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EFFECTS OF TOBACCO SMOKING  
AND ATHLETICS

by

James D. Anderson

EFFECTS OF TOBACCO SMOKING  
AND ATHLETICS

A Term Paper  
Presented in Physical Education 530  
To Eastern Illinois University

In Partial Fulfillment Of The  
Requirements For the Degree  
Master of Science in Education

by

James D. Anderson

May, 1961

EFFECTS OF TOBACCO SMOKING  
AND ATHLETICS

This paper has been approved as  
partial fulfillment of the require-  
ments for the Degree Master of Science  
in Education.

Approved:

A handwritten signature in cursive script, appearing to read "Maynard O'Brien", is written over a horizontal line.

Dr. Maynard O'Brien  
Advisor  
Class Instructor

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## I. INTRODUCTION

Charles Lamb, the English Essayist once wrote:  
"For thy sake, tobacco, I would do anything but die."<sup>1</sup> Just how many people have died ultimate deaths for the sake of tobacco is a concern of scientists, doctors and various other people.

It is of primary interest to athletes, coaches and others connected with athletics; the effects that smoking tobacco has upon the human body.

Capable scientists still debate the degree of influence cigarette smoking has on lung cancer, heart disease, and other conditions.

Industry continues to issue denials of the validity of scientists' findings and conclusion.

If the cigarette industry does not believe these findings, why do they continue to try to cut down tar and nicotine that is taken into the body thru tobacco smoke? Why do they make filters for cigarettes to dut down these harmful ingredients from entering the body thru the mouth and nose? Why is there so much advertisment as to the nicotine and tars taken into the body thru cigarette smoking?

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<sup>1</sup>Pat McGrady, Cigarettes and Health(New York: Public Affairs Pamphlets., 1960) No. 220A, P. 2.

America's young people appear to be smoking earlier and heavier than ever before.<sup>2</sup> Among these students are athletes of whom cigarettes and other forms of tobacco smoking effect their performance.

The purpose of this paper is to show evidence of the effect of tobacco smoking and give coaches and other people connected with athletes, ammunition to prove that smoking has a definite effect upon the body in given situations. Although this paper is written primarily to bring information to those specifically concerned with athletics, it might well apply to all people.

The mind and body will be referred to as the organism since it is the belief of the writer that what affects the body, could affect the mind and vice versa. The purpose of this paper is not to tell people not to smoke or to quit smoking, but to produce information as to the effects of smoking and let the reader draw his own conclusions.

Many tests have been made in experimental laboratories, both in this country and abroad, which demonstrate the harmful effects of tobacco on physical efficiency. One such experiment dealt with nearly two thousand army cadets in England

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<sup>2</sup>William D. Boutwell, What's Happening in Education? (Chicago: National Parent-Teacher, September, 1959)p. 13.

who competed annually in three-mile, cross-country runs over a seven-year period. The percentage of non-smokers who placed among the first ten was three times as great as that of heavy smokers, and heavy smokers were three times likely to end up in one of the last ten places.<sup>3</sup>

Coaches usually required that players refrain from smoking while they are in training. Although coaches may not be able to prove that an athlete's ability and performance are lowered by smoking, most of them agree that this is just what happens. Even if they make no scientific study of the matter, they develop a general impression of the relationship between smoking and performance in sports which is quite valid.

It is generally agreed by physicians that young people should not use tobacco while their bodies are going through delicate changes of growth into adulthood. Smoking tends to cause an immediate increase in blood sugar and so tends to reduce the feeling of hunger.<sup>4</sup> Smoking itself does not stunt the growth, but the effects of nicotine on blood sugar and the resulting effects of hunger may cause the mental

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<sup>3</sup>State of Illinois, Office of Public Instruction, Information on Tobacco (Springfield, 1960) p. 3.

<sup>4</sup>Ibid. p. 3



and physical development of young people to be slower than normal by taking the edge off normal, healthy appetites. The habitual use of tobacco and other drugs weakens the ability of youth to concentrate. Drugs encourage responses to desires and emotions which perhaps help to avoid the difficult things.<sup>5</sup>

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<sup>5</sup>Ibid., p. 3

## II. HISTORICAL BACKGROUND

It is believed that tobacco was used in China in ancient times, the knowledge of the plant and its uses spread to the rest of the world through America. At the time Columbus discovered the New World, the Indians were smoking and chewing tobacco, and using it as snuff.

Tobacco is a plant of the night shade family, whose leaves have enormous commercial value. Tobacco is not a food, nor can it be said to fulfill any essential human need, but because its manufactured products are a source of pleasure to great numbers of the human race, it has an established place among plants cultivated for industrial purposes.

There are several species of the tobacco plant, but that designated as NICOTINA TABACUM (native to America) is commercially the most important.

Tobacco leaves are ready for harvesting when the surface becomes a mottled yellow and green. The methods of cutting and curing vary for different kinds of tobacco. In some cases, the entire plant is cut down when the middle leaves are ripe, and in others the leaves are removed separately as each one matures.

The United States is the leading country in the

production, consumption, and export of tobacco. The annual tobacco crop of the United States as a whole ranges between a billion and a billion and a half pounds.

The manufacture of tobacco products is an industry of enormous proportions. Only the income tax is a greater source of revenue to the American Government than the tax on tobacco in its various forms.<sup>6</sup>

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<sup>6</sup>World Book Encyclopedia (Chicago: The Quarrie Corporation, 1961) Vol. 16., p. 7193.

### III. WHAT IS IN A CIGARETTE

In order to bring about information as to the harmful effects of tobacco smoking, it is necessary to understand the chemicals that are given off when tobacco is burning. Many people only consider the nicotine content, but there are other chemicals given off that are harmful and must be considered.

The following is a list, in alphabetical order of the chemicals given off in tobacco smoke.<sup>7</sup>

ALDEHYDES,	a colorless, very effective preservative and disinfectant.
AMMONIA,	a colorless gaseous compound of nitrogen and hydrogen.
ARSENIC,	a non-metallic element, extremely poisonous. Insecticidal used on tobacco plants and containing arsenic may result in arsenic content of cigarettes far in excess of limits allowed by law for foods.
BENZOPYRENE,	a hydrocarbon occurring in coal tar.
CARBOLIC ACID,	produced by the destructive distillation of wood, coal, etc., and obtained from coal tar. A powerful acaustic poison.
CARBON DIOXIDE,	popularly known as carbonic acid gas, familiar in soda water. Condensed and cooled, known as dry ice.
CARBON MONOXIDE,	product of the incomplete combustion of carbon. It seeks another oxygen molecule, and is very poisonous because it combines with the hemoglobin to carry the essential oxygen.

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<sup>7</sup>Roger William Riis, The Truth About Smoking (New York: Grosset and Dunlap., 1951) p. 4

FORMIC ACID,	a blistering agent, and counter irritant.
METHANE,	a gaseous hydrocarbon, light, odorless, inflammable, a product of the decomposition of organic matter in marshes and mines.
METHYL ALCOHOL,	wood alcohol. Causes intoxication, blindness, comma, often death.
METHYLAMINE,	a colorless, inflammable gas of strong ammonia odor, obtained from herring brine, distillation of wood, bones, etc.
NICOTINE,	a very poisonous alkaloid, the active principle of tobacco. In taste, acrid and burning.
PRUSSIC ACID,	also known as hydrocyanic acid, one of the most rapidly acting of all poisons. Used in several states for executing criminals. Peach blossom odor.
PYRIDINE,	obtained in distillation of bone oil, coal tar, etc. The parent of many organic compounds such as nicotine.
SULPHIDE OF HYDROGEN,	a colorless, inflammable poisonous gas, with the characteristic odor of rotten eggs.

In addition to this list, the manufacture adds two other kinds of chemicals. These are the flavoring agent and an agent to preserve moisture.

To preserve moisture, the most common agent used is glycerin, familiar to us in many toilet preparations, as a preservative in food products, and as an anti-freeze in the car's radiator.

Flavoring agents are many--brandy, chocolate, cocoa, cinnamon, ginger, honey, licorice, maple syrup, molasses, methyl,

oil of cloves, rum sugar, essence of peach, and prune, vanilla odor and many others.

Of the natural chemicals (those not added by man) listed previously, six are outright poisons and one is a germicide.<sup>8</sup>

Conditioning and training are an important part of athletic competition. In setting up training regulations it is necessary to know why certain things should be avoided. Smoking tobacco and drinking alcoholic beverages should be avoided and are two training regulations that are a part of most coaches regulations. In order to set up such regulations it is a good idea to know what is contained in tobacco and alcohol to justify such a regulation. If asked why such a regulation is included, a coach should be able to substantiate his stand, as to why tobacco smoking and drinking alcoholic beverages should be avoided. For a coach to say that tobacco smoking should be avoided because "I" said so is not a qualified answer for an inquisitive youngster or other members of the community. It will certainly be beneficial to a coach to know what it contains that makes it harmful.

It must be realized that coaching not only requires a knowledge of the sport but also a knowledge of health, both physical and mental.

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<sup>8</sup>Ibid., p. 4.

#### IV. WHAT SMOKING DOES TO THE DIGESTIVE SYSTEM

Some people will not stop smoking because of the fear of gaining weight.

Added weight, it must be borne in mind is always the over-plus of food which has been eaten and for which the body has no use. It represents, in plain and unvarnished fact, an amiable lack of self discipline.

Regular smokers know that they seem to be able to stop or at least deaden the pangs of hunger by smoking. This is true. When the stomach is empty and craves food, it contracts the walls, in more or less regular periods. Dr. J. H. Lewis<sup>9</sup> at the University of Chicago announced two discoveries in this line: 1. Stomach contractions were slowed by the action of the smoke on the nerves of the mouth, and 2. nicotine and other substances in the swallowed saliva acted directly upon the nerves in the stomach lining. The effect was to suppress the hunger contractions of the stomach and make it relatively idle. When it is idle, no hunger is felt.

There is no available evidence that smoking causes ulcers. However, there are many reports that people who have

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<sup>9</sup>Alfred Koehler., Effect of Smoking on Malnutrition and Digestion (Gastroenter., February 1947) p. 208.

ulcers are advised not to smoke because smoking irritates and exemplifies the effect of the ulcer.

The Federal Trade Commission in a 1950 analysis stated; "The only physiological effect cigarette smoking can have upon digestion, if it has any at all, is harmful."<sup>10</sup> Such harmful effects may be an interference with the normal gastric and intestinal mobility, an increase in the acidity of the digestive fluids of the stomach, a lessening of the hunger sensation, or an aggravation of existing gastrointestinal disorders.<sup>11</sup>

Taking the evidence by and large, it is very clear that tobacco smoking does not cause ulcers, but there is something about it which ulcers like and under which they thrive and do not go away. Just what that something is the medical profession makes no attempt to say, beyond vague and contradictory words about "acid". In considering people who have ulcers, it may well be said that ulcers thrive better in people who smoke the most.<sup>12</sup>

An unexpected finding as to heavy smokers and the

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<sup>10</sup>Riis, op. cit., p. 27

<sup>11</sup>Ibid., p. 27

<sup>12</sup>R. C. Batterman and I. Ehrenfeld. "The Influence of Smoking Upon the Management of the Peptic Ulcer Patient," Gastroenter, No. 4 (April, 1949), p. 575



stomach is that the heavy smokers are more prone to complications after an abdominal operation. The reason is that heavy smokers are more likely to want to cough frequently to clear the throat. But after an abdominal operation a cough can cause trouble in the area of the operation; and on the other hand, a cough repressed can cause trouble in the throat.

A cigarette taken just before a meal can take the edge off a normal appetite and nicotine is surely no aid to digestion.<sup>13</sup>

Strength being the most important factor in physiological development in respect to athletics can not reach a maximum performance in an athlete who smokes because food is the basis for obtaining the necessary vitamins and proteins and since cigarettes can take the edge off a normal appetite an athlete cannot hope to gain the adequate amount of strength needed for maximum performance in a given circumstance. This is especially true in situations where endurance is a primary factor such as the mile run in track.

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<sup>13</sup> Sidney Russ, Smoking and Its Affects (New York; The Macmillian Co., 1955) p. 67

## V. WHAT DOES SMOKING DO TO EYESIGHT

There does not appear to be convincing evidence that there is any difference between the eyesight of people who smoke and people who do not smoke. What evidence there is suggests that the effect of smoking on the eye is due to the constrictive action of nicotine on the blood vessels, and that it is not permanent but ceases when smoking ceases. Over indulgence in smoking can be expected to show definite effect.<sup>14</sup>

Toxic ambyopia is the medical term for dimming of the vision due to any poisoning notably nicotine. The pupils dilate, the optic nerve becomes inflamed. Unless it has gone too far, as soon as the cause is removed, the condition departs.

The blood vessels of the retina are tiny and scarce. Smoking contracts blood vessels, even to the closing down of the smallest ones. The process in the eye can be watched through the ophthalmoscope. In five persons who were especially sensitive to smoking the vessels could be seen closing down between eighteen percent and twenty-six percent.<sup>15</sup>

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<sup>14</sup> Riis, op. cit., p. 30

<sup>15</sup> Ibid., p. 31

Dr. Sheard<sup>16</sup> at the Mayo Clinic reported some interesting mechanical effects of smoking on the dark adaptation of the rods and cones of the eye. He found 1. a definite decrease of level of light sensitivity for fifteen to thirty minutes after inhaling the smoke from two standard cigarettes; 2. practically the same effect if the smoke is drawn into the mouth and not inhaled; 3. no effect when less than five percent of the nicotine remains after filtering; 4. no effect of smoking cubebs, corn-silk cigarettes, or similar materials without nicotine.

The use of tobacco has a decided effect on the eyesight. Heavy smokers of tobacco almost invariably show some defect of the color fields, especially in the red and green. A central area in the field of vision will be blind to these two colors.<sup>17</sup>

Mistiness of vision or even blindness is attributed to an indirect action of nicotine upon a particular bundle of fibers in the affected optic nerve.<sup>18</sup>

It is difficult enough to participate in athletic events with 20-20 vision and to destroy that natural advantage

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<sup>16</sup> Ibid., p. 31

<sup>17</sup> David H. Kress, M. D., The Cigarette As A Physician Sees It. (Pacific Press Publishing Association, 1931) p. 26

<sup>18</sup> Russ, op. cit., p. 59

is a detriment to any athlete.

A disease of the eyes, known as "toxic amblyopia" is produced by certain poisons and leads to partial or complete blindness. This disease is occasionally found in heavy pipe smokers. As the disease progresses, the cells of the retina and optic nerve degenerate. Although many other drugs and poisons have produced this condition, it is most important to recognize the cause of this condition early, for if the cause is removed, the sight in many cases will return toward normal.<sup>19</sup>

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<sup>19</sup> Boutwell, op. cit., p. 3

## VI. EFFECT OF SMOKING ON THE LUNGS

Cancer of the lung has increased in recent years by leaps and bounds, just as cigarettes smoking has increased. Some say this may be only an apparent increase in cancer, it may have been there for centuries but is discovered and indentified today because of our superior diagnosis. The Graham-Wynder<sup>20</sup> research which combed exhaustive records of autopsies with this point in mind. The researchers gave special attention to German records, which are thorough and methodical, but they find no mention of a condition in the lung or lungs which the surgeons would surely have noticed.

In another investigation German researchers added another bit of evidence to the case against smoking. They made a study of 4,059 men and women with lung and bronchial cancer. The men had lung or bronchial cancer with frequency five times that of the women.<sup>21</sup> The doctors concluded that this was because more men smoke and inhale, have smoked longer, and the cancer producing effect is a matter of years of exposure.<sup>22</sup>

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<sup>20</sup>Ernest L. Wynder, Evarts A. Graham, Tobacco Smoking As A Possible Etiologic Factor in Bronchiogenic Carcinoma(Journal Of American Medical Association, May 1960) 143:329-36.

<sup>21</sup>Riis, op. cit., p. 21

<sup>22</sup>Ibid., p. 22

The Germans went a step further and diagnosed cancer of the liver and bladder as due, frequently, to the accumulation of products of tobacco combustion.

The Graham-Wynder report divided smokers into five categories, they are: Non-smokers (less than one cigarette a day for more than twenty years); Moderately heavy smokers (one to nine cigarettes a day for more than twenty years); Heavy smokers (sixteen to twenty cigarettes a day for more than twenty years); Excessive smokers (twenty-one to thirty-four cigarettes a day for more than twenty years); and chain smokers (thirty-five cigarettes or more a day for more than twenty years).

The purpose of breaking down into categories was to determine which people are the greatest percentage of smokers and percentage of cancer. The results of the findings were: that the greater amount of cigarettes smoked, the greater percentage of cancer.<sup>23</sup>

The search at the present time is for some factor in the environment which will help to explain the rapid rise of lung cancer. It is natural to inquire into contaminants of the air we breath. Gaseous products of domestic smoke, exhaust gases from motor vehicles, dust from tarred roads, and tobacco smoke are the ones under suspicion.<sup>24</sup>

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<sup>23</sup>Graham-Wynder, op. cit., p 36

<sup>24</sup>Russ, op. cit., p. 106

Evidence now at hand is sufficient to conclude beyond reasonable doubt that cigarette smoking greatly increases the probability of developing cancer of the lungs and cancer of other tissues which are directly exposed to tobacco smoke or condensed material from tobacco smoke.<sup>25</sup>

Cancer is important to everyone but there are other factors involved in smoking that affect the lungs that are of primary interest to coaches and athletes.

The extent to which the surfaces of the airways into the lungs will absorb the gases in tobacco smoke will depend to a large extent on the time the smoke is in contact with them.

When the lungs are at full expansion during inhaling the smoke and gases are carried into every part of the lung structure in just the same way as a intake of pure air. There is a continuous exchange in the lung tissue between the carbon dioxide, a gas which is to be given off, and oxygen is absorbed and then joins the haemoglobin of the blood and makes its way to the heart. This begins the circulation of nicotine thru the blood.<sup>26</sup>

When nicotine is taken in the body, the first reaction

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<sup>25</sup>The American Biology Teacher, Cigarette Smoking and Disease(Danville, Ill., Publication of the National Association of Biology Teachers, November 1959) p. 296

<sup>26</sup>Russ, op. cit., p. 41

of the lungs is constriction, the dilatation of the bronchi, and when large doses are taken in, the respiratory center is paralyzed.<sup>27</sup>

The intake of oxygen is especially important in athletics because oxygen is carried to the muscles through the blood stream which has an effect upon the fatigue of an individual.

The habitual use of tobacco, especially when it involves overindulgence, produces harmful effects in certain persons. The carbon monoxide which is present in tobacco smoke will, if inhaled, reduce the capacity of the hemoglobin of the red corpuscles to carry oxygen. This is due to the fact that hemoglobin absorbs carbon monoxide about three hundred times faster than it does oxygen, with which it ordinarily combines; therefore, to the extent that the blood takes on carbon monoxide, it cannot in that same proportion carry oxygen. This results in breathlessness when there is physical exertion.<sup>28</sup>

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<sup>27</sup> Pierre Schrupf Pierron, M.D. Tobacco and Physical Efficiency (New York: Paul B. Hoeber Inc., 1927) p. 32

<sup>28</sup> State of Illinois, Office of Public Instruction, op. cit., p. 3



## VII. EFFECTS OF SMOKING ON CIRCULATORY SYSTEM

Smoking can cause irregular heart beat, it can make the heart stop and jump beat which is enough to frighten anyone.

The normal pulse rate is seventy. Smoking a cigarette can increase the pulse rate to ninety-eight which is forty per cent above normal. The average increase is ten beats per minute.<sup>29</sup> During the time smoking, the heart beat increases: This means that there will be some effect in relation to systolic and diastolic blood pressure because the slow pulse rate of the trained individual is related to the magnitude of the systolic output, or stroke volume, of the heart. The increase in stroke volume, the net minute heart output of blood, even under resting conditions, is appreciably greater in trained than untrained individuals.<sup>30</sup> Through training, the heart adjustments to the venous return and the minute heart output are such as to increase its mechanical efficiency and thus diminish the burden placed upon it.<sup>31</sup> The efficiency of the heart rises as the stroke volume and the minute output are increased relative to the heart rate.<sup>32</sup>

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<sup>29</sup>A. V. Bock and C. Van Caulert. "Studies In Muscular Activity"., Journal of Physiology, (London, 1928) p. 66.

<sup>30</sup>Ibid. p. 136.

<sup>31</sup>Adrian Gould and Joseph A. Dye, Exercise and Its Physiology (New York, A. S. Barnes and Co., 1932) p. 383.

<sup>32</sup>Ibid., p. 384

By definition, pulse pressure is the arithmetical difference between the systolic and diastolic blood pressure.<sup>33</sup> During exercise, the diastolic pressure changes little and the systolic pressure rises considerable and the pulse pressure rather closely follows the fluctuations of the systolic pressure.<sup>34</sup> The pulse pressure may be used as a rough estimate of the trend of the change in the heart stroke, indicates an increase in stroke volume during exercise.<sup>35</sup>

Better athletes have a larger stroke volume, and in this lies their superiority.<sup>36</sup> Since tobacco smoking increases the heart and pulse rate and therefore decreases the stroke volume it may be concluded that tobacco smoking is a detriment to athletic performance.<sup>37</sup>

The blood pressure does not return to normal for approximately one hour after smoking.<sup>38</sup> Smoking increases

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<sup>33</sup> Peter V. Karpovich, Physiology of Muscular Activity (Philadelphia: W. B. Saunders Co., 1959) p. 219

<sup>34</sup> Ibid., p. 219

<sup>35</sup> Ibid., p. 219

<sup>36</sup> Ibid., p. 231

<sup>37</sup> Ibid., p. 232

<sup>38</sup> Riis, op. cit., p. 99

the blood pressure momentarily, but does not cause permanent high blood pressure.<sup>39</sup> When the first puff is inhaled the blood pressure rises sharply, but when smoking stops, it falls again, slowly, to normal.<sup>40</sup>

To speculate on this point, what happens to people who smoke one cigarette after another? It is obvious that the blood pressure stays higher than normal. If athletes smoke, it is evident that they cannot perform at their best because the heart is pumping at an un-normal rate, the blood pressure is higher and it is doubtful that the peak performance can be reached under these circumstances.

Investigators have demonstrated that normal persons, after smoking one cigarette, register higher blood pressure, increased pulse rate and lower temperature of the hands and feet, indicating a constriction of peripheral blood vessels.<sup>41</sup> The electrocardiograph also registers changes in the smoker's heart action. Usually these conditions revert to normal in less than an hour, but reappear after the smoking of another cigarette.<sup>42</sup>

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<sup>39</sup> Ibid., p. 11

<sup>40</sup> Ibid., P. 14

<sup>41</sup> Lois Mattox Miller and James Monahan, Nicotine-The Smoker's Enigma (Pleasantville, New York: Reader's Digest, January 1958) p. 16

<sup>42</sup> Eric Northrup, Science Looks at Smoking (New York: Coward-McCann, Inc., 1957) p. 95

The constricting of the surface blood vessels is in itself evidence enough that smoking is not good for the body. Since smoking temporarily constricts the blood vessels it can then be established that people who smoke one cigarette after another are changing this conception from temporary to permanent except when they are not smoking. An athlete then who smokes cannot gain maximum performance because of handicapping the body through the use of nicotine.

For those who do not believe that smoking effects the heart in an abnormal action, a simple experiment can be made. Pick out one individual at random, take the pulse rate, then have the individual smoke one cigarette and take the pulse rate again and compare the two. The writer has tested this experiment for thirty-two days in succession and the pulse rate has an increase from five to fifteen beats per minute.

The American Cancer Society's report on the smoking habits of 188,000 men between the ages of fifty and seventy years revealed a coronary death rate for smokers seventy percent higher than for nonsmokers.<sup>43</sup>

Since most athletic events are concerned with the functioning of the hands and feet, they should be given

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Miller and Monahan, op. cit., p. 17

consideration in training for competition. Smoking cuts down on the circulation in the hands and feet, therefore it can be established that smoking is a detriment to the performance of an athlete. The writer is not drawing a conclusion that smoking causes or attributes to Buerger's disease, but since smoking does cut down on circulation and Buerger's disease is characterized by poor circulation, there may be a correlation between the two.

Studies are now being made as to the contribution of smoking to Buerger's disease. Buerger's disease is definitely aggravated by smoking.

The American Heart Association has done research in respect to smoking and heart ailments.

There is evidence supported by clinical observations in a large number of cases, that tobacco smoking is harmful in certain diseases of the peripheral blood vessels of the arms and legs. This harmful effect is demonstrated most clearly in the condition known as thrombo-angiitis obliterans (Buerger's disease). It is known that this disease will usually continue to progress if the patient continues to smoke, and that it will usually become stationary, or even improve, if he stops smoking. If smoking is resumed, the disease will usually become active again.<sup>44</sup>

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<sup>44</sup> Committee on Smoking and Cardiovascular Disease, Cigarette Smoking and Cardiovascular Diseases (New York: American Heart Association, July 1960) p. 160

Although extensive work has been carried out to determine the cause of the changes in the heart during smoking, the controversy has not been settled. However, with new and more critical instrumentation, the answer may be forthcoming.

### VIII. CONCEPTS OF TOBACCO SMOKING

In a study to determine the validity and accuracy of tobacco smoking concepts in accordance to physiological effects jurors of experts rated the concepts as "true", "false," "debatable," or "ambiguous". Twenty-one of the physiological jurors were physicians, most of whom were specialists and many of whom were active in cancer and smoking research. The other three held doctor's degrees in physiology. From the jury ratings, approved lists of concepts were established physiological concepts.<sup>45</sup>

#### EVALUATION OF PHYSIOLOGICAL CONCEPTS FOR TOBACCO SMOKING EDUCATION

	T	F	D	A
1. Smoking is an irritant to the respiratory tract.	100	0	0	0
2. Individuals vary in physiological sensitivity by smoking. . . . .	100	0	0	0
3. Smoking generally reduces the appetite. . . . .	92	0	8	0
4. Moderate smoking for one person may be excessive for another. . . . .	92	0	0	8

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<sup>45</sup> Alexander F. Galarneaux, Clem W. Thompson, The Selection, Development, and Evaluation of Tobacco Smoking Concepts (Washington, D. C.: The Research Quarterly of the American Association for Health, Physical Education, and Recreation, May 1959, Vol. 30, No. 2) p. 147

	T	F	D	A
5. Today many physicians are advising many patients to quit smoking or reduce the number of cigarettes smoked daily.	88	0	12	0
6. Rather violent physiological reactions cause many individuals to become ill after their first experience with smoking.	88	0	8	4
7. Body temperatures of the fingers and toes are lowered when one smokes.	88	0	8	4
8. Inhaling causes a smoker to absorb more nicotine.	83	0	12	4
9. Ulcers of the stomach are more difficult to treat if the patient continues to smoke. . . . .	83	4	11	0
10. The smoker's cough often masks the first symptoms of lung cancer.	83	0	17	0
11. Death rates of heavy cigarette smokers are higher than non-smokers.	79	0	8	12
12. The great rise in male lung cancer in the United States is compatible with the increased cigarette consumption.	79	0	12	8
13. The physiological effects of smoking on the cardiovascular systems have been demonstrated on the electrocardiogram. . . . .	79	0	16	0



	<u>T</u>	<u>F</u>	<u>D</u>	<u>A</u>
14. Smoking affects the circulatory system through the autonomic nervous system.	75	8	8	4
15. The incidence of lip and mouth cancer is greater in smokers than non-smokers. . . . .	75	0	16	8
16. Most medical authorities believe there is an association between cancer of the lung and cigarette smoking. . . . .	74	0	25	0
17. Substances taken into the body in the smoke of burning tobacco include nicotine, ammonia gas, pyridine orpyridine derivatives, carbon monoxide, and tobacco tars.	75	4	20	0
18. The chances of developing lung cancer increases in proportion to the number of cigarettes smoked. .	71	4	24	0
19. In some individuals smoking causes increased irritability and nervousness. . . . .	71	4	24	0
20. Heart rate and blood pressure increases due to smoking tend to persist for ten to twenty minutes after smoking one cigarette. . . . .	67	4	16	4

Another evaluation by a general education jury established the value of these concepts to general education. A list of comprehensive teachable concepts is available to health educators, science teachers and other interested in tobacco smoking which would include coaches and athletes. The findings of this study based on physiological concepts are: <sup>46</sup>

GENERAL EDUCATION JURY RATINGS OF THE IMPORTANCE OF PHYSIOLOGICAL, PSYCHOLOGICAL TOBACCO SMOKING CONCEPTS.

I. Very Important to General Education

Physiological

1. Most medical authorities believe there is an association between cancer of the lung and cigarette smoking.
2. Smoking is an irritant to the respiratory tract.
3. Death rates of heavy cigarette smokers are higher than non-smokers.
4. The chances of developing lung cancer increase in proportion to the number of cigarettes smoked.
5. Inhaling causes a smoker to absorb more nicotine.
6. The great rise in male lung cancer in the United States is compatible with the increased cigarettes smoked daily.

7. Today many physicians are advising many patients to quit smoking or reduce the number of cigarettes smoked daily.
8. The physiological effects of smoking on the cardiovascular system have been demonstrated on the electrocardiogram and ballistocardiogram.
9. Individuals vary in physiological sensitivity to smoking.
10. Moderate smoking for one person may be excessive to another.
11. The incidence of lip and mouth cancer is greater in smokers than in non-smokers.
12. Substances taken into the body in the smoke of burning tobacco include nicotine, ammonia gas, pyridine or pyridien derivatives, carbon monoxide, and tobacco tars.
13. Heavy smokers past forty years of age should have an X-Ray every six months.

## II. Moderately Important to General Education.

### Physiological

1. In some individuals, smoking causes increased irritability and nervousness.
2. Smoking affects the circulatory system through the autonomic nervous system.
3. Ulcers of the stomach are more difficult to treat if the patient continues to smoke.
4. Heart rate and blood pressure increases due to smoking tend to persist for ten to twenty minutes after smoking one cigarette.

5. Smoking generally reduces the appetite.
6. Rather violent physiological reactions cause many individuals to become ill after their first experience with smoking.
7. Body temperature of fingers and toes are lowered when one smokes.

Psychology plays an important role in coaching athletics. Many games are won or lost due to the "state of mind," that an athlete reaches either prior to or during a contest.

Evaluation of psychological concepts for tobacco smoking education were conducted by twenty-four psychological jurors who were psychologists, in both research and teaching, with doctorates in the field. The following are the results of the survey.<sup>47</sup>

EVALUATION OF PSYCHOLOGICAL CONCEPTS FOR TOBACCO SMOKING EDUCATION

	<u>T</u>	<u>F</u>	<u>D</u>	<u>A</u>
1. Smoking may become a habit. . . . .	100	0	0	0
2. Adolescents frequently start smoking to indicate adult status. . .	97	3	0	0
3. Sociability, custom, and nervous habits are factors in smoking. . . . .	94	3	0	3
4. Some individuals believe it looks sophisticated to smoke. . . . .	94	0	6	0

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<sup>47</sup>

Ibid., p. 149

	<u>T</u>	<u>F</u>	<u>D</u>	<u>A</u>
5. Some children begin smoking because smoking means breaking away from parental restraint.	94	0	6	0
6. A person may smoke because he desires to be on a level with the other fellow. . . . .	94	0	3	3
7. The desire to smoke is in no way an innate desire. . . . .	88	3	3	6
8. Some people like to smoke for sensory pleasure. . . . .	88	0	6	6
9. The logical way to decide whether to smoke should involve a consideration of the advantage and disadvantage of smoking. . . . .	85	6	6	3
10. Many individuals smoke because their associates smoke. . . . .	82	3	12	3
11. A strong motivation must be present to break the smoking habit. . . . .	82	0	6	12
12. People smoke to relieve tension. . . . .	76	0	18	3
13. Many individuals feel a need to do something with themselves and their hands so they smoke. . . . .	76	0	18	6
14. Smoking habits may be changed by psychologically oriented advertising. . . . .	73	6	18	3

	<u>T</u>	<u>F</u>	<u>D</u>	<u>A</u>
15. Some people smoke to express sociability and an aid to poise.	73	3	15	9
16. Some people smoke to relieve anticipated stress. . . . .	73	0	24	3
17. Smokers are stimulated by watching others smoke.	73	3	18	6
18. Many individuals do not smoke because of participation in athletics.	70	9	15	6
19. Fear of certain disease implications associated with smoking is a deterrent to some potential smokers. . . . .	67	9	18	3

The evaluation of the general education jury ratings of the importance of psychological tobacco smoking concepts were broken down into very important, moderately important and the findings of this study were:

I. Very Important to General Education.

Psychological

1. Smoking may become a habit.
2. A strong motivation must be present to break the smoking habit.
3. Adolescents frequently start smoking to indicate adult status.

## II. Moderately Important to General Education.

## Psychological

1. The logical way to decide whether to smoke should involve a consideration of the advantage and disadvantages of smoking.
2. Sociability, custom, and nervous habit are factors in smoking.
3. Smoking habits may be changed by psychologically oriented advertising.
4. A person may smoke because he desires to be on a level with the other fellow.
5. Some children begin smoking because their parental restraint is being broken.
6. Many individuals smoke because their associates smoke.
7. Some people smoke to relieve anticipated stress.
8. Some individuals believe it looks sophisticated to smoke.
9. Many individuals do not smoke because of participation in athletics.
10. Many people smoke to relieve tension.
11. Individuals smoke to express sociability and as an aid to poise.
12. Many individuals smoke for relaxation.
13. The desire to smoke is in no way an innate desire.
14. In a time of crisis, a smoker may find a quieting power in a cigarette.

15. Many individuals feel a need to do something with themselves and with their hands so they smoke.
16. Some people like to smoke for sensory pleasure.



## IX. SUMMARY

There was evidence that smoking does not contribute to the healthful functioning of the body and that any effect that tobacco smoking has on the body is detrimental to its normal function.

The habitual use of tobacco and other drugs weaken the ability of youth to concentrate. Drugs encourage responses to desires and emotions which perhaps help to avoid the difficult things.

A cigarette taken just before a meal can take the edge off a normal appetite and nicotine is surely no aid to digestion. Stomach contractions are slowed by the action of smoke on the nerves of the mouth. Nicotine and other substances in the swallowed saliva act directly upon the nerves in the stomach lining. This effect suppresses the hunger contractions of the stomach and make it relatively idle. When hunger contractions are idle, no hunger is felt.

Smoking does not cause ulcers, but there is something about it which ulcers like and under which they thrive and do not go away. In considering people who have ulcers, it may well be said that ulcers thrive better in people who smoke the most.

The use of tobacco has a decided effect on the eyesight. Heavy smokers of tobacco almost invariably show some defect of the color fields, especially in the red and green. A central

field of vision will be blind to these two colors.

Mistiness of vision or even blindness is attributed to an indirect action of nicotine upon a particular bundle of fibers in the affected optic nerve.

There is sufficient evidence to conclude that cigarette smoking greatly increases the probability of developing cancer of the lungs and cancer of other tissues which are directly exposed to tobacco smoke or condensed material from tobacco smoke.

Better athletes have a larger stroke volume of the heart, and in this lies their superiority. Tobacco smoking increases the heart and pulse rate and decreases the stroke volume. It may be concluded that tobacco smoking is a detriment to athletic performance.

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