American adults report smoking. Of those individuals who do smoke, 89% report a knowledge of the associations between cigarette smoking and heart disease (CDC, 1993).

Like alcohol, cigarette smoking behavior is at least partially maintained as a result of the reinforcing effects of smoking. Smokers enjoy smoking and continue to smoke because of the reinforcement smoking provides to them. Research suggests that the reinforcing agent in cigarette smoke is nicotine (Russell, 1976). Individuals who enjoy smoking are reinforced by nicotine effects. As with alcohol, the relative importance of nicotine as a reinforcer varies between individuals (Mangan & Golding, 1984). Some individuals appear to merely enjoy the taste and smell of cigarettes. For others, nicotine serves as a mood control agent when individuals are over-excited or anxious (Mangan & Golding, 1984). Smoking has also been found to decrease fatigue and drowsiness, act as

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an appetite suppressant, reduce irritability, facilitate memory or attention, and have alerting and muscle relaxant effects (Mangan & Golding, 1984).

The various reinforcing effects of cigarette smoking may help explain why so many individuals continue to smoke despite the well known health consequences associated with smoking. In fact, it is estimated that two-thirds of American adult smokers wish to quit smoking. Over seventeen million smokers try to quit yearly, yet fewer than 1 out of 10 actually succeed. For every smoker who successfully quits, nine others try and fail (Kessler, 1994).

Caffeine

It is estimated that caffeine consumption is much higher than the use of either alcohol or nicotine. Although exact numbers are difficult to calculate, it is estimated that the majority of U.S. adults consume some form of caffeine-containing beverages on a daily basis (Gilbert, 1976).

In 1972, individuals aged 10 and older consumed an average of 2.55 cups of coffee daily. In the same year, 75% of the U.S. population drank 1 or more cups of coffee daily, whereas 20-25% of individuals drank 4 or more cups of coffee on a daily basis (Gilbert, 1976). In addition to coffee, the average consumption of tea, cola, and other caffeinated beverages is quite widespread. However, good estimates of their usage are not readily available.

Coffee consumption increases with age. Individuals in the 25 to 29 age group consume an average of 2.47 cups of coffee daily, compared to 3.51 cups for individuals in the 30 to 39 age group (Shapiro, Lane, & Henry, 1986). Coffee consumption appears to decline somewhat after age 40 (Shapiro et al., 1986).

Normal caffeine use is probably benign and not associated with many life-threatening illnesses. However, some literature does suggest that caffeine use may be associated with states of anxiety and heart conditions, in genetic abnormalities, and in various other pathologies (Gilbert, 1976). Other researchers have suggested that high caffeine consumption (particularly coffee) is associated with total cholesterol and triglycerides (Shapiro et al., 1986). Although few firm conclusions can be drawn from existing literature, most researchers agree that studies examining the cardiovascular and other physiological effects of caffeine suggest that heavy caffeine consumption may be a significant risk factor for cardiovascular disease. This risk is greatly increased when caffeine is combined with other risk factors, such as chronic stress, family history of hypertension, and cigarette smoking (Shapiro et al., 1986).

Although there are many caffeinated beverages available today, research on caffeine consumption typically focuses on coffee intake. The reinforcing mechanism of coffee, as with other caffeinated beverages, is thought to be caffeine (Shapiro et al., 1986). However, the amount of caffeine in these beverages varies widely.

As with the other psychoactive substances discussed earlier, caffeine is reinforcing to the individuals who consume it. The reinforcing effects of caffeine appear to be related to its stimulant properties, including enhanced psychomotor performance, enhanced alertness, reduction in fatigue, and interference with sleep (Sawyer, Julia, & Turin, 1982; Shapiro et al., 1986). Caffeine has also been shown to elevate mood or attitude (Gilbert, 1976).

Other illicit drugs

The use of illicit drugs is much lower than the psychoactive drugs reviewed earlier. Over 13% of the American population report using an illicit drug within the past year, and 6.4% admit to using some type of illicit drug in the past month. It is estimated that the average age for first use of alcohol and cigarettes is younger than illicit drugs, at 17.2 and 14.9 years, respectively, compared to 18.7 years for first use of marijuana, the most commonly used illicit drug (NIDA, 1990).

Concurrent use of tobacco, caffeine, and alcohol

Epidemiological studies have documented the interrelationships of smoking and coffee intake (Dawber, Kannel, & Gordon, 1974) and smoking and alcohol consumption (Craig & Van Natta, 1977). In addition, laboratory studies have demonstrated that smoking increases following alcohol consumption (Griffiths, Bigelow, & Liebson, 1976) and coffee intake (Marshall, Epstein, & Green, 1980a). Generally speaking, scientific literature continually documents the strong associations found among cigarette smoking and coffee consumption as well as cigarette smoking and alcohol intake.

Epidemiological studies: alcohol, caffeine, and tobacco

Recent research has investigated the concurrent use of alcohol, caffeine, and tobacco in the general population. However, there are few studies examining the use of all three of these substances. Clinical lore posits that there is a positive association between alcohol and smoking, as well as caffeine (especially coffee) and smoking. Generally speaking, heavy smokers tend to consume larger amounts of coffee and of alcohol than non-smokers (Epstein & Jennings, 1986).

Tobacco and alcohol. Istvan and Matarazzo (1984) conducted an extensive review of studies examining the concurrent use of alcohol and tobacco. Despite variability in assessment techniques and methodology, the general consensus remains the same. There is a consistent pattern for increased smoking to be associated with higher consumption of alcohol. Additionally, amount of tobacco consumed is correlated with higher amounts of alcohol. This relationship is evident in both sexes, across ages, and among individuals of various national origins. Thus, it appears that there is some common dimension, whether it be pharmacological, psychological, or cultural in origin that links tobacco and alcohol (Istvan & Matarazzo, 1984).

The concurrent use of alcohol and tobacco plays a significant role in the etiology of a number of illness. In particular, prevalence rates of head, neck, and oral cancers are highest among those individuals who smoke and drink. Additionally, research suggests that excessive alcohol use and smoking may both significantly increase the risk of morbidity and mortality as a result of cardiovascular disease (Istvan & Matarazzo, 1984).

Researchers also suggest a pattern of behaviors between smoking, consumption of alcohol, and use of illicit drugs. Schorling and colleagues (Schorling, Gutgesell, Klas, Smith, & Keller, 1994) examined cigarette, alcohol, and illicit drug use among 3,374 undergraduates. Generally speaking, regular smokers engaged in more illegal drug consumption (marijuana, cocaine, and LSD) than did occasional smokers. In addition, smokers reported significantly more illegal drug use than non-smokers. Although less than one fourth of this sample were classified as smokers (23.5%), this small subgroup accounted for the majority of all illicit drug use in this sample. In regards to alcohol

consumption, occasional smokers were as likely to engage in binge drinking as regular smokers. This tendency for binge drinking was not evident in non-smokers.

Schorling and colleagues (1994) also assessed subjects' perceived risk of drug behavior between smokers and non-smokers and between users and nonusers of each drug. Smokers tended to perceive less risk of drug use as compared to non-smokers. One possible explanation as to why cigarette smoking may be related to other drug use may be related to lower perceptions of drug use. Although the adverse health risks of smoking are well documented, an individual who chooses to smoke may minimize the potential consequences of the behavior. This inclination to minimize may generalize to other substances, and may thus increase the likelihood of their use.

Tobacco and caffeine. In studies examining the relationship between tobacco and caffeine, cigarette smoking is the indicator of nicotine, and coffee drinking is given as the indicator of caffeine consumption. Coffee appears to be the caffeinated beverage of choice in the U.S., whereas tea is the preferred beverage in several European and Far Eastern nations (Sulkunen, 1976).

The majority of research investigating the relationship between coffee and smoking indicates a strong relationship between these two substances in the general population (Istvan & Matarazzo, 1984). Only one study examining tea drinking and smoking was included in this review. Findings indicate a weak negative relationship between tea drinking and cigarette smoking, but a moderately strong association between coffee drinking and smoking. Such results suggest that different situational or individual difference factors mediate tea drinking smoking than coffee and cigarette smoking (Istvan & Matarazzo, 1984).

Swanson and colleagues (Swanson, Lee, & Hopp, 1994) reviewed six epidemiological studies. In all studies reviewed, smokers consumed significantly more coffee than non-smokers (86.4% vs. 77.2%). Former smokers also consumed more coffee than non-smokers, but somewhat less than smokers. Of the numerous experimental studies reviewed, researchers suggested that the pharmacological effects of caffeine contained in coffee may be partly, but not completely, responsible for the relationship between these substances. An additional hypothesis relates to conditioning of the two drugs.

One pharmacological explanation for the link between coffee and smoking may be related to an increase in metabolism and the shorter half-life of caffeine in cigarette smokers. Smokers tend to metabolize caffeine faster than non-smokers. Thus, it is possible that smokers increase their coffee consumption in order to maintain certain body caffeine levels (Swanson et al., 1994). Research suggests that when an individual stops smoking, caffeine metabolism slows, the half-life of caffeine lengthens, and saliva and plasma caffeine levels increase. Although there is a strong relationship between cigarette smoking and coffee consumption, the relationship does not appear to be dose related. A number of experimental studies have found no increase in number of cigarettes smoked when coffee dose increased (Swanson et al., 1994). Thus, factors other than pharmacological factors must be involved in the coffee-smoking relationship.

It is likely that as a result of repeated pairings of coffee and smoking, a behavioral conditioning stimulus for smoking may have developed. Coffee consumption may serve as a cue to trigger cigarette smoking (Marshall et al., 1980a; Swanson et al., 1994). In addition, individuals are twice as likely to smoke after drinking coffee than before, suggesting that coffee serves as a cue for smoking (Emurian, Nellis, Brady, & Ray, 1982;

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Swanson et al., 1994). Other research supports the finding that coffee consumption cannot completely account for increase in smoking solely due to the pharmacological effects of caffeine. There must be some sort of conditioned association between the two drugs (Swanson et al., 1994).

The behavioral link between these two drugs may be the result of an indirect reciprocal interaction, where one drug serves as a cue to elicit the other. Caffeine consumption increases arousal / anxiety, whereas some individuals report an emotional calming effect from nicotine. It is also possible that the joint effects of a third variable, such as stress or alcohol, account for the relationship. Several studies have found that during periods when stress level or alcohol consumption increases, there is a corresponding increase in both coffee intake as well as cigarette smoking (Swanson et al., 1994).

Caffeine and alcohol. A paucity of research exists that examines the relationship between alcohol and caffeine. The general conclusion of the few studies available regarding the relationship of caffeine and alcohol suggests the presence of an either weak or nonexistent relationship between the two substances, with one exception. Studies investigating the heavy use of either of these substances did find a conjoint relationship (Istvan & Matarazzo, 1984).

Epidemiological studies also suggest that relationships of smoking and alcohol and smoking and coffee between smokers and non-smokers is also seen in ex-smokers and non-smokers. Former smokers consume more coffee and more alcohol than individuals who never smoked regularly. It is likely that previously learned behaviors associated with

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smoking continue to place the former smoker at risk for developing other forms of morbidity (Istvan & Matarazzo, 1984).

<u>Laboratory studies</u>

Experimental studies have documented the associations between tobacco, alcohol, and coffee found in the general population. Laboratory studies suggest that both coffee consumption and / or alcohol intake set the occasion for cigarette smoking (Epstein & Jennings, 1986). This suggests that smokers do not use tobacco in isolation.

<u>Tobacco and caffeine</u>. Marshall and colleagues (1980a) examined the relationship between coffee and smoking while they had subjects complete crossword puzzles. Results show that subjects consuming coffee in any amount smoked significantly more than subjects who did not consume coffee. In fact, coffee subjects smoked twice as many cigarettes than those subjects without coffee. In a second experiment, these researchers assessed the characteristics of coffee that may influence smoking. Smokers were assigned to one of five groups in which they received no drink, water, Potsum (a coffee substitute), caffeinated coffee, or decaffeinated coffee. Results show that subjects receiving either decaffeinated or caffeinated coffee smoked more than subjects in the other groups. The results from these two experiments provide support for the role of coffee as a stimulus for smoking. These results suggest that the effects of coffee on cigarette smoking are not caffeine-dependent. Rather, they are more likely the result of conditioning by the repeated pairing of coffee drinking with cigarette smoking (Epstein & Jennings, 1986).

In a third study, Marshall and colleagues (Marshall, Green, Epstein, Rogers, & McCoy, 1980b) examined the relationship between smoking, coffee consumption, and urinary pH. Again, findings demonstrate an increase in smoking in the presence of coffee.

No relationship between urinary pH and smoking were found. These three studies provide strong support for an association between smoking and coffee drinking, thus suggesting that coffee acts as a strong antecedent stimulus for smoking behavior. Findings suggest that this relationship is not due to taste, consumption of just any liquid, caffeine, or urinary pH. These results demonstrate the importance of stable relationships between environmental stimuli and smoking. If coffee consumption reliably serves as a cue for smoking, the control of coffee intake may be critical in the regulation of smoking.

Tobacco and alcohol. Laboratory studies also provide support for the relationship between smoking and alcohol, demonstrating that alcohol can also serve to set the stage for increased smoking (Epstein & Jennings, 1986). Griffiths and colleagues (1976) examined the relationship between cigarette smoking and consumption of alcohol in a set of studies. Results from these studies indicate that consumption of alcohol is a potent determinant of cigarette smoking. Subjects smoked more cigarettes on days when they were provided alcohol than on days when they were given a placebo. Additionally, this alcohol-induced increase in smoking was evident in a variety of situations or experimental conditions. Increased smoking was not due to the increased socialization that often occurs during drinking episodes. In addition, the nicotine-alcohol relationship was not dose-dependent (Epstein & Jennings, 1986).

Researchers continue to investigate the possible link between these substances. Several models have been proposed in attempts to explain the joint consummatory behavior of caffeine, alcohol, and tobacco. It is possible that psychoactive substance use establishes a pattern that characterizes a reciprocal activation mechanism (Swanson et al., 1994). In other words, use of one drug activates or serves as a cue to elicit use of a

second drug. As previous research has suggested, both alcohol and coffee intake can act as cues to elicit smoking behavior. This pattern of use becomes strengthened over time. Environmental stimuli can also serve as stimuli for smoking behavior. Common situations that are often associated with smoking (e.g., smoking after meals) may maintain smoking behavior by the constant pairing of the stimulus and smoking.

In addition, use of any one of these psychoactive substances may function as a generalized behavioral stimulant that produces, among other outcomes, increased use of other psychoactive substances. It has been suggested that the coffee-tobacco and alcohol-tobacco relationships are so potent that consumption of one substance (e.g., coffee, alcohol) enhances the effects of another substance (e.g., smoking). Findings from the Griffiths et al. study (1976) suggest that smoking causes objective and subjective effects of ethanol to become more powerful than when smoking occurs in the absence of alcohol. Thus, the alcohol-induced increase in smoking likely reflects the ability of cigarette smoking to enhance the effects of alcohol.

Several authors (e.g., Bickel, DeGrandpre, Hughes, & Higgins, 1991; Epstein, Bulik, Perkins, Caggiula, & Rodefer, 1991; Perkins, Epstein, Grobe, & Fonte, 1993; Perkins, Epstein, Sexton, & Pastor, 1990) have advocated that principles derived from behavioral economic theory provide a novel approach to our understanding of drug dependence. One aspect of this theory that is particularly important to the proposed study deals with the importance of alternative reinforcers. Some alternative reinforcers appear to be reliable substitutes of drugs, thus resulting in a decrease in drug use when these reinforcers are available. Other reinforcers are complements to drug use, enhancing the drug effects and increasing in frequency as drug consumption increases. Behavioral

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economic theory interprets this concept in terms of change in the elasticity of a commodity (e.g., drug). Elasticity is defined as the degree to which consumption changes as unit price or response requirement changes (DeGrandpre, Bickel, Abu Turab Rizvi, & Hughes, 1993).

Results from the Griffiths et al. study (1976) suggest that smoking and alcohol may serve as complements to each other -- an increase in consumption of one drug (in this case, alcohol) is associated with increased consumption in another drug (smoking). However, it is also possible that two commodities may not exclusively be complements. Many psychoactive substances can serve several roles. The same two commodities that share a complementary relationship can also serve as substitutes for each other. As researchers have demonstrated, cigarette smoking increases with alcohol consumption (Griffiths et al., 1976), suggesting a complementary relationship between smoking and alcohol. However, cigarette smoking and alcohol consumption could serve as substitutes for each other if their consumption varied inversely. For example, if restrictions placed on cigarette smoking were associated with increased alcohol consumption, it could be concluded that alcohol is a substitute for smoking.

Commodities are described as substitutes for each other when the increased price of one commodity causes increased consumption of another commodity (Bickel, Hughes, DeGrandpre, Higgins, & Rizzuto, 1992). Commodities or reinforcers are substitutes when they are used interchangeably (Vuchinich & Tucker, 1988). Perkins and colleagues (1990) found support for the substitutability of alcohol and smoking. Findings showed that alcohol and high caloric intake increased after smoking cessation and returned to normal levels upon resumption of smoking. Some researchers have suggested that such

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increased consumption represents attempts to cope with negative affect associated with nicotine withdrawal. However, this belief was not supported. Consumption of alcohol and sweets peaked later in the week following cessation, whereas craving and negative affect peaked earlier in the week.

Alcohol and sweets appear to be substitutes for tobacco (Perkins et al., 1990). When smoking was not available to subjects, alternative reinforcers (in this case, alcohol and sweet, fatty foods) were consumed. The use of some alternative reinforcers increased as a result of removal of a separate reinforcer (smoking) from the environment. However, other alternative reinforcers that were also available (e.g., soda, TV viewing) did not increase, and thus did not appear to be effective substitutes for cigarette smoking behavior. This finding leads researchers to suggest that the effects smoking cessation have on alternative reinforcers is specific, rather than a generalized effect (Perkins et al., 1990). Findings from previous studies (e.g., Griffiths et al., 1976; Perkins et al., 1990) suggest that alcohol can serve as both a complement to, as well as a substitute for, cigarette smoking. The concepts of complementary stimuli and substitutable stimuli, borrowed from behavioral economic theory, may provide a better understanding of drug consumption and dependence.

Behavioral Economic Theory: The reinforcing stimulus as a commodity

Three potential relationships exist between reinforcing stimuli: substitutable stimuli, complementary stimuli, or independent stimuli. Substitutable stimuli must serve similar functions or purposes (Baumol, 1972). With respect to drug dependence, the demand for a drug is not conceptualized as a demand for the substance itself. Rather,

demand is understood in terms of drug effects such as satisfaction or euphoria that accompanies ingestion of the drug (Green & Freed, 1993). Two drugs which produce similar effects should serve as substitutes for each other. From a behavioral economic perspective, choice behavior should be directly influenced by the cost associated with each of these stimuli if similar effects are found. Behavioral economic theory allows researchers to study behavioral choices between two concurrent reinforcers. Changes in the reinforcing value of one reinforcer within the context of a second reinforcer may provide a better understanding of drug dependence (Perkins et al., 1993).

Although drug consumption can be a reinforcing activity, reinforcement alone cannot solely account for drug maintenance or dependence since there are other reinforcing activities in which individuals can engage (Vuchinich & Tucker, 1988). Other factors must be associated with the reinforcing value of drug consumption relative to the value of alternative reinforcing activities that are available.

Early studies of substitutability (e.g., Rachlin, Green, Kagel, & Battalio, 1976; Vuchinich & Tucker, 1988) suggest that as the "price" of or effort to obtain a good increases, consumption or use of that commodity decreases, and consumption of an alternative good increases. Thus, choice of available reinforcers contributes to consumption of a drug. If availability to a particular reinforcer (e.g., a drug) is limited, a reduction in drug consumption should be seen. In addition, an increase in preference or choice made in the direction of available alternative reinforcers should be identified. This concept of choice has been experimentally demonstrated in relation to alcohol consumption, a highly preferred activity for many individuals. Studies show that an increase on the constraints on alcohol is related to a decreased preference for alcohol

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intake. In addition, when alcohol is only one of a set of available reinforcers, increased constraints on other reinforcers leads to an increase in alcohol consumption. Empirical findings (Vuchinich, Tucker, & Rudd, 1987) show that preference for alcohol consumption significantly increases with delay of alternative reward (e.g., money). Additionally, preference for alcohol increases as constraints on alternative reinforcers increases.

Complementary stimuli are defined by the use pattern of a commodity. When the use of one stimulus is directly tied to the use of an alternative stimulus, a complementary relationship is said to exist. Commodities are said to be complements of each other when an increase (or decrease) in the consumption of one commodity results in a similar change in the other commodity (Bickel et al., 1992). Two commodities are more likely to be complements the more both are required to produce the desired state, effect, or outcome, such as coffee and tobacco (Hursh & Bauman, 1987).

Both the substitutability and complementarity of commodities can be defined as the degree to which consumption of one commodity changes as the value of an alternative commodity changes as well (Green & Freed, 1993). However, it is important to note that the same two commodities may serve as both substitutes and complements across various situations.

The reinforcing effects of a particular drug are critical to drug dependence. However, the relative reinforcing properties of a drug may be influenced by constraints upon access to that particular drug in addition to the drug effects themselves (Epstein et al., 1991). In addition, the reinforcing characteristics of a drug may be influenced by alternative reinforcers.

Behavioral economic theory provides a mechanism for investigating variables that influence an individual's drug-taking behavior. This theory posits that access to alternative reinforcers or activities that vary in their accessibility influence drug consumption. When applied to smoking, this theory asserts that the reinforcing value of smoking (or any commodity) is dependent upon the constraints placed upon it (e.g., cost, availability, deprivation, response demands to obtain the reinforcer) as well as the alternative reinforcers available (Epstein et al., 1991). Drug abuse treatment programs may be more successful if satisfactory behavioral substitutes for drugs were identified.

Behavioral economic theory has recently been used to help explain the relative reinforcing value of smoking. Smoking appears to decrease as the response requirement for smoking increases (Bickel et al., 1992). Overnight deprivation (Epstein et al., 1991; Perkins et al., 1993) and the presence of smoking cues (Perkins et al., 1993) increase the reinforcement value of nicotine. Similar factors (e.g., deprivation, environmental cues) appear to influence the reinforcement value of food (Epstein et al., 1991), suggesting a degree of generalization across reinforcers.

Researchers (Epstein et al., 1991) have successfully demonstrated that behavioral economic paradigms can be used to examine the reinforcing value of cigarette smoking in comparison to alternative reinforcers (e.g., food) or activities. Researchers have found that smoking and food are not reliable substitutes for each other when both reinforcers are available. However, when subjects are deprived of both commodities, food tends to be more reinforcing than smoking.

One crucial fact to consider when comparing food and smoking as reinforcers is the difference in their usual consummatory behavior. Smoking occurs at a higher

frequency than does eating. In addition, satiation after eating lasts longer than satiation after smoking. The process of digestion of food requires much more time than do the drug effects of nicotine on the body. Thus, it is possible that these two reinforcers do not share as many similar characteristics as do other commodities (e.g., smoking and coffee consumption) and are not true substitutes for each other. Rather, some researchers suggest that the act of eating may act as a cue that elicits smoking, thus serving as a complement to smoking (Epstein et al., 1991). Other research suggests that joint consummatory behaviors are linked by some sort of reciprocal activation mechanism, where the use of one substance serves as a cue in eliciting the second substance (Istvan & Matarazzo, 1984; Marshall et al., 1980a, b).

Since the reinforcement value of a commodity is related to the cost or effort associated with earning it compared to the cost necessary to earn alternative commodities (Vuchinich et al., 1987), perhaps having access to alternative reinforcers could decrease the consumption of addictive commodities. Behavioral economic theory would predict that the elasticity of an addictive commodity's demand curve would increase if substitutable alternatives were available.

Preference for money and nicotine were examined in dependent and non-dependent smokers (Collins, Quevedo, & Epstein, 1995). Findings suggest that dependent and non-dependent smokers did not differ in smoking preferences when work cost remained equal. For dependent smokers, nicotine was more reinforcing than alternative reinforcers when less expensive alternative reinforcers were available. Dependent smokers found smoking to be very reinforcing and preference to reduce smoking required large differential costs. On the other hand, non-dependent smokers appeared to be influenced more by the costs

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associated with alternative reinforcers than by nicotine. Non-dependent smokers found nicotine reinforcing when alternative reinforcers were not available; however, these individuals easily reduced their smoking with small incentives.

It is well documented in the literature that there is a strong association between cigarette smoking and coffee as well as cigarette smoking and alcohol. Smokers consume significantly more coffee and alcohol than do non-smokers. If constraints were placed on the availability of these three psychoactive substances and access to alternative reinforcers was increased, it is likely that preference for alternative reinforcers or activities would increase as consumption of the drugs decreased.

Nicotine consumption, because of its acceptance, low unit-price, and growing health concern is an area that needs more effective treatment (Kristeller, Merriam, Ockene, Ockene, & Goldberg, 1993). The identification of nicotine substitutes would produce a better understanding of the reinforcement value of nicotine. Demonstration of the effects which alternative reinforcers have on nicotine consumption may provide insight into the general effect alternative reinforcers have on addictive behavior. When performing enjoyable activities, individuals may use drugs to increase on enhance their level of enjoyment, thus demonstrating the complementary relationship between drug and activity. On the other hand, when no reinforcing alternatives available are available, individuals may use drugs to increase enjoyment and reinforcement level.

Recently, it has been suggested that drug users consider increasing alternative activities in lieu of drug consumption. For example, the William Wrigley Jr., Co. has promoted their chewing gum as something to do when "you can't smoke." It is unclear whether or not chewing gum provides a distracting alternative or actually reduces craving

for a cigarette. However, it is likely that chewing gum may provide an acceptable alternative reinforcement value for smokers.

Behavioral economic theory suggests that the availability of alternative reinforcers may contribute to the development or maintenance of an addiction. If alternative reinforcers are unavailable, drug addiction may be inevitable as drugs become an individual's only possible reinforcement. By definition, the reinforcing property of a drug is the extent to which an individual will work to obtain it. It is possible that the availability of substitutable activities or reinforcers may affect addictive behavior. However, not all researchers agree that alcohol, caffeine, and tobacco are addictive.

Drug dependence

Although definitions of addictive substances may vary slightly, all definitions have some common criteria. First, a drug is classified as addictive if its use is compulsive, often despite knowledge of its harmful effects. Second, the substance produces a psychoactive effect (a direct chemical effect) on the brain. Third, drug use is reinforcing to the individual in some way and is conditioned to continued use. In addition, cessation of many drugs produces withdrawal symptoms. These criteria are the hallmarks of addictive substances and nicotine meets them all (Kessler, 1994).

All addictive drugs share a common ability to produce chemical effects upon the brain (Kessler, 1994). Research has shown that it is the effect psychoactive substances have on dopamine in the brain that is responsible for self-administration of drugs in animals. This dopamine-hypothesis may also help explain how humans develop addictions to certain drugs (Kessler, 1994).

Psychoactive substances effect dopamine receptor sites in the brain (the "reward center" of the brain), and thus reward the drug taking behavior. This behavior-reward association is responsible for repetition of the drug-taking behavior that originally produced the reward (Kessler, 1994). The process by which the regulation of dopamine is responsible for a human to repeat the drug-taking behavior is what is known as reinforcement. Substances that have the ability to directly alter dopamine levels in the brain can produce powerfully addictive effects (Kessler, 1994). Most, but certainly not all, researchers argue that alcohol, caffeine, and nicotine are all highly addictive substances.

In attempts to determine the ability of a drug to produce dependence, four general types of behavior-modifying drug effects can be identified (U.S. Department of Health and Human Services [USDHHS], 1988). They include (a) discriminative effects of a drug; (b) drugs as positive reinforcers or rewards; (c) drugs as unconditioned stimuli; and (d) drugs as aversive stimuli.

Discriminative effects of a drug

The discriminative effects of a particular drug refer to the ability of an organism to distinguish drug state from the non-drug state. Animal and human studies have both documented the ability to detect ingestion of alcohol, nicotine, and caffeine. Governmental reports (USDHHS, 1988) suggests that both animals and humans can reliably discriminate between nicotine and non-nicotine states. It has been demonstrated that nicotine produces unique effects that are reliably identified by both animals as well as humans. Nicotine administered by a variety of routes produces dose- and time-related discriminative effects. The effects produced by nicotine also permit it to be distinguished from most other psychoactive drugs.

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Drugs as positive reinforcers

A drug can serve as a reinforcer or reward when its presentation produces repetition and strengthening of the drug behavior. In other words, drugs serve as stimuli that strengthen behavior. When drugs are consumed, various environmental stimuli can be intermittently associated with the pharmacological actions of the drug (e.g., pleasure, relief from withdrawal). These environmental stimuli appear to be important in controlling, strengthening, and maintaining drug-taking behavior. Both animal and human studies have demonstrated that nicotine can function as an efficacious positive reinforcer (USDHHS, 1988).

Drugs as unconditioned stimuli

Drugs may directly elicit various responses which subsequently become conditioned to occur in the presence of whatever stimuli were associated with those drug effects. These effects may be associated with either an increase or reduction in drug levels in the body (drug-taking or drug withdrawal). In addition, individuals may view these effects as either positive or negative effects (USDHHS, 1988).

Smokers try to maintain a certain nicotine blood level at all times. When the nicotine level drops below a certain point, withdrawal symptoms develop. Smoking another cigarette reduces some of those withdrawal symptoms by raising blood nicotine level. This reduction in withdrawal symptoms is seen as positive result.

Drugs as aversive stimuli

This concept refers to the ability in which drug consumption or drug abstinence functions as a punisher or aversive stimulus. Dependence-producing drugs can be aversive under some conditions (e.g., intoxication or toxicity). Animal and human studies have

demonstrated that high levels of nicotine can serve as a punisher and suppress choice behavior leading to alternative reinforcers. Nicotine may also be viewed as an aversive stimulus or negative reinforcer which maintains behavior that may either terminate or prevent intake of more nicotine (USDHHS, 1988).

Withdrawal symptoms

Understanding withdrawal symptoms may help researchers to better understand drug consumption. Withdrawal from a substance occurs after cessation, when blood or tissue levels of the substance decline in an individual who had maintained prolonged or heavy use of the substance. Resumption of the substance or a similar substance often occurs to relieve or avoid unpleasant withdrawal symptoms (American Psychiatric Association [APA], 1994). In fact, withdrawal is one of the criteria for substance dependence found in the Diagnostic and Statistical Manual of Mental Disorders -- Fourth Edition [DSM-IV] (APA, 1994).

Nicotine withdrawal and ethanol withdrawal are both formal diagnoses contained in the DSM-IV (APA, 1994) and are well documented. Caffeine withdrawal is not officially recognized as a diagnosis. At the time of DSM-IV publication, the data were insufficient to determine if the withdrawal symptoms associated with caffeine cessation were associated with clinically significant impairment that met the criteria for substance dependence. However, some researchers argue that caffeine is a drug of abuse (Gilbert, 1976). Individuals can become dependent upon caffeine as easily as other psychoactive substances. Caffeine withdrawal is listed in the DSM-IV as a criteria set for further study.

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Caffeine toxicity is listed in the DSM-IV and does have several symptoms in common with nicotine and ethanol withdrawal.

Symptoms common to all three syndromes include anxiety and insomnia (APA, 1994). Symptoms common to nicotine withdrawal and caffeine toxicity include, depression, irritability-frustration, restlessness-nervousness-jittery, sleep disturbances, and gastrointestinal problems (Swanson et al., 1994). The joint use of caffeine and nicotine may produce interactive effects. For example, where symptoms of anxiety may result from excessive caffeine consumption, some individuals find the pharmacological effects of nicotine to be helpful in reducing anxiety (Swanson et al., 1994). Restlessness-nervousness-jittery symptoms appear to be associated with nicotine withdrawal, caffeine toxicity, and caffeine withdrawal (Swanson et al., 1994).

Although these two drugs share may similar withdrawal symptoms, there are a few differences among the two, including headaches and sleepiness-fatigue. The abrupt cessation of caffeine consumption may result in gradual, throbbing, and severe headaches to some individuals. Other related symptoms include nausea, vomiting, runny nose, and flu-like symptoms (Swanson et al., 1994). Headaches appear to be associated with caffeine withdrawal and appear sooner as a result of smoking, but do not typically appear with tobacco withdrawal (Swanson et al., 1994).

Symptoms of fatigue-drowsiness seem primarily to be related to caffeine withdrawal, although a few nicotine studies have demonstrated similar findings. Heavy smokers appear to be more affected by drowsiness than light smokers.

Nicotine has been shown to decrease arousal in the presence of caffeine (Rose & Behm, 1991). A significant interactive caffeine-nicotine effect on subjective arousal was

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found in individuals who smoked a least one pack and consumed at least 3 cups of coffee daily. For these subjects, nicotine was found to decrease arousal only in the presence of caffeine. Thus, the effects of nicotine on subjective arousal may be dependent upon the presence of caffeine.

Studies examining the effects of alcohol and caffeine on nicotine withdrawal symptoms do not appear to be significantly associated (Hughes & Oliveto, 1993). However, some exceptions may exist. Higher caffeine and alcohol consumption were associated with greater hunger and craving. It is interesting to note that these effects were not consistent across measures, follow-ups, or studies.

Many researchers suggest that smokers consume more coffee than non-smokers due to the higher rate of caffeine metabolism in smokers and their desire to maintain body caffeine levels (Swanson et al., 1994). One possible explanation for the relationship between coffee and tobacco is pharmacological in nature. Smokers experience higher rates of caffeine metabolism and shorter half-life of caffeine. Thus, this increase in caffeine metabolism may contribute to the increase in coffee consumption as the smoker attempts to maintain certain body caffeine levels. In abstinent smokers, blood caffeine levels increase over 200% of baseline levels due to increased caffeine consumption and remain elevated for 6 months (Swanson et al., 1994). These higher blood levels may result in a nervous system caffeine toxicity syndrome in abstinent smokers. The coffee drinking smoker who quits smoking may simultaneously experience nicotine withdrawal symptoms and caffeine toxicity. Abstinent smokers report that they still experience nicotine withdrawal symptoms 1 year after cessation (Swanson et al., 1994). This may be yet another factor adding to the difficulties of remaining abstinent.

Chewing Gum

It is estimated that over 90,000 tons of chewing gum (Rivenburg, 1993), valued at over $823.6 million are sold wholesale each year (Fisher, 1993), with a retail value of approximately 1.6 billion dollars (Rudnitsky, 1993). Chewing gum production yields 2.4 billion dollars on the U.S. retail market (Pulley, 1991).

Over 80% of female and 50% of male college students report chewing gum at least once a week (Oberrieder & Fryer, 1991). Twelve and a half percent of females chew gum at least three times daily. Fewer male students are regular gum chewers. However, the largest difference among the two genders is in daily use. Over 31% of females chew gum at least once daily, compared to only 5% of males who chew it on a daily basis.

Gum consumption tends to decline with age. It is estimated that over 75% of elementary school children chew gum at least once weekly. Nearly 70% of high school students and 40.4 % of adults chew gum on a weekly basis (O'Connor, O'Mullane, & Whelton, 1993).

Chewing gum produces many positive effects. It sweetens breath, moistens and freshens the mouth, helps the chewer stay alert, helps clean and strengthen teeth, aids in digestion, helps reduce plaque when brushing is not an option, and tastes good (O'Connor et al., 1993). Chewing gum may also help alleviate thirst and hunger, increase concentration, strengthen jaw muscles, aid in speech therapy, give gums a healthier firmness, give chewers a pleasant little lift, pop ears in planes and submarines, and be used as a diet aid (Hendrickson, 1976).

Chewing gum has also been promoted as a way of reducing muscular tension to help people feel more relaxed (Hollingworth, 1939). Early studies examining the use and

effects of chewing gum suggest that gum chewers report feeling more relaxed while chewing gum compared to non-chewers and to those who chewed on a flavored wafer (Hollingworth, 1939). Subjects reported reduced tension in the sense of the subjective feeling of strain, reduction in fatigue, and decrease in muscular tension while chewing gum. Of course, it may be the act of chewing alone that produces this effects -- that chewing on most anything can reduce tension. Gum chewing is merely an easier way to achieve relaxation. Some gum makers even promote chewing gum as something to do when smoking is not allowed.

It is estimated that half of the chewing gum produced in the U.S. is consumed by individuals 15 to 24 years old (Rivenburg, 1993). In addition, there is a large segment of the U.S. population that neither smokes nor consumes alcohol or coffee (e.g., individuals of the Mormon faith). This portion of the population also consumes a significant amount of chewing gum. In fact, Utah has the highest per-capita gum consumption rate (Rivenburg, 1993). Clinical lore posits that gum may serve as a substitute for these other reinforcing activities. Since constraints are placed on consumption of alcohol, caffeine, and tobacco in this particular population, preference for alternative reinforcers (e.g., chewing gum) increases.

Hypotheses

There are several goals of the present study. First, potential differences in chewing gum use among smokers and non-smokers will be evaluated. Second, possible differences in consumption patterns of alcohol and caffeine (particularly coffee) in smokers and non-smokers will be investigated. In addition, the role of chewing gum in smoking behavior

and other substance use will be determined. Finally, the inter-relationships of tobacco, caffeine, and alcohol will be examined.

Epidemiological studies have examined the consumption of cigarette smoking, alcohol, and caffeine. However, no study available assessing all three of these substances has looked at these substances using the same measure. The present study is unique in that information regarding the consumption of these substances will be obtained in very similar ways, thus allowing easier comparisons across drugs. In addition, caffeine consumption will not be restricted to coffee only, but will also include other caffeinated beverages, such as tea and soft drinks. Behavioral economic theory will be used to help explain the relationships across drugs and alternative reinforcers (e.g., chewing gum).

In addition to obtaining consumption patterns of the most commonly used psychoactive substances, information will be obtained regarding various psychological variables thought to be related to drug use, such as subjects' current mood, cultural identification, general affect, and degree of religiosity. Clinical lore posits that these variables may be related to an individual's use of drugs. Such information may provide a better understanding of drug use and the use of alternative reinforcers. Data from these additional questionnaires are not directly related to the hypotheses or the analyses of the current project. However, participants did complete the additional questionnaires as part of a larger study. A detailed description of these questionnaires can be found in Appendix A. Specific hypotheses of the current study are listed below.

Subjects were categorized according to smoking status (non-smoker, moderate smoker, and heavy smoker), alcohol status (non-drinker, low-rate drinker, and moderate-heavy drinker), caffeine status (non-caffeine drinker, low-moderate caffeine drinker, and

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heavy caffeine drinker), coffee status (non-coffee drinker, low-moderate coffee drinker, and heavy coffee drinker), and chewing gum status (gum chewer or non-chewer) based upon their responses to items on the research instrument. Detailed descriptions of how these category breakdowns were determined can be found in the Method section of this paper.

Hypothesis 1A: Gum status is hypothesized to be differentially related to smoking status. Specifically, it is predicted that non-smokers are more likely to chew gum than smokers. The null hypothesis states that no differences will exist between gum and smoking status groups. Subjects will be categorized into gum status groups and smoking status groups.

Hypothesis 1B: It is hypothesized that gum use (consumption) will differ among smokers and non-smokers. Specifically, it is predicted that non-smokers will chew significantly more gum than smokers. The null hypothesis states that there will be no difference in gum use among smokers and non-smokers. Subjects will be grouped into categories according to smoking status. The dependent variable (DV) for this hypothesis is gum consumption (average number of pieces chewed daily). The independent variable (IV) is smoking status.

Hypothesis 2A: Alcohol status is hypothesized to be differentially related to smoking status. Specifically, it is predicted that smokers are more likely to use alcohol than non-smokers. The null hypothesis states that no differences will exist between groups. Subjects will be categorized into alcohol status groups and smoking status groups.

Hypothesis 2B: Based on existing literature, it is expected that alcohol consumption will differentiate smokers and non-smokers. Specifically, it is predicted that smokers will consume significantly more alcohol than non-smokers. The null hypothesis states that no differences will be found in alcohol consumption among smokers and non-smokers. The DV for this hypothesis is average weekly alcohol intake. The IV is smoking status.

Hypothesis 3A: Caffeine status is hypothesized to be differentially related to smoking status. Specifically, it is predicted that smokers are more likely to use caffeine than non-smokers. The null hypothesis states there no differences will be found between groups. Subjects will be categorized into caffeine status groups and smoking status groups.

Hypothesis 3B: Total caffeine consumption is predicted to differentiate smokers and non-smokers. Specifically, it is predicted that smokers will consume significantly more caffeine than non-smokers. The null hypothesis states that there will be no difference in caffeine consumption among smokers and non-smokers. The DV for this hypothesis is daily caffeinated beverage intake. The IV is smoking status as previously described.

Hypothesis 4A: Coffee status is hypothesized to be differentially related to smoking status. Specifically, it is predicted that smokers are more likely to drink coffee than non-smokers. The null hypothesis states that no differences will exist between groups. Subjects will be categorized into coffee status groups and smoking status groups.

Hypothesis 4B: Coffee consumption is hypothesized to differentiate smokers and non-smokers. Specifically, it is predicted that smokers will consume significantly more

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coffee than non-smokers. The null hypothesis predicts that no differences will exist in coffee consumption among groups. The DV is average daily coffee intake. The IV is smoking status.

The first four hypotheses focus on the relationship of cigarette smoking with other commonly used oral reinforcers. It is proposed that cigarette smoking will significantly be related to alcohol, coffee, and caffeine use. Therefore, it is important to identify the relationships among these substances in order to understand how they are related to other oral behaviors, independent of smoking. By narrowing the focus to non-smokers only, the relationships these substance have with each other and with other oral behaviors can be examined separately from smoking. Since the majority of the U.S. population (as well as the current sample) are non-smokers, the following hypotheses will examine this group more closely. In particular, gum's substitutability for cigarette smoking and for other drug use will be examined.

Hypothesis 5A: Gum status is hypothesized to be differentially related to alcohol status in non-smokers. Specifically, it is predicted that non-smokers who do not drink alcohol are more likely to chew gum than non-smokers who do consume alcohol. The null hypothesis states that no differences will exist between these groups. Subjects will be categorized into gum and alcohol status groups.

Hypothesis 5B: Previous research suggests that gum consumption will differ among non-smokers who consume alcohol and those who do not. Specifically, it is predicted that non-smokers who consume no alcohol will chew more gum than non-smokers who do drink. The null hypothesis states that no differences will exist among

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these groups. The DV in this hypothesis is gum consumption. The IV is level of alcohol consumption.

Hypothesis 6A: Gum status is hypothesized to be differentially related to caffeine status in non-smokers. Specifically, it is predicted that non-smokers who do not drink caffeine are more likely to chew gum than non-smokers who do consume caffeine. The null hypothesis states that no differences will exist between these groups. Subjects will be categorized into gum and caffeine status groups.

Hypothesis 6B: It is predicted that amount of chewing gum chewed will differentiate caffeine groups. Specifically, it is predicted that chewing gum use among non-smokers who consume no caffeine will be higher than non-smokers who consume large amounts of caffeine. The null hypothesis asserts that gum consumption will not differ among these groups. The DV in this hypothesis is gum consumption. The IV is caffeine status.

Hypothesis 7A: Gum status is hypothesized to be differentially related to coffee status in non-smokers. Specifically, it is predicted that non-smokers who do not drink coffee are more likely to chew gum than non-smokers who do consume coffee. The null hypothesis states that no differences will exist between these groups. Subjects will be grouped into gum and coffee status groups.

Hypothesis 7B: Differences in chewing gum use is expected to differentiate coffee groups in non-smokers. Specifically, it is predicted that non-smokers who do not consume coffee will chew more gum than coffee-consuming non-smokers. The null hypothesis asserts that no differences will exist among these groups. The DV is gum consumption. The IV is coffee drinking status.

Method

<u>Subjects</u>

Three hundred-eighty one male and female volunteers were recruited from undergraduate psychology classes for a study investigating college students' activities. Subjects completed the Habits Use Questionnaire (Britt, 1995) during the Fall 1995 semester at Oklahoma State University. Subjects received extra credit for their participation in this study. Other extra credit opportunities were made available for those students who did not wish to participate.

A total of 381 undergraduates participated in this study. Mean age of participants was 20.55 years (range: 18-49 years). Number and percentage of subjects in various levels of smoking, alcohol, caffeine, coffee, and chewing gum status groups are presented in Table 1.

<u>Materials</u>

<u>Habits Use Questionnaire</u> (HUQ; Britt, 1995). The HUQ is a self-administered questionnaire developed by the author specifically for this study (Appendix B). The HUQ assesses an individual's consumption of various oral substances, including alcohol, cigarette smoking, smokeless tobacco, coffee, tea, soda, and chewing gum use. Patterns of consumption (e.g., frequency of use and amount typically consumed) were obtained for each substance. Standard demographic information (e.g., age, martial status, etc.), brief medical history, and frequency of illegal drug use were also obtained.

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Procedure

Male and female volunteers were recruited from undergraduate psychology classes for participation in a study examining college students' activities and habits. Those who volunteered to participate were asked to sign their names on a sign-up sheet designating the time and place of the study. Subjects who reported to the study site received extra credit in their psychology class for participation in the research study.

The study consisted of one session, lasting approximately 30-45 minutes. Subjects were requested to sign their names on extra credit sheets before they completed any questionnaires. These extra credit records were forwarded to their psychology instructors as a record of their participation in research. Subjects were informed that they may discontinue the study at any time and still receive extra credit.

At the beginning of the assessment session, a brief description of the study was provided to participants and questions were entertained. After participants' concerns were addressed, consent forms were then signed. Subjects read and signed the consent forms and were then given a questionnaire with a code number on it. This code number cannot be linked with any participant's name. There is no way to determine which participant was assigned to which code number.

Participants then completed the HUQ, a series of questionnaires regarding caffeine, tobacco, alcohol, chewing gum, and other substance use, as part of a larger study. Additional questionnaires surveyed participants' mood, cultural identification, affect, religiosity, and brief medical history. Data from these additional questionnaires are described in more detail in Appendix A and will be presented in future research. All information remained confidential and can be identified by code numbers only.

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Category Groupings

Prior to beginning any analyses, group categorizations were identified for each oral behavior. The behaviors, their category breakdowns, and rationale for these classifications follow.

Smoking behavior was divided into 3 levels according to average number of cigarettes smoked daily: 1) non-smokers, who had never smoked or who were ex-smokers; 2) moderate smokers, smokers who smoked 15 or less than 15 cigarettes daily, or individuals who smoked, although maybe not daily; and 3) heavy smokers, those who reported smoking more than 15 cigarettes daily. These categories were somewhat arbitrarily designed. However, various factors contributed to classifying individuals in this manner. There is no definitive "cutoff" nicotine researchers consistently use to classify "moderate" or "heavy" smokers. Classification of "heavy" smokers varies across studies. However, researchers have generally suggested that individuals smoking 25 or more cigarettes daily usually are classified as heavy smokers (Lichtenstein & Glasgow, 1992). Previous research with similar college samples, however, has suggested that few young, college students actually smoked more than 25 cigarettes daily (Collins et al., 1995). In fact, the majority of smokers in the current sample did not smoke more than 15 cigarettes daily. In addition, two-thirds of the 53 million smokers in the U.S. smoke more than 15 cigarettes daily (Lichtenstein & Glasgow, 1992). Therefore, "more than 15 daily" was used to categorize "heavy" smokers in the current sample. It should be noted that "heavy smoker" is a relative term.

Alcohol behavior was categorized into three categories based on weekly alcohol consumption. 1) Non-drinkers were those individuals who reported consuming no alcohol

at all; 2) low-rate drinkers reported consuming 1-10 alcoholic beverages per week; and 3) heavy drinkers are those that reported consuming 11 or more alcoholic beverages weekly. These levels of alcohol consumption are based on information presented by Cornwell and Cornwell (1993). These researchers have categorized individuals into alcohol status groups based on amount of alcohol consumed weekly. In addition, these researchers have proposed that "safe" levels of drinking exist for both sexes. They have suggested that up to 14 drinks per week for women and up to 21 drinks weekly for men constitute "safe" levels of drinking. According to these "safe" levels, it appears that the levels of alcohol groups used in this study are appropriate.

Caffeine behavior was classified into 3 levels based on information presented in the DSM-IV (APA, 1994). The first diagnostic criteria presented in the DSM-IV under caffeine intoxication suggests that 250 mg. of caffeine may be considered excess. This criterion was used as a reference point to categorize subjects' caffeine intake. Three levels of caffeine groups were identified: 1) non-caffeine drinkers, who reported consuming no caffeinated beverages at all; 2) low-moderate caffeine drinkers, who consumed less than 250 mg. of caffeine daily (no more than 2-3 cups of brewed coffee, or 5-6 soft drinks or glasses of tea); and 3) heavy caffeine drinkers, who consumed more than 250 mg. of caffeine daily. This information was obtained and computed from subjects' reports of number of total caffeinated beverages consumed. Total caffeine consumption is based on number of cups of caffeinated coffee, number of caffeinated sodas consumed, and number of caffeinated cups of tea.

Coffee behavior was also classified into 3 levels based on information presented in the DSM-IV (APA, 1994). The criteria set presented in the DSM-IV under caffeine

intoxication was used, suggesting that 250 mg. of caffeine (more than 2-3 cups of brewed coffee) might be considered excess. Three levels of coffee groupings were identified: 1) non-coffee drinkers, who reported consuming no coffee at all; 2) low-moderate coffee drinkers, who reported consuming less than 250 mg. of caffeine daily (no more than 2-3 cups of brewed coffee); and 3) heavy coffee drinkers, who consumed more than 250 mg. of caffeine daily (more than 2-3 cups of brewed coffee). This information was obtained and computed from subjects' reports of number of cups of coffee consumed.

Gum behavior was categorized into two categories: gum chewer or non-gum chewer, based upon subjects' responses to gum use items.

Results

In order to determine the number of subjects needed for the analyses, a power analysis was conducted to determine power and effect size. These analyses determined that one-hundred subjects were needed for 80% power (effect size) at alpha = .05. Thus, with 381 subjects, there were good chances of detecting medium or large effect sizes. Number of subjects varied in hypotheses depending upon hypothesis in question. Total number of subjects included in individual analyses ranged from 145 to 381 subjects. Despite variability in number of subjects included in individual analyses, all hypotheses included well over the 100 subjects needed, as determined by the power analysis.

As previously presented in the review of existing literature, age and gender are thought to be associated with the use of many of the substances under investigation in the current study. As a result of their proposed importance, analyses of covariance were conducted to examine the relationships age and gender have in substance use. Each

analysis comparing group means was run using age and gender as covariants. No consistent pattern of covariance was found. In other words, neither age nor gender consistently appeared as significant covariant effects. Therefore, covariant effects were used whenever they were found to be significant. If no covariant effects were found to be significant, ANOVA findings will be presented instead. All data were first analyzed with a chi-square analysis and then with an analysis of covariance (ANCOVA) or a one-way analysis of variance statistic (ANOVA).

Cigarette smoking and chewing gum

The chi-square analysis examining smoking status and chewing gum status (see Table 2) indicated significant group differences. Generally speaking, non-smokers were more likely to chew gum than smokers. These findings supported the hypothesis that differences exist among smoking status and chewing gum status. These data suggest that cigarette smoking and chewing gum are related. For all individuals who reported chewing gum, an ANCOVA was conducted to examine the relationship of chewing gum use according to smoking status. As seen in Table 3, significant group differences were found, $F(2,319) = 4.13$, $p<.05$. In addition, significant covariant effects were found for age, $t<.05$. Post-hoc analyses indicated that heavy smokers chew significantly more gum than either moderate smokers or non-smokers, $t<.05$ (see Figure 1).

Cigarette smoking and alcohol

The chi-square analysis examining smoking status and alcohol status found significant group differences (see Table 4). Heavy smokers were more likely to consume alcohol than not to consume alcohol. Few non-smokers were moderate-heavy alcohol users. These findings provide support for the smoking-alcohol relationship. An analysis

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of variance was conducted using only individuals who reported using alcohol. ANOVA results did not demonstrate group differences in alcohol consumption (See Table 5 and Figure 2).

Cigarette smoking and caffeine

The chi-square analysis examining smoking status and caffeine status detected significant group differences. As can be seen in Table 6, over 91% of individuals reported consuming at least some caffeine on a daily basis. Very few individuals reported drinking no caffeine at all. In addition, there appeared to be a dose-dependent relationship. Heavier smokers were more likely to be heavy caffeine users. These findings support the smoking-caffeine relationship. An analysis of covariance, conducted using only caffeine-consuming individuals, indicated significant group differences for caffeine consumption, $F(2,357) = 13.01$, $p<.001$ (see Table 7). Significant covariant effects were found for both age and gender, $t<.001$. Post-hoc analyses indicated that heavy smokers and moderate smokers consume significantly more caffeine than non-smokers, $p<.05$ (see Figure 3).

Cigarette smoking and coffee

The chi-square analysis examining smoking status and coffee drinking status detected significant group differences. As seen in Table 8, non-smokers were more likely to be non-coffee drinkers than smokers. Smokers, on the other hand, were more likely to be coffee drinkers than non-coffee drinkers. Again, findings provide evidence for a relationship between cigarette smoking and coffee. An analysis of covariance was conducted using only individuals who report consuming coffee. As depicted in Table 9, ANCOVA results indicated significant group differences for coffee consumption, $F(2,140) = 6.65$, $p<.001$. In addition, significant covariant effects were found for age, $t < .001$.

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Post-hoc analyses demonstrated that heavy smokers and moderate smokers consume significantly more coffee than non-smokers, $t < .05$ (see Figure 4).

Alcohol and chewing gum (Non-smokers only)

The chi-square analysis examining alcohol status and chewing gum status in non-smokers revealed significant group differences. As depicted in Table 10, an inverse relationship existed between gum and alcohol status. The heavier drinker one is, the less likely one is a gum chewer. An analysis of variance was conducted looking only at individuals who chew gum. As seen in Table 11 and Figure 5, ANOVA results were non-significant. Individuals appeared to chew similar amounts of gum regardless of alcohol status – whether they drink alcohol or not.

Caffeine and chewing gum (Non-smokers only)

The chi-square analysis examining caffeine status and chewing gum status in non-smokers did not reveal significant differences. This finding suggests that there are no significant group differences in this population (see Table 12). Most people reported chewing gum regardless of whether they drink caffeine or not. Additionally only 10 of 286 non-smokers reported drinking no caffeinated beverages at all. This number is so incredibly small, that this may not show the true relationship. An analysis of variance was conducted using only gum chewers. As depicted in Table 13, ANOVA results yielded significant group differences for gum consumption among caffeine groups, $\underline{F}(2,247) = 3.34$, $p < .05$ (see Figure 6). Tukey's HSD post-hoc analyses showed that heavy caffeine users chew significantly more gum than low-moderate caffeine consumers, $p < .05$. One might expect that significant differences should have emerged between heavy caffeine

users and non-users. However, it is likely that the small number of subjects contained in the no caffeine group may account for this lack of significant finding.

Coffee and chewing gum (Non-smokers only)

The chi-square analysis examining coffee status and chewing gum status in non-smokers did not reveal significant differences. As seen with caffeine groups, individuals in this sample were more likely to be gum chewers than non-gum chewers regardless of coffee status (see Table 14). Only those individuals who reported chewing gum were included in the analysis of variance. As seen in Table 15, ANOVA results did not yield significant group differences for gum consumption among coffee groups.

Discussion

Findings from the present study are generally consistent with the literature, suggesting that cigarette smoking is positively related to the use of alcohol, coffee, and total caffeine (as measured by caffeinated beverages). These results suggest that as smoking behavior increases, use of other psychoactive substances increases as well. These findings also suggest that alcohol, coffee, and total caffeinated beverages may serve as complements to cigarette smoking. Substances are said to be complements when an increase in consumption of drug use is associated with increased consumption of other drug use. As smoking behavior increases, so does use of these other substances. In addition, dose-dependent relationships appear to exist among cigarette smoking and coffee and caffeinated beverages. Generally speaking, the heavier smoker one is, the larger amounts of coffee and total caffeinated beverages one consumes. This relationship may help describe the concurrent use of these psychoactive substances for many individuals.

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Results from the present study regarding the relationship among cigarette smoking and alcohol were somewhat surprising. As can be seen from the chi-square analysis, significant differences were found among smoking and alcohol status groups, suggesting a positive relationship. However, no significant group differences in weekly alcohol consumption were found. It is possible that group differences would have been detected if groups were divided into broader categories, such as smokers and non-smokers. It is likely that the numbers of subjects included in one or more of the individual groups were too small to detect significant differences. In addition, it is possible that the way alcohol consumption was measured may have affected these findings. Consumption of beer and other alcoholic beverages were combined to assess total alcohol consumption. It is possible that significant group differences would have emerged if these alcohol groups would have been analyzed separately. Nevertheless, future studies should include larger numbers of subjects and possibly different methods of assessing alcohol consumption.

The results from the current study confirm the hypotheses that smokers consume larger amounts of coffee and total caffeinated beverages than non-smokers. In addition, dose-dependent relationships were seen in caffeine and coffee consumption, suggesting that the more one smokes, the more caffeine and/or coffee one consumes. One possible reason for this is that smokers must increase coffee consumption to maintain certain body caffeine levels (Swanson et al., 1994). Maintenance of body caffeine levels may also account for the increased total caffeine consumption seen in smokers. In addition, previous research has suggested that for individuals who are both smokers and coffee-drinkers, coffee "tastes" better when accompanied by a cigarette. These findings provide support for the complementary roles of coffee and caffeine to cigarette smoking. In

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addition, the physiological effects associated with these substances may interact in such a way that these substances actually become *more* reinforcing to an individual when used together. It is also possible that heavy users of one psychoactive substance are also heavy users of other substances.

Significant age effects were seen in coffee and total caffeine consumption among smoking status groups. Previous research has suggested that coffee consumption increases with age, until approximately age 40 (Shapiro et al., 1986). Similar consumption patterns may be true for caffeine consumption, although exact estimates are difficult to calculate. It is estimated that caffeine consumption is much higher than alcohol or tobacco use. Although exact numbers are difficult to calculate, it is estimated that the majority of U.S. adults consume some form of caffeine-containing beverages daily (Gilbert, 1976). Significant gender effects were seen for total caffeine consumption. It is likely that this findings is related to the high percentage of individuals in the sample who were current caffeine users (96.8%).

Results from the present study regarding the strong associations of coffee and other caffeinated beverages with cigarette smoking are very important. Most of the existing literature assessing caffeine use limits caffeine consumption to coffee only. As can clearly be seen from this study, many individuals do not drink coffee. Yet, nearly all of the current sample consumed at least some caffeine. To limit caffeine use solely to coffee consumption is to ignore a large portion of the sample. Future studies should broaden their assessment of caffeine use to other caffeinated products.

Findings regarding chewing gum were both interesting and surprising. The hypothesis that differences existed in chewing gum status among smoking groups was

confirmed. In particular, findings suggested that non-smokers were more likely to chew gum than heavy smokers. Thus, it appears that non-smokers may have some alternative form of oral reinforcement (gum) in lieu of smoking. It is possible that for non-smokers who do chew gum, gum may serve as a form of reinforcement, whereas smokers smoke as their source of reinforcement.

As expected, significant group differences were found in amount of gum chewed. Significant age effects may be related to the large amount of chewing gum consumed by college-age individuals. In fact, it is estimated that half of the chewing gum produced in the U.S. is consumed by individuals 15 to 24 years old (Rivenburg, 1993). Gum consumption, however, declines with age. It is estimated that only 40.4 % of adults chew gum weekly (O'Connor et al., 1993).

Although significant differences emerged, it was found that smokers chewed <u>more</u> gum than non-smokers. Initially, this inverse-dose-dependent relationship finding was puzzling. However, there are a few plausible explanations that may help explain this finding. First, it is possible that heavy smokers also tend to be heavy gum chewers. In other words, heavy users of one substance may also be heavy users of other substances. Smokers may be alternating between smoking and chewing gum, generally engaging in one behavior or the other. A second possibility is that chewing gum use increases when smokers are in situations where smoking is prohibited or restricted. In fact, a recent study (Cohen, Britt, Collins, & Stewart, 1996) has shown that chewing gum helped reduce craving and withdrawal symptoms for a cigarette when dependent smokers did not have access to cigarettes. Researchers (Cohen et al., 1996) are not suggesting that chewing

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gum alleviates craving or withdrawal; rather, evidence suggests that chewing gum may reduce these symptoms in dependent smokers.

Given these findings, it is possible that non-smokers incorporate chewing gum into their everyday activities, as smokers do with cigarette smoking. However, when smokers are placed in situations where smoking is prohibited (e.g., movie theaters, class, airplanes), their source of reinforcement is restricted. In such instances, it is likely that smokers chew gum as a source of reinforcement, something to do, or in attempts to reduce craving. This suggests that gum may serve as an alternative reinforcer in lieu of (or a substitute to) cigarette smoking. When you cannot smoke, chew gum.

Since the majority of the current sample were non-smokers and the majority of the population were gum chewers, remaining analyses focused on the use of chewing gum in non-smokers. Analyses were conducted using only individuals who chewed gum.

Results suggest that non-drinking non-smokers were more likely to chew gum than those who did drink alcohol. Again, this suggests that non-drug users (non-smokers / non-drinkers) may obtain reinforcement from sources other than drugs, in this case, reinforcement from chewing gum. However, findings on gum consumption among alcohol groups were non-significant. Gum use was fairly consistent regardless of alcohol status. These findings were surprising since it was predicted that gum use would be lower in heavy drinkers. However, several possible explanations emerge. First, chewing gum may not be a good substitute for alcohol. Gum and alcohol may be incompatible in taste or in oral sensation. Second, gum may be a more appropriate substitute for one kind of alcohol (e.g., beer) rather than all types of alcohol combined. Weekly alcohol intake was computed by combining beer and other alcoholic beverages together. It is possible that

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the relationship between gum and alcohol would have looked differently had beer and alcohol consumption been analyzed separately. Future studies should take this into consideration when analyzing alcohol-related data.

As was seen with the smoking-gum relationship, heavy caffeine users who also chew gum tended to chew more gum than non-users. Contrary to the predicted hypotheses, heavy caffeine consumers chewed more gum than low-moderate consumers of these substance, but not significantly more than the no-caffeine group. It is likely that small numbers of subjects in some groups can account for the lack of significant differences here. Again, there appears to be a dose-dependent trend. Individuals who use such large quantities of one substance may use large quantities of other substances (chewing gum). This would suggest that gum may serve as a complement to caffeinated beverages. However, it is also possible that individuals who use caffeine may be substituting chewing gum when use of a preferred caffeinated beverage is restricted. It is possible that heavy users of psychoactive substances obtain their reinforcement from these psychoactive substances, whereas non-drug users seek reinforcement from non-drug sources. It has been suggested that smokers chew gum at least to some extent to decrease craving and withdrawal symptoms (Cohen et al., 1996). Thus, chewing gum serves as a substitute to cigarette smoking. It is possible that chewing gum serves a similar role in reducing craving and withdrawal with other commonly used drugs, such as caffeinated beverages.

Similar findings were not duplicated when examining the role of chewing gum in relation to coffee use, although the probability level approached significance. Insignificant findings may be due to the relatively small number of coffee drinkers in the current sample,

particularly in the heavy coffee use group. This finding is interesting given the fact that most researchers assess caffeine consumption through coffee use only. It seems only appropriate to include caffeinated beverages in addition to coffee when assessing caffeine use.

Despite such interesting findings, this study is not without its limitations. First, small numbers of subjects in some groups may contribute to the difficulty of generalizing these findings to other populations. One may be able to place more confidence in these findings if more (heavy) smokers had participated in the present study. Unfortunately for the purposes of the current study, smokers comprise only a small percentage of the American public and of the sample in this study. Second, it would be interesting to examine the relationship of the substances examined in this study with other oral behaviors, such as food intake. It is likely that similar complementary and substitutable relationships among food intake and psychoactive substance use would be identified. Third, findings must be interpreted with caution based on the self-report method of data collection. Although participants were assured of the confidentiality of their responses, some individuals may have completed the self-report inventories in a socially desirable manner. In addition, response reliability of some individuals may have been influenced by the length and repetitiveness of the questionnaire or by the nature of the items themselves. Although great lengths were taken to avoid any discomfort on the part of the participants, the accuracy or honesty of responses must be carefully considered.

Despite the limitations noted above, this study does have strong merits. First, the present study is unique in that the research instrument used in this study assessed use and consumption patterns of various substances in almost identical formats. This is one of the

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few studies employing such standardization in obtaining the desired data on substance use. This not only facilitated subject completion of the questionnaires, but allowed drugs to be compared in similar fashions. Second, most studies examining the relationship between cigarette smoking and caffeine use have focused on coffee consumption alone, ignoring other caffeinated beverages. The current study, however, examined the relationship between smoking and coffee separate from the smoking-caffeine relationship. Given the sometimes different findings of coffee and caffeinated beverage analyses, the decision to investigate these substances separately seems most appropriate. Third, despite the small numbers of subjects in some groups, the power analysis conducted provides researchers with confidence in these findings. Future studies currently in developmental stages are proposed to include larger numbers of subjects, particularly more smokers. Forth, despite the limitations associated with self-report data, it appears as if subjects generally made concerted efforts to complete the questionnaire accurately, despite its length and repetitiveness.

These findings have led to both anticipated and novel conclusions. First, consistent with the literature, results demonstrated that tobacco, caffeine, and alcohol are all inter-related, showing positive relationships with cigarette smoking. Smokers consume more coffee and total caffeinated beverages than non-smokers. No significant differences in alcohol consumption were found in the current sample. Yet, previous research has documented a strong alcohol-smoking relationship. This information may be helpful when designing smoking cessation programs or in individual substance use treatment programs. Treatment focusing solely on use of one substance may not be enough. Researchers and clinicians alike should consider other substances that may concurrently be in use and be

contributing to the reinforcing properties of that substance. It only seems appropriate to monitor an individual's consumption of all of these substances, in addition to the target behavior. In addition, identifying more "appropriate" suitable substitutes for smoking (e.g., chewing gum) may help control the use of other psychoactive substances.

Smokers and non-smokers also appear to differ in gum use. Non-smokers who chew gum are much more likely to chew gum than smokers who chew gum. If smoking is not an acceptable reinforcer, chewing gum might be acceptable for those individuals who do chew gum. However, heavy smokers chew more gum than moderate or non-smokers. Chewing gum seems to serve as an alternative (or substitute) for smoking, especially for "heavy" smokers. It is likely that chewing gum serves as an adequate substitute when the usual reinforcer (smoking) is unavailable.

It has been suggested that chewing gum appears to be an acceptable alternative to smoking when smoking is restricted. Similar findings are seen with use of caffeinated beverages as well. These findings suggest that chewing gum plays an important role for cigarette smoking and caffeinated beverage use. Although gum use appears to be related to alcohol use, gum consumption does not appear to play a major role in alcohol use. It is possible that chewing gum is not an appropriate substitute for all drugs.

Behavioral economic theory has been used to help explain the relationship across the most commonly used drugs, namely, alcohol, caffeine, and tobacco. It has been suggested that these substances may serve as complements to each other in some situations and as substitutes for each other in other situations. The role alternative reinforcers play in substance use has been discussed as well. Chewing gum is only one example of an alternative reinforcer that may serve as an acceptable substitute for various

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commonly used substances. Individual and group treatment programs should consider the role of chewing gum and other possible alternative reinforcers in cessation of drug use. Many substitutable activities (such as chewing gum) can be easily incorporated into an individual's daily routine and help weaken the relationship among the drugs of choice.

Findings from the present study suggest that chewing gum seems to serve as an acceptable behavioral substitute in lieu of smoking for smokers who chew gum. It is likely that gum may serve as a substitute when the usual reinforcer, smoking, is unavailable. In the future, smoking cessation programs should consider the role of chewing gum and other alternative reinforcers in drug use.

Chewing gum is only one example of a behavioral substitute. A great deal of marketing has suggested a link between cigarette smoking and chewing gum. The largest chewing gum manufacturer, William Wrigley, Jr., Co., has even suggested that "When you can't smoke, chew gum." Little empirical data, if any, exists in support of this suggested relationship. The current study is the first systematic attempt to document the relationship between smoking and chewing gum. Future research will examine the role chewing gum plays in other commonly used drugs, such as alcohol and caffeine, in attempts to examine the substitutability of gum for these drugs. Other studies will focus on identifying additional behavioral substitutes for cigarette smoking and other commonly used drugs. These findings continue to provide exciting new directions for research in the substance abuse area.

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APPENDIX A

Both clinical and empirical literature document the association between depressed mood and cigarette smoking. Some researchers view depression as a consequence of smoking. In fact, research suggests that 55% to 90% of individuals diagnosed with mental disorders are current smokers, compared to only 30% in the general population (APA, 1994). Prevalence of depression is more common in current smokers than in ex-smokers or non-smokers (APA, 1994; Newhouse & Hughes, 1991). Other researchers (Covey, Glassman, & Stetner, 1990) conclude that some individuals smoke as a consequence of depression. Consequently, many depressed individuals self-medicate with alcohol or other drugs (Heston & White, 1991). Depression is also a frequently reported nicotine withdrawal symptom (Swanson et al., 1994). Based on existing literature, it is predicted that current smokers will have higher scores on a standardized measure of depressive symptomatology than non-smokers, thus suggesting the presence of more symptoms of depression in smokers than non-smokers. Analyses will examine the relationships among depressed mood, cigarette smoking, and other drug use.

Depressed mood will be assessed using the Inventory to Diagnose Depression (IDD; Zimmerman, Coryell, Corenthal, & Wilson, 1986). The IDD is an 18-item self-administered instrument designed to assess the severity of depressive symptomatology as described in the DSM-IV (APA, 1994). Subjects are asked to answer each item with one of five statements accompanying items, which are arranged in order of increasing severity. Each item's answer is summed to obtain a severity index of depressive symptomatology.

The psychometric properties of the IDD have been well documented and have demonstrated that the IDD is a psychometrically sound instrument (Zimmerman & Coryell, 1987; Zimmerman & Coryell, 1988; Zimmerman et al., 1986). The IDD has

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excellent test-retest reliability (.98), split-half reliability (.91-.93), and good internal consistency (Zimmerman & Coryell, 1987; Zimmerman et al., 1986). Cronbach's alpha is estimated to be .92 (Zimmerman & Coryell, 1987; Zimmerman et al., 1986). The IDD also has good concurrent validity as is evidenced by the significant correlations between the IDD and other standardized measures of depression (Zimmerman & Coryell, 1987; Zimmerman et al., 1986).

It is also proposed that the level of an individual's and his/her family's cultural identification may be related to drug use. It is currently unclear if individuals who identify with one culture differ in drug use from individuals who identify with another culture, or even with various cultures. Knowledge of the culture to which an individual most identifies with may help explain some drug use patterns. For example, it is possible that for an individual who identifies him/herself with more than one culture, drug use may be more frequent. It is also predicted that individuals who feel that they and their families strongly identify with one particular culture exhibit less tolerance to drug use. This study includes a scale designed to assess cultural identification of various cultures.

Cultural identification will be assessed with the Cultural Identification Scale (CID; Oetting & Beauvais, 1990-1991). The CID used in the present study is a 4-item modified version of the original scale. Both the original and modified versions of the CID are orthogonal scales of cultural identification which allow respondents to independently express identification or lack of identification with various cultures. Individuals express how much or how little they feel that they and their families identify with various cultures, independent of the level of identification with any one culture.

Recent use of the CID has been used to study the association between cultural identification and alcohol and drug use in Native-American and Mexican-American youth. Studies of these two groups suggest that identification with the Anglo culture is related to having Anglo friends and to family acceptance of an Anglo marriage. Identification with either the minority or majority culture appears to be a source of personal and social strength. In addition, researchers claim that drug use is not associated with this great strength. Rather, drug use is related to how much the culture an individual identifies with approves or disapproves of drug use.

The modified version of the CID used in this study contains only 4 items assessing individuals' and their families' identification with and success in the American-Indian, White-American, Mexican-American, African-American, and Asian-American cultures. Responses are made on a 4 point Likert scale, ranging from 1(none at all) to 4 (a lot). The 4-item modified version of the CID has reported acceptable validity and reliability. This modified version is reported to have good concurrent and discriminant validity of Native American, Anglo, and Hispanic cultural identification measures. Such validity estimates suggest that this scale is strongly correlated with other measures assessing cultural identification (Oetting & Beauvais, 1990-1991).

The 4-item CID is reported to have internal consistency reliability reaching the upper .80s. Cultural identification studies with adults use only a 2-item version of the CID, personal identification with and personal success in various cultures. However, the addition of the "family" items increases the reliability from the .70s (2-item version) to the .80s. In addition, the 4-item scale broadens the concept of identification to include both personal and family identification with each culture.

An individual's general or trait affect may also be related to drug use. It is predicted that individuals who describe themselves in a more positive manner are less likely to use drugs than those who have a more negative view of themselves. An instrument designed to assess an individual's trait affect is included in this study. Analyses will examine the relationship between general affect and drug use interactions.

Trait affect will be assessed using the Positive and Negative Affect Schedule - Expanded Form (PANAS-X; Watson and Clark, 1991). The PANAS-X is a self-administered 60-item scale designed to measure 2 higher order scales, positive affect and negative affect, and 11 specific content scales: fear, sadness, guilt, hostility, shyness, fatigue, surprise, joviality, self-assurance, attentiveness, and serenity. Subjects are asked to rate each feeling or emotion based on a 5 point Likert scale (1 = not at all or very slightly to 5 = extremely).

The PANAS-X can be used as both a measure of trait or state affect (Watson & Clark, 1991). In the present study this scale was used as a measure of trait affect. Data suggest that trait versions of the PANAS-X are significantly correlated with corresponding judgments made by well-acquaintance peers. Most PANAS-X scales are of acceptable discriminative validity and possess adequate external validity. Data demonstrate that trait scores on the PANAS-X are stable over time, show significant convergent and discriminative validity when correlated with peer judgments, and are strongly related to measures of personality and emotionality.

The content scales attentiveness, serenity, and surprise yield reliability estimates with alphas ranging from .70 to .80. Reliability estimates for other content scales are above .80. PANAS-X scales are less highly correlated with each other, suggesting better

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discriminative validity among the scales. Each PANAS-X scale is closely related to its Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) counterpart, with convergent correlations ranging from .85 to .91.

In addition to depressive symptomatology, cultural identification, and general affect, degree of religiosity is also thought to be related to drug use. It is predicted that degree of religiosity is associated with drug consumption. In particular, it is believed that the more intrinsically religious an individual is, the less likely he/she is to use psychoactive substances and the more likely alternative reinforcers are used. A scale designed to measure an individual's religiosity yields extrinsic and intrinsic scores of religiosity.

Religiosity will be assessed with the Religious Orientation Scale (ROS; Allport & Ross, 1967; Genia, 1993). The original ROS is a 20 item self-report scale designed to measure intrinsic and extrinsic religious orientation. Early research with the original ROS utilized this scale to assess an individual's level of prejudice in relation to their intrinsic and extrinsic religious orientation.

More recent research has been conducted with revised versions of the ROS. The original scale yielded only two constructs (intrinsic and extrinsic), where the revised version yields three. Researchers conclude that the extrinsic scale can be subdivided into two categories of extrinsicness: extrinsic items that are socially oriented and extrinsic items that are personally oriented. In addition, earlier versions of the ROS identified possible acquiescence response bias and presence of a specific behavior (church attendance) which is thought to be better considered as a consequence of intrinsic faith rather than as a measure of it (Gorsuch & McPherson, 1989).

Most recent versions of the ROS have dropped 5 of the original item to produce a more internally consistent intrinsic scale (Genia, 1993; Leong & Zachar, 1990). The modified version of the ROS measures 3 distinct dimensions of religiousness: I (Intrinsic), Ep (use of religion for personal benefits), and Es (use of religion for social reward). In addition, extrinsic subfactors relate differentially to other psychosocial and religious variables. This study will use a 15-item modified version of the ROS (Gorsuch & McPherson, 1989). Subjects are asked to rate statements based on a 5 point Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree).

Reconstruction of the scale increased I reliability from .79 to .86. Reliabilities for Ep and Es are .62 and .54, respectively (Genia, 1993). However, low internal consistency is thought to be related to low number of items. The revised ROS has also been counter-balanced for response bias and eliminates the redundancy in correlations between intrinsic commitment and worship attendance. In addition, the 15-item revised version of the ROS is more appropriate for people of non-Christian faiths than the original ROS. The revised ROS has proven to be a distinct dimension of religiousness in a religiously diverse sample as evidenced by the discriminative validity among the 3 factors (Gorsuch & McPherson, 1989).

In summary, future research will examine the natural occurrences, consumption, and relationships of cigarette smoking, alcohol, caffeine, and chewing gum in relation to the psychological variables described above. Future analyses will examine the differences in use of these substances in relation to other variables thought to be associated with substance use.

APPENDIX B

Descriptive Information

Please check the appropriate answer or fill in the requested information.

Today's Date (Month / Day / Year) _____

Your Age: _____   Weight: _____ lbs.

Height: _____ ft. _____ in.   Sex: (1) _____ Male
                                                (2) _____ Female

Are you currently in college?   (1) _____ Yes
                                       (2) _____ No

    If yes, what is your class standing?   (1) _____ Freshman
    (Check one answer only)   (2) _____ Sophomore
                                                               (3) _____ Junior
                                                               (4) _____ Senior
                                                               (5) _____ Grad Student
                                                               (6) _____ Non-degree seeking

    If no, which is the highest education level achieved?
    (Check one answer only)
                                       (1) _____ High School Diploma
                                       (2) _____ Some College
                                       (3) _____ College Degree
                                       (4) _____ Graduate Degree

Which best describes your current marital status? (Check one answer only)

(1) _____ Single (Never Married)   (4) _____ Widowed
(2) _____ Married   (5) _____ Separated
(3) _____ Divorced   (6) _____ Co-habitating
                                          (7) _____ Engaged

Which best describes your ethnic background?   (Check one answer only)

(1) _____ Caucasian (White)   (5) _____ Arab American
(2) _____ African American   (6) _____ Hispanic
(3) _____ Native American   (7) _____ International--not U.S. born
(4) _____ Asian American   (8) _____ Other (Specify, _____)

Which best describes your religious background? (Check <u>one</u> answer only)

(1) _____ Baptist		(8) _____ Jewish	
(2) _____ Buddhist		(9) _____ Lutheran	
(3) _____ Catholic		(10) _____ Methodist	
(4) _____ Church of Christ		(11) _____ Mormon	
(5) _____ Episcopalian		(12) _____ Moslem	
(6) _____ Fundamentalist		(13) _____ Pentecostal	
(7) _____ Hindu		(14) _____ Other (Specify, _____)	
		(15) _____ Non-affiliated	

Which best describes your current living arrangement? (Check one answer only)

(1) _____ Alone
(2) _____ With parents or siblings
(3) _____ With Spouse / Partner
(4) _____ With roommate(s) / friend(s)
(5) _____ Other (Please specify, _____)

How many people live in your home (<u>including</u> yourself)? _____ people

For the following items, please write a brief description of your parents' occupation. Category descriptions provided below may be used, or exact job titles (e.g., elementary teacher, owns small farm) may be provided.

Father's occupation: _____
Mother's occupation: _____

(1) Executive, major professional
(2) Manager, minor professional
(3) Administrator, small business owner, semi-professional
(4) Clerical; Scales
(5) Skilled worker
(6) Semi-skilled worker
(7) Unskilled worker
(8) Unemployed
(9) Homemaker

Using the numbers from the list below, indicate how far each of your <u>parents</u> went to school.

        Father _____   Mother _____

(1) Graduate of professional training (degree obtained)
(2) Partial graduate or professional training
(3) College graduate (Bachelor's degree obtained)
(4) Partial college training (include technical training beyond high school; Associate's degree obtained)
(5) High school graduate (GED; graduate of technical or trade school)
(6) Partial high school (10th grade through part of 12th grade)
(7) Partial junior high school (7th grade through 9th grade)
(8) Elementary School (6th grade or less)

Coffee

If you have __NEVER been a caffeinated coffee drinker__ (currently OR in the past), please skip this section and proceed to question 11a.

1a. Do you currently drink caffeinated coffee?   (1) ____ Yes
                                                        (2) ____ No

       If you answered "yes" to question 1a, please skip
       questions 1b-1g and proceed to question 2a.

****

       If you answered "__no__" to question 1a (e.g., do not
       __currently__ drink caffeinated coffee) but __have__ in the
       past, please answer the following questions:

1b. At what age did you first begin to drink caffeinated coffee?   ____ years old

1c. At what age did you begin drinking caffeinated coffee
     regularly, (e.g., almost daily)   ____ years old

1d. When you were a regular coffee drinker, how many cups
     of coffee did you drink on an average day?   ____ cups

1e. How long ago did you QUIT drinking caffeinated coffee?

                    (1) less than 6 months   ____
                    (2) 6 months to 1 year   ____
                    (3) 1-2 years   ____
                    (4) more than 2 years   ____

1f. Do you now drink decaffeinated coffee?   (1) ____ Yes
                                                   (2) ____ No

1g. If yes, how many cups of decaffeinated coffee do you
     average on a typical day?   ____ cups

       Please now proceed to question 11a.

****

2a. If you do drink caffeinated coffee daily or almost daily, please
     record the number of cups you typically drink each day: ____ cups

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2b. How often do you drink caffeinated coffee? (Check <u>one</u> answer only)

(1) ____ daily or almost daily   (4) ____ 1-3 times a month
(2) ____ 1-3 times a week   (5) ____ only on occasions
(3) ____ 4-5 times a week   (6) ____ never or almost never

2c. When you <u>do</u> drink caffeinated coffee, do you <u>typically</u> drink brewed coffee or instant coffee? (Check one answer only)

(1) ____ brewed
(2) ____ instant

3. Do you have a preferred brand of <u>caffeinated</u> coffee?

(1) ____ Yes   If yes, please list: _____
(2) ____ No

4a. At what age did you <u>first</u> begin drinking caffeinated coffee?
____ years old

4b. At what age did you begin drinking caffeinated coffee <u>regularly</u>?
____ years old

5. How long have you been a <u>regular</u> caffeinated coffee drinker?

(1) ____ less than 6 months
(2) ____ 6 months to 1 year
(3) ____ 1-2 years
(4) ____ over 2 years

6. When you are tense or stressed, do you tend to
(Check <u>one</u> answer only)

(1) ____ drink more caffeinated coffee?
(2) ____ drink less caffeinated coffee?
(3) ____ drink about the same amount of caffeinated coffee?

7. How many people in your home also drink caffeinated coffee?

____ number of caffeinated coffee drinkers (including yourself) out of ____ total number of people (including yourself)

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8. When do you typically have your first cup of caffeinated coffee of the day? (Check the 1 best answer)

    (1) _____ As soon as I wake up in the morning
    (2) _____ With breakfast
    (3) _____ At work or school in the morning (but not with a meal)
    (4) _____ At lunch
    (5) _____ Sometime during the afternoon
    (6) _____ At dinner
    (7) _____ At work or school in the afternoon (but not with a meal)
    (8) _____ In the evening (e.g., after dinner time, but before bedtime)
    (9) _____ Other (please specify, _____)

9. If you **HAD** to give up 1 cup of caffeinated coffee, which would be the absolute hardest to give up? (Check the 1 best answer)

    (1) _____ As soon as I wake up in the morning
    (2) _____ With breakfast
    (3) _____ At work or school in the morning (but not with a meal)
    (4) _____ At lunch
    (5) _____ Sometime during the afternoon
    (6) _____ At dinner
    (7) _____ At work or school in the afternoon (but not with a meal)
    (8) _____ In the evening (e.g., after dinner time, but before bedtime)
    (9) _____ Other (please specify, _____)

10. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all much			somewhat			very

To what degree does caffeinated coffee make you feel...

a)	relaxed	1	2	3	4	5	6	7
b)	tense	1	2	3	4	5	6	7
c)	energetic	1	2	3	4	5	6	7
d)	more sociable	1	2	3	4	5	6	7
e)	more in control	1	2	3	4	5	6	7
f)	better able to concentrate	1	2	3	4	5	6	7

To what degree do you drink caffeinated coffee...

g)	when you are in a bad mood	1	2	3	4	5	6	7
h)	to relieve a craving	1	2	3	4	5	6	7
i)	to boost your mood	1	2	3	4	5	6	7
j)	when you see someone else drinking it	1	2	3	4	5	6	7
k)	in social situations	1	2	3	4	5	6	7
l)	to increase your energy	1	2	3	4	5	6	7
m)	more or less depending on the situation	1	2	3	4	5	6	7
n)	just out of habit	1	2	3	4	5	6	7
o)	because you enjoy the taste	1	2	3	4	5	6	7
p)	to help control your hunger	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath	1	2	3	4	5	6	7
r)	because you are bored	1	2	3	4	5	6	7
s)	to help you relax	1	2	3	4	5	6	7
t)	because you are anxious	1	2	3	4	5	6	7

Tea

If you have __NEVER been a caffeinated tea drinker__ (currently OR in the past), please skip this section and proceed to question 21a.

11a. Do you currently drink caffeinated iced or hot tea?　　(1) ____ Yes
　　　　　　　　　　　　　　　　　　　　　　　　　　　　(2) ____ No

　　　　　If you answered "__yes__" to question 11a, please skip
　　　　　questions 11b-11g and proceed to question 12a.

****

　　　　　If you answered "__no__" to question 11a (e.g., do not
　　　　　__currently__ drink caffeinated tea) but __have__ in the
　　　　　past, please answer the following questions:

11b. At what age did you __first__ begin to drink caffeinated tea?　　　____ years old

11c. At what age did you begin drinking caffeinated tea
　　　　__regularly,__ (e.g., almost daily)　　　　　　　　　　　　　____ years old

11d. When you were a regular tea drinker, how many cups
　　　　of tea did you drink on an __average__ day?　　　　　　　　　____ cups

11e. How long ago did you QUIT drinking caffeinated tea?

　　　　　　　　　　　　(1) less than 6 months　　____
　　　　　　　　　　　　(2) 6 months to 1 year　　____
　　　　　　　　　　　　(3) 1-2 years　　　　　　 ____
　　　　　　　　　　　　(4) more than 2 years　　 ____

11f. Do you now drink __decaffeinated__ tea?　　　(1) ____ Yes
　　　　　　　　　　　　　　　　　　　　　　　　(2) ____ No

11g. If yes, how many cups of decaffeinated tea do you
　　　　average on a typical day?　　　　　　　　　　　　　　　　　____ cups

　　　　　Please now proceed to question 21a.

****

12a. If you __do__ drink caffeinated tea daily or almost daily, please
　　　　record the number of cups you typically drink each day:　　　____ cups

12b. How often do you drink caffeinated tea? (Check <u>one</u> answer only)

    (1) ____ daily or almost daily   (4) ____ 1-3 times a month
    (2) ____ 1-3 times a week   (5) ____ only on occasions
    (3) ____ 4-5 times a week   (6) ____ never or almost never

13. Do you have a preferred brand of <u>caffeinated</u> tea?

    (1) ____ Yes   If yes, please list: _____
    (2) ____ No

14a. At what age did you <u>first</u> begin drinking caffeinated tea?
        ____ years old

14b. At what age did you begin drinking caffeinated tea <u>regularly</u>?
        ____ years old

15. How long have you been a <u>regular</u> caffeinated tea drinker?

    (1) ____ less than 6 months
    (2) ____ 6 months to 1 year
    (3) ____ 1-2 years
    (4) ____ over 2 years

16. When you are tense or stressed, do you tend to
    (Check <u>one</u> answer only)

    (1) ____ drink more caffeinated tea?
    (2) ____ drink less caffeinated tea?
    (3) ____ drink about the same amount of caffeinated tea?

17. How many people in your home also drink caffeinated tea?

    ____ number of caffeinated tea drinkers (including yourself) out of ____ total
        number of people (including yourself)

18. When do you <u>typically</u> have your <u>first</u> cup of caffeinated tea of the day? (Check the 1 <u>best</u> answer)

    (1) _____ As soon as I wake up in the morning
    (2) _____ With breakfast
    (3) _____ At work or school in the morning (but not with a meal)
    (4) _____ At lunch
    (5) _____ Sometime during the afternoon
    (6) _____ At dinner
    (7) _____ At work or school in the afternoon (but not with a meal)
    (8) _____ In the evening (e.g., after dinner time, but before bedtime)
    (9) _____ Other (please specify, _____)

19. If you **HAD** to give up 1 cup of caffeinated tea, which would be the absolute <u>hardest</u> to give up? (Check the 1 <u>best</u> answer)

    (1) _____ As soon as I wake up in the morning
    (2) _____ With breakfast
    (3) _____ At work or school in the morning (but not with a meal)
    (4) _____ At lunch
    (5) _____ Sometime during the afternoon
    (6) _____ At dinner
    (7) _____ At work or school in the afternoon (but not with a meal)
    (8) _____ In the evening (e.g., after dinner time, but before bedtime)
    (9) _____ Other (please specify, _____)

20. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all much			somewhat			very

To what degree does caffeinated tea make you feel...

a)	relaxed...	1	2	3	4	5	6	7
b)	tense..	1	2	3	4	5	6	7
c)	energetic...	1	2	3	4	5	6	7
d)	more sociable..	1	2	3	4	5	6	7
e)	more in control.....................................	1	2	3	4	5	6	7
f)	better able to concentrate......................	1	2	3	4	5	6	7

To what degree do you drink caffeinated tea...

g)	when you are in a bad mood..................	1	2	3	4	5	6	7
h)	to relieve a craving..............................	1	2	3	4	5	6	7
i)	to boost your mood...............................	1	2	3	4	5	6	7
j)	when you see someone else drinking it..........	1	2	3	4	5	6	7
k)	in social situations...............................	1	2	3	4	5	6	7
l)	to increase your energy.........................	1	2	3	4	5	6	7
m)	more or less depending on the situation........	1	2	3	4	5	6	7
n)	just out of habit...................................	1	2	3	4	5	6	7
o)	because you enjoy the taste....................	1	2	3	4	5	6	7
p)	to help control your hunger...................	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath........	1	2	3	4	5	6	7
r)	because you are bored...........................	1	2	3	4	5	6	7
s)	to help you relax..................................	1	2	3	4	5	6	7
t)	because you are anxious........................	1	2	3	4	5	6	7

Sodas and Colas

If you have __NEVER been a caffeinated soda drinker__ (currently or in the past), please skip this section and proceed to question 31a.

21a. Do you currently drink caffeinated sodas or colas?   (1) ____ Yes
    (2) ____ No

      If you answered "yes" to question 21a, please skip questions 21b-21g and proceed to question 22a.

****

      If you answered "no" to question 21a (e.g., do not currently drink caffeinated sodas) but have in the past, please answer the following questions:

21b. At what age did you first begin to drink caffeinated soda?   ____ years old

21c. At what age did you begin drinking caffeinated soda regularly, (e.g., almost daily)   ____ years old

21d. When you were a regular soda drinker, how many glasses of soda did you drink on an average day?   ____ cups

21e. How long ago did you QUIT drinking caffeinated soda?

        (1) less than 6 months   ____
        (2) 6 months to 1 year   ____
        (3) 1-2 years   ____
        (4) more than 2 years   ____

21f. Do you now drink decaffeinated soda?   (1) ____ Yes
    (2) ____ No

21g. If yes, how many glasses of decaffeinated soda do you average on a typical day?   ____ glasses

      Please now proceed to question 31a.

****

22a. If you do drink caffeinated soda daily or almost daily, please record the number of glasses you typically drink each day: ____ glasses

22b. How often do you drink caffeinated soda? (Check <u>one</u> answer only)

(1) ____ daily or almost daily   (4) ____ 1-3 times a month
(2) ____ 1-3 times a week   (5) ____ only on occasions
(3) ____ 4-5 times a week   (6) ____ never or almost never

23. Do you have a preferred brand of <u>caffeinated</u> soda?

(1) ____ Yes   If yes, please list: _____
(2) ____ No

24a. At what age did you <u>first</u> begin drinking caffeinated soda?
       ____ years old

24b. At what age did you begin drinking caffeinated soda <u>regularly</u>?
       ____ years old

25. How long have you been a <u>regular</u> caffeinated soda drinker?

(1) ____ less than 6 months
(2) ____ 6 months to 1 year
(3) ____ 1-2 years
(4) ____ over 2 years

26. When you are tense or stressed, do you tend to
(Check <u>one</u> answer only)

(1) ____ drink more caffeinated soda?
(2) ____ drink less caffeinated soda?
(3) ____ drink about the same amount of caffeinated soda?

27. How many people in your home also drink caffeinated soda?

____ number of caffeinated soda drinkers (including yourself) out of ____ total
number of people (including yourself)

28. When do you <u>typically</u> have your <u>first</u> caffeinated soda of the day? (Check the 1 <u>best</u> answer)

 (1) _____ As soon as I wake up in the morning
 (2) _____ With breakfast
 (3) _____ At work or school in the morning (but not with a meal)
 (4) _____ At lunch
 (5) _____ Sometime during the afternoon
 (6) _____ At dinner
 (7) _____ At work or school in the afternoon (but not with a meal)
 (8) _____ In the evening (e.g., after dinner time, but before bedtime)
 (9) _____ Other (please specify, _____)

29. If you HAD to give up 1 caffeinated soda, which would be the absolute <u>hardest</u> to give up? (Check the 1 <u>best</u> answer)

 (1) _____ As soon as I wake up in the morning
 (2) _____ With breakfast
 (3) _____ At work or school in the morning (but not with a meal)
 (4) _____ At lunch
 (5) _____ Sometime during the afternoon
 (6) _____ At dinner
 (7) _____ At work or school in the afternoon (but not with a meal)
 (8) _____ In the evening (e.g., after dinner time, but before bedtime)
 (9) _____ Other (please specify, _____)

30. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all			somewhat			very
much						

To what degree does caffeinated soda make you feel...

a)	relaxed	1	2	3	4	5	6	7
b)	tense	1	2	3	4	5	6	7
c)	energetic	1	2	3	4	5	6	7
d)	more sociable	1	2	3	4	5	6	7
e)	more in control	1	2	3	4	5	6	7
f)	better able to concentrate	1	2	3	4	5	6	7

To what degree do you drink caffeinated soda...

g)	when you are in a bad mood	1	2	3	4	5	6	7
h)	to relieve a craving	1	2	3	4	5	6	7
i)	to boost your mood	1	2	3	4	5	6	7
j)	when you see someone else drinking it	1	2	3	4	5	6	7
k)	in social situations	1	2	3	4	5	6	7
l)	to increase your energy	1	2	3	4	5	6	7
m)	more or less depending on the situation	1	2	3	4	5	6	7
n)	just out of habit	1	2	3	4	5	6	7
o)	because you enjoy the taste	1	2	3	4	5	6	7
p)	to help control your hunger	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath	1	2	3	4	5	6	7
r)	because you are bored	1	2	3	4	5	6	7
s)	to help you relax	1	2	3	4	5	6	7
t)	because you are anxious	1	2	3	4	5	6	7

Cigarette Smoking

*If you have **NEVER** smoked at all (currently or in the past), please proceed to question 41a.*

31a. Do you currently smoke cigarettes?

(1) ____ Yes

(2) ____ No

> *If you answered "yes" to question 31a, please skip questions 31b-31e and proceed to question 32a.*

****

> *If you answered "**no**" to question 31a (e.g., do not currently smoke cigarettes) but have in the past, please answer the following questions:*

31b. At what age did you first begin to smoke? ____ years old

31c. At what age did you begin smoking regularly, (e.g., almost daily) ____ years old

31d. When you were a regular smoker, how many cigarettes did you smoke on an average day? ____ cigarettes

31e. How long ago did you QUIT smoking?

(1) less than 6 months ____

(2) 6 months to 1 year ____

(3) 1-2 years ____

(4) more than 2 years ____

> *Please now proceed to question 41a.*

****

32a. If you do currently smoke cigarettes daily or almost daily, please record the number of cigarettes you typically smoke each day:
____ cigarettes

32b. How often do you smoke cigarettes? (Check one answer only)

(1) ____ daily or almost daily

(2) ____ 1-3 times a week

(3) ____ 4-5 times a week

(4) ____ 1-3 times a month

(5) ____ only on occasions

(6) ____ never or almost never

33. Do you have a preferred brand of cigarettes?

    (1) _____ Yes   If yes, please list: _____
    (2) _____ No

34a. At what age did you <u>first</u> begin smoking?
    _____ years old

34b. At what age did you begin smoking <u>regularly</u>?
    _____ years old

35. How long have you been a <u>regular</u> smoker?

    (1) _____less than 6 months
    (2) _____6 months to 1 year
    (3) _____1-2 years
    (4) _____over 2 years

36. When you are tense or stressed, do you tend to
    (Check <u>one</u> answer only)

    (1) _____smoke more?
    (2) _____smoke less?
    (3) _____smoke about the same number of cigarettes?

37. How many people in your home also smoke?

    _____ number of smokers (including yourself) out of _____ total number of people
        (including yourself)

38. When do you <u>typically</u> have your <u>first</u> cigarette of the day? (Check the 1 <u>best</u> answer)

    (1) _____ As soon as I wake up in the morning
    (2) _____ With breakfast
    (3) _____ At work or school in the morning (but not with a meal)
    (4) _____ At lunch
    (5) _____ Sometime during the afternoon
    (6) _____ At dinner
    (7) _____ At work or school in the afternoon (but not with a meal)
    (8) _____ In the evening (e.g., after dinner time, but before bedtime)
    (9) _____ Other (please specify, _____)

39. If you HAD to give up 1 cigarette, which would be the absolute <u>hardest</u> to give up?
   (Check the 1 <u>best</u> answer)

    (1) _____ As soon as I wake up in the morning
    (2) _____ With breakfast
    (3) _____ At work or school in the morning (but not with a meal)
    (4) _____ At lunch
    (5) _____ Sometime during the afternoon
    (6) _____ At dinner
    (7) _____ At work or school in the afternoon (but not with a meal)
    (8) _____ In the evening (e.g., after dinner time, but before bedtime)
    (9) _____ Other (please specify, _____)

40. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all much			somewhat			very

To what degree does smoking make you feel...

a)	relaxed	1	2	3	4	5	6	7
b)	tense	1	2	3	4	5	6	7
c)	energetic	1	2	3	4	5	6	7
d)	more sociable	1	2	3	4	5	6	7
e)	more in control	1	2	3	4	5	6	7
f)	better able to concentrate	1	2	3	4	5	6	7

To what degree do you smoke...

g)	when you are in a bad mood	1	2	3	4	5	6	7
h)	to relieve a craving	1	2	3	4	5	6	7
i)	to boost your mood	1	2	3	4	5	6	7
j)	when you see someone else smoking	1	2	3	4	5	6	7
k)	in social situations	1	2	3	4	5	6	7
l)	to increase your energy	1	2	3	4	5	6	7
m)	more or less depending on the situation	1	2	3	4	5	6	7
n)	just out of habit	1	2	3	4	5	6	7
o)	because you enjoy the taste	1	2	3	4	5	6	7
p)	to help control your hunger	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath	1	2	3	4	5	6	7
r)	because you are bored	1	2	3	4	5	6	7
s)	to help you relax	1	2	3	4	5	6	7
t)	because you are anxious	1	2	3	4	5	6	7

Smokeless Tobacco

If you have __NEVER__ been a smokeless tobacco user at all (currently OR in the past), please skip this section and proceed to question 53a.

41a. Do you currently use smokeless tobacco?   (1) _____ Yes
                                                  (2) _____ No

       *If you answered "yes" to question 41a, please skip
       questions 41b-41e and proceed to question 42a.*

****

       *If you answered "__no__" to question 41a (e.g., do not
       currently use smokeless tobacco) but have in the
       past, please answer the following questions:*

41b. At what age did you first begin to use smokeless   _____ years old
      tobacco (dip)?

41c. At what age did you begin dipping
      regularly, (e.g., almost daily)   _____ years old

41d. When you were a regular dipper, how many dips
      did you have on an average day?   _____ dips

41e. How long ago did you QUIT dipping?

                (1) less than 6 months   _____
                (2) 6 months to 1 year   _____
                (3) 1-2 years   _____
                (4) more than 2 years   _____

       Please now proceed to question 53a.

****

42a. If you do use smokeless tobacco daily or almost daily, please record the number of
      dips you typically have each day: _____ dips

42b. How often do you use smokeless tobacco? (Check <u>one</u> answer only)

    (1) _____ daily or almost daily   (4) _____ 1-3 times a month
    (2) _____ 1-3 times a week   (5) _____ only on occasions
    (3) _____ 4-5 times a week   (6) _____ never or almost never

43. If you currently use smokeless tobacco, how many cans do you use per day?

    (1) _____ less than 1/2 a can
    (2) _____ between half a can and 1 can
    (3) _____ more than 1 can per day

44. If you currently use smokeless tobacco, approximately how long do you leave a dip in your mouth?

    _____ minutes _____ hours

45. Do you have a preferred brand of smokeless tobacco?

    (1) _____ Yes If yes, please list: _____
    (2) _____ No

46a. At what age did you <u>first</u> begin to use smokeless tobacco?
    _____ years old

46b. At what age did you begin using smokeless tobacco (dipping) <u>regularly</u>?
    _____ years old

47. How long have you been a <u>regular</u> smokeless tobacco user?

    (1) _____ less than 6 months
    (2) _____ 6 months to 1 year
    (3) _____ 1-2 years
    (4) _____ over 2 years

48. When you are tense or stressed, do you tend to
    (Check <u>one</u> answer only)

    (1) _____ use more smokeless tobacco?
    (2) _____ use less smokeless tobacco?
    (3) _____ use about the same amount of smokeless tobacco?

49. How many people in your home also use smokeless tobacco?

_____ number of smokeless tobacco users (including yourself) out of _____ total
number of people (including yourself)

50. When do you typically have your first dip of the day? (Check the 1 best answer)

(1) _____ As soon as I wake up in the morning
(2) _____ With breakfast
(3) _____ At work or school in the morning (but not with a meal)
(4) _____ At lunch
(5) _____ Sometime during the afternoon
(6) _____ At dinner
(7) _____ At work or school in the afternoon (but not with a meal)
(8) _____ In the evening (e.g., after dinner time, but before bedtime)
(9) _____ Other (please specify, _____)

51. If you **HAD** to give up 1 dip, which would be the absolute hardest to give up? (Check the 1 best answer)

(1) _____ As soon as I wake up in the morning
(2) _____ With breakfast
(3) _____ At work or school in the morning (but not with a meal)
(4) _____ At lunch
(5) _____ Sometime during the afternoon
(6) _____ At dinner
(7) _____ At work or school in the afternoon (but not with a meal)
(8) _____ In the evening (e.g., after dinner time, but before bedtime)
(9) _____ Other (please specify, _____)

52. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all much			somewhat			very

To what degree does smokeless tobacco make you feel...

a)	relaxed	1	2	3	4	5	6	7
b)	tense	1	2	3	4	5	6	7
c)	energetic	1	2	3	4	5	6	7
d)	more sociable	1	2	3	4	5	6	7
e)	more in control	1	2	3	4	5	6	7
f)	better able to concentrate	1	2	3	4	5	6	7

To what degree do you use smokeless tobacco...

g)	when you are in a bad mood	1	2	3	4	5	6	7
h)	to relieve a craving	1	2	3	4	5	6	7
i)	to boost your mood	1	2	3	4	5	6	7
j)	when you see someone else using it	1	2	3	4	5	6	7
k)	in social situations	1	2	3	4	5	6	7
l)	to increase your energy	1	2	3	4	5	6	7
m)	more or less depending on the situation	1	2	3	4	5	6	7
n)	just out of habit	1	2	3	4	5	6	7
o)	because you enjoy the taste	1	2	3	4	5	6	7
p)	to help control your hunger	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath	1	2	3	4	5	6	7
r)	because you are bored	1	2	3	4	5	6	7
s)	to help you relax	1	2	3	4	5	6	7
t)	because you are anxious	1	2	3	4	5	6	7

Alcohol

If you have __NEVER__ drank alcohol (currently OR in the past), please skip this section and proceed to question 66a.

53a. Do you currently drink alcohol?

(1) _____ Yes
(2) _____ No

If you answered "yes" to question 53a, please skip questions 53b-53e and proceed to question 54a.

****

If you answered "no" to question 53a (e.g., do not currently drink alcohol) but have in the past, please answer the following questions:

53b. At what age did you __first__ begin to drink alcohol?   _____ years old

53c. At what age did you begin drinking alcohol __regularly,__ (e.g., almost daily)   _____ years old

53d. When you did drink alcohol regularly, how many drinks did you have on an __average__ day?   _____ drinks

53e. How long ago did you QUIT using alcohol?

(1) less than 6 months   _____
(2) 6 months to 1 year   _____
(3) 1-2 years   _____
(4) more than 2 years   _____

Please now proceed to question 66a.

****

54. How many beers do you have...
    a) on an __average__ day?   _____
    b) in a __typical__ week?   _____

55. How many other drinks (including wine, mixed drinks, etc.) do you have...
    a) on an __average__ day?   _____
    b) in a __typical__ week?   _____

56. If you do drink alcohol, please record the total number
    of drinks you typically drink...
    a) _____ drinks on an average day
    b) _____ drinks in an average week:

57. How often do you drink alcohol? (Check one answer only)

    (1) _____ daily or almost daily   (4) _____ 1-3 times a month
    (2) _____ 1-3 times a week   (5) _____ only on occasions
    (3) _____ 4-5 times a week   (6) _____ never or almost never

58a. Do you have a preferred brand of beer?

    (1) _____ Yes   If yes, please list: _____
    (2) _____ No

58b. Do you have a preferred brand of liquor/alcohol?

    (1) _____ Yes   If yes, please list: _____
    (2) _____ No

59a. At what age did you first begin drinking alcohol?
     _____ years old

59b. At what age did you begin drinking alcohol regularly?
     _____ years old

60. How long have you been drinking at this rate?

    (1) _____ less than 6 months
    (2) _____ 6 months to 1 year
    (3) _____ 1-2 years
    (4) _____ over 2 years

61. When you are tense or stressed, do you tend to
    (Check one answer only)

    (1) _____ drink more alcohol?
    (2) _____ drink less alcohol?
    (3) _____ drink about the same amount of alcohol?

62. How many people in your home also drink alcohol?

     _____ number of people who use alcohol (including yourself) out of _____ total
         number of people (including yourself)

63. When do you typically have your first drink of the day? (Check the 1 best answer)

    (1) ____ As soon as I wake up in the morning
    (2) ____ With breakfast
    (3) ____ At work or school in the morning (but not with a meal)
    (4) ____ At lunch
    (5) ____ Sometime during the afternoon
    (6) ____ At dinner
    (7) ____ At work or school in the afternoon (but not with a meal)
    (8) ____ In the evening (e.g., after dinner time, but before bedtime)
    (9) ____ Other (please specify, _____)

64. If you **HAD** to give up 1 drink, which would be the absolute hardest to give up? (Check the 1 best answer)

    (1) ____ As soon as I wake up in the morning
    (2) ____ With breakfast
    (3) ____ At work or school in the morning (but not with a meal)
    (4) ____ At lunch
    (5) ____ Sometime during the afternoon
    (6) ____ At dinner
    (7) ____ At work or school in the afternoon (but not with a meal)
    (8) ____ In the evening (e.g., after dinner time, but before bedtime)
    (9) ____ Other (please specify, _____)

65. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all much			somewhat			very

To what degree does alcohol make you feel...

a)	relaxed	1	2	3	4	5	6	7
b)	tense	1	2	3	4	5	6	7
c)	energetic	1	2	3	4	5	6	7
d)	more sociable	1	2	3	4	5	6	7
e)	more in control	1	2	3	4	5	6	7
f)	better able to concentrate	1	2	3	4	5	6	7

To what degree do you drink alcohol...

g)	when you are in a bad mood	1	2	3	4	5	6	7
h)	to relieve a craving	1	2	3	4	5	6	7
i)	to boost your mood	1	2	3	4	5	6	7
j)	when you see someone else drinking it	1	2	3	4	5	6	7
k)	in social situations	1	2	3	4	5	6	7
l)	to increase your energy	1	2	3	4	5	6	7
m)	more or less depending on the situation	1	2	3	4	5	6	7
n)	just out of habit	1	2	3	4	5	6	7
o)	because you enjoy the taste	1	2	3	4	5	6	7
p)	to help control your hunger	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath	1	2	3	4	5	6	7
r)	because you are bored	1	2	3	4	5	6	7
s)	to help you relax	1	2	3	4	5	6	7
t)	because you are anxious	1	2	3	4	5	6	7

Chewing Gum

*If you have **NEVER been a gum chewer** (currently or in the past), please skip this section and proceed to question 76.*

66a. Do you ever chew gum?

(1) ____ Yes
(2) ____ No

> *If you answered "yes" to question 66a, please skip
> questions 66b-66e and proceed to question 67a.*

****

> *If you answered "no" to question 66a (e.g., do not
> currently chew gum) but have in the
> past, please answer the following questions:*

66b. At what age did you first begin to chew gum?   ____ years old

66c. At what age did you begin chewing gum
       regularly, (e.g., almost daily)   ____ years old

66d. When you chewed gum regularly, how many pieces
       of gum did you chew on an average day?   ____ pieces

66e. How long ago did you QUIT chewing gum?

(1) less than 6 months   ____
(2) 6 months to 1 year   ____
(3) 1-2 years   ____
(4) more than 2 years   ____

> *Please now proceed to question 76.*

****

67a. If you do chew gum, please record the number
       of pieces you typically chew each day: ____ pieces

67b. How often do you chew gum? (Check one answer only)

(1) ____ daily or almost daily   (4) ____ 1-3 times a month
(2) ____ 1-3 times a week   (5) ____ only on occasions
(3) ____ 4-5 times a week   (6) ____ never or almost never

68. Do you have a preferred brand of gum?

    (1) ____ Yes   If yes, please list: _____
    (2) ____ No

69a. At what age did you <u>first</u> begin chewing gum?
    ____ years old

69b. At what age did you begin chewing gum <u>regularly</u>?
    ____ years old

70. How long have you been a <u>regular</u> gum chewer?

    (1) ____ less than 6 months
    (2) ____ 6 months to 1 year
    (3) ____ 1-2 years
    (4) ____ more than 2 years

71. When you are tense or stressed, do you tend to
    (Check <u>one</u> answer only)

    (1) ____chew more gum?
    (2) ____chew less gum?
    (3) ____chew about the same amount of gum?

72. How many people in your home also chew gum?

    ____ number of gum chewers (including yourself) out of ____ total number of
        people (including yourself)

73. When do you <u>typically</u> have your <u>first</u> piece of gum of the day? (Choose the 1 <u>best</u>
    answer)

    (1) ____ As soon as I wake up in the morning
    (2) ____ With breakfast
    (3) ____ At work or school in the morning (but not with a meal)
    (4) ____ At lunch
    (5) ____ Sometime during the afternoon
    (6) ____ At dinner
    (7) ____ At work or school in the afternoon (but not with a meal)
    (8) ____ In the evening (e.g., after dinner time, but before bedtime)
    (9) ____ Other (please specify, _____)

74. If you **HAD** to give up 1 piece of gum, which would be the absolute <u>hardest</u> to give up? (Choose the 1 <u>best</u> answer)

(1) ____ As soon as I wake up in the morning
(2) ____ With breakfast
(3) ____ At work or school in the morning (but not with a meal)
(4) ____ At lunch
(5) ____ Sometime during the afternoon
(6) ____ At dinner
(7) ____ At work or school in the afternoon (but not with a meal)
(8) ____ In the evening (e.g., after dinner time, but before bedtime)
(9) ____ Other (please specify, _____)

75. Please use the following rating scale for the rest of the questions on this page:

1	2	3	4	5	6	7
not at all much			somewhat			very

To what degree does gum make you feel...

a)	relaxed	1	2	3	4	5	6	7
b)	tense	1	2	3	4	5	6	7
c)	energetic	1	2	3	4	5	6	7
d)	more sociable	1	2	3	4	5	6	7
e)	more in control	1	2	3	4	5	6	7
f)	better able to concentrate	1	2	3	4	5	6	7

To what degree do you chew gum...

g)	when you are in a bad mood	1	2	3	4	5	6	7
h)	to relieve a craving	1	2	3	4	5	6	7
i)	to boost your mood	1	2	3	4	5	6	7
j)	when you see someone else chewing it	1	2	3	4	5	6	7
k)	in social situations	1	2	3	4	5	6	7
l)	to increase your energy	1	2	3	4	5	6	7
m)	more or less depending on the situation	1	2	3	4	5	6	7
n)	just out of habit	1	2	3	4	5	6	7
o)	because you enjoy the taste	1	2	3	4	5	6	7
p)	to help control your hunger	1	2	3	4	5	6	7
q)	to help combat a bad taste or bad breath	1	2	3	4	5	6	7
r)	because you are bored	1	2	3	4	5	6	7
s)	to help you relax	1	2	3	4	5	6	7
t)	because you are anxious	1	2	3	4	5	6	7

Medical Information:

76. Please indicate whether or not you have had medical problems in the following areas:

a) Cardiovascular (heart)	___ Yes	___ No	
b) Respiratory (lung)	___ Yes	___ No	
c) Gastrointestinal (stomach)	___ Yes	___ No	
d) Ulcers	___ Yes	___ No	

Dental

e) Jaw tension/soreness	___ Yes	___ No	
f) Cavities	___ Yes	___ No	
g) Gum disease	___ Yes	___ No	
h) Cold sores	___ Yes	___ No	
i) Mouth ulcers	___ Yes	___ No	
j) Excessive sore throat	___ Yes	___ No	

k) Cancer   ___ Yes   ___ No

l) Other   ___ Yes   ___No

(if yes, please specify: _____)

****

77. Have you ever received treatment for any of the following?

a) nervousness or anxiety	___ Yes	___ No	
b) depression	___ Yes	___ No	
c) alcohol abuse	___ Yes	___ No	
d) drug abuse	___ Yes	___ No	
e) eating disorder	___ Yes	___ No	
f) other	___ Yes	___ No	

(if yes, please specify: _____)

78. Please answer the following items:

a) I never smoke marijuana. _____ True _____ False
b) I occasionally smoke marijuana. _____ True _____ False
c) I frequently smoke marijuana. _____ True _____ False

d) I never use illegal drugs
    (other than marijuana). _____ True _____ False
e) I occasionally use illegal drugs
    (other than marijuana). _____ True _____ False
f) I frequently use illegal drugs
    (other than marijuana). _____ True _____ False

g) I never engage in excessive use
    of prescription drugs. _____ True _____ False
h) I occasionally engage in excessive
    use of prescription drugs. _____ True _____ False
i) I frequently engage in excessive
    use of prescription drugs. _____ True _____ False

Due to the sensitive nature of the topics addressed in this questionnaire, it is sometimes difficult for individuals to disclose some information. We would like to obtain an estimate from you about how honest you felt you could be in reporting your answers to the questions in this questionnaire. Please answer as honestly as you can. Indicating that you had difficulty in responding honestly will not be penalized. You will still receive full credit for your participation regardless of our answer here. Please mark only one (1) answer below.

Overall, I feel:

_____ I responded honestly to all questions

_____ I responded honestly to all but a few questions

_____ I was not able to respond honestly to many of the questions

Table 1

Subject characteristics

Gender

    Male   159 (41.7%)
    Female   221 (58.0%)

Smoking status

    Non-smokers   287 (75.3%)
    Moderate smokers   75 (19.7%)
    Heavy smokers   19 (5%)

Alcohol status

    Non-drinkers   152 (39.9%)
    Low-rate drinkers   157 (41.2%)
    Moderate-heavy drinkers 72 (18.9%)

Caffeine status

    Non-caffeine users   11 (2.9%)
    Low-moderate users 269 (70.6%)
    Heavy users   100 (26.2%)

Coffee status

    Non-coffee users   236 (61.9%)
    Low-moderate users 130 (34.1%)
    Heavy users   15 (3.9%)

Chewing gum status

    Non-gum chewers   57 (15.0%)
    Gum chewers   324 (85.0%)

Table 2

Smoking status by chewing gum status

	Non-gum chewer	Gum chewer
Non-smoker	36 (12.5%)	251 (87.5%)
Moderate smoker	15 (20.0%)	60 (80.0%)
Heavy smoker	6 (31.6%)	13 (68.4%)

$X^2 = (2, \underline{N} = 381) = 6.94, \underline{p} < .05.$

Table 3

Analysis of variance for gum consumption across smoking groups

Source	DF	SS	MS	F	p
Between groups	2	47.57	23.79	4.13	.02
Regression	1	30.18	30.18	5.24	.02
Within+residual group	319	1837.68	5.76		
Total	322	1920.99			

Note. Post-hoc analyses suggest that heavy smokers chew significantly more gum per day than either moderate smokers or non-smokers.

Table 4

Smoking status by alcohol status

	No Alcohol	Low-rate Alcohol	Moderate-Heavy Alcohol
Non-smoker	126 (43.9%)	115 (40.1%)	46 (16.0%)
Moderate smoker	19 (25.3%)	36 (48.0%)	20 (26.7%)
Heavy smoker	7 (36.8%)	6 (31.6%)	6 (31.6%)

$X^2 = (4, \underline{N} = 381) = 11.81, \underline{p} < .05.$

Table 5

Analysis of variance for average weekly alcohol consumption across smoking groups

Source	DF	SS	MS	F	p
Between groups	2	385.52	192.76	2.03	.13
Within groups	226	21490.04	95.09		
Total	228	21875.55			

Table 6

Smoking status by caffeine status

	No Caffeine	Low-Moderate Caffeine	Heavy Caffeine
Non-smoker	10 (3.5%)	217 (75.9%)	59 (20.6%)
Moderate smoker	0 (0%)	45 (60.0%)	30 (40.0%)
Heavy smoker	1 (5.3%)	7 (36.8%)	11 (57.9%)

$X^2 = (4, \underline{N} = 380) = 24.32, p<.01.$

Table 7

Analysis of variance for average daily caffeine consumption across smoking groups

Source	DF	SS	MS	F	p
Between groups	2	1061274.47	530637.23	13.01	.001
Regression	2	1243599.48	621799.74	15.24	.001
Within+residual	357	14564093.94	40795.78		
Total	361	17096176.40			

Note. Post-hoc analyses show that heavy smokers and moderate smokers consume significantly more total caffeinated beverages than non-smokers.

Table 8

Smoking status by coffee status

	No Coffee	Low-Moderate Coffee	Heavy Coffee
Non-smoker	193 (67.2%)	85 (29.6%)	9 (3.1%)
Moderate smoker	36 (48.0%)	37 (49.3%)	2 (2.7%)
Heavy smoker	7 (36.8%)	8 (42.1%)	4 (21.1%)

$X^2 = (4, \underline{N} = 381) = 27.65, \underline{p} < .00.$

Table 9

Analysis of variance for average daily coffee consumption across smoking groups

Source	DF	SS	MS	F	p
Between groups	2	307488.05	153744.03	6.65	.001
Regression	1	634636.54	634636.54	27.46	.002
Within+residual	140	3235412.22	23110.09		
Total	143	4253741.49			

Note. Post-hoc analyses suggest that heavy smokers and moderate smokers consume significantly more coffee than non-smokers.

Table 10

Alcohol status by chewing gum status in non-smokers

	Non-gum chewer	Gum chewer
No alcohol	11 (8.7%)	115 (91.3%)
Low-rate alcohol	13 (11.3%)	102 (88.7%)
Moderate-heavy alcohol	12 (26.1%)	34 (73.9%)

$X^2 = (2, \underline{N} = 287) = 9.52, \underline{p} < .00.$

Table 11

Analysis of variance for non-smokers' gum consumption across alcohol status groups

Source	DF	SS	MS	F	p
Between groups	2	7.04	3.52	.65	.52
Within groups	248	1329.98	5.36		
Total	250	1337.01			

Table 12

Caffeine status by chewing gum status in non-smokers

	Non-gum chewer	Gum chewer
No caffeine	3 (30.0%)	7 (70.0%)
Low-Moderate caffeine	26 (12.0%)	191 (88.0%)
Heavy caffeine	7 (11.9%)	52 (88.1%)

$X^2 = (2, \underline{N} = 286) = 2.86, \underline{p} < .24.$

Table 13

Analysis of variance for non-smokers' gum consumption across caffeine groups

Source	DF	SS	MS	F	p
Between groups	2	35.02	17.51	3.34	.04
Within groups	247	1296.27	5.25		
Total	249	1331.30			

Note. Tukey's HSD post-hoc analyses indicated heavy caffeine users chew significantly more gum than low-moderate users.

Table 14

Coffee status by chewing gum status in non-smokers

	Non-gum chewer	Gum chewer
No coffee	21 (10.9%)	172 (89.1%)
Low-Moderate coffee	14 (16.5%)	71 (83.5%)
Heavy coffee	1 (11.1%)	8 (88.9%)

$X^2 = (2, \underline{N} = 287) = 1.70, p < .43.$

Table 15

Analysis of variance for non-smokers' gum consumption across coffee groups

Source	DF	SS	MS	F	p
Between groups	2	29.54	14.77	2.80	.06
Within groups	248	1307.47	5.27		
Total	250	1337.01			
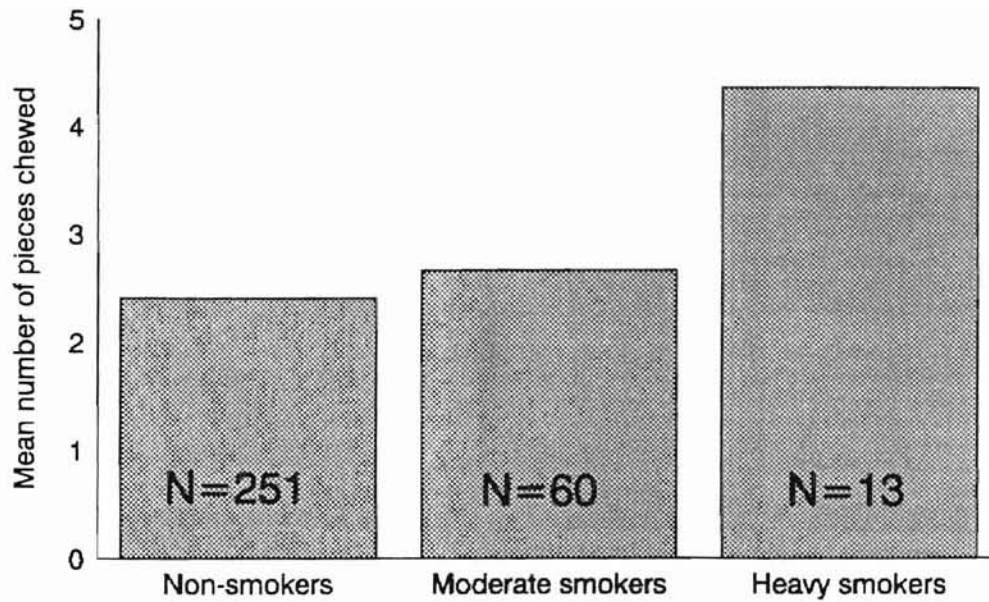
Figure 1. Chewing gum consumption across smoking status groups
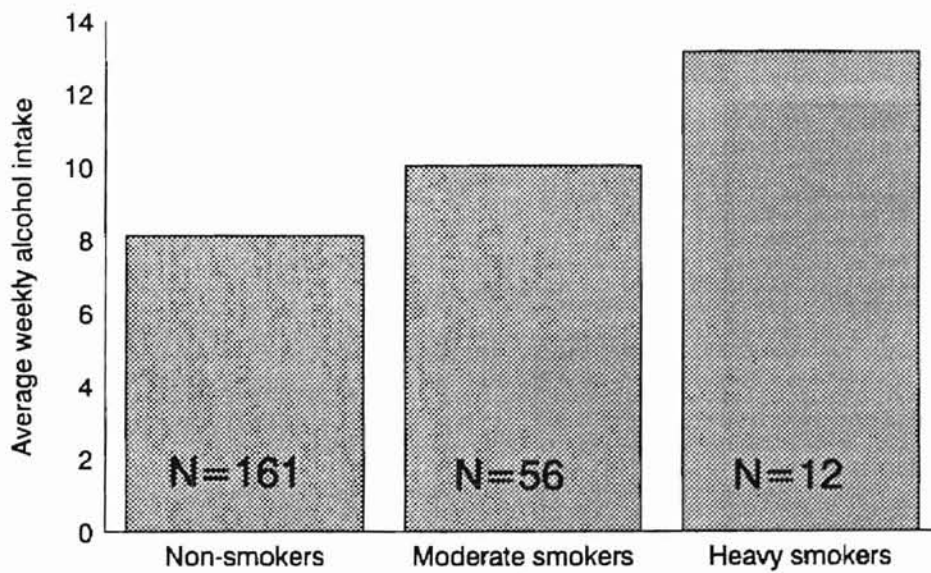
Figure 2. Average weekly alcohol consumption across smoking status groups
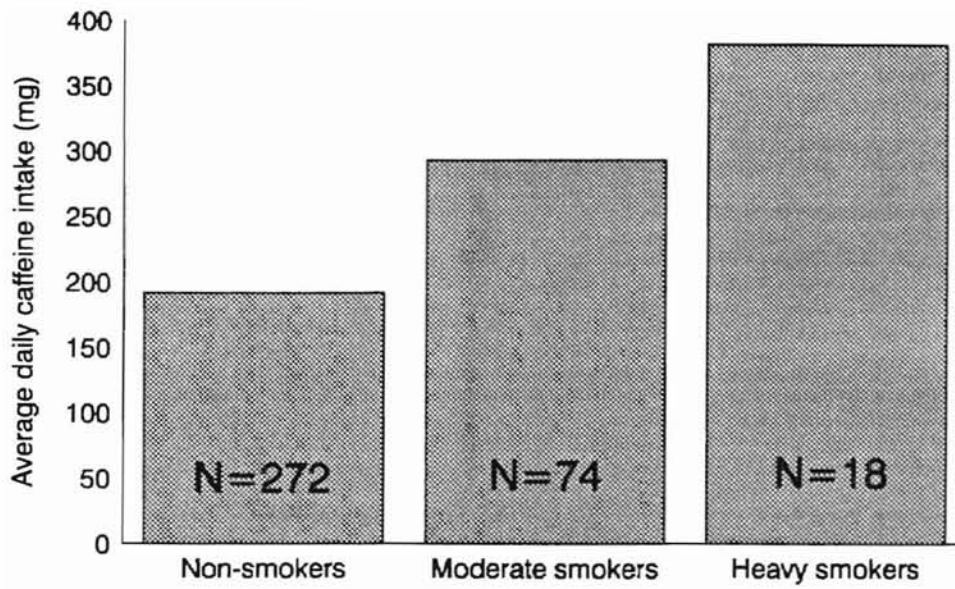
Figure 3. Daily caffeine consumption among smoking groups
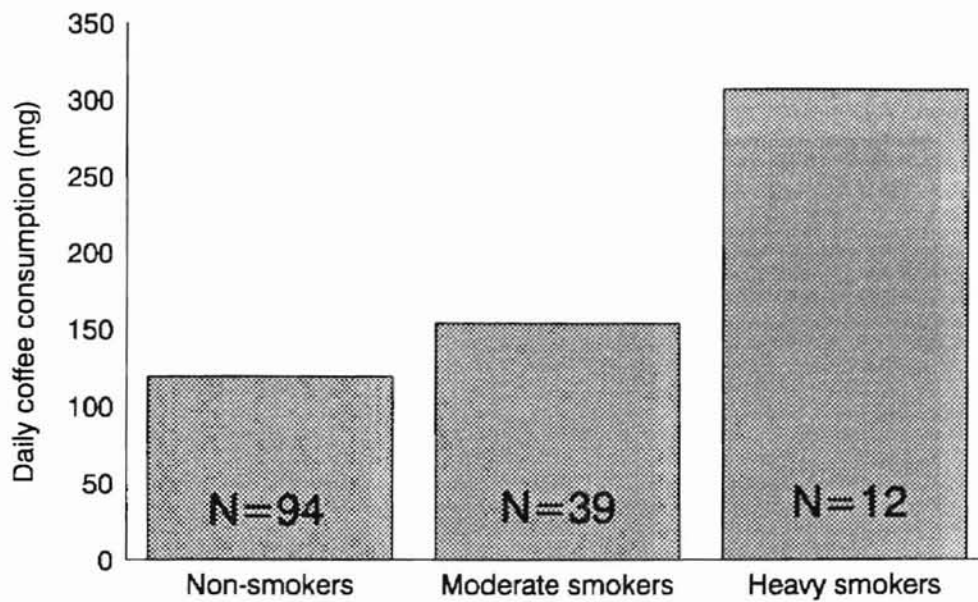
Figure 4. Daily coffee consumption across smoking status groups
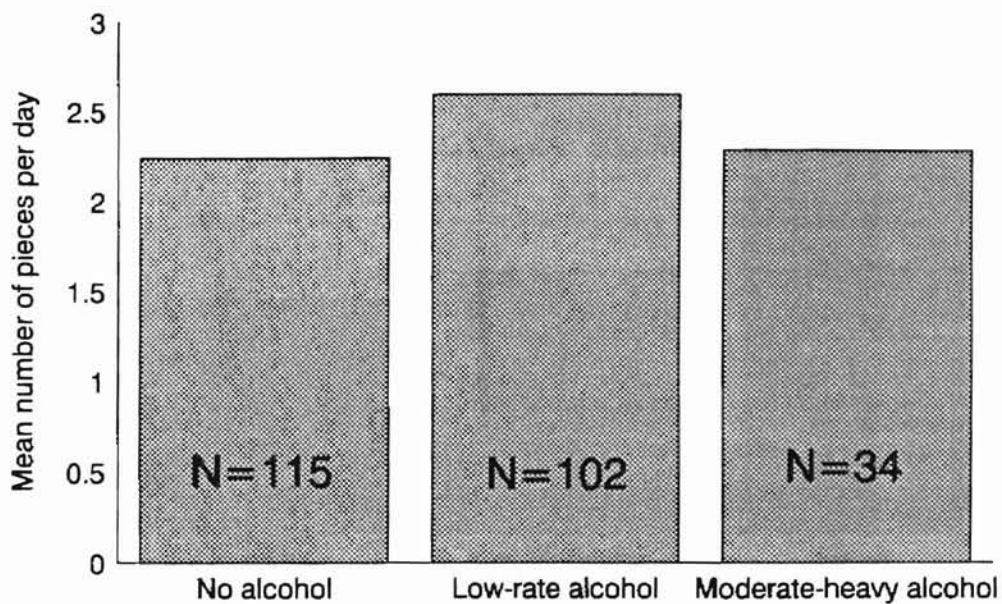
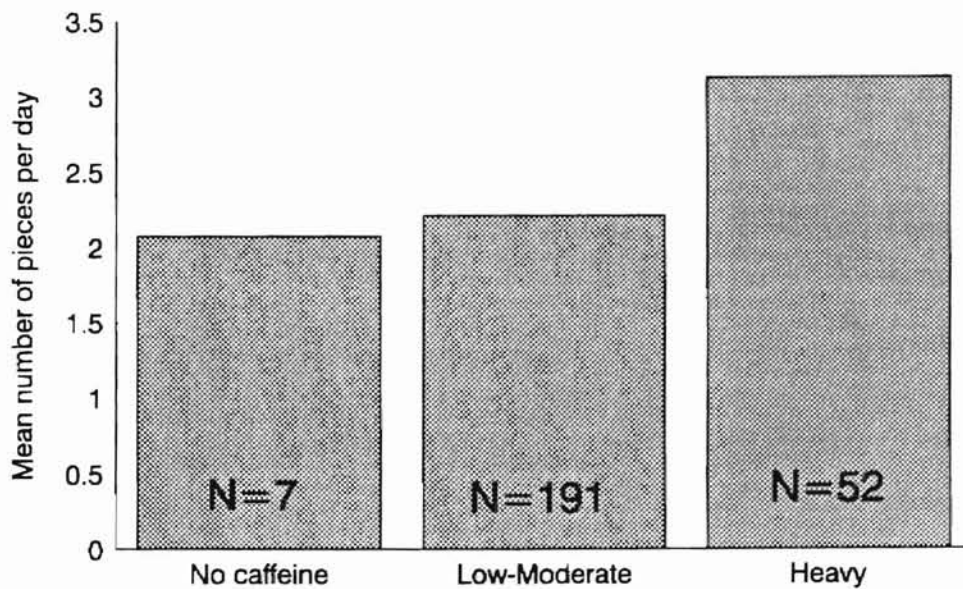Figure 5. Non-smokers' gum consumption across alcohol status groups

Figure 6. Non-smokers' gum consumption across caffeine status groups
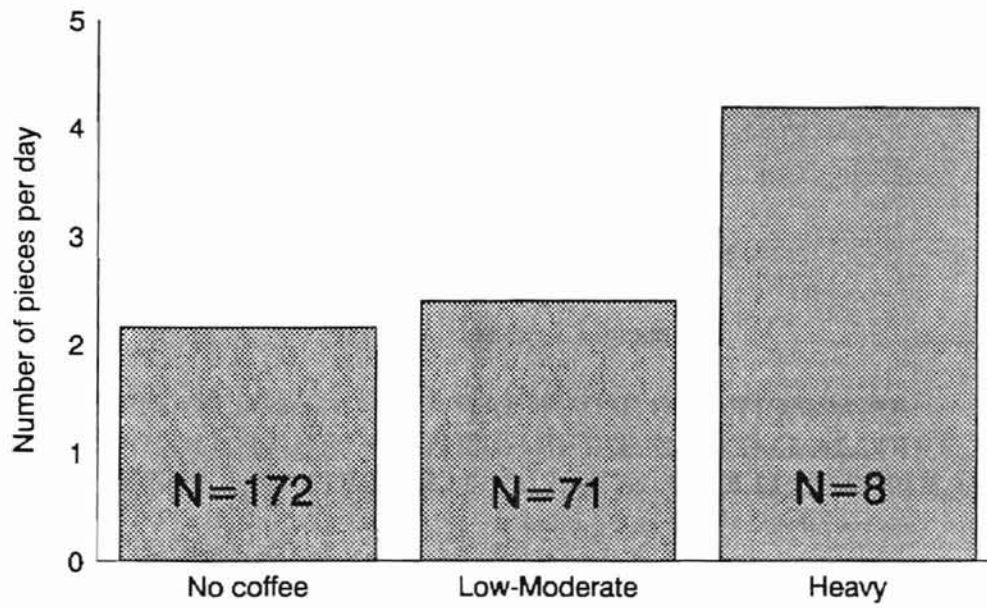
Figure 7. Non-smokers' gum consumption across coffee status groups

VITA

Dana M. Britt

Candidate for the Degree of

Master of Science

Thesis: THE DEVELOPMENT OF A HABITS USE QUESTIONNAIRE:
RELATIONSHIP BETWEEN CIGARETTE SMOKING, ALCOHOL,
CAFFEINE, AND CHEWING GUM USE IN A COLLEGE POPULATION

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OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 05-15-95   **IRB#:** AS-95-058

Proposal Title: HABITS QUESTIONNAIRE STUDY

Principal Investigator(s): Frank Collins, Dana Britt

Reviewed and Processed as: Expedited

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD
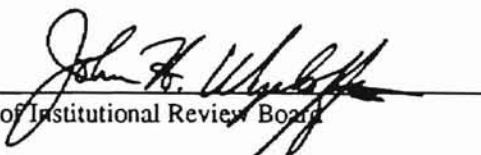AT NEXT MEETING.
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A
CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD
APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR
APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval
are as follows:

Provisions received and approved.

Signature: _____   Date: June 13, 1995

Chair of Institutional Review Board