

THE RELATIONSHIP OF CIGARETTE CONSUMPTION
AND UPPER RESPIRATORY DISEASE
AMONG COLLEGE STUDENTS

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Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
DOCTOR OF EDUCATION
July, 1974

MAR 13 1975

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ACKNOWLEDGMENTS

The author wishes to express her sincere appreciation to her friend and major adviser, Dr. A. B. Harrison, for his long hours of guidance and assistance throughout this study of several years. Appreciation is extended to Dr. Ruth Lindsey for her help in the preparation of the final manuscript. Recognition is also given to Drs. John Bayless and Robert Brown for their assistance throughout this investigation.

A very special note of gratitude is given Dr. Robert Kamm, President of Oklahoma State University, for his assistance and support.

Appreciation is extended to the staff members of Tulsa Junior College for their cooperation and to the students who were willing to give their time to participate in this study.

A note of thanks is given to Mrs. Ann Waughtal for typing the final manuscript.

There are many people who have given of themselves so generously over the past years. They especially have been a source of support and encouragement over the past year. These people are: my son, John; my parents, Mr. and Mrs. Charles E. Hunter; my sister, Charlotte; and brother, Chuck; many friends but especially Mr. and Mrs. Kenneth Gallagher, Miss Jimmie McGuire, and Miss Minnie Mae Prescott.

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CHAPTER I

ORIENTATION TO THE STUDY

The history of tobacco has been traced to the late fifteenth century when Columbus, on his famous voyage discovering America, found the Indians smoking tobacco in pipes (21) (78). Intrigued with the apparent pleasure the Indians derived from this pipe smoking, Columbus brought back tobacco plants to Queen Isabella of Spain. Since that historic trip, Spain and other countries have enjoyed tobacco in various forms for pleasure and medicinal purposes (23) (78). The recorded history of cigarette consumption, however, dates back to the seventeenth century in Spain (23). From Spain, the use of cigarettes spread to the eastern lands of Turkey and Russia. France and England were introduced to cigarette smoking when their soldiers participated in the Crimean War against the Russians in 1853 in Eastern Europe (28).

Cigarette consumption in the United States is of relatively recent origin. The early cigarettes were "roll your own," often from a sack of Bull Durham (50). While this procedure of "roll your own" probably limited the number of cigarettes one would consume daily, the cigarette machine developed in 1870 soon changed that (50). Annual cigarette consumption rose from 400 million cigarettes prior to the discovery of the cigarette machine to well over two billion cigarettes by 1880 (11) (51).

Since the turn of the century, the use of tobacco by Americans has increased enormously. In 1900 the average person's consumption rate for

the total population of adults 18 years or older was less than 50 cigarettes per year. In 1930 the rate for the same age group had increased to 1,389 cigarettes per person (49). Finally in 1963 the peak of cigarette consumption for the adult population was reached with an average of 4,345 cigarettes per person per year. After 1963 there was a decrease in cigarette consumption among the adult population. Expressed in percentages, there has been little change in cigarette consumption the past 11 years except for the 9 per cent decrease during the years of 1969 and 1970 (see Table I).

Why have cigarette sales boomed during the first half of the century? Borgatta attributed the increase of cigarette consumption in the early 1900's to mass production of the cigarette and lower cost units (11). Diehl (21:136) stated ". . . cigarette consumption had a strong beginning with the free distribution of cigarettes to soldiers of World War I; prior to World War I, cigarette smoking was infrequent." The rise in cigarette smoking has also been attributed in part to the acceptance of cigarette smoking by women (21).

While cigarette smoking has gained rapid acceptance throughout the years, it also has met with opposition. As early as the seventeenth century the use of tobacco was reviled by some as the scourge (50). In this century, the use of cigarettes has not escaped public criticism; the medical profession, for example, has been concerned with the effects of cigarette consumption upon the human body (14). One physician, Dr. Beuissen, a century ago suspected a tobacco-cancer relationship (21). Dr. Tylecete, an English physician, reported in a medical journal in 1927 that he found in almost every case of lung cancer the patient was a regular smoker, usually of cigarettes (21).

TABLE I

NUMBER OF CIGARETTES SMOKED PER PERSON AGED EIGHTEEN AND OVER

Year	Number of Cigarettes Smoked Per Person
1900	50
1930	1,389
1962	4,265
1963	4,345
1964	4,194
1965	4,258
1966	4,287
1967	4,280
1968	4,186
1969	3,993
1970	3,970
1971	4,042
1972	4,080
1973	4,240

The uncertainty about the effects of cigarette consumption by the general public in the United States was first reflected in the decline in cigarette sales in 1964, according to Dr. Horn (47). (See Table I.) This concern began with the statements published by the Public Health Service citing the physical health dangers inherent in the habit of smoking cigarettes. In 1964, the Surgeon General issued a report on smoking (86). In this report, data were made available on the overall disabilities associated with cigarette smoking. Since the report by the National Health Service, there have been countless studies on the subject of smoking. Recent evidence has not reversed the conclusions of the 1964 findings. Jesse L. Steinfeld, Surgeon General, stated in the 1972 National Health Service Report, that each review of the scientific evidence which links cigarette smoking to disease has seemed to confirm and

strengthen the conclusion of the 1964 report that cigarettes are a major cause of death and disease (90). The Public Health Service has released the following major conclusions:

1. Cigarette smokers tend to die at earlier ages and experience more days of disability than do comparable nonsmokers in the population.
2. If it were not for cigarette smoking, practically none of the earlier deaths from lung cancer would have occurred; a substantial portion of the earlier deaths from chronic bronchitis and emphysema would not have occurred; and a portion of the earlier deaths of cardiovascular origin would not have occurred.
3. If it were not for cigarette smoking, excess disability from chronic respiratory and cardiovascular diseases would be reduced.
4. By quitting or significantly reducing their smoking, people could delay or avert a substantial portion of the deaths which occur from lung cancer, a substantial portion of the earlier deaths and disability from chronic respiratory diseases, and some portion of the earlier deaths from cardiovascular causes.
5. The risk of death is about 70 per cent higher for men who smoke cigarettes than men who do not. The risk is significantly higher for women who smoke than for those who do not.
6. The risk of death from chronic bronchitis and emphysema is between three and twenty times greater, depending upon age and total amount smoked.
7. The risk of death from coronary artery disease—the major killer of smokers and nonsmokers alike—is seventy per cent greater for smokers than nonsmokers.
8. The greater the number of cigarettes smoked daily, the higher the death rate.
9. Life expectancy among young men is reduced by an average of eight years for heavy (over two packs a day) cigarette smokers, and an average of four years in a light (less than one-half a pack a day) smokers.
10. The risk is greater for those who inhale (88:25).

A report of the Surgeon General in 1972 stated that in conjunction with the chronic obstructive bronchopulmonary disease (COBD) and cigarette consumption that:

1. Cigarette smoking is the most important cause of chronic bronchopulmonary disease in the United States. Cigarette smokers show an increase prevalence of respiratory symptoms, including cough, sputum production, and breathlessness, when compared with nonsmokers.
2. Cigarette smoking does not appear to be related to death from bronchial asthma, although it may increase the frequency and severity of asthmatic attacks in patients already suffering from this disease.
3. The risk of developing or dying from COPD among pipe and/or cigar smokers is probably higher than that among nonsmokers while clearly less than that among cigarette smokers.
4. Ex-cigarette smokers have lower death rates from COPD than continuing smokers.
5. Young, relatively asymptomatic, cigarette smokers show measurably altered ventilatory function when compared with nonsmokers of the same age.
6. For the bulk of the populations of the United States, the importance of cigarette smoking as a cause of COPD is much greater than that of atmospheric pollution or occupational exposure. However, exposure to excessive atmospheric pollution or dustly occupational material and cigarette smoking may act jointly to produce greater COPD morbidity and mortality.
7. The results of experiments in both animals and humans have demonstrated that the inhalation of cigarette smoke is associated with acute and chronic changes in ventilatory function and pulmonary histology. Cigarette smoking has been shown to alter the mechanism of pulmonary clearance and adversely affect ciliary function.
8. Pathological studies have shown that cigarette smokers who die of diseases other than COPD have histologic changes characteristic of COPD in the bronchial tree and pulmonary parenchyma more frequently than do nonsmokers.
9. Respiratory infections are more prevalent and severe among cigarette smokers, particularly heavy smokers, than among nonsmokers.
10. Cigarette smokers appear to develop more post-operative pulmonary complications more frequently than nonsmokers (90:37).

In 1972, for the first time, the Public Health Service Report included information on public exposure to air pollution from tobacco, on the relationship between tobacco and allergy, and on the harmful con-

stituents which have been found in cigarette smoke. The following is a summary of that Report on Allergies:

1. Tobacco leaf, tobacco pollen, and tobacco smoke are antigenic in man and animals.
2. (a) Skin sensitizing antibodies specific for tobacco antigens have been found frequently in smokers and nonsmokers. They appear to occur more often in allergic individuals. Precipitating antibodies specific for tobacco antigens have also been found in both smokers and nonsmokers.

(b) A delayed type of hypersensitivity to tobacco has been demonstrated in man.

(c) Tobacco may exert an adverse effect on protective mechanisms of the immune system in man and animals.
3. (a) Tobacco smoke can contribute to the discomfort of many individuals. It exerts complex pharmacologic, irritative, and allergic effects, the clinical manifestations of which may be indistinguishable from one another.

(b) Exposure to tobacco smoke may produce exacerbation of allergic symptoms in nonsmokers who are suffering from allergies of diverse causes.
4. Little is known about the pathogenesis of tobacco allergy and its possible relationship to other smoking-related diseases (90:49).

The 1972 Report made these statements regarding Air Pollution from Tobacco Smoke:

1. An atmosphere contaminated with tobacco smoke can contribute to the discomfort of many individuals.
2. The level of carbon monoxide attained in experiments using room filled with tobacco smoke has been shown to equal, and at times to exceed, the legal limits for maximum air pollution permitted for ambient air quality in several localities and can also exceed the occupational threshold limit value for a normal work period presently in effect for the United States as a whole. The presence of such levels indicates that the effect of exposure to carbon monoxide may on occasion, depending upon the length of exposure, be sufficient to be harmful to the health of an exposed person. This would be particularly significant for people who are already suffering from chronic bronchopulmonary disease and coronary heart disease.
3. Other components of tobacco smoke, such as particulate matter and the oxides of nitrogen, have been shown in various

concentrations to affect adversely animal pulmonary and cardiac structure and function. The extent of the contributions of these substances to illness in humans exposed to the concentrations present in an atmosphere contaminated with tobacco smoke is not presently known (90:51).

The 1972 Report presented the following summary on Harmful Constituents of Cigarette Smoke:

A number of substances or classes of substances found in cigarette smoke are identified as those which are judged to be contributors to the health hazards of smoking. These constituents are further divided into the most likely contributors to these health hazards (carbon monoxide, nicotine, and tobacco "tar"), substances which are probable contributors, and those which are suspected contributors. The recommendations for control in this area are to seek progressive reduction of all harmful constituents in cigarette smoke with priority being given first to the most likely contributors named and second to the probable contributors to the health hazards of smoking. These judgments represent the consensus of experts based upon current knowledge and are subject to modification and further elaborations as more knowledge becomes available (90:52).

Although all the present knowledge about cigarette smoking was not available in the Surgeon General's 1964 Report, the Report did state that smoking was a health hazard. Despite this warning cigarette sales remained high. (See Table I.) In 1967 cigarette sales began a gradual decline; this was the year after the Federal Trade Commission began requiring health warnings on all cigarette packs and cartons. The percentage of smokers among adults in the United States dropped during the late 1960's from 41.6 per cent in 1965 to 36.7 per cent in 1970 (6). This decline occurred about the same time as the controversy over the application of the Fairness Doctrine to cigarette advertising. Later in 1967, the Federal Communications Commission ruled that health agencies were to be given equal time to state their case against smoking on all television and radio stations that had carried the advertisement of cigarettes. Finally, in March of 1970, Congress passed a bill banning commercials from television and radio after January 2, 1971 (18).

According to George Weissman, President of Philip Morris, Inc., the tobacco industry had a peak year in 1971 despite the television ban (20). The United States Department of Agriculture says, because of gains in population and in the use of cigarettes, cigarette consumption rose four per cent above the 1972 level (84). Moreover, cigarette sales are expected to rise even further since there will be an above average population in the 25 to 44 year age bracket and fewer anti-cigarette announcements (5). The continued gain is expected through the year 1980 since new smokers are beginning the habit of smoking cigarettes as fast as smokers are quitting the habit of cigarette consumption (85).

Why is cigarette smoking popular? A spokesman for the tobacco industry replied:

Western man has enjoyed tobacco for 300 years, and he likes it. Second, people don't want to believe that smoking is bad for their health. The questions raised concerning smoking are quite serious, but they by no means have been answered (6:92).

A spokesman for the American Cancer Society explained that the reason for the renewed popularity of cigarettes is that "young people still think smoking is sophisticated. Some see it as slightly decadent or adventurous" (6:92).

Research reported to the National Clearinghouse for Smoking and Health showed that in 1970 the 18 year old men increased cigarette consumption from 35.5 per cent in 1968 to 42.5 per cent in 1970. Cigarette consumption for women of the same age increased from 21.3 per cent in 1968 to 27.8 per cent (40). Jones, Shainberg, and Byer added their commentary on the cigarette consumption issue in their college textbook,

Dimensions:

Despite public information campaigns on the subject, too few smokers realize the degree and extent of damage to their bodies associated with cigarette smoking. Early morning

hacking and smoker's cough are so common that millions of Americans consider these "normal," rather than signals that warn of damage to the body. Each day in the United States, 250 people die of heart attacks, 175 of lung cancer, and 150 from other cigarette-related diseases. Minor ailments directly related to smoking compete with the common cold as major causes of time lost from work and school (49:155).

In 1969 the author conducted a pilot study in the Sand Springs Public High School, Sand Springs, Oklahoma, in an effort to determine if smokers were absent more frequently from school due to illness than non-smokers. With a small sample of only 33 subjects, it was found that smokers, subjects that smoked at least three cigarettes a week, were absent more due to illnesses of colds, pneumonia, and influenza than were nonsmokers (48). This finding was in agreement with the statement issued by the Department of Health, Education, and Welfare that the nation's working people who smoked spent over a third as much time away from work due to illnesses such as chronic bronchitis, emphysema, sinusitis, peptic ulcer, lung cancer, and heart disease than did non-smokers (92). Findings by the Public Health Service Study show that there are very large economic losses which are incident to cigarette smoking.

Estimates of excess deaths associated with cigarette smoking have ranged up to 300,000 deaths per year, and the study of illness show an excess of some 77 million workdays lost per year because of illness as well as an excess of over 300 million days of restricted activity (92:2).

Although schools have made a great effort to curb the initiation of cigarette smoking among the high school students, there appears to be an upward trend in cigarette consumption after high school. Dilley concluded after studying 50 colleges and universities that the rate of beginning the smoking habit was higher in the first year of college than in previous grade levels (22). These figures can be seen in Table II:

TABLE II
YEAR COLLEGE STUDENTS BEGAN SMOKING HABIT

	Per Cent
Before senior high school	18.35
During the first two years of senior high school	16.56
During the third year of senior high school	14.02
During the fourth year of senior high school	16.74
During the first year of college	23.55
During the second year of college	7.21
During the third year of college	2.98
During the fourth year of college	.57

Other studies have supported evidence that there is an increase in cigarette consumption during the first year of college (7) (61).

The issue of smoking and health is not new to the college health field. In 1962 the 40th Annual Meeting of the American College Health Association outlined the position of the Association on the controversy of cigarette smoking research:

WHEREAS, a preponderance of scientific evidence (with scant counter evidence) indicates an association relationship and suggest a causal relationship between cigarette smoking and disease, and

WHEREAS, the cigarette smoking habit often is acquired now by young people either not long before they commence college, or while they are attending college, and

WHEREAS, colleges and universities are in a particularly advantageous position to undertake an effective educational effort to stop and to prevent cigarette smoking by college students, therefore be it

RESOLVED, that the American College Health Association, recognizing the above mentioned relationships between cigarette smoking and some diseases, urges its entire membership—both institutional and individual—to attempt, in whatever ways considered most suitable, to discourage cigarette smoking by college students and future alumni (68:24).

"Today many authorities consider smoking to be the most important public health problem facing our country" (7). In view of this statement, it is not surprising to find a variety of studies being conducted on the campus population. Pervin justified the study of this population by stating, "If information about the ill-effects of smoking is going to be effective in reducing the number of cigarette smokers, it should be with this uncommitted and intelligent population" (61:388).

Many studies of undergraduate smoking habits and various other variables such as intelligence and attitudes have been conducted, but few studies have been designed to learn the relationship between cigarette consumption and disease (7) (32) (33) (60) (64) (66). Each study indicated that nonsmokers had fewer medical problems than did smokers.

Older subjects as well as students of all ages have participated in numerous studies to allow researchers to learn if there is a relationship between cigarette consumption and upper respiratory illnesses. The combined published findings of the research dealing with this problem has produced mixed reactions from the general public. One such reaction was a partial ban on smoking in the buildings of the American Public Health Association (45). Similar action has been taken in the Department of the Health, Education, and Welfare Offices (45). Specific reasons given for this action were:

In view of the compounded evidence that smoking is severely damaging to health and contributes to premature death; in view of 20 years of APHA resolutions and policy statements calling upon members to urge those with whom and for whom they work to stop smoking, and to refrain from smoking themselves; and in view of recent grounds for belief that nonsmokers are also at risk when exposed to the smoker's contaminated atmosphere, an effort is being made to protect the rights of all people to breathe air unpolluted by smoke. At the same time, APHA is acknowledging its obligation to meet health-related problems by setting an example for all other health organizations.

Under the new policy, the chairmen of all meetings are required to seek agreement prior to meetings on whether smoking should be permitted, banned, or restricted to specific sections of the room: smokers working in close proximity to nonsmokers must receive express permission to smoke from their nonsmoking colleagues; smoking is prohibited in APHA's kitchens; and, although smoking is allowed in private offices, it is prohibited during the course of business with nonsmokers (45:1).

While there appears to be some agreement by outstanding individuals and respected agencies that cigarette consumption can be injurious to the human body specifically and in general, statistics about cigarette consumption indicate that these facts are either not known, not accepted, or disregarded.

Peters and Ferris proposed, "It seems reasonable that a search for early effects of smoking in a young population (college age) might yield results that could be used in efforts to dissuade young people from commencing the habit of smoking" (65:161). In conjunction with such an investigation, the author felt there was a need to continue to probe several areas associated with cigarette consumption among college students. The first consideration was to learn the percentages of smokers and nonsmokers and to determine the characteristics of college students who used cigarettes. This information would aid in the evaluation of the educational health programs in the schools and yield additional knowledge about the cigarette consumption habits of students.

A related area of interest was to learn the percentages of smokers and nonsmokers among the students studying in the medical programs. Ascertaining the medical program students' knowledge of the effects of cigarette consumption upon the human body appeared to warrant study. The information derived on the percentage of smokers and nonsmokers and the knowledge level concerning the effects of cigarette consumption would be beneficial in determining if medical program students were different

from nonmedical program students.

Finally there was a need to determine if there was a relationship between cigarette consumption and upper respiratory illnesses. Similarly, there was a need to ascertain the relationship between the amount of inhalation of cigarette smoke by nonsmokers and upper respiratory illnesses. This information would provide additional data on the potential hazards of cigarette usage.

Because cigarette consumption appeared to be a serious consideration in the matter of health, it was believed that a study of the relationship of cigarette consumption and upper respiratory illnesses among the medical program students and nonmedical program students was a desirable research endeavor. With data from a questionnaire yielding both personal information and smoking knowledge and a daily record of each subject's upper respiratory condition as he or she perceived it, the author felt meaningful data could be collected from Tulsa Junior College.

Statement of the Problem

The purpose of this study as derived from the problem previously stated was to examine the incidence of cigarette consumption among students at Tulsa Junior College and its relationship to upper respiratory illnesses. Other related problems to cigarette consumption were students' beliefs and knowledge of the effects of cigarette consumption, and the relationship of small and large amounts of cigarette exposure to the incidence of upper respiratory illnesses.

Specifically, the examined problems were:

1. The relationship between nonsmokers, light, moderate, and heavy smokers in the number of days ill while attending classes and days

absent due to upper respiratory illnesses.

2. The relationship between nonsmokers, light, moderate, and heavy smokers in the number of days absent from the college due to upper respiratory illnesses.
3. The relationship between the length of time smokers have consumed cigarettes and the incidence of upper respiratory illnesses.
4. The relationship between race and cigarette consumption.
5. The relationship between smoking habits and students' beliefs and knowledge of the effects of cigarette smoking.
6. The relationship between scores made on the smoking knowledge test by students majoring in the medical programs and all other students.
7. The relationship between the students' professional fields of study and the incidence of cigarette consumption.
8. The difference between absenteeism due to upper respiratory illnesses of students majoring in the medical programs and of all other students at the college.
9. The relationship of the amount of exposure to cigarette smoke among nonsmokers and the incidence of respiratory illnesses.
10. The relationship of gender to the incidence of cigarette consumption.

Statement of the Hypotheses

1. There will be no significant differences among nonsmokers, light, moderate, and heavy smokers in the combined number of days ill while attending classes and days absent due to upper respiratory illnesses.
2. There will be no significant differences among nonsmokers, light, moderate, and heavy smokers in the number of days absent from the college ill due to upper respiratory illnesses.

- ✓ 3. There will be no significant relationship between the number of years smokers have consumed cigarettes and the incidence of upper respiratory illnesses.
4. There will be no significant relationship between smoking habits and the race of the students.
- ✓ 5. There will be no significant relationship between smoking habits and students' beliefs and knowledge about cigarette consumption.
6. There will be no significant difference between students majoring in medical programs and students majoring in other fields of study in scores earned on the smoking knowledge test.
7. There will be no significant difference between students majoring in medical programs and students majoring in other fields of study in the incidence of cigarette consumption.
8. There will be no significant difference between absenteeism due to upper respiratory illnesses of the students majoring in the medical programs and of all other students at the college.
9. There will be no significant difference in the incidence of upper respiratory illnesses between nonsmokers who are exposed to a large amount of cigarette smoke daily and nonsmokers who are exposed to a small amount of cigarette smoke daily.
10. There will be no significant difference between men and women in the incidence of cigarette consumption.

Definition of Terms

Cigarette Smoke Exposure - The average number of hours in an average day nonsmokers breathed cigarette smoke in close proximity or in an enclosed area such as at home, work, or college. A large amount of ciga-

rette exposure was defined as three or more hours of daily inhalation of cigarette smoke. A small amount of cigarette exposure was defined as two or less hours of daily inhalation of cigarette smoke.

Discontinued Smoker - Students who at one time smoked cigarettes but were not smoking at the time of this study. Since this number became appreciable, those discontinued smokers who had smoked for no more than a year and quit smoking more than six months ago were placed in the nonsmoker category. Those who had consumed cigarettes a year or longer and had quit smoking in the last six months were placed in the smoker category.

Heavy Smoker - Students who regularly smoked about a pack and a half or more of cigarettes a day and at the time of the survey considered themselves to be a smoker.

Light Smoker - Students who regularly smoked about a half a pack of cigarettes a day and at the time of the survey considered themselves to be a smoker.

Moderate Smoker - Students who regularly smoked about one pack of cigarettes a day and at the time of the survey considered themselves to be a smoker.

Nonsmoker - Students who were not currently smoking cigarettes and who have never smoked cigarettes regularly.

Upper Respiratory Illnesses or Infections - Conditions of asthma, bronchitis, colds, emphysema, hayfever, influenza, pneumonia, sinusitis, and sore throats as reported by the students to their instructors.

Limitations

1. Only one institution was surveyed in determining the relationship

between the incidence of cigarette consumption and upper respiratory illnesses.

2. The number of upper respiratory illnesses for each student was determined for only the fall semester of 1972.
3. There was no medical diagnosis of the students' upper respiratory illnesses.
4. There was no attempt to learn of any illness other than the upper respiratory illnesses as listed in the definitions. (Students were told what constituted an upper respiratory illness.) Many factors other than smoking could have affected the students' health, but these factors were not included because the variable could neither be controlled nor measured in this study.
5. The study included only 25 per cent of all the students enrolled in the medical occupation classes and in the health classes, the physical education activity classes, and recreation class.

Assumptions

1. Students enrolled in the health classes, the physical education activity classes, and recreation class were quite diverse in age, background, and represented many different major fields of study; it was assumed the students in these classes were representative of the population at Tulsa Junior College.
2. It was assumed the questionnaires were completed with honest answers.
3. It was assumed a record was accurately kept of the upper respiratory illnesses the students reported.
4. It was assumed students reported an upper respiratory illness when it occurred.

CHAPTER II

REVIEW OF LITERATURE

Although there have been numerous studies conducted in regard to the various effects of cigarette consumption upon college students, a review of the literature revealed that only ten known investigations (29) (30) (55) (56) (60) (61) (64) (66) (70) (71) have been conducted in attempting to determine the relationship between cigarette consumption and disease among college students. Only four authors (29) (60) (64) (30) have examined the relationship of cigarette consumption and upper respiratory illnesses.

There was a need to survey the junior college medical and nonmedical program students to learn not only the relationship between cigarette consumption and upper respiratory illnesses, but also their attitudes and smoking knowledge. Moreover, there was a need to establish the relationship between inhalation of cigarette smoke and incidence of upper respiratory illnesses among nonsmokers since this aspect of cigarette usage has not been investigated. In making this study of the relationship between cigarette consumption and upper respiratory disease among college students, it was necessary to review the literature in the following areas: the physiological effects of breathing cigarette smoke; the physiological effects of cigarette consumption upon high school students and college students; and the trends of the different college populations in regard to their attitudes, beliefs, and practices of cigarette

consumption.

The Physiological Effects of Inhaling Cigarette Smoke

For some time there has been concern about the environmental conditions produced by indoor cigarette smoking (3) (9) (42) (43) (58).

Recently, the Surgeon General requested a ban on public smoking in closed areas (1).

As early as 1956 Hoffstaedt (43) called for research into tobacco smoke pollution of closed public spaces. He based this need upon the fact that when nonsmokers and smokers breathe tobacco smoke in closed spaces, both suffer from loss of oxygen; and irritation occurs in the mucous membrane and air passages. Hoffstaedt felt that air sampling and analysis of oxygen, carbon dioxide, and carbon monoxide in smoky public rooms and public vehicles would reveal the lack of satisfactory public health standards.

Anderson (5) discussed the relationship of smoking and respiratory disease in his article, "Smoking and Respiratory Disease." He summarized his points by stating that smoking continued to be the most important factor, though not the only one, in the production of bronchitis. Air pollution and tobacco smoking have been cited as the main factors in the disease of bronchitis, according to Anderson.

Abelson (3) noted that cigarette smoke was a very damaging source of air pollution, comparable to air pollutions of automobile exhaust, the smokestacks, or trash burner. Carbon monoxide, nitrogen dioxide and hydrogen cyanide were found to be three of the most damaging of the ingredients found in cigarette smoke. He showed that carbon monoxide

concentrations of 120 parts per million for one hour of exposure led to inactivation of five per cent of the body's hemoglobin. This caused dizziness, headache, and lassitude. Abelson noted that the incidence of lung cancer was higher in the city than in the rural areas. Finally, Abelson underscored the fact that while smokers receive the principal effects of smoking (chronic disease and shortened life) nonsmokers should not breathe the polluted air in poorly ventilated spaces.

Buell and Dunn (15) discussed the problem of explaining the relationship of air pollution to the disease of lung cancer. Their article noted that while lung cancer has been associated in a causal manner with cigarette consumption, the authors' intent was to resolve how the etiologic agents such as cigarette smoke, nickel dust, chromates, asbestos particles, and sulfur dioxide interact. That is, have the etiologic factors interacted with cigarette smoke in a competitive, additive, or a multiplicative manner? According to the authors, the literature on occupational factors has not given any clear answer.

Speer (77) conducted a study to learn what kinds of reactions nonsmokers developed when they breathed the smoke of cigarettes. In this study, two groups were formed, one of private patients with allergic diseases such as nasal allergy, asthma, and allergic headache; another composed of members of the professional staff of the University of Kansas and their families, known to be nonallergic. The study revealed that intolerance to tobacco smoke was common to both groups. The most common complaints were nasal symptoms, conjunctival irritation, headache, and coughing. Since similar reactions occurred in allergic and nonallergic individuals, the effect of tobacco smoke was said to appear to be of an irritative character, rather than an allergic reaction.

Cooper, Crane, and Boucout (19) collected data on all cases of histologically proven lung cancer from 12 Philadelphia hospitals between 1957 and 1963. The results of this investigation revealed that lung cancer was uncommon among those who had never smoked. Only 4.6 per cent or 63 cancer victims were nonsmokers. There were more cases of lung cancer among women nonsmokers (41 per cent) than men nonsmokers (one per cent). The data on nonsmokers suggested to the authors that other factors, such as an unsuspected inhaled carcinogen, might have been the cause of lung cancer, especially in women.

The first known study of effects of cigarette smoke upon the health of smokers' and nonsmokers' children was conducted by Cameron and Kostin (16) in 1969. Their major finding was that smokers' children were ill more frequently than nonsmokers' children. Moreover, there was some evidence that among children exposed to smoke, the children who were ill were exposed to cigarette smoke more often. It was not known if the severity of the illness was related to the amount of smoke in the environment. In this study there were two age groups of children, one group of 695 children 16 years of age or less and another group of 350 children age nine or less. The types of respiratory illnesses checked were colds, two types of influenza, pneumonia, bronchitis, and other acute respiratory conditions.

Luquette and Landiss (53) studied the immediate effects of a smoking environment on 51 elementary school children and made the following observation: Without proper ventilation, the nonsmoking elementary school children experienced significant increases in heart rate and in systolic and diastolic blood pressure. Luquette and Landiss also found that the smoking environment's effect upon the children in the environment were

similar to the cigarette smoke's effect upon the smoker but on a reduced scale. Finally, children of both sexes reacted in somewhat the same manner after being exposed to a 30 minute smoking environment, regardless of whether or not they came from homes where smoke was a part of their environment.

Another warning of the cigarette dangers was aimed primarily at nonsmokers who breathe cigarette smoke (58). According to this article, one of the most insidious offenders to nonsmokers is carbon monoxide, for it has been traced to damaged heart and lungs by way of the bloodstream. The accepted maximum of carbon monoxide in most industrial situations has been established at 50 parts of carbon monoxide to 1,000,000 parts of air. A roomful of cigarette smokers has been found to be able to raise this ratio of carbon monoxide to between 20 and 80 parts per million. Although the cigarette industry has produced and continues to develop a safer cigarette in terms of tars and nicotine, carbon monoxide will be more difficult to control.

Banzhaf (9) presented findings of the effect of cigarette smoke upon the human being and challenged nonsmokers to be more forceful in not becoming victims of the dangerous, noxious tobacco smoke. He reiterated the dangerous effects of carbon monoxide, tar, and nicotine upon those breathing the polluted air. The author explained that the dangers were real, noting that healthy nonsmokers can suffer from eye irritation, nasal symptoms, headache, cough, and sore throat if exposed to cigarette smoke.

Hoegg (42), in a descriptive article of how cigarette smoke can be evaluated in closed spaces, found filter cigarettes to be higher in carbon monoxide than nonfilter cigarettes, especially in the sidestream smoke as

compared to the mainstream smoke. Passive smoking, or breathing cigarette smoke, was measured by a term "cigarette equivalent." He found that an estimated .01-1.20 "cigarette equivalent" was inhaled in the average closed space.

The Physiological Effects of Cigarette Consumption Upon High School Students

Rogers and Reese (72) reported that in their investigation of 381 men and 473 women high school students, regular cigarette smokers of both sexes had lower grade averages, high absence frequency, and a higher number of visits to the school nurse than nonsmokers.

In 1966, a study was conducted by Hayes, Krstulovic, and Loomis (41) with 919 male students at a boys preparatory school near Princeton, New Jersey. The purpose of their investigation was to find relationships of cigarette consumption to the incidence and type of respiratory infection. Their findings were as follows: 48 per cent of the students aged 14 to 19 were smokers with a higher proportion of smokers in the upper grades; all types of respiratory illnesses (upper, lower, severe, or total) were more frequent among regular smokers than nonsmokers; and the incidence of severe lower respiratory tract infections among regular smokers was 6.5 times that of nonsmokers and ex-occasional smokers.

Addington, Carpenter, and McCoy (4) reported in their study of 556 high school students in Oklahoma City that respiratory symptoms were significantly more frequent in smokers than in nonsmokers. There were no significant differences noted in the forced expiratory volume and the mean vital capacity between the two groups.

In 1969 this author (48) conducted a pilot study in the Charles Page

High School in Sand Springs, Oklahoma, in an effort to determine if smokers were absent from school more frequently due to illness than non-smokers. With a small sample of 33 subjects, it was found that smokers, subjects who smoked at least one to three cigarettes a week, were absent more due to illnesses of colds, pneumonia, and influenza than were non-smokers.

In examining 365 high school students in the New Haven area, Seely, Zuskin, and Bouhuys (74) found significant differences between the smoker and nonsmoker groups in physiological measurements. Students with one to five years of cigarette consumptions had excessive cough, sputum production, and shortness of breath. The young smokers had lower flow rates at mid-vital capacity and at lower lung volumes than nonsmoking students.

The Physiological Effects of Cigarette Consumption Upon College Students

The first known investigation of smoking and its effects upon college students was conducted by Mendelssohn (55) in Russia in 1897. He found in studying 1,071 medical and technology students that smokers had a greater "affection" of the respiratory and alimentary tract than non-smokers. The "affection" was greater for smokers of long duration smokers of short duration, and inhalers had a greater "affection" than noninhalers. From his research he concluded that the youth should be instructed in the "harmfulness of smoking."

The chief aim of Dr. Meyland's (56) study was to determine if smoking exerted any influence upon the physical and mental characteristics of the 223 college males included in his study. His research findings revealed that the use of tobacco by college students was closely associated with

idleness, lack of ambition, lack of application, and low scholarship. He noted further that there was no scientific evidence that the moderate use of tobacco by healthy, mature men produced any beneficial or injurious physical effects that could be measured. In his opinion, excessive use of tobacco would produce injurious effects.

Pervin and Dalrymple conducted a thorough study of 278 Princeton male students. Their results were reported in two papers (61) (62). The first paper (61) dealt with smoking habits of the undergraduates and the relationship of these habits to familial smoking patterns and personal health. The student responses revealed that 53.2 per cent of the freshmen and 43.9 per cent of the upper classmen were nonsmokers; 21.1 per cent of the freshmen and 29.5 per cent of the upper classmen were smokers. There were 9.5 per cent former cigarette smokers in the freshman class and 6.5 per cent former smokers among the upper classmen. The results of this study indicated that approximately 15-20 per cent of the students started smoking cigarettes during the college years. The students from the freshman year to the upper class years increased the amount of cigarette consumption, more inhaled, and more used nonfiltered cigarettes rather than the filtered. Students were more likely to smoke if a sibling smoked than if either parent smoked cigarettes. When students were asked to check a list of 14 physical health complaints, a significant difference at the .05 level of confidence was found between smokers and nonsmokers in the complaints of loss of appetite, nasal stuffiness, and post-nasal drip. There was a significant difference at the .01 level of confidence between smokers and nonsmokers when questioned about shortness of breath and chest pains. Smokers in general reported a significantly greater number of physical complaints than nonsmokers.

Robbins (71) conducted a pilot study in California in 1966 to determine if a greater percentage of atypical epithelial cells appeared in the bronchi of college students who smoked cigarettes than in those who did not smoke. In a group of 58 smokers and 45 nonsmokers, with subjects of both sexes, the smokers who had consumed at least 10 cigarettes daily exhibited more atypical bronchial epithelial cells than nonsmokers. From this preliminary study, Robbins completed a similar study (69) on a much larger scale (see page 27).

The incidences and durations of pure infections of the upper respiratory tract, tracheitis-bronchitis-pneumonia, and coryza syndrome were studied in 98 student nurses by Parnell, Anderson, and Kissin (60). The respiratory diseases were less in nonsmokers; coryza syndrome and tracheitis-bronchitis-pneumonia occurred more often in smokers than in nonsmokers. The data also indicated that smoking was directly or indirectly an important determinate of time lost from duty by student nurses. In the total group of 47 smokers, smoking was responsible for 122 extra illnesses totaling 108 days duration during the year of study.

Peters and Ferris (66) investigated the smoking habits, pulmonary function and respiratory symptoms of 124 seniors at Harvard College. The authors used a questionnaire to determine the smoking habits of students and the Stead-Wells Spirometer to determine the students' vital capacity and speed of forced expiratory volume. Of the subjects examined, 29 were smokers and 41 were nonsmokers. The remainder of the subjects were ex-smokers, and pipe and/or cigar smokers, 10 and 15, respectively. The students who smoked cigarettes had a significantly greater frequency of cough, phlegm, breathlessness, and chest involvement with colds than nonsmokers. There was an inverse correlation between frequency of

respiratory symptoms and pulmonary function.

Peters and Ferris completed another study (64) on smoking and respiratory disease in 1967 with 1,623 Harvard graduates and 404 Radcliffe graduates. A questionnaire was used to determine smoking habits of students, and tabulations of the number of visits made to the University Health Clinic by both smokers and nonsmokers were kept for a year. The frequency and severity of the total diseases were greater for the smokers than for the nonsmokers, especially in the respiratory diseases. There was a highly significant positive correlation between number of years of cigarette smoking and number of lifetime packs smoked and frequency of respiratory disease.

Robbins and Lichlyter (70) elaborated upon the preliminary findings of the five year longitudinal study being conducted at the University of California at Santa Barbara. Using 98 nonsmokers as a control group and 98 smokers as the experimental group, Robbins and Lichlyter discovered that the smoker group was found to have more atypical bronchiolar epithelial cells than nonsmokers. Of these epithelial changes, the men outnumbered the women nearly two to one.

Fodor, Glass, and Wisner (32) studied the immediate effects of smoking on 400 healthy young college men. The smokers and nonsmokers groups each had 200 subjects. The two groups were compared for possible differences in knowledge about smoking and health, religious activities, academic experiences, and social relationships. Data indicated that smokers were better informed about the effects of smoking on health, but the remainder of the results on the written inventory were inconclusive. Physiologically, smokers had higher levels of triglycerides and fatty acid ratio of 18 to 1 than nonsmokers. The immediate effects of smoking

were changes in the heart rate, and the T-wave of the electrocardiograms, and in the systolic and diastolic blood pressure while smoking and during exercise.

Finklea and Sandifer (29) reported their findings of effects of cigarette smoking upon 1,900 cadets at the Citadel who suffered from epidemic influenza. Prior to the epidemic, all cadets were free of asthma or chronic respiratory disease and were in excellent condition. There were 963 cadets who never smoked cigarettes; 218 ex-cigarette smokers, pipe, and/or cigar smokers; and 630 cigarette smokers. Of the cigarette smoker group, 468 cadets smoked about a pack a day, and 162 cadets smoked more than a pack a day. The incidence of illness and length of illness in bed was greater for smokers than for nonsmokers.

Finklea, Hasselblad, and Sandifer (30) assumed another investigation of respiratory disease at the Citadel after their earlier investigation in 1969. Within the two year period, the authors found that 978 cadets never smoked cigarettes; 232 were ex-cigarette, pipe, and/or cigar smokers; and 638 were cigarette smokers. There was a rise in cigarette smokers only by a small margin, eight in number. Of the 638 cigarette smokers, 473 cadets smoked about a pack a day, and 165 cadets smoked more than a pack a day. These figures were representative of the earlier study. From the results of this study, it was found that smokers, particularly heavy cigarette smokers, exhibited significantly more upper and lower respiratory disease of both the outpatient and hospital types than nonsmokers.

Trends of College Students in Attitudes, Beliefs,
and Practices of Cigarette Consumption

Dr. Pack (59) in 1912 sent a questionnaire to a number of coaches and athletic directors in colleges and universities to determine the differences in male smokers and nonsmokers on the following criteria: age, weight, "ordinary" anthropometric measurements, ability on the team, scholastic standing, and the number of smokers and nonsmokers who were on the first team. Only 13 institutions responded to the questionnaire, but of these schools, there was a total of 109 or 44 per cent smokers and 139 or 56 per cent nonsmokers. Conclusions drawn from this early study were that only half as many smokers as nonsmokers were successful in "try outs" for football squads, that able-bodied men who consumed cigarettes had a loss in lung capacity of 10 per cent, and that smoking was inversely associated with low scholarship.

Holt (44) published the results of his 1922-23 study of smoking and nonsmoking male students at the University of Tennessee comparing the physiological measurements of height, weight, blood pressure, lung capacity, and their respective scholastic honors. There was a total of 232 smokers and 378 nonsmokers in Holt's study. Of the freshman, sophomore, and upper classes there were more nonsmokers than smokers. There appeared to be no significant differences between smokers and nonsmokers in the above-mentioned measurements, but nonsmokers had more scholastic honors than smokers.

In April, 1923, the American Physical Education Review (2) featured a numerical review of the smoking habits of 15,080 freshman men in 24 colleges and universities. Of these subjects, 5,501 were smokers and 9,579 were nonsmokers. Of the smoker group, the majority of them used

cigarettes (3,081). Pipe smoking was popular with 859. The age that most students commenced the smoking habit was age 18 (1,093 began at this time). At ages of 17 and 19 the number of students beginning the habit was 946 and 437, respectively.

Arnett (7) requested that each man and woman at Drexel Institute of Technology complete a personal history questionnaire in order to determine the smoking habits of all the students enrolled there. Of the 1,719 students cooperating in the study, 30 per cent of the men and 24 per cent of the women believed that lung cancer was associated with smoking cigarettes.

Bonnell-Lewis (10) distributed 190 questionnaires to a sample of women students attending an unidentified college to learn some of their attitudes and smoking habits. Of the 146 returned questionnaires about one-half of the sample smoked cigarettes with 20 per cent classified as moderately heavy smokers. The majority of the students started smoking at ages between 16 and 18, with 30 per cent starting at age 18. Most smokers, 19 per cent, liked to smoke most when under mental stress. Most of the students, 90 per cent, both smokers and nonsmokers, were aware of the Surgeon General's Report; 68 per cent accepted it, and two per cent rejected it. The effect of this Report upon smokers was shown in the following figures: 66 per cent showed no effect, 22 per cent reduced their consumption rate, and three per cent discontinued cigarette smoking. The role both groups, smokers and nonsmokers, perceived a teacher to assume in connection with cigarette consumption was to disseminate the facts, 62 per cent; to influence by example, 38 per cent; and to take no action at all, eight per cent.

Mausner (54) in 1964 began a survey of attitudes, information, and

smoking habits of medical and law students. She found that of 1,052 men and women medical students, 348 or 33 per cent were current smokers while 420 or 40 per cent were nonsmokers. The remainder were former tobacco users. Of the smoker group, there were about 33 per cent male smokers and 31 per cent female smokers. Of the 343 law students, 128 or 37 per cent were smokers while 102 or 30 per cent were nonsmokers. There were 237 ex-smokers in the medical group and 99 ex-smokers in the law group. Expressed attitudes about cigarette smoking were that 75 per cent of the medical students and 69 per cent of the law students rated the evidence linking smoking and disease as strongly convincing or incontrovertible; three per cent of the medical students and two per cent of the law students found the evidence linking smoking and disease as completely unconvincing. The medical students showed an increased level of knowledge over freshman knowledge levels about diseases associated with smoking, but the law students failed to show this same increase in knowledge. Medical students consumed more cigarettes than law students in the categories of less than one-half pack and one-half to one pack, but more law students smoked one pack of cigarettes or more than medical students.

Caracker (17) discussed studies of various populations to discover the relationship between smoking and the psychological profile of smokers. He suggested that smoking not only made one more susceptible to disease, but it may also hamper the efficiency of memory and intelligence. If this were the case, students who consumed cigarettes may find studying more difficult.

Pervin and Dalrymple (62) in their second paper of a series of two, reported that smokers and nonsmokers did not differ in terms of knowledge

about the smoking-cancer relationships or in estimates of the general extents of the dangers of smoking. Although 68 per cent of the smokers have tried unsuccessfully to quit the habit of smoking cigarettes, smokers indicated on a smoking knowledge test that they were well acquainted with the dangers of cigarette smoking. They believed their tobacco consumption rate was well below a dangerous level. Smokers also felt a cure for cancer would be discovered before they were in danger for having smoked too much.

Schubert (73) attempted to show personality differences between smokers and nonsmokers of freshmen and sophomores from large universities. One university had 314 subjects in the study; of these 231 men and 83 women subjects, 158 men and 47 women smoked cigarettes. In the total 956 subjects from all the universities used in this study, there were 246 smokers of 400 men subjects and 274 smokers of the 556 women subjects. For this study, students were given the Minnesota Multiphasic Personality Inventory Test and were questioned about their cigarette usage. Smokers scored significantly lower on the Social-Introversion and Lie Scales of the MMPI and significantly higher on the Psychopathic-Deviate Scale. The author concluded from smokers' scores that students who used cigarettes experienced physiological, social, and psychological arousal needs.

A two-part questionnaire was circulated by Forrest (34) within Trinity College, Dublin, a British women's college, to obtain information on students' cigarette smoking history. From a population of 800, replies were received from 214 students of whom 140 were nonsmokers and 73 were smokers. Data elicited from this survey indicated that 36 per cent of the women were light smokers, one to five cigarettes smoked

daily; 59 per cent were moderate smokers, about a pack or less smoked daily; and five per cent were heavy smokers, a pack or more cigarettes smoked daily. The heavy smokers first experimented cigarette smoking at age 17, while moderate and light smokers experimented at ages 18 and 19, respectively.

Dunn (24) reported the results of a study from 3,567 student questionnaires involving questions about student smoking habits and attitudes about cigarette consumption. She found that smokers constituted 40 per cent of the subjects, and of those, 43 per cent wished to discontinue the habit. Of the total number of smokers who smoked at least one year prior to attending college, 56 per cent had increased their daily number of cigarettes; of these subjects 50 per cent were men and 69 per cent were women. Smokers who consumed one or more packs a day were characterized by the following: one-half of the subjects had been smoking the same amount of cigarettes for over a year, more than 95 per cent inhaled smoke into the lungs, 75 per cent smoked three-fourths of the tobacco portion, 25 per cent smoked more than three-fourths of the tobacco portion, 75 per cent used filter-tipped cigarettes, and more than one-fourth had tried to quit the habit of smoking cigarettes.

Arnett and Black (7) elaborated upon Arnett's previous study (8) at Drexel Institute of Technology by distributing questionnaires on smoking to both the freshman and senior classes between 1960 and 1966. Of the 6,276 freshmen responding to the questionnaire, 26 per cent were smokers; 27 per cent were men and 23 per cent were women. In comparing the classes in percentages in the amounts of cigarettes consumed, 48 per cent of the freshmen and 54 per cent of the seniors smoked between a half and a whole pack of cigarettes. Freshmen tended to smoke less than a half

pack (48 per cent) daily while 19 per cent of the seniors smoked one to two packs daily. Of the five freshman classes polled, more nonsmokers than smokers agreed that lung cancer and heart disease were related to smoking. However, 65 per cent of the subjects agreed that lung cancer and cigarette smoking were related, while 20 per cent disagreed, and 15 per cent had no opinion.

Dvorak (26) examined students from the University of Minnesota to determine whether smokers and nonsmokers differed significantly on certain education and personality characteristics. He found that an inverse relationship existed for freshmen cigarette smokers and high school rank, earned grade point average, and the number of quarters completed in the school year with the educational variables tested. Freshmen nonsmokers tended to have a higher school rank, achieved better grades in college, and were more likely to complete the freshmen year in college than smokers. The Minnesota Multiphasic Personality Inventory test scores differences for smokers and nonsmokers were not clearly defined.

Peter and Ferris (65) initiated a study to determine the lifetime smoking patterns of each student at Radcliffe and Harvard College. Smoking habits were ascertained as freshmen during the initial physical examination; then a questionnaire on smoking habits was sent to each student as seniors. Questionnaires concerning students' smoking habits were again sent to the graduates who were later in the graduate schools. Comparisons of Harvard graduates with Radcliffe graduates revealed little differences in the cigarette smoking patterns, but the Harvard students smoked a high proportion of cigars. In comparing Harvard medical students' cigarette consumption rates with business, law, and arts and sciences school students, medical students had the greatest percentage

(65 per cent) of nonsmokers. The medical students also had the lowest rate (six per cent) of all other groups of students to smoke more than a pack of cigarettes a day.

Peters and Ferris (63) correlated certain descriptive sociological and environmental variables with cigarette smoking in 2,148 graduates of Harvard. Data for the study were secured from questionnaires given the students as freshmen and as seniors. Ten statements summarized the descriptive variables. Nonsmokers achieved better than smokers. Students in natural science smoked less, and students in humanities smoked more than average. Jews smoked less, and Catholics more than average. Students from Massachusetts and outside the country tended to smoke more than average as freshmen. Preparatory school graduates smoked more than high school graduates. Students who attended psychiatric clinics were more likely to be moderate to heavy smokers. Smokers were reluctant to return the questionnaire or did not return it at all. Those who graduated late tended to be smokers.

Haro and Dilley (38) conducted a survey of the attitudes, beliefs, and smoking behavior of 21,917 males and 21,255 females from 50 colleges and universities. The statistics of the smokers, nonsmokers, and ex-cigarette smokers for men and women are as follows: men, 40 per cent smokers, 50 per cent nonsmokers, and 10 per cent ex-cigarette smokers; women, 40 per cent smokers, 52 per cent nonsmokers, and eight per cent ex-cigarette smokers. Of the women smokers, 39 per cent began smoking after they started their first year in college while 30 per cent of the men began smoking after they started their first year in college. Approximately 56 per cent of both the men and the women smokers consumed from 5 to 24 cigarettes daily, and of these smokers there was at least

a "fair" amount of concern about their smoking in conjunction with their health.

Foley, McGinn, Amoe, Coon, and Culver (33) surveyed the cigarette habits of the 771 students in the University of Michigan Medical School. These habits were then correlated with their personal opinions about the relationship of cigarette consumption to carcinoma of the lung, pulmonary emphysema, and coronary-artery disease. There were 62 per cent of the students who were nonsmokers, and 23 per cent were cigarette smokers. Almost 90 per cent of both groups, smokers and nonsmokers, believed that cigarette smoking could cause carcinoma of the lungs. A significantly higher per cent of smokers, 89 per cent, than nonsmokers, 81 per cent, believed emphysema was causally related to cigarette smoke. The smokers, 56 per cent, were less certain than the nonsmokers, 60 per cent, that cigarette smoking was a contributing factor in coronary-artery disease.

Smoking in medical students in Australia was examined by Brackenridge and Block (13) to determine the pattern of relationships between smoking and examination performance, specific personality factors, and a number of plasma constituents. Of the 78 students, 67 men and 11 women, there were 27 habitual smokers. The mean number of cigarettes consumed daily was 17.6 with a range of 1-60 on a daily basis. Blood samples were collected at least 90 minutes after cigarettes were consumed by the smokers. From this procedure, it was found that nonsmoking students had significantly superior scores in the overall examination as compared to students who smoked cigarettes. Smokers had an elevation in their anxiety level during the oral examination, but the nonsmokers' levels remained constant. Mean levels of plasma cholesterol and magnesium were higher and uric acid levels were lower in smokers than in

nonsmokers.

Hope (46) found in her investigation of the smoking habits of college students that male students were more inclined to smoke cigarettes than women in all classes except in the sophomore year. The highest percentage of male smokers appeared in the freshman class with 39 per cent consuming cigarettes. The highest per cent of women smoking cigarettes was 44 per cent and this occurred in the sophomore year. There was a total of 165 smokers and 337 nonsmokers in this study; of these, 73 of the men and 92 of the women were smokers. There were 127 male nonsmokers and 210 women nonsmokers. The chief reasons given for using cigarettes were "calming of the nerves" and "being unable to kick the habit."

Lipp, Tinklenberg, Benson, and Melges (52) completed an investigation of drug use and cigarettes among 1,063 medical students from four medical schools in 1972. Only 17 per cent of all the students indicated they used cigarettes, and at no school was the mean use as much as one pack a day. Smokers at two schools averaged less than one-half a pack of cigarettes a day. The use of marijuana varied.

Dunn (25) found in a longitudinal study of cigarette consumption rates of students both as freshmen (24) and as seniors (25) significant changes in the smoking behavior pattern. The profile of a senior who consumed cigarettes included several attitudes. Over 50 per cent of the seniors smoked a pack or more of cigarettes daily for at least a year. As freshmen, only 28 per cent had smoked this amount. Over one-third of the seniors who smoked cigarettes had begun the habit since their freshman year. The percentage of women and men smokers remained about the same from the freshman year to the senior year. She found 32 per cent

of the freshman women to be smokers and 33 per cent as seniors. Men smokers changed very little from the freshman year to the senior year with 68 per cent smokers in the freshman year and 67 per cent as smokers as seniors. Of those students discontinuing the smoking habit, twice as many men as women discontinued the habit, with men having a total of 17 per cent fewer smokers as seniors as there were in the freshman year.

Summary

Breathing the smoke produced by cigarettes appeared to cause various physiological effects in both those who used cigarettes and those who merely breathed the smoke of cigarettes, regardless of age (3) (9) (16) (58) (77). Evidence of a positive association of cigarette consumption and respiratory infections was found in students as young as 14 years of age and in college students (4) (29) (30) (41) (60) (64) (74). While a causal relationship has not been established between cigarette smoking and illness, college men and women who smoked cigarettes reported a significantly greater number of health complaints than those who did not smoke.

Some of the physiological effects associated with cigarette smoking upon college students ranged from simple nasal stuffiness, loss of appetite, post-nasal drip (61) to more serious effects of changes within the body (32) (66) (70) to disease (29) (30) (60) (64). More specifically, students who smoked cigarettes had significantly greater frequency of cough, phlegm, breathlessness, and chest colds than nonsmokers (66). Fodor, Glass, and Wisner (32) found smokers had a higher level of triglycerides and fatty acids than nonsmokers. In addition, they found measurable cardiac changes while students smoked and exercised.

Robbins and Lichlyter (70) found in a five year longitudinal study that smokers exhibited more atypical bronchiolar epithelial cells than nonsmokers, men exhibiting this condition twice as often as women. Parnell, Anderson, and Kinnis (60) reported that the incidence rate for respiratory diseases was less in nonsmokers than smokers, and that smoking was directly or indirectly responsible for absence in nurses' duty. Peters and Ferris (64) reported that the frequency and severity of the total diseases were higher in students that consumed cigarettes than in nonsmokers. A high positive correlation existed between years of cigarette consumption and lifetime packs of cigarettes and respiratory disease. Finklea and Sandifer (29) reported findings of the effects of cigarette smoking upon corps of cadets who suffered from influenza. The incidence of illness and the length of illness was greater for smokers than nonsmokers. The same authors (30) investigated the respiratory diseases of smokers and nonsmokers after their previous (29) study. Smokers exhibited significantly more upper and lower respiratory diseases than nonsmokers.

The review of literature revealed that in all studies there have been more nonsmokers than smokers. Traditionally, more men than women have smoked cigarettes, but this trend has changed. Now about as many women as men smoke cigarettes. Early cigarette consumption rates for college women are not known to this author, but in the early 1900's (2) (59), 38 to 44 per cent of the men in college smoked cigarettes. Reported cigarette consumption in men and women today ranges from 39 per cent (22) to 48 per cent (38). In discontinuing the cigarette habit, men have a higher rate than women; Dunn (25) reported that approximately one in five men ceased the habit while only one in 10 women discontinued

smoking.

The mean age for beginning the cigarette habit was 18 years of age or during the first year of college in most all reported studies. The chief reasons given for smoking cigarettes were "to calm the nerves" and "unable to kick the habit," respectively. Over 50 per cent of all the smokers and nonsmokers accepted the 1964 Report of the Surgeon General stating that cigarette smoking can be dangerous to health; however, fewer smokers believed it than nonsmokers. Smokers were as knowledgeable of the effects of smoking cigarettes as nonsmokers, but most smokers believed their consumption rate was well below the dangerous level.

Fewer medical students are smoking cigarettes today than they were in 1966; Lipp (52) reported 17 per cent of the medical students smoking cigarettes while Mausner (54) found 33 per cent using cigarettes. Correspondingly, the medical students are consuming fewer cigarettes daily; Lipp (52) reported the mean rate of cigarette consumption to be less than one-half a pack while Mausner found a mean rate of above one-half pack.

Finally, the review of literature revealed that nonsmokers exhibited more success in academic programs in college than smokers in terms of grade point average, honors, and length of time in school.

CHAPTER III

METHODOLOGY

This chapter presents the general design of the study and the methods employed to complete the design. Included within this chapter is information on the selection of subjects, data collection procedure, questionnaire development, validity and reliability of the instrument, and the statistical treatment of the hypotheses.

Selection of Subjects

The investigator was interested in surveying college students in order to assess their attitudes, knowledge of the effects of cigarette consumption upon the human body, and personal behavior concerning cigarette consumption. The subjects for this survey included all medical program students and all other students in the health classes, the physical education activity classes, and a recreation class, regardless of their major field of study.

The medical programs represented were the associate degree in nursing, inhalation therapy assistant, medical laboratory technician, medical record secretary, occupational therapy assistant, and physical therapy assistant. The fields represented in the health, physical education, and recreation classes were business, education, engineering related occupations, and a category of "others" for those students whose major was unlisted. The 14 medical classes were taught by 10 full time

instructors, and the 14 classes in health, physical education, and recreation were taught by two full time instructors.

The health, physical education, and recreation classes, through a preliminary survey, were determined to be as representative of all student majors as any other group. Because there were concentrated groups of medical program students and a cross section of students from all other major fields of study in the health, physical education, and recreation classes, students from these combined areas were chosen as subjects for this investigation. In addition, these two groups were chosen for comparison purposes since they represented different programs of study. Finally, these subjects were selected because they were accessible, and there was cooperation among the staff members for this investigation.

Initially, there were 490 subjects from the combined medical classes and the health classes, the physical education activities classes, and the recreation class, but there was complete data for only 323 subjects. Complete data included a daily health record and a completed questionnaire. Of the 323 subjects, 115 were men and 208 were women. Of the 152 subjects from the medical classes, 40 were men and 112 were women. Of the 171 subjects from the field of health, physical education, and recreation, 75 were men and 96 were women.

Procedure for Collection of Data

Data for this study included the students' daily health records and their personal histories obtained from a questionnaire concerning their attitudes and practices toward cigarette consumption. At the beginning of the fall semester of 1972, the investigator gave each

instructor involved in this study a form to record only the upper respiratory illnesses and absences of each of their students for the 12 week period. Accompanying the form was an instruction sheet to help the instructors record the illnesses and absences with uniformity. Both forms are listed in Appendices A and B.

Health Record

To complete the health record, the subjects reported their physical condition each day as they perceived it or as it was diagnosed by their family physician. Each day the class met, the instructor recorded the students' conditions, using code letters. An "R" was recorded if the subjects reported an upper respiratory illness. (See Definitions.) (Only the listed upper respiratory illnesses were recorded; others such as infectious mononucleosis illnesses were disregarded.) If subjects were absent, the instructor recorded an "A" by the appropriate date. When the subjects returned to class, the "A" was accompanied by an "R" if they had suffered from one of the listed upper respiratory conditions during their absence. If the subjects were absent due to other illnesses, the "A" was the only symbol used. If a student had been absent with a listed upper respiratory illness, his record would include both an "A" and an "R" for every day absent. If upon return the subject's condition persisted even though he could attend class, an "R" was recorded until the condition ceased. Collection of this data began September 4, 1972, and concluded November 22, 1972. Students were informed that the instructors were merely keeping a record of upper respiratory illnesses students might contract during a semester. The matter of cigarette consumption was not discussed until after the questionnaire was completed.

To be assured the instructors were correctly recording all the necessary data, the investigator conferred with each instructor once during the first week and once during the second week of the 12 week period. After the first two weeks, the investigator conferred with the instructors every two or three weeks. The records were collected by the investigator at the end of the time period.

Questionnaire

A questionnaire (see Appendix C) was administered by each instructor who taught medical program classes or health, physical education classes. The questionnaire was administered one time only to each of the classes during the week of December 4, 1972. The first part of the questionnaire included personal history questions on the subjects' age, race, sex, major field of study, attitudes about cigarette consumption and practices, and a medical account of types of upper respiratory illnesses contracted since the beginning of the fall semester of 1972. The second part of the questionnaire contained a test of 20 questions on cigarette smoking knowledge.

Instructions for completing the questionnaire form were standardized. (See Appendix D.) Because the instructors and the subjects were familiar with computerized testing, the administration of the questionnaire was relatively simple. Although all questionnaire items were non-timed, most students completed the form in 15 to 20 minutes. The questionnaire with an attached instruction sheet was given to each student in the class. Instructions were read aloud by the instructors. Any questions were answered, then the students began completing the form. Questions that arose after the questionnaire was begun were answered individually.

Students enrolled in more than one of the classes participating in the study were requested to complete the questionnaire form a second time. This procedure provided the investigator with a reliability check for consistency in responses.

As the students completed the form, an attempt was made by the instructors to check the responses to be sure all items were answered. This was not possible to execute in some instances and in others the check was so rapid many incomplete IBM cards passed the instructors unnoticed. Table III summarizes the number of subjects who actually participated and completed all the necessary data for the study.

The student attrition rate resulted from students' excessive absences, dropping courses, or incomplete data on questionnaire forms. There were 35 subjects who completed the questionnaire form twice. While these subjects' forms were used for a reliability check, both forms the 35 subjects completed were deleted from the study since the author could not determine which was the first or second administration of the questionnaire forms.

There were 119 students who dropped out of classes involved in this study, and there were 24 incomplete questionnaires. Of the 119 students who dropped out of the study, 39 were men and 80 were women; 12 of the men and 31 of the women were medical students. From the nonmedical major field of study, there were 27 men and 49 women who dropped out of the study. Of the 24 incomplete questionnaires, three men and eight women from the medical field were represented while the nonmedical field had eight men and five women with incomplete questionnaires.

TABLE III
NUMBER OF STUDENTS WHO PARTICIPATED IN STUDY

Major Field of Study	Enrolled in Class		Dropped Class		Incomplete Questionnaire		Reliability Subjects*		Total Number of Subjects	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Medical	71	185	12	31	3	8	6	16	40	112
Non-Medical	107	127	27	49	8	5	7	6	75	96
Totals	178	312	39	80	11	13	13	22	115	108

*These subjects were deleted from the total study.

$\frac{108}{223}$

Questionnaire Development

While there have been numerous questionnaires developed for the purpose of ascertaining cigarette consumption rates and habits, few studies (61) (64) (66) have employed the questionnaire to measure the variables associated with cigarette consumption and upper respiratory illnesses. The questionnaire and the health record were designed to determine the characteristics of college students who smoked cigarettes and to ascertain if there were a positive association between cigarette consumption and upper respiratory illnesses.

In designing the questionnaire form, validity, reliability, and objectivity were considered in order that the test would be a useful instrument. The first part of the form included 12 personal history questions regarding students' age, gender, major field of study, types of upper respiratory illnesses experienced over the past four months, and the

daily average number of hours of breathing cigarette smoke. Question 13 was an attitude question concerning the students' belief about cigarette consumption and health. In the final part of the form, students who used tobacco were requested to respond to questions 34 through 37. These four questions dealt with tobacco consumption habits. Because of the nature of these 17 questions mentioned above, there was no one correct response to the questions. Questions 14 through 33 were smoking and tobacco knowledge test questions, and each of these 20 questions had one correct answer.

Curricular validity, according to Weiss and Scott (94), can be established several ways when a test is being constructed. First, an investigator can demonstrate curricular validity if items in the form reflect the various aspects of the subject matter. If the test questions "amply" cover the subject matter in proper proportions, curricular validity can be established. Curricular validity can also be established with the assistance from experts judging both the content of the test and the mechanical aspects of the test (94).

The author, in constructing the tobacco and smoking knowledge questions, employed many of the personal-psychological, physiological, and socio-economic concepts Galarneaux and Thompson (36) (81) established. The 20 smoking knowledge test questions were developed from ideas and materials of persons considered to be experts in the field of health and medicine (22) (29) (36) (47) (81) (86) (87) (88) (89) (91) (92).

The three areas represented in the investigator's questionnaire were the same three Thompson (81) used: personal and psychological, historical and sociological, and physiological. Eighteen questions or 49 per cent dealt with the personal and psychological aspect of tobacco;

six questions or 16 per cent were considered historical and sociological aspects; and 14 questions or 38 per cent were physiological aspects of tobacco usage. Questions one through 14 and 34 through 37 were considered personal or psychological questions. Questions 19, 21, 25, 26, and 27 were considered historical and sociological. The remainder of the questions were physiological in nature.

After the questionnaire was developed, Dr. A. B. Harrison, Director of Graduate Studies in Health, Physical Education, and Recreation, a specialist in Health Education and Research, made additions and corrections upon the content of the entire questionnaire. With the necessary corrections and additions completed, the questionnaire was submitted to the scrutiny of the faculty committee of the investigator. Curricular validity through this procedure was again established (94).

Statistical validity of the tobacco and smoking knowledge questions was determined by an item discrimination power formula called the Flanagan Index of Discrimination. This test was applicable only to the knowledge questions, for they were the only questions with only one correct response. The Flanagan formula reportedly

. . . yields a product-moment coefficient of correlation which indicates how well a test item differentiates good and poor performance. The correlation coefficient is high when the item is answered correctly by those who score high on the total test and answered incorrectly by those who score low on the test (94:226).

Item coefficient is low when both the high and low scorers score equally well on a given test item. In this particular test, the experimenter used only those subjects' examination papers that scored in the upper 27 per cent and the lower 27 per cent of all subjects. In this investigation, using the upper and lower 27 per cent of 323 subjects, 174 subjects' smoking knowledge tests were used according to the Flanagan Index of

Discrimination.

Another measure of statistical validity is a difficulty rating for each test item. This measure is the actual percentage of students answering a test item correctly (94). The lower the percentage of students answering the item correctly, the more difficult the item is said to be. Difficulty ratings are desirable if they concentrate around 50 per cent; however, if a spread of difficulty ratings occur between 10 and 90 per cent, discrimination at all levels of ability is assured (94). Test items with less than 10 per cent or more than 90 per cent are often dropped, for items too difficult or too easy have low discriminating power (94). Difficulty ratings were established for the tobacco and smoking knowledge test questions.

"Consistency in results or a reliability coefficient is not of primary importance when evaluating written tests" according to Weiss and Scott (94:234). These authorities based this statement upon the premise that if a written test meets the standards for discrimination, difficulty rating, curricular validity, and is an appropriate test form, the test will probably be reliable (94).

The Product-Moment Coefficient Test of Reliability originally was planned to be conducted with comparative data from the 35 subjects who completed the questionnaire twice. Although the comparative data were available and were collected by the investigator, failure to devise a method of distinguishing completed IBM answer cards of the first administration from the second administration prevented the use of this procedure.

The reliability of the entire questionnaire was tested by requesting the University Computer Center to provide the investigator with two data

printouts, one with the 35 subjects and another without the 35 subjects. With these two printouts the similarities of the probability values were compared for reliability. (See Table VII.) More support for reliability can be found in Chapter IV (page 58).

Reliability was also established by a second means. The 35 subjects' responses on two questionnaire IBM answer cards were checked against each other for consistency in responses. These responses in turn were compared with their own records in the Admissions Office of Tulsa Junior College. To determine the reliability of each students' questionnaire responses, the number of consistent responses were divided by the number of possible responses. This procedure gave a further reliability check. (See Table VI.)

According to Van Dalen, in order to construct an objective test, a researcher strives to create a test form that will be as free from subjective judgments as possible (93). To achieve this objectivity, the author wrote specific instructions for the cooperating instructors in this investigation. Instructions were written for how to keep daily health records and how to administer the questionnaire.

Statistical Treatment of the Data

The data on the subjects' IBM questionnaire answer cards were given to the Oklahoma State University Computer Center to be key punched and processed. Since the investigator needed evidence of reliability on the test, the data were processed twice, as discussed above.

The data were first compiled and converted into percentages. Four statistical designs were employed to test the hypotheses. They were: The University Computer center Kruskal-Wallis Test Program, The University

Computer Center Mann-Whitney U Test Program, The BMD-03D Correlation with Item Deletion, The University Computer Center Chi-Square Program, and the BMD02S Contingency Table Analysis.

Since there was no stated direction given in each of the hypotheses, the two tailed tests of significance were applied. The .05 level of confidence was used to test all hypotheses.

Hypotheses one and two were tested by the Kruskal-Wallis and Mann-Whitney U Tests. Hypothesis three was tested by the BMD-03D correlation with item deletion, and hypotheses four and five were tested by the UCC CPS Chi-Square program. The remainder of the hypotheses (six through ten) were tested by the Mann-Whitney U Test.

CHAPTER IV

FINDINGS AND ANALYSIS

The chief purposes of this study were to determine the percentages of smokers and nonsmokers at Tulsa Junior College, and to ascertain the characteristics of the students who used cigarettes. The third purpose was to determine the relationship between cigarette consumption and upper respiratory illnesses. These findings are reported in this chapter.

As in other studies on cigarette consumption, there were more nonsmokers than smokers in this investigation. There were 145 smokers and 178 nonsmokers. The smokers comprised 45 per cent of the entire group while the nonsmokers constituted the remaining 55 per cent. This figure for smokers was higher than in all of the studies reported in the review of literature. The highest percentage reported was 40 per cent by Haro and Dilley (38) and Dunn (24).

Separating the smoker and nonsmoker groups into categories of men and women smokers and nonsmokers, it was found that of the 145 cigarette smokers, 68 or 60 per cent were men and 77 students or 37 per cent were women. There were 47 or 41 per cent men in the nonsmoker category and 131 or 63 per cent women nonsmokers. As in all studies found for the review of literature, there were more men than women who used cigarettes. (See Figure 1.)

There was a group of 36 discontinued smokers included in the findings. They were placed in either the smoker or nonsmoker category

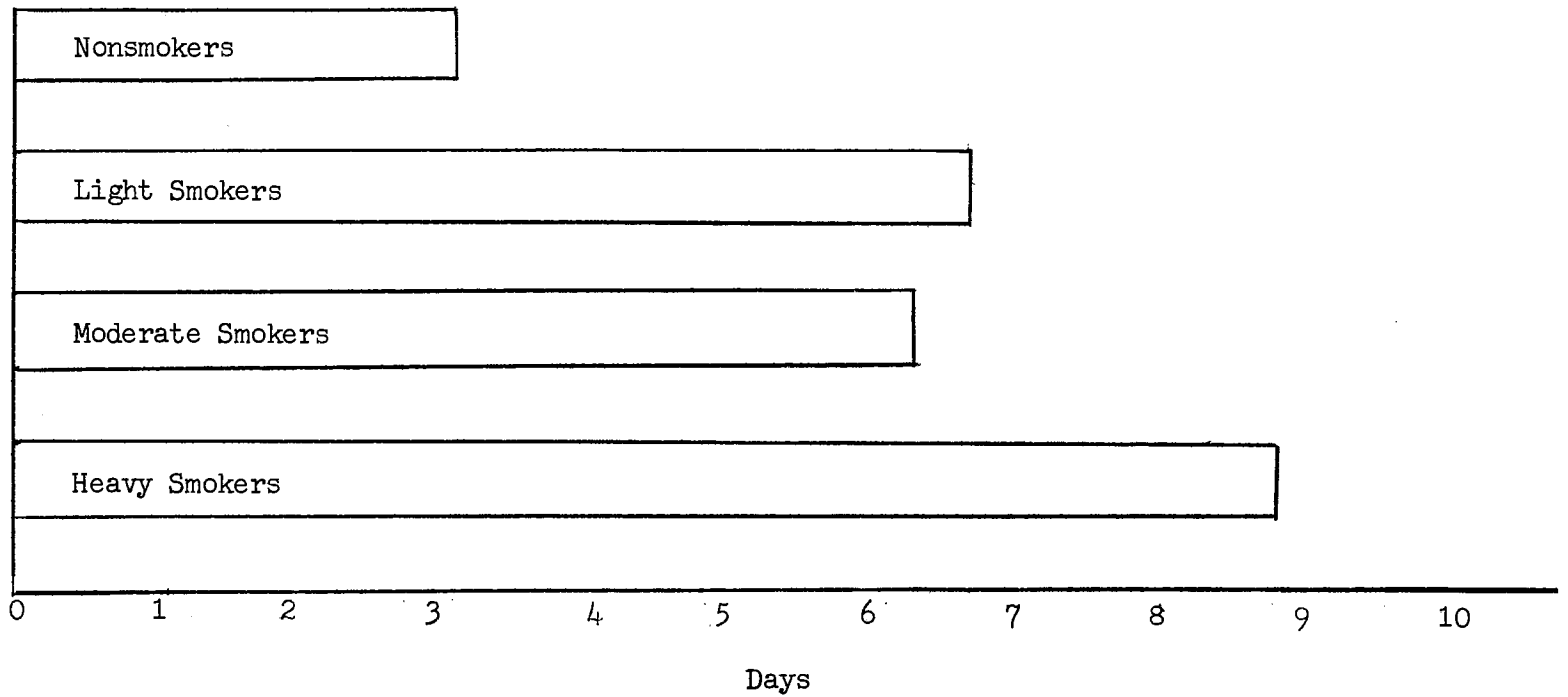


Figure 1. Average Number of Days Ill While Attending Classes and Days Absent Among Nonsmokers, Light Smokers, Moderate Smokers, and Heavy Smokers, Due to Upper Respiratory Illnesses

according to the definitions of a discontinued smoker in Chapter I. Of these 36 subjects, 26 were classified as smokers and eight classified as nonsmokers; two were disregarded due to information placed inappropriately on their IBM answer cards.

Characteristics of Students Who Used Cigarettes

Characteristics of the students who used cigarettes in this study were: 49 per cent of the students smoked a pack of cigarettes daily, 36 per cent had smoked cigarettes for five years or longer, and 90 per cent used filter cigarettes. The majority of smokers or 32 per cent felt they could quit smoking cigarettes, but did not wish to do so. Finally, 53 per cent of the smokers were in the 17 to 20 year age range.

Selected Responses by Smokers on Questionnaire

In responses to the question, "How much do you smoke daily?" the answers were: 32 per cent smoked one-half a pack of cigarettes daily, 49 per cent smoked a pack of cigarettes daily, 14 per cent smoked one and one-half packs of cigarettes daily, and finally, two or 5 per cent smoked about two packs of cigarettes daily.

In response to the question about how long the students had used cigarettes, the results showed: 15 per cent had smoked less than one year, 17 per cent had smoked for one to two years, 13 per cent had smoked for three years, 18 per cent had smoked for four years, and 36 per cent had smoked for five years or longer. The mean number of years of cigarette consumption for students who used cigarettes was 3 years, but the majority (36 per cent) had used cigarettes for five years or longer.

In response to the question, "What do you smoke?" the answers were:

7 per cent used plain cigarettes, 3 per cent used cigars, one student or .7 per cent smoked a pipe, and 90 per cent used filtered cigarettes.

In describing their feelings about quitting the cigarette habit, the responses were: 23 per cent had tried to quit but were unsuccessful, 8 per cent felt they were unable to discontinue the habit, 13 per cent indicated they would quit smoking if their physician told them to, 23 per cent felt none of the descriptions listed were applicable to them, and 32 per cent felt they could quit smoking cigarettes, but did not wish to do so.

In response to the question of the students' ages the responses were: 53 per cent were in the 17 to 20 year age range, 24 per cent were in the 21 to 25 age bracket, 14 per cent were in the 26 to 30 age bracket, 5 per cent were in the 31 to 40 age bracket, and finally, there were 4 per cent in the over 40 years of age bracket.

In other studies (25) (29) (34), students who used cigarettes consumed approximately a pack a day. These statistics were similar for the students who used cigarettes in this study.

In this study, 90 per cent of the students used the filter cigarette. This was more than other researchers have found. Dunn (24) found in her 1967 survey 75 per cent of the students used filtered cigarettes, but Pervin and Dalrymple (61) found in their 1964 survey that most of the students used plain cigarettes.

Validity and Reliability

The statistical validity of the tobacco and smoking knowledge test questions were determined by the Flanagan Index of Discrimination (31). A product-moment coefficient of correlation was computed for each of the

20 questions. The results of the computations are shown in Table IV. According to Weiss and Scott (94) in order for a test question to be retained for validity, an "index" of approximately .20 or better is needed. While there were four test items that failed to yield this index (items 19, 20, 24, and 26), they were not deleted from the smoking knowledge test. The author felt justified in retaining these items because developing a smoking knowledge test was not the primary concern with this study. Moreover, while these test items previously mentioned failed to show an appropriate statistical index of at least .20, curricular validity existed for all items on the smoking knowledge test.

Test question item number 29 exhibited the highest relationship between the highest and lowest 27 per cent of the students answering the question correctly. (See Table IV.)

There were 10 questions that yielded a marked relationship (\pm .40 to \pm .70) between the highest and lowest 27 per cent of the students answering the questions correctly. These questions were numbers 14, 15, 17, 18, 21, 22, 28, 30, 31, and 32.

Three questions, test items 25, 27, and 33, yielded low relationships (\pm .20 to \pm .40) between the highest and lowest 27 per cent of the students answering these questions correctly.

Since Weiss and Scott (94) indicated a .20 relationship between the highest and lowest per cent of the students answering test items correctly was sufficient to retain test items for validity, it appeared this test had overall validity. Sixteen items or 80 per cent of the test items yielded sufficient validity.

TABLE IV

FLANAGAN INDEX OF DISCRIMINATION DEPICTING THE CORRELATION COEFFICIENT
BETWEEN SUCCESSFUL TEST ITEM SCORES IN THE HIGHEST AND IN
THE LOWEST 27 PER CENT OF 323 SUBJECTS

Numbers	Number of Subjects Answering Correctly		Per Cent of Subjects Answering Correctly		Flanagan Index
	High Group (105)	Low Group (89)	High Group	Low Group	
14	75	28	71	31	.40
15	68	20	65	22	.40
16	44	19	42	21	.20
17	98	40	93	45	.55
18	95	35	90	39	.55
19	19	16	18	18	.00
20	42	23	40	26	.15
21	99	53	94	60	.45
22	86	30	82	34	.45
23	62	34	59	38	.20
24	38	24	36	27	.10
25	41	14	39	16	.25
26	16	11	15	12	.05
27	48	21	46	24	.25
28	42	8	40	9	.40
29	87	11	83	12	.70
30	97	43	92	48	.55
31	93	38	89	43	.50
32	73	19	70	21	.45
33	84	44	80	49	.30

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Difficulty Ratings

The difficulty ratings were analyzed for each of the 20 knowledge test questions. The ratings are shown in Table V. The lower the percentage of students answering the question(s) correctly, the more difficult the item is rated. On this basis questions 19, 26, and 28 were the most difficult while questions 21, 30, and 31 were the least difficult. The difficulty ratings ranged from 83 per cent to 14 per cent. According to Weiss and Scott (94) a wide range is desirable for it insures discrimination at all levels of ability.

Reliability

A reliability check of the responses was conducted on subjects who completed the questionnaire twice. These responses were compared to the students' own records in the Admissions Office at Tulsa Junior College. The results of this reliability check are presented in Table VI. Most scores reported in Table VI were above .95. The mean proportion of similar test responses for all 35 subjects was .97. Only three subjects selected responses that were not in agreement with the Tulsa Junior College records. The greatest number of deviations for any one subject was four deviations while the least was no deviations. There were only seven subjects that scored below .95 on this consistency check. There were no subjects that scored below .89; therefore, it seemed the questionnaire was reliable or consistent.

As mentioned previously in Chapter III (page 49), a Product-Moment Coefficient Test of Reliability could not be conducted. While comparative data from 35 subjects was collected by the investigator, failure to devise a method of distinguishing completed IBM answer cards of the

TABLE V

DIFFICULTY RATING FOR EACH TEST QUESTION MEASURED BY THE PER CENT
OF STUDENTS ANSWERING THE TEST QUESTION CORRECTLY

Test Item Numbers	Number of Students Answering Correctly	Per Cent of Students Answering Correctly
14	183	52
15	139	39
16	83	24
17	246	69
18	230	64
19	57	16
20	109	31
21	294	83
22	226	63
23	153	43
24	121	34
25	96	27
26	50	14
27	116	33
28	56	16
29	155	44
30	271	76
31	260	73
32	151	43
33	245	70

TABLE VI

SUBJECTS' RESPONSES ON QUESTIONNAIRE ITEMS COMPARED WITH
STUDENTS' COLLEGE RECORDS ON GENDER, SOCIAL
SECURITY, AND MAJOR FIELD OF STUDY

Subject	Number of Deviations on Question- naire Items	Number of Deviations of Responses With College Records	Number of Consistent Responses	Number of Responses	Proportion of Similar Responses
1.	0	0	36	36	1.00
2.	0	0	36	36	1.00
3.	0	0	36	36	1.00
4.	2	0	34	36	.94
5.	1	0	35	36	.97
6.	2	0	38	40	.95
7.	0	0	40	40	1.00
8.	4	0	32	36	.89
9.	2	0	34	36	.94
10.	2	1	33	36	.92
11.	0	0	36	36	1.00
12.	0	0	36	36	1.00
13.	0	0	36	36	1.00
14.	0	0	40	40	1.00
15.	1	0	35	36	.97
16.	0	0	36	36	1.00
17.	0	0	36	36	1.00
18.	0	0	40	40	1.00
19.	0	0	36	36	1.00
20.	2	0	34	36	.94
21.	2	0	38	40	.95
22.	3	0	33	36	.92
23.	2	1	37	40	.93
24.	1	0	35	36	.97
25.	0	0	36	36	1.00
26.	0	0	36	36	1.00
27.	1	0	35	36	.97
28.	0	0	40	40	1.00
29.	0	0	36	36	1.00
30.	1	0	39	40	.98
31.	0	0	40	40	1.00
32.	0	0	35	35	1.00
33.	0	1	35	36	.97
34.	0	0	36	36	1.00
35.	1	0	35	36	.97

first administration from the second administration prevented this procedure.

A reliability check was conducted by testing the hypotheses twice. The first testing included the 35 subjects who had completed the questionnaire form twice and the second testing excluded these subjects. The results of the hypotheses testing from both printouts were compared for reliability, as seen in Table VII. Because the results of the tested hypotheses were either identical or very similar, the entire test was considered reliable. (See Table VII.)

Hypothesis 1 There will be no significant differences among non-smokers, light smokers, moderate smokers, and heavy smokers in the combined number of days ill while attending classes and days absent due to upper respiratory illnesses.

Results: Rejected

The Kruskal-Wallis One-Way Analysis of Variance was employed to test this hypothesis. The number of days of upper respiratory illnesses were both the number of days ill—but attended college classes, and the number of days ill but absent from the college. The total number days of respiratory illnesses per student is shown in Table VIII (page 63). There were 178 nonsmokers with 3.13 days of upper respiratory illnesses per student, 46 light smokers with 6.41 days of illnesses per student, 68 moderate smokers with 6.16 days of upper respiratory illnesses per student, and 27 heavy smokers with 8.63 days of upper respiratory illnesses per student. With these four categories, the degrees of freedom equaled three. In Table C of Siegel (75) with three degrees of freedom

TABLE VII
 COMPARISON OF COMPUTER PRINTOUTS ONE AND TWO FOR
 RELIABILITY CHECK ON HYPOTHESES ONE-TEN

Hypothesis Number	Test Design	Symbols for Test	Printout One Results of Subjects	Printout Two Results Without 35 Subjects
One	Kruskal-Wallis and Mann-Whitney U Tests Probability	H z	44.24 -4.34 .00006	37.32 -4.22 .00006
Two	Kruskal-Wallis and Mann-Whitney U Tests Probability	H z	43.96 -4.61 .00006	37.32 -4.32 .00006
Three	Product-Moment Coefficient	r	-.02	.003
Four	Chi-Square	X^2	1.62	1.33
Five	Chi-Square	X^2	7.11	7.75
Six	Mann-Whitney	z Prob- ability	-1.26 .21	-1.79 .072
Seven	Mann-Whitney	z Prob- ability	-.03 .97	-.24 .81
Eight	Mann-Whitney	z Prob- ability	-0.98 .32	-0.90 .36
Nine	Mann-Whitney	z Prob- ability	-.75 .45	-.81 .40
Ten	Mann-Whitney	z Prob- ability	-4.75 .00006	-4.51 .00006

at the 0.05 level of confidence, the table value was 7.82. Since the computed value of H equaled 37.32 and yielded a probability of .001 in a two tailed test table, the hypothesis was rejected. There was a significant difference between nonsmokers, light smokers, moderate smokers, and heavy smokers in the number of days ill with upper respiratory illnesses.

TABLE VIII
KRUSKAL-WALLIS ANALYSIS OF THE COMBINED NUMBER DAYS
ABSENT DUE TO RESPIRATORY ILLNESSES

Groups	Number in Group	Number of Days Ill While Attending Classes and Days Absent	Average Rank
Nonsmokers	178	3.13	134.31
Light Smokers	46	6.41	190.01
Moderate Smokers	68	6.16	188.24
Heavy Smokers	27	8.63	207.11

Degrees of Freedom = 3

H = 37.32

Value needed for rejection = >7.82 at the .05 level of confidence

To find where the differences were, a Mann-Whitney U Test was applied. The results of the Mann-Whitney U revealed there was a significant difference only between nonsmokers and all degrees (light, moderate,

and heavy) of cigarette consumption at the .05 level of confidence. As seen in Table IX, the smaller the probability yielded by the Mann-Whitney U Test, the more significant is the test. The z values, found in Siegel (75), yielded the probabilities for a two tailed test.

TABLE IX

MANN-WHITNEY U ANALYSIS OF DAYS ILL WHILE ATTENDING CLASSES
AND DAYS ABSENT DUE TO UPPER RESPIRATORY ILLNESSES

	z	Light Smoker Probability	z	Moderate Smoker Probability	z	Heavy Smoker Probability
Nonsmokers	-4.223	.00006	-4.54	.00006	-4.18	.00006
Light Smokers	0.0	1.0	-0.06	.95	-1.04	.30
Moderate Smokers	0.0	1.0	0.0	1.0	-1.08	.28

As seen in Table VIII, the smokers experienced twice as many days of upper respiratory illnesses as the nonsmokers. The finding that smokers experienced significantly more combined upper respiratory illnesses than nonsmokers supported the findings of previous studies found in the review of literature (29) (30) (60) (61) (66). It should be noted, however, a causal relationship has not been established.

Hypothesis 2 There will be no significant differences among non-smokers, light smokers, moderate smokers, and heavy smokers in the number of days absent from the college due to upper respiratory illnesses.

Results: Rejected

In testing this hypothesis, the Kruskal-Wallis One-Way Analysis of Variance was employed. As Table X shows, there were 178 nonsmokers, 46 light smokers, 68 moderate smokers, and 27 heavy smokers. The non-smokers experienced an average of .84 absences per student, the light smokers experienced an average of 1.85 absences per student, the moderate smoker experienced an average of 1.88 per student, and the heavy smoker experienced an average of 2.30 absences per student. With these four categories, there were three degrees of freedom. In Table C of Siegel (75) with three degrees of freedom at the .05 level of confidence, the table value was 7.82. Since the computed value of H equaled 44.16 and yielded a probability of .001 in a two tailed test, the hypothesis was rejected. There was a significant difference among nonsmokers, light smokers, moderate smokers, and heavy smokers in the number of days absent from the college due to respiratory illnesses.

To find where the differences were, a Mann-Whitney U Test was applied. The results of the Mann-Whitney U Test indicated there was a significant difference only between nonsmokers and all degrees (light, moderate, and heavy) of cigarette consumption at the .05 level of confidence. (See Figure 2.)

There were no significant differences between any other variables as seen in Table XI. The z values, found in Siegel (75), yielded probabilities above the .05 level of confidence for a two tailed test.

TABLE X

KRUSKAL-WALLIS ANALYSIS OF RESPIRATORY ABSENCES AMONG
NONSMOKERS, LIGHT, MODERATE, AND HEAVY SMOKERS

Groups	Number in Group	Number of Absences Per Student	Average Rank
Nonsmokers	178	.84	130.70
Light Smokers	46	1.85	194.16
Moderate Smokers	68	1.88	189.60
Heavy Smokers	27	2.30	220.44

Degrees of Freedom = 3

H = 44.16, at the .05 level of confidence

Value needed for rejection = >7.82 at .05 level of confidence

TABLE XI

MANN-WHITNEY U ANALYSIS OF DAYS ABSENT DUE
TO UPPER RESPIRATORY ILLNESSES

	<u>Light Smoker</u>		<u>Moderate Smoker</u>		<u>Heavy Smoker</u>	
	z	Probability	z	Probability	z	Probability
Nonsmokers	-4.32	.00006	-4.62	.00006	-4.663	.00006
Light Smokers	0.0	1.0	-0.24	.81	-1.41	.16
Moderate Smokers	0.0	1.0	0.0	1.0	-1.68	.09

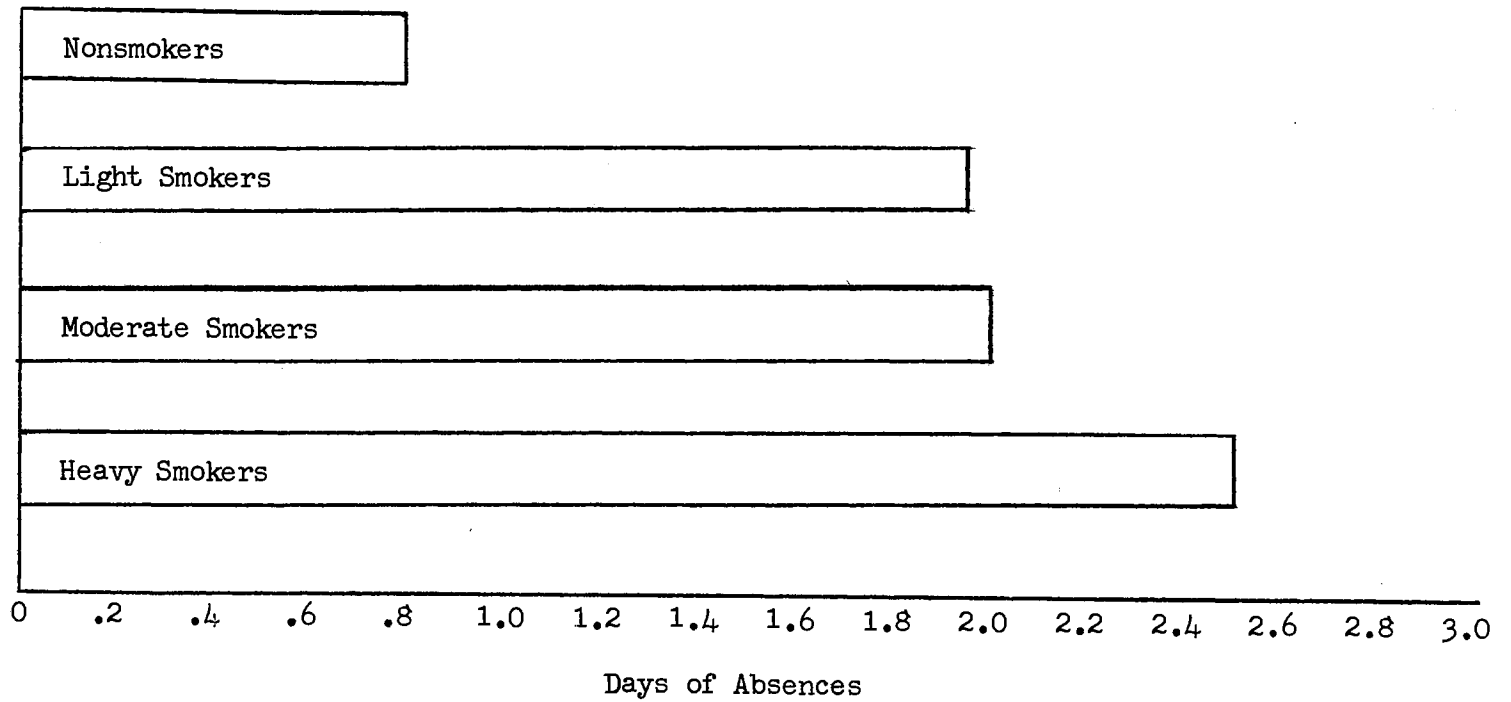


Figure 2. Average Number of Days of Absences for Nonsmokers, Light Smokers, Moderate Smokers, and Heavy Smokers

As seen in Table X smokers, regardless of the amount of cigarettes consumed, experienced more days absent from the college due to upper respiratory illnesses than nonsmokers. These findings concurred with the findings of Parnell, Anderson, and Kinnis (60), Peters and Ferris (64), and Finklea and Sandifer (29) who concluded from their investigations that smokers experienced more absences due to upper respiratory illnesses than nonsmokers.

A related problem that was researched was the number of days smokers and nonsmokers were ill with an upper respiratory illness but attended their college classes. Many people have upper respiratory illnesses which are not severe enough to force them to be absent from their classes. Therefore, this seemed a worthy problem to examine. The hypothesis tested was: There will be no significant difference between smokers and nonsmokers in the number of days they suffer from upper respiratory illnesses while attending classes. The results indicated that there was a significant difference between smokers and nonsmokers in the number of days they attended classes while ill from upper respiratory illnesses. The smokers had 690 days in class while suffering from upper respiratory illnesses, and the nonsmokers had 407 days in class while suffering from upper respiratory illnesses. Applying the Mann-Whitney U Test, a z of -6.27 was produced. According to Table A in Siegel (75), this yielded a probability of $.00006$. Since this value of $.00006$ was less than the $.05$ level of confidence previously set, the hypothesis was rejected. (See Table XII.)

TABLE XII

MANN-WHITNEY U ANALYSIS OF THE NUMBER DAYS AT COLLEGE
BUT ILL DUE TO UPPER RESPIRATORY ILLNESSES

Group and Number	Number of Absences Per Student	Rank of Data	z	Probability
Smoker 145	4.76	U = 7,789		
			-6.28	.00006
Nonsmoker 178	2.29	U' = 18,021		

Hypothesis 3 There will be no significant relationship between the number of years smokers have consumed cigarettes and the incidence of upper respiratory illnesses.

Results: Accepted

There were 152 subjects who consumed cigarettes in this aspect of the investigation. Three variables were correlated with the independent variable of number of years smokers have consumed cigarettes. They were the number of days absent from the college due to upper respiratory illnesses, the number of days attending classes with an upper respiratory illness, and the combination of both. The Product-Moment Coefficient then was employed. The computations revealed a negligible relationship between the number of years smokers had consumed cigarettes and upper respiratory illnesses and each of the variables. The correlation between the number of years of cigarette consumption and the number of

days absent with an upper respiratory illness was .003. The correlation between the number of years of cigarette consumption and number of days ill with an upper respiratory illness but attending classes was .024. The relationship between the number of years of cigarette consumption and total days ill (absent or in class) due to an upper respiratory illness was .02. With this negligible relationship, the hypothesis was accepted.

Hypothesis 4 There will be no significant relationship between smoking habits and the race of the subjects.

Results: Accepted

The Chi Square Test was employed to test for relationships between smoking habits and the race of the subjects. With the students divided into smoker and nonsmoker groups, the 323 students were also grouped into one of the following racial categories: American Indian, Caucasian, Negro, and other. The distribution of the races is shown in Table XIII. A Chi-Square of 1.33 was computed with three degrees of freedom. To determine the significance, if any, of this value, Table C, the Table of Critical Values of Chi-Square (75) was employed. Since the computed value of 1.33 was less than the table value, the hypothesis was accepted. This acceptance of the hypothesis indicated there was no significant relationship between smoking habits and race.

The Negro race had the largest percentage of smokers (50 per cent). The second high percentage of smokers was the Caucasian race followed by the Indian race.

The highest group of nonsmokers was the group whose race was indicated by the category of "others." The second highest group of nonsmokers was the Indian race, followed by the Caucasian race for the third highest

group of nonsmokers. (See Table XIII.)

TABLE XIII
CHI-SQUARE TEST OF THE RELATIONSHIP
BETWEEN SMOKING HABITS AND RACE

Race	Number of Smokers	Per Cent of Smokers	Number of Nonsmokers	Per Cent of Nonsmokers	Total Number
Indian	7	41	10	59	17
Caucasian	118	45	145	55	263
Negro	16	50	16	50	32
Others	3	30	7	70	10

Degrees of Freedom = 3

Chi-Square = 1.33

Value needed for rejection = >7.82 at the .05 level of confidence

Hypothesis 5 There will be no significant relationship between smoking habits and students' beliefs and knowledge about cigarette consumption.

Results: Accepted

The Chi-Square Test was employed to test this hypothesis. With the students divided into smoker and nonsmoker groups, there was a total of 323 subjects.

The distribution of the number of correct answers the two groups of

students earned on the 20 smoking knowledge test questions can be seen in Table XIV. In order to test for any significant relationships between the smokers and nonsmokers on knowledge about cigarette consumption, the number of degrees of freedom was first established. The data produced a Chi-Square value of 7.75. To determine the significance of this value, Table C, the Table of Critical Values of Chi Square, (75), was employed using three degrees of freedom. At the .05 level of confidence, the table value was 7.82. Since the computed value of 7.75 was less than the 7.82 needed for rejection of the hypothesis, the hypothesis was accepted as tenable.

Most subjects felt cigarette smoking was harmful to their health. Of the smokers, 70.34 per cent felt cigarette consumption was injurious while 85.96 per cent of the nonsmokers felt that cigarette consumption was injurious to health. Thirty-four of the smokers and 18 of the nonsmokers were uncertain of the effects of cigarette consumption upon health. Only nine smokers and seven nonsmokers believed that cigarette consumption was not harmful to health.

These findings are in general agreement with data from other sources (7) (10) (33) (38) (62) which indicated that the majority of nonsmokers and smokers alike accepted the fact that cigarette consumption could be harmful to health. In other studies, as a rule, more nonsmokers accepted the fact than did smokers. In this investigation there was no significant difference between the groups on smoking knowledge. The smokers averaged nine correct answers and nonsmokers averaged 9.28 on the 20 item smoking knowledge test. The smokers' test scores ranged from 2 to 17 test questions answered correctly. The nonsmokers had test scores ranging from 3 to 15 test questions answered correctly. The standard deviation

for the smokers' test score was 3.09 while the standard deviation for the nonsmokers' test score was 2.80.

TABLE XIV
CHI-SQUARE TEST OF THE RELATIONSHIP BETWEEN SMOKING
HABITS AND STUDENTS' BELIEFS AND KNOWLEDGE
ABOUT CIGARETTE CONSUMPTION

Number of Correct Answers to Test Questions	Smokers		Nonsmokers	
	Number	Per Cent	Number	Per Cent
0-5	19	13	12	7
6-10	81	56	107	60
11-15	42	29	59	33
16-20	3	2	0	0
Totals	145	100	178	100

Degrees of Freedom = 3

Chi-Square = 7.75

Value needed for rejection = 7.82 at the .05 level of confidence

Table XIV reveals that three students (two per cent) of the subjects from the smoker group were able to answer more than 15 smoking knowledge test questions correctly. None of the nonsmokers were able to answer more than 15 test questions correctly.

In comparing the results of this study with other similar investigations, Fodor et al. (32) found smokers were better informed than

nonsmokers about the effects of cigarette consumption while another study (62) noted no difference between the two groups on smoking knowledge.

Hypothesis 6 There will be no significant difference between students majoring in medical programs and students majoring in other fields of study in scores earned on the smoking knowledge test.

Results: Accepted

The Mann-Whitney U Test was applied to determine if there was any significant difference between knowledge scores of students majoring in medical programs and students majoring in all other fields of study. The 152 students from the medical related programs scored a mean of 11.96 correct answers on the 20 point knowledge test and all other students scored a mean of 7.08 on the same test. The U yielded 11,503 and the U' yielded 14,488. From these figures, a z of -1.79 was computed. The z of -1.79 in Table A in Siegel (74) yielded a probability of .072 for a two tailed test. Since this value was greater than the .05 level of confidence, the hypothesis was accepted as tenable. There appeared to be no significant difference between the two groups in smoking knowledge. (See Table XV.)

The students majoring in the medical program had test scores ranging from 2 to 17 test questions answered correctly. The students majoring in all other fields had test scores ranging from 3 to 16 test questions answered correctly. Forty-one per cent of the medical program students had test scores ranging from 11 to 17, but only 19 per cent of the students majoring in all other fields had test scores ranging from 11 to 17.

TABLE XV

MANN-WHITNEY U TEST ANALYSIS OF SCORES EARNED ON SMOKING KNOWLEDGE
TEST FOR STUDENTS IN MEDICAL PROGRAMS AND STUDENTS IN
OTHER FIELDS OF STUDY AT TULSA JUNIOR COLLEGE

Group and Number	Mean Score Per Student	Rank of Data	z	Probability
Medical Students 152	11.96	U = 11,503.50		
			-1.79	0.07
Other Fields of Study Students 171	7.08	U' = 14,488.50		

Mausner (54) reported in her 1966 study medical students, but not the law, students increased their knowledge about the diseases associated with cigarette consumption with increased years of training. The higher level of knowledge, however, among the senior medical students was not associated with "demonstrable differences in attitudes and personal smoking behavior." This investigation supported Mausner's (54) finding, for while the percentages of smokers among the medical program students and nonmedical program students were almost identical (see Table XV), the medical program students had higher scores on the smoking knowledge test than nonmedical program students. This difference, however, was not statistically significant.

It should be noted the students in Mausner's (54) study were graduate medical students in their first years of internship. Although the Tulsa

Junior College students were pursuing an associate degree in the medical area, caution should be exercised in comparing the two groups of medical students.

Hypothesis 7 There will be no significant difference between students majoring in medical programs and students majoring in other fields of study in the incidence of cigarette consumption.

Result: Accepted

There were 83 students (44.74 per cent) who used cigarettes from the medical program, and 62 students (45.03 per cent) who consumed cigarettes from all other major fields of study. In testing for significant differences between the two groups, the Mann-Whitney U Test was applied. The U and U' yielded a z of $-.24$. The z of $-.24$ according to Table A in Siegel (75) yielded a probability of .81 for a two tailed test. Since this value of .81 was larger than the .05 level of confidence set, the hypothesis was accepted as tenable. (See Table XVI.)

The percentage of smokers in the medical program were almost identical to the percentage of smokers in all other majors, 44.74 per cent and 45.03 per cent, respectively. In other studies where comparisons have been reported between medical program students and nonmedical program students, the medical program students had fewer smokers than did other groups (32) (33) (52) (54). As previously noted in the discussion on hypothesis 8, two investigations (52) (54) dealt with medical students in graduate degree programs. Perhaps as pre-medical students their personal smoking habits were not unlike those of the Tulsa Junior College students.

TABLE XVI

MANN-WHITNEY U ANALYSIS OF INCIDENCE OF CIGARETTE CONSUMPTION FOR
STUDENTS MAJORING IN MEDICAL PROGRAMS AND STUDENTS
MAJORING IN OTHER FIELDS OF STUDY

Group and Number	Number of Smokers	Per Cent of Smokers	Rank of Data	z	Probability
Medical Program Students 152	68	44.74	U = 12,813		
				-0.24	.81
All Other Student Majors 171	77	45.03	U' = 13,179		

145

Although there were smokers represented from all fields of study, the combination of engineering related occupations had the highest percentage of smokers (60 per cent). The lowest percentage of smokers was in the field of education (30 per cent). (See Table XVII.) The second highest group of smokers was the category listed as Others with 51 per cent, followed by the field of medicine with 45 per cent. Due to the size of the sample in Table XVII, caution should be used in generalizing about the groups.

TABLE XVII
NUMBER OF SMOKERS AND NONSMOKERS AMONG THE MAJOR FIELDS OF STUDY

Group	Smokers		Nonsmokers	
	Number	Per Cent	Number	Per Cent
Business	14	44	18	56
Education	12	30	28	70
Engineering Related Occupations	9	60	6	40
Medical Related Occupations	83	45	101	55
Others	26	51	25	49

Hypothesis 8 There will be no significant difference between absenteeism due to upper respiratory illnesses of students majoring in the medical programs and of all other students at the college.

Results: Accepted

The Mann-Whitney U Test was applied to test for any differences between students majoring in the medical programs and all other students in the number of days absent from the college due to upper respiratory illnesses. There were 152 students in the medical program who experienced a total of 182 days away from the college due to upper respiratory illnesses. There were 171 students in all other programs who experienced 251 total days away from the college due to upper respiratory illnesses.

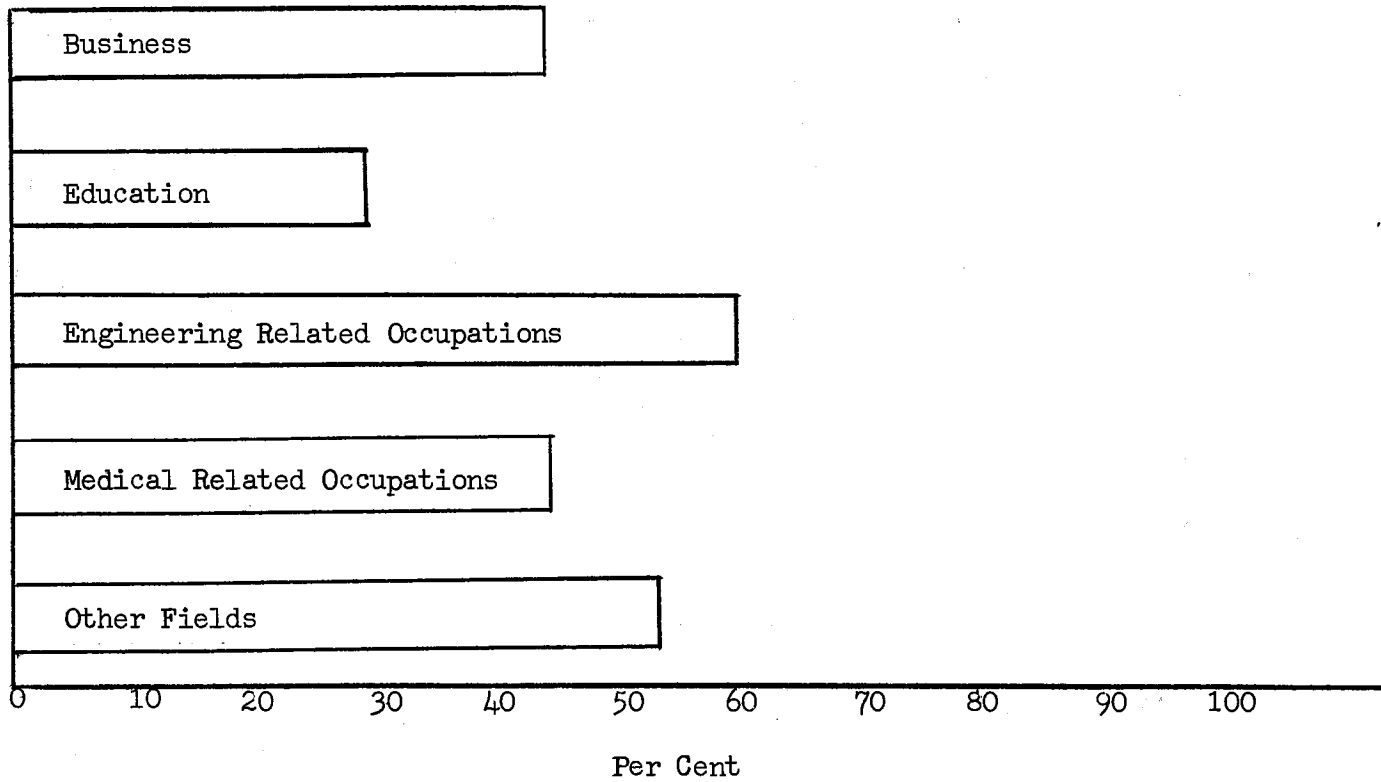


Figure 3. Percentages of Smokers Per Major Field of Study

A z of $-.539$ was calculated. A z of -0.539 according to Table A in Siegel (75) yielded a probability of $.58$ in a two tailed test. Because this figure of $.58$ was larger than the $.05$ level of confidence, the hypothesis was considered accepted as tenable. There was no significant difference between absenteeism due to upper respiratory illnesses of students majoring in the medical programs and of all other students at the college.

A related problem that was researched was the number of days medical students and all other students attended their college classes while ill with an upper respiratory illness. The hypothesis tested was that there will be no significant difference between the students majoring in the medical programs and students majoring in all other fields in the number of days classes were attended while sick with an upper respiratory illness. The 152 medical program students experienced a total of 433 days of upper respiratory illnesses while attending college classes. The 171 nonmedical program students experienced a total of 664 days of upper respiratory illnesses while attending college classes. With these figures, the U and U' for the Mann-Whitney U Test were computed. A z of -0.693 was calculated. A z of -0.693 according to Table A in Siegel (75) yielded a probability of $.488$ in a two tailed test. Because this figure of $.488$ was larger than the $.05$ level of confidence set, the hypothesis was accepted. There was no significant difference between the number of days ill with an upper respiratory illness while attending college classes for either the student in the medical program or students in the non-medical programs.

Combining the two above hypotheses, another hypothesis was developed to determine if students in the medical programs had significantly more

days ill with upper respiratory illnesses from the college or ill but attended college classes than nonmedical program students. The hypothesis tested was that there will be no significant difference between the students majoring in medical programs and students majoring in all other fields in the combined number of days absent and days ill but attending college classes. There were 152 students in the medical program who experienced a total of 615 days of upper respiratory illnesses and 171 nonmedical program students who experienced 915 total days of upper respiratory illnesses. With these figures, the U and U' for the Mann-Whitney U Test were computed. A z of -0.903 was calculated. A z of -0.903 according to Table A in Siegel (75) yielded a probability of .366 in a two tailed test. Because this figure of .366 was greater than the .05 level of confidence set, the hypothesis was accepted as tenable.

In comparing students in the medical program with students in the nonmedical program, the nonmedical students experienced more upper respiratory illnesses than the medical program students (see Tables XVIII, XIX, and XX). There was, however, no significant difference between medical program students and nonmedical program students in the number of days of upper respiratory illnesses resulting in absence and days ill while attending college classes.

Hypothesis 9 There will be no significant difference in the incidence of upper respiratory illnesses between nonsmokers who are exposed to a large amount of cigarette smoke and nonsmokers who are exposed to a small amount of cigarette smoke.

Result: Accepted

TABLE XVIII

MANN-WHITNEY U ANALYSIS OF ABSENTEEISM DUE TO UPPER
RESPIRATORY ILLNESSES OF MEDICAL PROGRAM STUDENTS
AND NONMEDICAL PROGRAM STUDENTS

Group and Number	Number of Illnesses Per Student	Rank of Data	z	Probability
Medical Program Students 152	1.197	U = 12,576.0		
			-0.539	.58
Nonmedical Program Students 171	1.47	U' = 13,416.0		

TABLE XIX

MANN-WHITNEY U ANALYSIS OF DAYS AT COLLEGE WITH UPPER
RESPIRATORY ILLNESSES BETWEEN MEDICAL STUDENTS
AND NONMEDICAL STUDENTS

Group and Number	Number of Illnesses Per Student	Rank of Data	z	Probability
Medical Program Students 152	2.85	U = 12,428.50		
			-0.693	.488
Nonmedical Program Students 171	3.88	U' = 13,563.50		

TABLE XX

MANN-WHITNEY U ANALYSIS OF DAYS ABSENT AND DAYS SICK FOR MEDICAL PROGRAM STUDENTS AND NONMEDICAL PROGRAM STUDENTS

Group and Number	Number of Illnesses Per Student	Rank of Data	z	Probability
Medical Program Students 152	4.05	U = 12,249.50		
			-0.903	.366
Nonmedical Program Students 171	5.35	U' = 13,742.50		

The Mann-Whitney U Test was employed to determine if exposure to cigarette smoke and the incidence of upper respiratory illnesses was related. There were 72 non-smoking subjects exposed to a large amount of smoke (three hours or more daily) who experienced a total of 73 days of absence from the college. There were 93 nonsmoking subjects exposed to a small amount of smoke (two or less hours daily), who experienced a total of 67 days of absence from the college. The U and U' yielded a z of -0.81. The z of -0.81 according to Table A in Siegel (75) yielded a probability of .40. Since this value was considerably larger than the .05 level of confidence set, the hypothesis was accepted as tenable. There was no significant difference between upper respiratory illnesses of nonsmokers who were exposed to a large amount of cigarette smoke and those who were exposed to a small amount of cigarette smoke.

A related problem that was researched was the hypothesis that there would be no significant difference in the number of days ill due to upper respiratory illnesses while attending college classes among nonsmokers exposed to small amounts of cigarette smoke and nonsmokers exposed to large amounts of cigarette smoke. There were 72 subjects in the non-smoking group who were exposed to large amounts (three hours or more) of cigarette smoke daily. There were 93 subjects in the group exposed to small amounts of cigarette smoke (two hours or less) daily. The group exposed to a large amount of smoke experienced 173 total days ill due to upper respiratory illnesses while attending college classes, and the group exposed to a small amount of cigarette smoke experienced 203 total days ill due to upper respiratory illnesses while attending college classes. The U and U' yielded a z of -0.29 . The z of -0.29 according to Table A in Siegel (75) yielded a probability of .772. Since this value was considerably greater than the 0.05 level of confidence set, the hypothesis was accepted as tenable. There was no significant difference between nonsmokers who were exposed to large amounts of cigarette smoke, and nonsmokers who were exposed to small amounts of cigarette smoke in the number of days ill due to upper respiratory illnesses while attending college classes.

Combining the two above hypotheses, another hypothesis was developed to determine if nonsmokers who are exposed to large amounts of cigarette smoke and nonsmokers who are exposed to small amounts of cigarette smoke had significantly more absences and more days ill due to upper respiratory illnesses while attending college classes. The tested hypothesis was that there will be no significant difference between nonsmokers who are exposed to large amounts of cigarette smoke and nonsmokers exposed to

small amounts of cigarette smoke in the combined number of days absent and days ill due to upper respiratory illnesses while attending college classes. There were 72 nonsmokers exposed to large amounts of cigarette smoke (three hours or more) daily. There were 93 subjects exposed to small amounts of cigarette smoke (two hours or less) daily. The group exposed to a large amount of smoke experienced 230 total days ill due to upper respiratory illnesses, and the group exposed to a small amount of cigarette smoke experienced 286 total days of upper respiratory illnesses. The U and U' yielded a z of -0.14 . The z of -0.14 according to Table A in Siegel (75) yielded a probability of .88. Since this value was considerably greater than the .05 level of confidence previously set, the hypothesis was accepted as tenable.

Although the students exposed to the larger amount of cigarette smoke experienced more illnesses (see Tables XXI, XXII, and XXIII), there was no significant difference between nonsmokers who were exposed to large amounts of cigarette smoke, and nonsmokers who were exposed to small amounts of cigarette smoke in the combined number of days absent and days ill due to upper respiratory illnesses while attending college classes.

In analyzing the daily number of hours nonsmokers breathed cigarette smoke, it was found 60 subjects or 34 per cent had no appreciable cigarette exposure. Of those nonsmokers who indicated they had been exposed to cigarette smoke ranging from one hour to more than eight hours daily, the majority of nonsmokers (46 or 26 per cent) had a daily exposure of cigarette smoke of one to two hours. As shown in Table XXIV, approximately 20 per cent (37 subjects) were exposed to cigarette smoke from three to four hours daily, and approximately 20 per cent (35

TABLE XXI

MANN-WHITNEY U ANALYSIS OF INCIDENCE OF RESPIRATORY
ABSENCE BETWEEN NONSMOKERS EXPOSED TO LARGE
AND SMALL AMOUNTS OF CIGARETTE SMOKE

Amount of Exposure	Number of Absences Per Student	Rank of Data	z	Probability
Large	1.01 days	U = 3,188.0		
			-0.810	.416
Small	.72 days	U' = 3,558.0		

TABLE XXII

MANN-WHITNEY U ANALYSIS OF DAYS ILL BUT AT COLLEGE
BETWEEN NONSMOKERS EXPOSED TO LARGE AND
SMALL AMOUNTS OF CIGARETTE SMOKE

Amount of Exposure	Number of Absences Per Student	Rank of Data	z	Probability
Large	2.40 days	U = 3,262.50		
			-0.29	.77
Small	2.18 days	U' = 3,433.50		

TABLE XXIII

MANN-WHITNEY U ANALYSIS OF THE TOTAL RESPIRATORY
ILLNESSES BETWEEN NONSMOKERS EXPOSED TO LARGE
AND SMALL AMOUNTS OF CIGARETTE SMOKE

Amount of Exposure	Number of Illnesses Per Student	Rank of Data	z	Probability
Large	3.19	U = 3,308.0		
			-0.138	.88
Small	3.08	U' = 3,388.0		

TABLE XXIV

DAILY HOURS OF CIGARETTE SMOKE EXPOSURE AMONG NONSMOKERS

Number of Daily Hours of Exposure	Number of Subjects	Per Cent Subject
None	60	33.70
One to Two	46	25.84
Three to Four	37	20.79
Five to Six	23	12.92
More Than Eight	12	6.74

subjects) were exposed to cigarette smoke five or more hours daily.

Hypothesis 10 There will be no significant difference between men and women in the incidence of cigarette consumption.

Results: Rejected

In this study, 68 of the 115 men used cigarettes; there were 77 women who consumed cigarettes of the 208 women in the total sample. The percentages of men and women using cigarettes were 59 and 37 per cent, respectively. In testing for differences between the two groups, the Mann-Whitney U Test was employed. The U of 8,665.0 and the U' of 15,255.0 yielded a z of -4.51. The z of =4.51 according to Table A in Siegel (75) yielded a probability of .00006 for a two tailed test. Since the computed value of .00006 was well below the .05 level of confidence previously set, the hypothesis was rejected. There was a significant difference between men and women in the incidence of cigarette consumption. (See Table XXV.)

The 59 per cent of men smokers and 37 per cent of the women smokers can be compared with Haro and Dilley's study (38). The latter reported 40 per cent of the college men and college women to be consuming cigarettes.

Summary

In this study there were more nonsmokers than smokers, and men constituted the larger percentage of smokers. Characteristics of the typical Tulsa Junior College student who used cigarettes were: their ages ranged from 17 to 20, a pack of cigarettes was consumed daily, filter cigarettes were preferred over the plain cigarettes, and the majority of

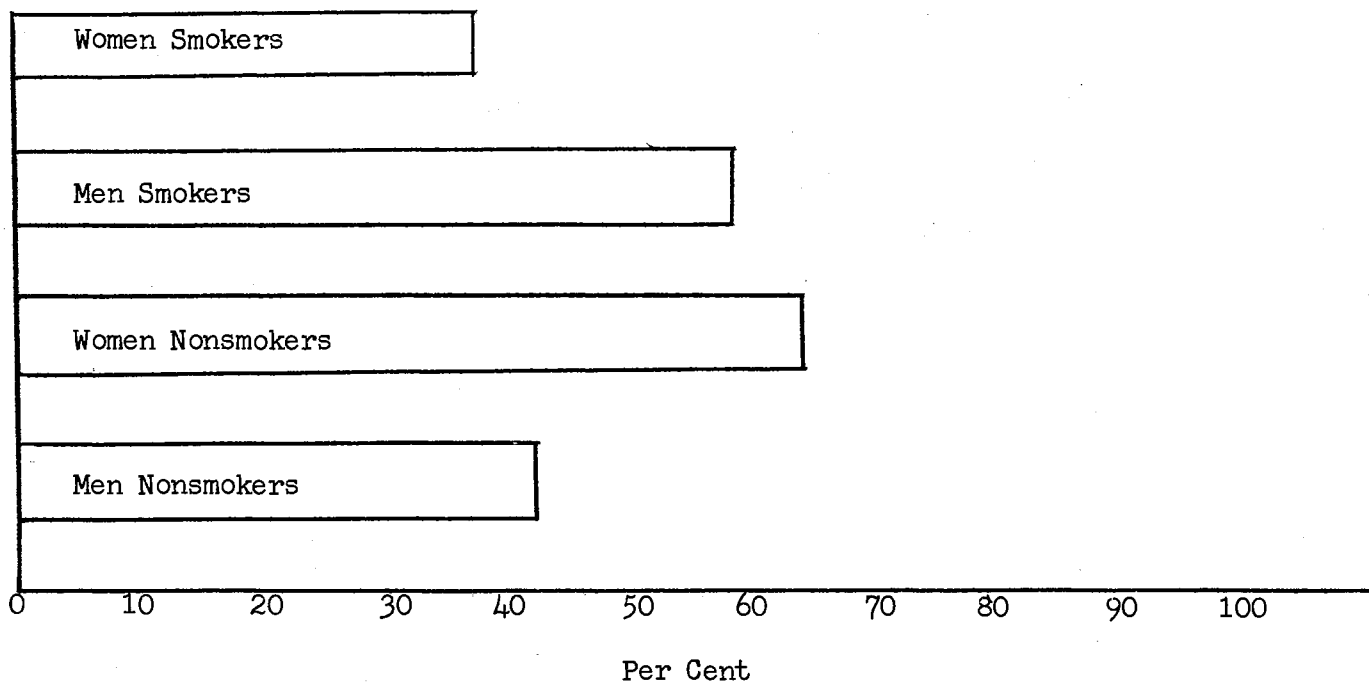


Figure 4. Per Cent of Men and Women Smokers and Nonsmokers

the smokers felt they could discontinue the cigarette habit if they so desired. Smokers experienced significantly more upper respiratory illnesses than nonsmokers, with significantly more days absent and more days ill while attending classes. There was no significant difference between degrees of cigarette consumption and upper respiratory illnesses.

TABLE XXV
MANN-WHITNEY U ANALYSIS OF THE INCIDENCE OF CIGARETTE
CONSUMPTION BETWEEN MEN AND WOMEN

Group and Number	Per Cent of Smokers	Rank of Data	z	Probability
Men 115	59	U = 8,665.0		
			-4.51	.00006
Women 208	37	U' = 15,255.0		

There was no significant difference between students from the medical programs and students from nonmedical programs in the incidence of cigarette consumption. Engineering related fields represented the largest percentage of smokers of all other vocations while the largest percentage of nonsmokers was represented by the field of education. There was no significant difference between students from the medical programs and students from the nonmedical programs in the number of

respiratory illnesses that resulted in days absent, days ill while attending college classes, and the combination of both.

There was no significant relationship between the number of years of cigarette consumption and the incidence of respiratory illnesses. There was no significant relationship between smoking habits and race. There was no significant relationship between smoking habits and student beliefs about cigarette consumption and knowledge of test scores. A majority of all students, however, felt cigarette consumption was harmful to health. Medical and nonmedical students failed to demonstrate any significant difference on the smoking knowledge test.

There was no significant difference between nonsmokers who were exposed to large amounts of cigarette smoke and those exposed to small amounts in the number of upper respiratory illnesses that resulted in days absent, days ill while attending college classes, and the combination of both.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

There were three chief purposes for this study. The first purpose was to determine the percentages of smokers and nonsmokers of Tulsa Junior College students while the second was to ascertain the characteristics of these college students who used cigarettes. Finally, there was a need to determine if there were a relationship between cigarette consumption and upper respiratory illnesses.

Because several researchers have reported a high rate of college students beginning the cigarette habit during the first year of college, there was a need to continue probing the issue of cigarette consumption among the college populations. A related area of interest examined was the students' knowledge of the effects of cigarette consumption upon the human body. How medical program students differed from nonmedical program students in attitudes and incidence of cigarette consumption, knowledge of the effects of cigarette consumption, and in the number of upper respiratory illnesses was another area of research. Finally, the problem of nonsmokers breathing cigarette smoke and the incidence of upper respiratory illnesses was pursued.

Procedure

The subjects for this investigation were 323 students from the

medical programs and all other major fields of study represented in the health, physical education, and recreation classes at Tulsa Junior College, Tulsa, Oklahoma, during the fall semester of 1972. Data for this study included a daily health record and a completed personal history and smoking knowledge questionnaire for each of the subjects. The daily health record included each subject's class attendance record and any respiratory complaint given by the student. If a subject suffered from one of the nine listed respiratory illnesses, an "R" was recorded if the subject were in class. If the subject had been absent with one of the nine listed respiratory illnesses, the instructor recorded an "A" and an "R" on the health record. For every day, Monday through Friday, a subject suffered from one of the nine respiratory illnesses either at the college or at home, an appropriate symbol was recorded. This daily health record was kept for 12 weeks by each of the cooperating instructors in the investigation. At the end of the 12 week period, the personal history and smoking knowledge questionnaire was administered once to all the subjects in the medical programs and health, physical education, and recreation classes. The subject's record of respiratory illnesses, while absent and ill while attending classes, were computed and correlated with designated items on the questionnaire. The subjects were divided into groups of smokers and nonsmokers and medical program students and students in all other major fields of study in order to determine the relationship of cigarette consumption and upper respiratory illnesses among these groups.

Questionnaire Development

There were three aspects of tobacco use represented in the question-

naire, the personal-psychological, historical and sociological, and the physiological. These were the same three concepts that Galarneau and Thompson (36) developed for their smoking and tobacco knowledge test. Questionnaire construction for this form included 18 questions from the personal-psychological aspect of tobacco, six questions from the historical or sociological aspect of tobacco, and 14 questions from the physiological aspects of tobacco. The 20 smoking knowledge test questions were developed from ideas and materials of persons considered to be experts in the field of health and medicine.

The first part of the form included 12 personal history questions followed by an attitude question concerning the subject's belief about cigarette consumption and health. In the final part of the form, students who used tobacco were requested to respond to questions 34 through 37; these four questions dealt with tobacco consumption habits. Because of the nature of these 17 questions mentioned above, there was no one correct response to the questions.

Statistical validity of the smoking knowledge test questions was determined by the Flanagan Index of Discrimination Formula and a difficulty rating test.

Reliability of the entire questionnaire was determined by comparing the values of the tested hypotheses twice. The first testing of the hypotheses included 35 subjects who had completed the form twice. These 35 subjects were enrolled in two classes participating in the study, and they had been requested to complete the form twice. The second testing of the hypotheses excluded these 35 subjects. Comparisons of the similarity of the values from the two sets of tested hypotheses established reliability.

Reliability was further checked by comparing the 35 subjects' responses on both questionnaire IBM answer cards against each other for consistency in responses. These responses in turn were compared with the subjects' own records in the Tulsa Junior College Admissions Office.

Statistical Designs

In addition to the data being converted into percentages, five statistical designs were employed from the Oklahoma State University Computer Center: the Kruskal-Wallis Test Program, the Mann-Whitney U Test Program, the BMD-03D Correlation With Item Deletion Program, the CPS Chi-Square Program, and the BMD02S Contingency Table Analysis.

Descriptive Results

1. There were 145 smokers and 178 nonsmokers in this study. Expressed in percentages, there were 45 per cent of the subjects who used cigarettes; 55 per cent of the subjects were nonsmokers.
2. Of the 145 subjects who consumed cigarettes, 59 per cent were men and 37 per cent were women.
3. There were 41 per cent men and 63 per cent women who were nonsmokers.
4. There were 36 discontinued smokers.
5. Characteristics of the typical Tulsa Junior College student who used cigarettes were: 49 per cent smoked a pack of cigarettes daily, 36 per cent had smoked cigarettes for five years or longer, 90 per cent used filter cigarettes, 53 per cent were in the 17 to 20 years of age range, and 32 per cent felt they could quit smoking cigarettes, but did not wish to do so.
6. Cigarette consumption rates for the smokers in this study were:

32 per cent used one-half a pack of cigarettes daily, 49 per cent of the students smoked a pack of cigarettes daily, 14 per cent smoked one and one-half packs of cigarettes daily, and 5 per cent smoked about two packs of cigarettes daily.

7. The length of time students had consumed cigarettes was: 15 per cent had smoked cigarettes less than one year, 17 per cent had smoked cigarettes for one to two years, 13 per cent had smoked cigarettes for three years, 18 per cent had smoked cigarettes for four years, and 36 per cent had smoked cigarettes for five years or longer.
8. The responses given about discontinuing the cigarette habit were: 32 per cent felt they could quit smoking cigarettes, but they did not wish to do so, or 23 per cent had tried to quit but were unsuccessful, 8 per cent felt they were unable to discontinue the habit, 13 per cent indicated they would quit smoking if their physician told them to do so, and 23 per cent felt none of the descriptions listed were applicable to them.
9. The ages of the students who consumed cigarettes were: 53 per cent were in the 17 to 20 years of age range, 24 per cent were in the 21 to 25 age bracket, 14 per cent were in the 26 to 30 age bracket, 5 per cent were in the 31 to 40 age bracket, and 4 per cent were in the over 40 years of age bracket.

Results of Hypotheses Testing

Hypothesis 1 There will be no significant differences among nonsmokers, light, moderate, and heavy smokers in the combined number of days ill while attending classes and days absent due

to upper respiratory illnesses.

The null hypothesis was rejected.

Hypothesis 2 There will be no significant differences among nonsmokers, light, moderate, and heavy smokers in the number of days absent from the college ill due to upper respiratory illnesses.

The null hypothesis was rejected.

Hypothesis 3 There will be no significant relationship between the number of years smokers have consumed cigarettes and the incidence of upper respiratory illnesses.

The null hypothesis was accepted.

Hypothesis 4 There will be no significant relationship between smoking habits and the students' race.

The null hypothesis was accepted.

Hypothesis 5 There will be no significant relationship between smoking habits and students' beliefs and knowledge about cigarette consumption.

The null hypothesis was accepted.

Hypothesis 6 There will be no significant difference between students majoring in medical programs and students majoring in other fields of study at Tulsa Junior College in scores earned on the questionnaire smoking knowledge test section.

The null hypothesis was accepted.

Hypothesis 7 There will be no significant difference between students majoring in medical programs and students majoring in other fields of study at Tulsa Junior College in the incidence of cigarette consumption.

The null hypothesis was accepted.

Hypothesis 8 There will be no significant difference between absenteeism due to upper respiratory illnesses of the students majoring in the medical programs and of all other students at the college.

The null hypothesis was accepted.

Hypothesis 9 There will be no significant difference in the incidence of upper respiratory illnesses between nonsmokers who are exposed to a large amount of cigarette smoke and nonsmokers who are exposed to a small amount of cigarette smoke.

The null hypothesis was accepted.

Hypothesis 10 There will be no significant difference between men and women in the incidence of cigarette consumption.

The null hypothesis was accepted.

Conclusions

There were more nonsmokers than smokers in this study. Men comprised a significantly larger percentage of smokers as compared to the women.

Students who used cigarettes, regardless of the amount consumed, experienced significantly more upper respiratory illnesses as indicated by days absent and days ill while attending classes than nonsmokers.

In comparing the medical program students and the nonmedical program students, neither group demonstrated any significant difference in level of ability on the smoking knowledge test nor any significant difference in the incidence of cigarette consumption.

There was approximately the same percentage of smokers and non-smokers among the medical program students and nonmedical program students. Because the percentages were so similar, there was no significant difference between the two groups in the incidence of cigarette consumption.

While the nonmedical program students experienced more upper respiratory illnesses than the medical program students in the number of days absent and number of days ill while attending classes, this difference was not statistically significant.

There were three hypotheses which tested the relationships of cigarette consumption habits and a stated variable. First, while there was no significant relationship between cigarette consumption habits and race, the percentage of smokers among each of the races was high. Each exceeded 40 per cent with the Negro race having the highest percentage, 50 per cent.

While there was no significant relationship between smoking habits and students' beliefs and knowledge about cigarette consumption, most subjects felt cigarette smoking was harmful to their health.

Finally, there was no significant relationship between the number of years smokers had consumed cigarettes and the number of days absent due to upper respiratory illnesses. The correlation was so low, the value was considered to have a negligible relationship.

The last conclusion derived from the tested hypotheses was there was no significant difference in the incidence of upper respiratory illnesses between nonsmokers who were exposed to three hours or more or cigarette smoke and nonsmokers who were exposed to two hours or less of cigarette smoke.

Recommendations

Because there was a positive relationship between cigarette consumption and upper respiratory illnesses found in this study that resulted in absenteeism and days ill while attending classes, it appeared to the investigator that there was an urgent need to present the facts of the effects of cigarette consumption to all students entering the college campus in hopes of preventing this cigarette habit and discouraging those who already have begun the habit.

Perhaps this huge task could be implemented with the involvement of the student council on a college or university campus working with personnel from the Health, Physical Education, and Recreation Department. The facts of the effects of cigarette consumption upon the human body could be disseminated through a student orientation class or meeting and in the health, physical education, and recreation classes during a semester.

The choice of the health, physical education, and recreation personnel being involved in this project seemed justified for several reasons. First, there is a need for college students to learn about themselves and to learn how to care for themselves, for the subject of personal hygiene is usually dealt with very superficially in high school biology, home economics, family relations and child development, and physical education. College personnel in health, physical education, and recreation have become very scientific in their approach to physical education. With this type of scientific background, an explanation of how cigarette consumption affects the physiological function of the body would be well within the parameters of health, physical education, and recreation experiences.

Another reason why the health, physical education, and recreation personnel should accept the responsibility for this project is the students are currently interested in physical fitness. Certainly becoming more knowledgeable in the effects of cigarette consumption upon the human body would be most helpful to many college students in their pursuit of becoming physically fit.

Finally, some Health, Physical Education, and Recreation Departments have research laboratories. Within the research laboratories seminars on the effects of cigarette consumption upon the human body could be conducted with the students involved in the experiments.

Perhaps as a capstone experience, the health, physical education, and recreation personnel could conduct a withdrawal clinic for the cigarette smokers if there were an expressed interest.

The results of this investigation suggested to the investigator that the development of a unit of study for college students concerning cigarette consumption and health would be appropriate. Courses on the college and university level include personal hygiene or college health; perhaps an individualized instruction unit or a programmed learning unit on the effects of cigarette consumption upon the human body would facilitate learning in this area. Although previous studies (32) (62) did not agree as to which group, the smokers or the nonsmokers, were the more knowledgeable or better informed about the effects of cigarette consumption, perhaps a desirable study could be designed to test for this knowledge after an individualized instruction unit has been presented.

Another credible study that could be conducted would be an expansion of the investigator's research to extend to other junior colleges in the state. Such a study would allow an investigator to compare results from

an urban junior college with other junior colleges in the state of Oklahoma. Perhaps such a study would reveal if the findings in this study were typical or atypical for students matriculating in an urban junior college. An investigation of this nature perhaps could disclose any significant differences in students' cigarette consumption habits between junior colleges located in metropolitan areas and junior colleges located in towns of Oklahoma.

Comparing the scores from the smoking knowledge questionnaire of the Oklahoma Medical School students with scores earned on the same form from Tulsa Junior College medical program students and nonmedical program students appears to warrant further study. Included in such an investigation could be scores earned by first year pre-medical school students, sixth year intern students, and students who had completed all the requirements for the degree of Doctor of Medicine. With personal smoking habits being polled an investigator could determine if increased knowledge affected students' personal smoking behavior.

Finally an investigation of cigarette consumption and upper respiratory illnesses in a closed college aged population where the young adults health habits could be observed would be highly desirable. In such a population like Tinker Air Force Base in Oklahoma City, Oklahoma, upper respiratory illnesses could be diagnosed, monitored, and treated. In addition, the variable of nutrition and adequate rest and relaxation could be controlled.

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APPENDIX A

ATTENDANCE AND HEALTH RECORD

APPENDIX B

INSTRUCTIONS FOR KEEPING THE ATTENDANCE
AND HEALTH RECORD

INSTRUCTORS:

Please find out each day if any students have had or have any of the following:

asthma
 bronchitis
 colds
 emphysema
 hayfever
 influenza
 sinusitis
 sore throats

Please write an "R" in the day's box if a student COMES TO SCHOOL with one of the above or is ABSENT with one of the above.

Keep the record as follows:

- is a respiratory absence (student was gone for one of the above reasons)
- student is present but has a respiratory illness
- present and has no respiratory illness
- absent and not due to a respiratory illness

APPENDIX C
QUESTIONNAIRE

1. Age:
 - (1) 17-20
 - (2) 21-25
 - (3) 26-30
 - (4) 31-40
 - (5) over 40
2. Sex:
 - (1) female
 - (2) male
3. Race:
 - (1) American Indian
 - (2) Caucasian
 - (3) Negro
 - (4) Other
4. The professional program I am majoring in is in the area of:
 - (1) Business
 - (2) Education
 - (3) Engineering, drafting, technical occupations
 - (4) Medicine
 - (5) Other
5. Which of the following descriptions best fits you?
 - (1) I am currently smoking cigarettes
 - (2) I do not smoke cigarettes and have never smoked regularly
 - (3) I quit smoking cigarettes
6. I quit smoking cigarettes:
 - (1) Less than six (6) months ago
 - (2) More than a year ago
 - (3) This question does NOT apply to me
7. The length of time I smoked cigarettes BEFORE QUITTING was:
 - (1) 1-6 months
 - (2) 7-12 months
 - (3) More than a YEAR AGO
 - (4) This question does NOT apply to me
8. Mark all the diseases or illnesses you have had since school began this fall from this list:
 - (1) bronchitis
 - (2) cold
 - (3) influenza
 - (4) sinusitis
 - (5) sore throat

Go to next page please

9. From this list of diseases or illnesses from question number 8, MARK ALL you have CHRONICALLY (one that lasts for SOME TIME and REOCCURS):
- (1) bronchitis
 - (2) cold
 - (3) influenza
 - (4) sinusitis
 - (5) sore throat
10. From this list, please mark ALL the diseases or illnesses you have had since school opened this fall:
- (1) allergies—that affects your upper respiratory system
 - (2) asthma
 - (3) emphysema
 - (4) hayfever—that affects your upper respiratory system
 - (5) pneumonia
11. From the list of diseases and illnesses in question number 10, please mark ALL you have CHRONICALLY:
- (1) allergies that affects your upper respiratory system
 - (2) asthma
 - (3) emphysema
 - (4) hayfever that affects your upper respiratory system
 - (5) pneumonia
12. How many hours in an average day do you breathe your own cigarette smoke or others in close proximity or in an enclosed area such as at home, work or school?
- (1) none
 - (2) 1-2 hours
 - (3) 3-4 hours
 - (4) 5-6 hours
 - (5) more than 8 hours
13. Do you feel cigarettes are harmful to health?
- (1) No
 - (2) Yes
 - (3) Uncertain

KNOWLEDGE SECTION

On this page please answer each of the following questions to the best of your ability.

14. Filter cigarettes:
 - (1) are complete safe to smoke
 - (2) are effective in removing tobacco tars equally in all brands of cigarettes
 - (3) remove tars but not nicotine
 - (4) of some brands allow as much tar and nicotine as nonfilter cigarettes

15. The amount of nicotine taken into the body is least influenced by:
 - (1) amount of nicotine contained in the tobacco
 - (2) length of cigarette
 - (3) speed of smoking
 - (4) weight of smoker

16. The irritation to the nose and throat by smoking is:
 - (1) caused by tobacco tars
 - (2) caused by the ammonia gases in the smoke
 - (3) caused by the carbon of burning paper
 - (4) caused by the nicotine in tobacco

17. The blood pressure reaction of the average person to smoking is that it:
 - (1) will not be affected by smoking
 - (2) will be raised temporarily
 - (3) will be lowered temporarily
 - (4) will not be affected in the habitual smoker

18. The effect of smoking on heart rate is:
 - (1) an increase for a brief period
 - (2) a decrease for a brief period
 - (3) no measurable effect
 - (4) not affected in the habitual smoker

19. The male cigarette smoker's chances of developing lung cancer are:
 - (1) slightly greater than the female
 - (2) no different than the female
 - (3) at least five times greater than the female
 - (4) greatly reduced by filter cigarettes

20. The effects of smoking upon strength are that it:
 - (1) increased strength in adults
 - (2) decreases strength in adults
 - (3) affects the strength of habitual smokers only
 - (4) has no effect upon strength

Go to next page please

21. Studies reveal that the greatest health damage occurs in persons who:
- (1) smoke cigars
 - (2) are males and have smoked cigarettes for five years
 - (3) are women and have smoked cigarettes for five years
 - (4) start smoking cigarettes early in life
22. The risk of death in male cigarette smokers in relation to non-smokers is greater in:
- (1) old age—65 to 75 years of age
 - (2) middle age—35 to 55 years of age
 - (3) young men—20 to 35 years of age
 - (4) adolescents—12 to 19 years of age
23. Smokers chances of dying from lung cancer are greater than those of a nonsmoker by:
- (1) 2 to 1
 - (2) 10 to 1
 - (3) 30 to 1
 - (4) 50 to 1
24. Which of the following diseases has been shown to be related to smoking:
- (1) chronic bronchitis
 - (2) cancer of the esophagus
 - (3) cancer of the kidney
 - (4) all of the above
25. Lung cancer is:
- (1) not correlated to the number of years that a person has smoked
 - (2) rare among nonsmokers
 - (3) more frequent among women than men
 - (4) none of the above
26. Cigarette consumption:
- (1) is higher in the older adult population than in the younger adult population
 - (2) is higher in both older adult and younger adult population than ever before
 - (3) is lower in the older adult population than in the younger adult population
 - (4) is lower for the total population due to the education programs in the schools
27. Teenagers are most likely to smoke if:
- (1) their mother smokes
 - (2) their father smokes
 - (3) both parents smoke
 - (4) their friends smoke

Go to next page please

28. The after effects of smoking two cigarettes on the circulatory system for approximately 30 minutes after smoking is:
- (1) an increased blood flow
 - (2) decreased heart rate
 - (3) blood pressure stabilized
 - (4) reduction in skin temperature in extremities
29. The disease emphysema is:
- (1) a serious but curable disease
 - (2) a disabling disease now on the decline
 - (3) is caused only by smoking cigarettes
 - (4) is rare among nonsmokers
30. The amount of tar and nicotine in a cigarette is:
- (1) the same throughout a cigarette
 - (2) higher in the first two-thirds of the cigarette
 - (3) about equal in the first one-third as the last one-third
 - (4) several times greater in the last one-third of the cigarette
31. A characteristic from the profile of the average high school and college student who smokes cigarettes is:
- (1) one or both parents smoke cigarettes
 - (2) intelligence and superior grades
 - (3) active participation in school activities and athletics
 - (4) a high social and economic background
32. Cigarette consumption during pregnancy:
- (1) often suffocates the unborn fetus
 - (2) increases a baby's weight
 - (3) has resulted in more abortions and premature births
 - (4) has no effect on the fetus
33. The compound or chemical that appears to destroy the cilia of the respiratory passages and effects the heart and blood vessels is:
- (1) hydrogen sulfide
 - (2) lobeline
 - (3) nicotine
 - (4) ammonia

QUESTIONS BELOW FOR SMOKERS ONLY

34. How much do you smoke EACH day?
- (1) about one-half ($1/2$) a pack
 - (2) about a pack
 - (3) about a pack and a half ($1\ 1/2$)
 - (4) about 2 packs
35. How long have you been smoking regularly?
- (1) less than 1 year
 - (2) 1 - 2 years
 - (3) 3 years
 - (4) 4 years
 - (5) 5 years or longer

Go to next page please

36. What do you smoke? (Check ALL forms used)
- (1) filter cigarette
 - (2) plain cigarette
 - (3) cigar
 - (4) pipe
37. Which description about quitting the cigarette habit best fits you?
- (1) I have tried to quit but have been unsuccessful
 - (2) I think I can quit smoking, but I don't want to
 - (3) I would like to quit, but don't feel that I can
 - (4) I would quit smoking if my physician told me I should
 - (5) none of the above

APPENDIX D

INSTRUCTIONS FOR QUESTIONNAIRE

INSTRUCTIONS TO BE READ ALOUD AND THEN GIVEN TO THE STUDENTS

Today you are being asked to take part in a class project concerning health education. The information you give on this project will be quite helpful. This is NOT a test. It will NOT be graded. Your responses will only be tabulated by IBM for GROUP results to learn about student health. ALL information will be kept confidential. If you have completed this form in another class, please complete this form again.

Please sign in INK your name, social security number, and the name of the class you are now in on the white IBM card. No other marks are needed on this card. Now please take the blue edged IBM card. In INK write your name only on the BACK of it.

Now turn to the question section. Place ALL of your responses or answers in pencil only on the blue edged answer IBM card. Be sure each answer is marked clearly and fully on the answer card. Make no responses on the question sheet itself.

On Questions 8 through 11, you will make your responses as appropriate for you; that is, you may need to mark more than one answer or you may find that none of the questions apply to you. Be sure to read EACH question to see if the question applies to you. On the Questions 14 through 33, there is only ONE correct answer.

Please answer Questions 1-33 to the best of your ability. Questions 34 through 37 are to be answered only by smokers. When you are finished, please return the questions sheet, both IBM cards, and your pencil.

Thank you.

VITA

Mary Paula Hunter

Candidate for the Degree of

Doctor of Education

Thesis: THE RELATIONSHIP OF CIGARETTE CONSUMPTION AND UPPER RESPIRATORY DISEASE AMONG COLLEGE STUDENTS

Major Field: Higher Education

Minor Field: Health, Physical Education and Recreation

Biographical:

Personal Data: Born in Ponca City, Oklahoma, January 31, 1939, the daughter of Charles and Katherine Hunter, and have one son, John.

Education: Graduated from Ponca City High School, Ponca City, Oklahoma, in May, 1957; received the Bachelor of Science degree in Health, Physical Education, and Recreation from Oklahoma State University in May, 1961; received the Master of Science degree in Student Personnel Work in Higher Education, Syracuse University in August, 1963; completed requirements for the Doctor of Education degree in Higher Education at Oklahoma State University in July, 1974.

Professional Experience: Traveling Counselor for Kappa Delta Sorority, 1963-1964; Head Counselor for Wentz Dormitory, Oklahoma State University, 1964-1965; Physical Education Instructor at Edison Junior High, Tulsa, Oklahoma, 1965-1966; Instructor of Health, Physical Education, and Recreation at Drury College, Springfield, Missouri, 1966-1968; Counselor at Charles Page High School, Sand Springs, Oklahoma, 1969-1970; Instructor of Health, Physical Education, and Recreation at Tulsa Junior College, Tulsa, Oklahoma, 1970 to present.

Professional Organizations: American Association for Health, Physical Education, and Recreation; Oklahoma Association for Health, Physical Education, and Recreation; and Oklahoma Education Association.