# THE INCIDENCE OF COLDS AMONG COLLEGE WOMEN WHO SWIM DURING THE WINTER MONTHS

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# THE INCIDENCE OF COLDS AMONG COLLEGE WOMEN WHO SWIM DURING THE WINTER MONTHS

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## PREFACE

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# CHAPTER I

## INTRODUCTION

Studies dealing with the incidence of colds are numerous. There is little research, however, concerning the debated statement that there is an increase of cold infections among people who swim during the winter. Many people who believe that this statement is true do not take advantage of the water safety programs offered by the school systems. For various reasons, some of these same people do not take advantage of the numerous water safety programs offered in the summer. Yet, many of these people participate in one or more of the various recreational aquatic activities.

Aquatics has become this nation's number-one recreational activity.[1] An estimated one hundred million Americans now participate in various aquatic activities. The most popular of these activities is boating with some forty million participants each year.[2] The fact is that only a small percentage of these boaters have received formal water safety instruction.[3]

The need for water safety instruction becomes apparant when the following statistics on drownings are reviewed.

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[1]M.A. Gabrielsen, B. Spears, and B.W. Gabrielsen, Aquatic Handbook (Englewood Cliffs, New Jersey, 1960), p. 1.

[2]Water Safety Program Completes 50 Years of Service, American Red Cross Bul. No. 2112 (Washington, November 1963).

[3]Ibid.

The National Safety Council reports that there were 6,400 drownings in 1962.[4] The great majority of these drownings happen to people between the ages of one and thirty-six.[5] Drowning is the number two killer of people between the ages of five and twenty-four.[6] Because of the high rate of accidental drowning of American Youth, it is reasonable to assume that they do not have adequate water safety knowledges and skills. In fact, most of these people who drowned were non-swimmers, and most of these drownings occurred as a result of violations of good safety practices. Only 2.2 percent of the accidental drownings occurred in areas patrolled by life guards. Gabrielsen[7] lists twenty-two different causes of accidental drownings. The chief causes are: (1) boats capsizing and people falling out of boats with 24.4 percent and (2) children left unattended with 16.8 percent.

It is also reasonable to assume that the best way to teach the greatest number of American Youth water safety is through our school systems. This would involve swimming during winter months, to which many people object.

One of the primary reasons that many people object to swimming during the winter is that they believe that swimming will result in an increase in the number and length of colds. To explain this belief the following hypotheses have been offered. (1) Wet hair is a result of swimming. Frequently, there is insufficient time to dry hair after swimming, thus, swimmers are forced to face the elements with wet hair. This combination

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[4]Sidney D. Smith, ed., Accident Facts, National Safety Council (Chicago, Illinois, 1963), p.6.

[5]Ibid., p. 8.

[6]Ibid., p. 14.

[7]Gabrielsen, pp. 12-13.

of wet hair and cold weather increases the chances for cold infections. (2) Swimming requires energy that heats the body and thus opens the pores in the skin. Swimmers with open pores then go out into the elements. This exposure will increase chances for cold infections. In opposition to the aforesaid hypotheses the following hypothesis has been offered. Swimming in water that is cooler than 80 degrees Fahrenheit will constrict the pores of the skin and thus prevent or help to prevent cold infection.

This writer has found no proof of any of these hypotheses in research literature. However, in 1948, Humphrey and Ferinden[8] conducted a study on the cold infections of selected high school boys. They kept records of the colds for three groups of eighty boys for a period of three months. They concluded that the boys who swam regularly during the winter had fewer colds than those boys who did not swim. This conclusion was based on a comparison of the number of days of colds per group and the number of days of absences due to colds. No hypothesis was offered as to why the swimmers had fewer colds.

Based on the numerous studies that have been conducted on the incidence of colds, the medical profession believes that colds are caused by viruses.[9] During recent years workers in several countries have isolated one hundred strains of viruses. They have reproduced cold-like symptoms in volunteers by inoculating them with the virus cultures. Many of these volunteers,

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[8] Arthur Humphrey and William Ferinden, "The Effect of the Regular Use of the Swimming Pool During the Winter Months on the Frequency and Severity of Cold Infection," Research Quarterly, March 1948, pp. 40-42

[9] C.H. Andrewes, "The Taxonomic Position of Common Cold Viruses and Some Others," Yale Journal of Biology and Medicine, December 1959, p. 200.

however, have remained symptom-free. The reason for this is not known, but is suspected to be something commonly known as resistance.

The medical profession would like to know how to develop and maintain this resistance to the numerous cold viruses. Speaking on the prevention of the common cold, Dr. Andrewes[10] stated, "Presumably there is variation in some as yet elusive determining resistance; knowledge of its nature might give a very useful clue." Dr. Montoye[11] feels that "preventive medicine" for chronic and degenerate diseases is largely through nutrition and physical exercise. Dr. Andrews[12] indicated that there are more colds in the winter because more people stay indoors together - with windows closed - and this creates the opportunity for greater spread of infection.

During the course of four years of teaching swimming, this writer has received numerous objections to swimming in the winter. One of the prime objections was that swimming during the winter resulted in an increase in the number of cold infections. Another objection was that swimming would prolong the life of a cold.

This writer accepts, as fact, that colds are caused by viruses. It is also accepted, because of limited evidence, that there is some, as yet unknown, reason why colds are not caught each time exposure to these viruses has been made. There is basic disagreement among people who swim during the winter of its effects on cold infections. Humphrey and Ferinden[13] offer no

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[10] C.H. Andrewes, "Propogation of Common-Cold Virus in Tissue Cultures," Lancet, September 1953, p. 548.

[11] Henry J. Montoye, "The Role of Exercise in Preventive Medicine," The Journal of Sports Medicine, December 1962, p. 220.

[12] Justin M. Andrews, "Cure in Sight for Common Cold?" U.S. News and World Report, February 12, 1962, p. 62.

[13] Humphrey and Ferinden.

hypothesis for their conclusion that boys who swim during the winter have fewer colds than those boys who do not swim during the winters. Among the many differences between boys and women it is a well known fact that women have more hair to dry after swimming than do boys. This writer wondered if the results would be the same for women as it was for the boys in the study by Humphrey and Ferinden. It was, therefore, the purpose of this study to compare the incidence of colds among college women who swim regularly during the winter with college women who do not swim during the winter.

## Definitions

A cold is an inflammation of the nasal and throat mucosa with considerable discharge.[14] The symptoms usually begin with a sore throat followed by sneezing, nasal discharge and finally coughing. The distinction between a cold and other upper respiratory diseases was left to the discrimination of the individual subjects.

## Statement of the Problem

The purpose of the study was to compare the incidence of colds among college women who swim regularly during the winter months with those who participate in indoor physical activity, and with those who participate in no physical education activity. Subproblems were: (1) to compare the length of the colds for subjects in all three groups, (2) to compare the absenteeism due to colds for subjects in all three groups, (3) to compare the number of visits to a doctor because of a cold, (4) to compare the

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[14]Andrews, p. 62.

participation of subjects with cold infections in swimming and other physical activity, (5) to observe weather conditions in relation to the frequency of the beginning of colds, (6) to observe the temperature of the water in the swimming pool in relation to the frequency of the beginning of colds in the swimming group, (7) to discover subjects attitudes toward the cause of their colds, (8) to compare the method of drying hair between swimmers who had cold and swimmers who did not have colds.

The hypothesis was a null-hypothesis stated as follows: There is no difference in the number of colds or in the length of colds among women who swim regularly during the winter months as compared with women who participate in other physical activities and with women who participate in no physical education class.

## Limitations of the Study

This study was limited to college women enrolled at Oklahoma State University whose health records signified approval for swimming. In order to have sufficient number of subjects several instructors supervised the recording of data. Some of the subjects did not complete the information requested, nor was all the information completed consistently.

## CHAPTER II

## REVIEW OF LITERATURE

The problem of maintaining health and swimming during the winter months has been a controversial question for decades.

In 1916, Brown[1] stated that the teaching of swimming should be made compulsory in every school, because it topped the list of all systems for the purpose of physical care and as a preventative of disease as well as a builder of the body. Although Brown did not specifically state that swimming should be taught during the winter months, it can be concluded that if taught during the school year the winter months would be included.

In 1936, Ephraim[2] indicated that many people believed colds to be preceeded by one or more of the following indirect causes: chilling of the body; wet shoes and clothing; fatigue; general debility from illness; lack of sufficient sleep; poor eating habits; improper ventilation of rooms; lack of sunshine; sudden shifts of temperature; allergy or hypersensitivity; endocrine imbalance and unstable nervous system. He believed that the wide array of suspects indicated that true cause of colds was not

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[1]J.H.P. Brown, Modern Swimming (Boston, 1916), p. 4.

[2]J.W. Ephraim, "The Truth About Colds," The American Mercury, January 1936 p. 105

known, although science does know that colds are a virus disease that are highly contagious through sneezes, coughs and sputum.

In 1937, Lapp[3] conducted two studies on absenteeism of high school boys and girls. The five following groups were selected: (1) the boys physical education group, (2) the boys R.O.T.C. group, (3) those boys not enrolled in physical education or R.O.T.C., (4) the girls physical education group, and (5) those girls not enrolled in physical education. The number of absences for each subject was found, tabulated and treated by applying sampling error statistics. No attempt was made to determine the reason for absences. Conclusions were made at the 1 percent level of confidence. The data for the first study was collected during a three week influenza epidemic. He concluded that boys and girls in physical education classes were absent fewer days than the boys and girls not enrolled in physical education classes and that the boys enrolled in R.O.T.C. were absent slightly less than the boys enrolled in physical education classes. The data for the second study was collected over a semester period. The conclusions were the same for both studies.

In 1947, Humphrey and Ferinden[4] conducted a study using high school boys to ascertain whether the objections to swimming during the winter months were fact, prejudice or opinion. Three groups of eighty each were selected at random, the swim group, the physical education group, and the non-physical education group. Individual record cards were

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[3]V.W. Lapp, "Absence From School - Influenza Physical Education," Research Quarterly, December 1937, pp. 73-77.

[4]Humphrey and Ferinden, p. 42.

recorded daily using the following code: "A" student has a cold, "B" student absent from school, "C" Doctor consulted because of cold, and "X" student is O.K. Data was added and compared, then conclusions were made without statistical treatment. They concluded that the boys in the swimming classes averaged fewer colds and that the duration of the cold was less than for boys enrolled in physical education classes. The boys enrolled in physical education had fewer and less severe colds than the boys in the non-physical education group and the boys in swimming and physical education were not absent from school because of colds as frequently as the group not engaged in physical activity.

In 1950, Torney[5] believed that "sinusitus", an infection and inflammation of the sinus cavities and passages, can be caused by impure water injected into the nasal passages, and by the swimmers whose breathing is faulty or who practices forceful feet-first entries into the water. He further believed that colds may develop when chilling or overheating is permitted which could come about by too lengthy swimming periods, by adverse temperatures of air or water, or by forced inactivity in the water. He also believed that persons with colds should be excluded from pools.

Froshberg[6] indicated in 1957 that he knew people that refused, throughout their lives, to immerse their bodies in water, because they believed that the immersion in water would weaken their physical powers.

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[5]John A. Torney, Swimming (New York, 1950), p. 42

[6]Gerald Forshberg, Long Distance Swimming (New York, 1957), p. 4.

Burke and Smith[7] indicated in 1962 that swimming and good health are synonymous. It tones your muscles, improves your stamina, keeps your figure trim, and makes for a feeling of clean, vigorous well being.

A major research project on the common cold is being carried on at the Common Cold Research Unit, Salisbury, England, under the leadership of Christopher H. Andrewes, M.D. This project was started in 1943 by the United States Army and Harvard University as a research laboratory on communicable diseases. After the war the project was given to England. Dr. Andrewes was named head and decided to limit the project to the common cold.[8] After unsuccessful research with various kinds of animals, except the expensive chimpanzee, researchers decided to use human volunteers.[9]

The criteria that the Salisbury Unit used to determine the cause of a cold was ". . . 1. that the viruses can be recovered with reasonable frequence from typical common colds in adults, and 2. that they will reproduce typical common colds in volunteers."[10]

Many viruses have been isolated from upper respiratory infections. But prior to 1959 none of these viruses had been isolated from adults with only a common cold.[11] Between 1946 and 1953, twenty-five hundred volunteers

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[7]Lynn Burke and Don Smith, The Young Sportsman's Guide To Swimming (New York, 1962), p. 5.

[8]J.D. Ratcliff, "They're Closing In on the Common Cold," Todays Health, October 1961, p. 49.

[9]C.H. Andrewes, "The Viruses of the Common Cold," Scientific American, December 1960, p. 90.

[10]C.H. Andrewes, "The Taxonomic Position of Common Cold Viruses and Some Others," Yale Journal of Biology and Medicine, December 1961, p. 201

[11]Ibid., p. 202.

had been tested. Of those volunteers given infected nasal washings, the percentage of colds induced ranged from 27 to 57 percent.[12] However, only the Coe viruses and the Echo 20 virus did not produce additional symptoms such as fever and gastro-intestinal distress.[13]

By this time many facts had been learned concerning colds. One being that the incubation period of the cold causing viruses was less than four days.[14] Thus, the following procedure was used to test the viruses: the healthy volunteers checked into the hospital and were placed in pairs in isolation flats for a period of four days. On the fifth day all symptom-free volunteers were given an inoculation of either the infected nasal washing or a placebo. Volunteers were then studied for another six days. They never got closer than thirty feet to other volunteers, except their roommate. Many factors relating to colds were tested and observed.[15]

By 1953 the viruses were being cultivated in human embryonic lung tissue. In one experiment the viruses were propogated through ten cultures and colds were produced by materials from the fourth, sixth, seventh, ninth and tenth cultures. Cultures later than the tenth produced no colds. No other changes in the cultures were detected.[16] Attempts to reproduce this experiment were unsuccessful until 1958, when a mistake was made in the

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[12]C.H. Andrewes, "Propogation of Common-Cold Virus in Tissue Cultures," Lancet, September 1953, p. 546.

[13]Andrewes, Yale Journal of Biology and Medicine, p. 202.

[14]Andrewes, Scientific American, p. 100.

[15]Ibid., p. 90-92.

[16]C.H. Andrewes, "The Common Cold," British Medical Bulletin September 1953, p. 206.

food preparation for the cultures. The mixture contained only half the bicarbonate of soda that had been thought necessary. The acidity and the temperature of the nose was then checked. The diet and the temperature of the cultures was changed accordingly. Human embryo kidney tissue was substituted for the lung tissue and the cultures flourished.[17]

By 1961 numerous viruses had been isolated from patients with colds only. The Salisbury strain viruses or rhinoviruses were successfully isolated from about a third of young adults with colds. Most of the viruses isolated from adults with colds were rhinoviruses.[18] This was confirmed in a study by Hamre and Procknow[19] on the viral etiology of natural common colds over an eight month period in 103 preclinical medical students. Swabs were made at the volunteers first sign of a cold in duplicate, on being set for virological, the other for bacteriological examination. The results were fifty-three rhinoviruses were isolated from 199 cold infected specimens and only two from 456 symptom free specimens. These viruses were found to be the causation of 28 percent of the colds.

The Salisbury Unit learned many facts about the common cold. Many of these facts have been confirmed by other studies. They learned that experimental colds produced by rhinoviruses have an incubation period of from two to two and one-half days.[20]

In the study by Lidwell and Williams,[21] dealing with the epidemiology

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[17]"Epidemiology of Common Colds," Lancet, November 1961, p. 1073.

[18]Ibid.

[19]D. Hamre and J.J. Procknow, "Viruses Isolated from Natural Common Colds in U.S.A., "British Medical Journal, November 25, 1961, pp. 1382-1385.

[20]"Epidemiology of Common Colds," p. 1073.

[21]O.M. Lidwell and R.E.O. Williams, "Journal of Hygiene," Abstracts of World Medicine, February 1962, p. 149.

of the common cold among office workers and their families, the study population showed symptoms of colds from two to three days after being exposed to the infection. This study took place in London and Newcastle, England and lasted from 1951-1957, on from between three hundred and fifty to four hundred persons each year. For each participant a personal record was completed and a weekly visit was made to each subject by a nurse. Details of symptoms, onset and duration were recorded. Other results showed that no useful subdivision of the common cold syndrome was possible on the basis of symptoms, although there was a significant tendency for similar symptoms to occur in colds spread among household contacts. The average number of colds per year was two and 10 percent led to absence from work, the average duration of absence being 2.6 days. Female staff suffered 10 to 15 percent more colds than male staff. Neither the presence of children in the household nor the daily use of public transportation affected the incidence of colds significantly. The only factor found to be strongly associated with the number of colds suffered by an individual was age, adults under thirty being relatively susceptible and those over forty relatively resistant. The study population attributed about one-third of the colds acquired to infection from known contacts.

In 1958, A.T. Roden[22] analysed the clinical findings in typical colds at the Salisbury Unit. He found that increase in nasal discharge was the most important symptom of a cold, but this is correlated with the presence of other symptoms such as sore throat (which is particularly frequent at the onset of a cold) and cough (which is commonly a late symptom).

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[22]C.H. Andrewes, "The Common Cold and Other Minor Respiratory Infections," British Medical Bulletin, September, 1959, p. 222.

The Salisbury workers[23] found that chilling alone does not cause colds. Numerous volunteers took hot showers, doned a wet swim suit and stood outside in cold weather until they shivered all over. Other volunteers wore wet socks all day. In not one instance did chilling alone produce a cold.

This was confirmed by Dowling[24] in 1958. Of the healthy volunteers, 428 were inoculated with infected nasal secretions, and 233 were inoculated with a placebo. The two groups were subdivided. Each subject stayed for two to four hours either before or after inoculation in one of three special chambers in which the environmental temperature and humidity were controlled: one having a temperature of 60 degrees Fahrenheit with 80 percent relative humidity, the second having a temperature of 10 degrees Fahrenheit with 80 percent relative humidity and the third a temperature of 80 degrees Fahrenheit with 30 percent relative humidity. Those in the lowest temperature chamber wore outdoor clothing while those in the other chambers wore a minimum of clothing. The results showed that about one-third of those inoculated with infectious material developed colds regardless of the environment to which they had been exposed and it was, therefore, concluded, "that chilling of the host at or about the time of infection does not make him more susceptible to the virus of the common cold."[25]

Andrewes[26] stated that people not regularly exposed to small doses of viruses are highly susceptible so that when they do catch colds they suffer

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[23]Andrewes, Scientific American, p. 99.

[24]H.F. Dowling et al., "Transmission of the Common Cold to Volunteers Under Controlled Conditions," Journal of Clinical Investigation, May 1959, pp. 762-769.

[25]Ibid.

[26]Andrewes, Lancet, Vol. 265, p. 548.

from severe instead of relatively benign colds, and that frequent exposure to cold viruses of varying kinds keeps up resistance to at least a certain level.

At Oklahoma State University there seems to be an abundance of upper respiratory infections between the second and sixth weeks of school.[27] According to Cooper many viruses are present in the mouth and throat all the time for which there is an "auto-immunity". When an individual changes his environment he is exposed to a multitude of different viruses. Cooper calls this the "mixing of infections". Thus explaining the high number of upper respiratory infections at the beginning of school. Ratcliff[28] in describing the behavior pattern of a cold indicated that they appear in three annual waves - at the opening of school, with the advent of cold weather and with the beginning of spring.

Cooper related that colds are often hard to diagnose as they are often confused with allergies. He believes that colds can be caused by psychogenic reasons, fatigue, dissapation and traumatic conditions. Ratcliff[29] reported that at the University of Illinois volunteers were kept awake fifty-six hours. They found that efforts to give them colds were no more successful than among well-rested people.

The Salisbury workers[30] found that vaccines that claimed to prevent colds were useless even when administered before infection and continued

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[27]Donald Cooper, M.D., Interview, February 1964.

[28]Ratcliff, p. 50.

[29]Ratcliff, p. 88.

[30]Andrewes, Lancet, September 1953, p. 547.

thereafter, and that antihistamine[31] preparations were almost worthless in "ameliorating" the symptoms of the common cold.

In 1960, Miller[32] conducted a study of Bacterial vaccines for the common cold on three groups of flyers. Two groups were given vaccines and the other a placebo. Of the total, 86 percent had colds and were almost equally distributed among the three groups. He concluded that "autogenous bacterial vaccines" are unlikely to have any practical application in dealing with the problem of the common cold among flying personnel.

Several studies have been made based on the hypothesis that the symptoms of a cold are due to the viruses for the first few days and that bacteria are responsible thereafter.

The researchers at Salisbury[33] found that "the mucus of the common cold is clear - when the secretion gets thick and yellow, it means that bacteria of various sorts have joined in."

In 1961, McKerrow, Oldhan and Thomson[34] conducted a study to determine if treatment could prevent aggravation of the common cold by bacteria normally present in the naso pharynx. The criterion of successful treatment used in the study was the disappearance of the cold by the fourth day. The results were: 23 percent were cured by dummy lozenges and 50 percent by active treatment. They believed that the significance was uncertain.

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[31]Andrewes, Scientific American, 1960, p. 97.

[32]D.L. Miller et al., "A Trial of Bacterial Vaccines for the Common Cold in the Royal Air Force," Lancet, February 13, 1960, pp. 358-360.

[33]Andrewes, Scientific American, 1960, p. 100.

[34]C.B. McKerrow, C.B. Oldhan and S. Thomson, "Antibiotics and the Common Cold," Lancet, January 28, 1961, pp. 185-187.

Ritchie's study[35] in 1958 on antibiotic treatment of colds, 7 percent of those colds treated with antibodies developed into full colds and 42 percent of the colds treated with glucose developed into full colds. From the results he advocated treatment in the virus stage to prevent subsequent bacterial invasion. In 1962, Williams[36] found in a similar study on children that attacks of bronchitis were prevented in 58 percent of the infections in the tetracycline-treated group and in 49 percent of those in the control group. He concluded that this difference was not significant.

In 1961, Barnes[37] conducted a study on vitamin supplements and the incidence of colds in high school basketball players. The experimental groups consisted of ten boys and thirteen girls who played on the high school basketball teams. The control group consisted of eight boys and eight girls with similar backgrounds of cold and upper respiratory infection. The experimental group received a daily multivitamin supplement and the control group received no vitamin supplement. For the six week period the control group had 110 days of cold, an average of 6.9 per subject. In the experimental groups the thirteen girls had eighteen days of cold, an average of 1.3 per subject and the ten boys had sixteen days of cold, an average of 1.6 per subject. Barnes concluded that the vitamin definitely improved the health of the students. He related that the coaches noticed

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[35]J.M. Ritchie, "Antibiotics in Small Doses for the Common Cold," Lancet, March 22, 1958, pp. 618-621.

[36]N. Wynn Williams, "Control of Respiratory infections in Children by Tetracycline," British Medical Journal, February 18, 1961, pp. 469-471.

[37]Frank E. Barnes, "Vitamin Supplements and the Incidence of Colds in High School Basketball Players," North Carolina Medical Journal, January, 1961, p. 22-26.

a definite improvement in the students given the vitamin supplements, both in their attitudes and playing ability. This writer believes that the study might have been more meaningful if the control group had also been basketball players.

In 1961, Tyrrell and Bynoe[38] stated that the results from the numerous investigations were not conclusive nor statistically significant but were high enough to make researchers believe that they were on the right track. They predicted further investigations would include serological comparisons of virus strains, properties of cold viruses, further modification of cultural techniques, use of continously cultivable cell-lines and antibody response to infection.

In 1962, Dr. J.M. Andrews,[39] Director of the National Institute of Allergy and Infectious Disease in the United States, believed that while there were still some cold viruses that had not been found, the time had come to turn research projects to trying to prevent those common colds whose cause could be identified and against which vaccines could be made. He summarized that there were 100 different viruses that cause common colds but some twenty viruses were responsible for a large portion. He stated, "The business of making vaccines against viral diseases is pretty well established. It hasn't been done with the common cold because there are so many different strains of cold virus that it would be necessary to have a very complicated type of vaccine. But I think this is possible."[40] He further predicted that a vaccine for the common cold should be perfected by 1967.

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[38]D.A. Tyrrel and M.L. Bynoe, "Some Further Isolations from Common Colds," British Medical Journal, February 11, 1961, pp. 393-397.

[39]J.M. Andrews, "Cure in Sight for Common Cold?", U.S. News and World Report, February 12, 1962, pp. 62-64.

[40]Ibid., p. 64.

In summary, it can be observed that the common cold has been and still is an unsolved mystery. Many facts have been learned about the viruses that cause colds. Studies reveal that treatment and prevention through medication has, as yet, been unsuccessful. Colds seem to run in cycles, reaching their high points at the beginning of school, the beginning of cold weather and the beginning of spring.

There is basic disagreement among authorities as to the effect of resistance on the prevention of common colds. Humphrey and Ferinden, and Lapp offer evidence that swimming and physical education gives people something to make them have fewer colds. Barnes offers evidence that a combination of vitamins and physical activity helps to prevent colds. The Salisbury unit found that chilling, without the presence of a cold-causing virus, did not cause colds. However, many authorities believe that colds are preceeded by such factors as chilling, wet clothing, fatigue and poor eating habits. Some people try hard to keep themselves in such condition that they will not catch colds, but for some reason colds are often caught in spite of their physical and mental condition.

Because of the popular belief that swimming in the winter is a factor that preceeds additional cold infections, especially among women, and because of insufficient evidence to prove or disprove this belief, this study was undertaken.

# CHAPTER III

## PROCEDURE

This problem was set up with the permission of the Health, Physical Education and Recreation Department at Oklahoma State University. Data was collected from October 1 through December 13, 1963.

### Selection of Subjects

Three groups of women were selected from the fall semester 1963 classes at Oklahoma State University. The first group, hereinafter called the swimming group, was made up of all the women enrolled in eight swimming classes. There were five swimming classes, with a total enrollment of 106 women, that met for one hour three days a week, and three swimming classes with a total enrollment of 64 women that met for one hour two days a week.

The second group, hereinafter called the physical education group, was made up of women enrolled in six selected physical education classes. Body mechanics and badminton classes were selected because they were scheduled to meet at comparable times with the swimming classes. Four of the physical education classes, with a total enrollment of 140 women, met for one hour three days a week, and two physical education classes with a total enrollment of 65 women met two days a week with a total of three hours a week in class.

The third group, hereinafter called the non-physical education group, was composed of the 115 women in two health education classes and three art education classes that met for one hour three days a week. These

classes were selected because the women in these classes had completed their physical education requirement.

The health records of women students on file in the Health, Physical Education and Recreation office were checked for each subject. All subjects that were exempt from participating in swimming for medical reasons were eliminated from this study.

## Individual Cold Record Cards

Individual cold record cards were printed with spaces for obtaining the following information: (1) name, (2) class and section, (3) the date the cold began, (4) the date the cold was over , (5) the number of visits to a doctor because of a cold, (6) the number of days of classes missed due to a cold, (7) the number of days of participation in activity with a cold, (8) the number of days of observation of the activity because of a cold, and (9) the reason believed that caused each cold. In addition, the subjects in the swimming group were asked to indicate how they dried their hair. (See appendix A.)

## Instructions to Subjects

These individual cold record cards were distributed to the nine instructors of the selected classes along with printed instructions for completing the cards. (See appendix B.) The writer explained to these instructors the purpose of this study. The definition of a cold used in this study was explained. It was pointed out that for the purpose of consistency, the start of all colds should be dated the day that one or more visible symptoms appeared. The end of all colds should be dated the day that these visible symptoms disappeared. These included:

(1) nasal discharge, (2) watering eyes, (3) sneezing, (4) sputum, and (5) coughing. However, if subjects had a cough that "hung" on for a number of days or weeks after a cold was otherwise over, the subject should consider the cold over when all the other visible symptoms left and she felt good. It was pointed out that subjects should not record allergies with these same visible symptoms described for a cold.

Oral explanation was also given in addition to the printed instruction sheet on the format for completion of the individual cold record cards. Those subjects who already had colds that began before October 1, 1963 were asked to approximate the date of its beginning and record that date on her card. It was then explained that the number of days of absences, visits to a doctor, participation and observation of activity because of a cold were to be recorded only if they occurred between October 1, 1963 and December 13, 1963. Subjects in the non-physical education groups were instructed to disregard the columns for participation and observation of activity. Subjects in the swimming group were asked to indicate what they used to dry their hair and how dry they dried it.

Emphasis was made on the importance of the subjects being reminded at least once a week to complete the information requested. Subjects were asked to complete this information as it occurred. These individual cold record cards were kept by the instructors of the classes used in this study.

## Collection of Data

All groups followed their regular school routine. No attempt was made to isolate any factors of nutrition, physical or mental fatigue.

On October 1 and 2, 1963, the instructors of the classes used in this study gave each subject in his or her class an individual cold

record card. The instructions for completing the cards were given. Each subject wrote her name and class on the card. The definition of a cold and its symptoms were given. The instructors explained how to complete all the columns on the card. Subjects in the swimming group indicated how they dried their hair. Subjects in the non-physical education group were instructed to disregard the columns for participation and observation of activity. All subjects who already had a cold that began before October 1, 1963 recorded that cold and approximated the day of its beginning. The cards were made available each class period so that subjects could record datum as it occurred. The decision of whether or not a cold was present was left up to the individual subjects with the instructors acting as consultants.

The individual cold records were collected from the instructors on December 18, 1963, thus, allowing three days for students, who might have been absent on the last days of the study time to complete the information requested.

## Weather Conditions

The daily weather report printed in the Stillwater News Press, was used to determine the high and low temperatures for each day of the study. The presence of precipitation was also noted. A graph was made illustrating the daily relationship of the weather conditions and the onsets of colds for all three groups.

## Pool Water Conditions

The maintenance engineer of the swimming pool kept a daily record of the water temperature and Ph and chlorine count in the swimming pool. A check was made to determine if there was a relationship between the water conditions and the onsets of colds for subjects in the swimming group.

## Statistical Procedure

The data from the individual cold record cards was studied and tabulated. (See appendix C.) the total number of colds, the total number of days of colds, the total number of visits to a doctor because of a cold, and the total number of days of classes missed due to a cold was determined for each group. For those reports that omitted the number of visits to a doctor it was assumed that a visit to a doctor was not made because of a cold. It was likewise assumed that subjects were not absent because of a cold if this information was omitted. For the colds that did not have an ending date recorded the length of that cold was omitted from the tabulation of the length of colds.

The means and standard deviations were determined for the following catagories: (1) number of colds, (2) length of colds, (3) visits to a doctor because of a cold, and (4) absences caused by colds. To test the difference between all of these means t-ratios were computed.

The total number of days that subjects did not participate in activity was determined for the swimming and physical education groups. Percentages were computed and a comparison was made. For those reports that omitted the number of days of participation and observation of activity, it was assumed that the subjects did participate in the activity.

The personal beliefs of the subjects for the cause of their colds were catagorized and totaled.

A comparison was made on the method used for drying hair between those swimmers who reported colds and those swimmers who reported no colds.

The number of upper respiratory infections and the total number of illnesses treated at the Oklahoma State University Hospital was found for

the months between September 1961 and May 1962; September 1962 and May 1963 and September 1963 and February 1964. Percentages were computed and a comparison was made. (See appendix D.)

## CHAPTER IV

## RESULTS

The individual record cards were collected and studied. The data was tabulated and treated.

The swimming group of 170 subjects had a total of one hundred colds that lasted 480 days. There were thirty-nine visits to doctors and 58 days of classes missed because of these colds.

The physical education group of 205 subjects had a total of ninety-eight colds that lasted 476 days. Because of these colds there were twenty-three visits to a doctor and 36 days of classes missed.

The non-physical education group of 115 subjects had a total of seventy-six colds that lasted 691 days. There were twenty-three visits to a doctor and 35 days of classes missed. (See Table I.)

TABLE I

NUMBER OF COLDS, DAYS OF COLDS, VISITS TO A DOCTOR, ABSENCES

| | Groups | | |
|---|---|---|---|
| | Swimming | Physical education | Non-physical education |
| Number of subjects | 170 | 205 | 115 |
| Total colds | 100 | 98 | 76 |
| Total days of colds | 480 | 476 | 691 |
| Visits to a doctor | 39 | 23 | 23 |
| Total days of absences | 58 | 36 | 35 |

## Number of Colds

The data on the number of colds is contained in Table II. The mean for the number of colds was found to be .588 with a standard deviation of .691 for the swimming group; .478 with a standard deviation of .653 for the physical education group; and .661 with a standard deviation of .743 for the non-physical education group. Statistical comparison revealed a t-ratio of 1.57 between the swimming and physical education groups, which was not significant. The t-ratio between the swimming and the non-physical education group was found to be .829 which was not significant. The difference between the means of the physical education and non-physical education groups had a t-ratio of 2.178 which was significant at the 5 percent level of confidence.

## Length of Colds

The length of the cold could not be determined for those colds that did not have an ending date recorded. For the fifty-eight colds reported in the swimming group the mean length was found to be 8.28 with a standard deviation of 5.38. For the fifty-three colds reported in the physical education group the mean length was found to be 8.98 with a standard deviation of 5.45. For the sixty-five colds reported in the non-physical education group the mean length was found to be 10.63 with a standard deviation of 5.99. (See Table III.)

TABLE II

COMPARISON OF THE MEAN NUMBER OF COLDS

| Groups | Mean | S.D. | S.E.Mean | Difference Between Means Diff. | S.E.Diff | t |
|---|---|---|---|---|---|---|
| Swimming | .588 | .691 | .0028 | | | |
| Physical education | .478 | .653 | .0021 | .11 | .07 | 1.57 |
| Swimming | .588 | .691 | .0028 | | | |
| Non-physical education | .661 | .743 | .0049 | .073 | .088 | .829 |
| Physical education | .478 | .653 | .0021 | | | |
| Non-physical education | .661 | .743 | .0049 | .183 | .084 | 2.178* |

* Significant at the 5% level of confidence

TABLE III

COMPARISON OF THE MEAN LENGTH OF COLDS

| Groups | Mean | S.D. | S.E.Mean | Difference Between Means Diff. | S.E.Diff. | t |
|---|---|---|---|---|---|---|
| Swimming | 8.28 | 5.38 | .508 | | | |
| Physical education | 8.98 | 5.45 | .572 | .70 | 1.04 | .673 |
| Swimming | 8.28 | 5.38 | .508 | | | |
| Non-physical education | 10.63 | 5.99 | .561 | 2.35 | 1.03 | 2.281* |
| Physical education | 8.98 | 5.45 | .572 | | | |
| Non-physical education | 10.63 | 5.99 | .561 | 1.65 | 1.06 | 1.634 |

* Significant at the 5% level of confidence

The difference of the mean length of colds between the swimming and physical education groups revealed a t-ratio of .673 which was not significant. The t-ratio of 2.281 indicated a significance in the difference of the means of the swimming and non-physical education groups at the 5 percent level of confidence. The difference between the means of the physical education and the non-physical education groups revealed a t-ratio of 1.634 which was not significant. This data is contained in Table III.

## Visits to a Doctor

For those who had colds with nothing recorded for the number of visits to a doctor it was assumed that there were no visits to a doctor. The mean number of visits to a doctor per cold was found to be .39 with a standard deviation of .773 for the swimming group; .24 with a standard deviation of .469 for the physical education group; and .30 with a standard deviation of .539 for the non-physical education group.

The difference of the mean visit to a doctor per cold between the swimming group and the physical education group revealed a t-ratio of 1.68, which was not significant. The t-ratio was .874 between the means of the swimming and non-physical education groups and .872 between the means of the physical education and non-physical education groups, which was not significant. (See Table IV.)

TABLE IV

COMPARISON OF THE MEAN VISITS TO A DOCTOR PER COLD

| Groups | Mean | S.D. | S.E.Mean | Difference Between Means | | |
|---|---|---|---|---|---|---|
| | | | | Diff. | S.E.Diff. | t |
| Swimming | .39 | .773 | .0061 | | | |
| Physical education | .24 | .469 | .0023 | .155 | .092 | 1.68 |
| Swimming | .39 | .773 | .0061 | | | |
| Non-physical education | .30 | .539 | .0038 | .087 | .0095 | .874 |
| Physical education | .24 | .469 | .0023 | | | |
| Non-physical education | .30 | .539 | .0038 | .068 | .078 | .872 |

TABLE V

COMPARISON OF THE MEAN ABSENCES PER COLD

| Groups | Mean | S.D. | S.E.Mean | Difference Between Means | | |
|---|---|---|---|---|---|---|
| | | | | Diff. | S.E.Diff. | t |
| Swimming | .58 | 1.05 | .0112 | | | |
| Physical education | .37 | .82 | .0069 | .21 | .135 | 1.556 |
| Swimming | .58 | 1.05 | .0112 | | | |
| Non-physical education | .46 | .75 | .0076 | .12 | .169 | .682 |
| Physical education | .37 | .82 | .0069 | | | |
| Non-physical education | .46 | .75 | .0076 | .09 | .120 | .75 |

## Absenteeism

For those colds with nothing recorded for the number of days of classes missed due to a cold it was assumed that there were no absences due to a cold. The mean number of days of classes missed per cold was found to be .58 with a standard deviation of 1.05 for the swimming group; .37 with a standard deviation of .82 for the physical education group; and .46 with a standard deviation of .75 for the non-physical education group.

Statistical comparison between the mean absenteeism of the swimming and physical education groups revealed a t-ratio of 1.556, which was not significant. The t-ratio was .682 between the means of the swimming and non-physical education groups, and .75 between the means of the physical education and non-physical education groups. These were not significant. This data is contained in Table V.

In figure 1 there is a comparison of the means for all three groups in the following catagories: (1) number of colds, (2) visits to a doctor, (3) absences due to colds and (4) length of colds. The differences between most of these means were not significant at the 5 percent level of confidence. However, it was interesting to note that the means in the swimming group indicated more visits to a doctor, more absences, and the colds lasted for a shorter period of time than in the other two groups.

## Non-participation in Activity

For those reports with nothing reported for the number of days of observation of activity due to a cold it was assumed that the subject did not observe activity. There were 114 subject days that participants

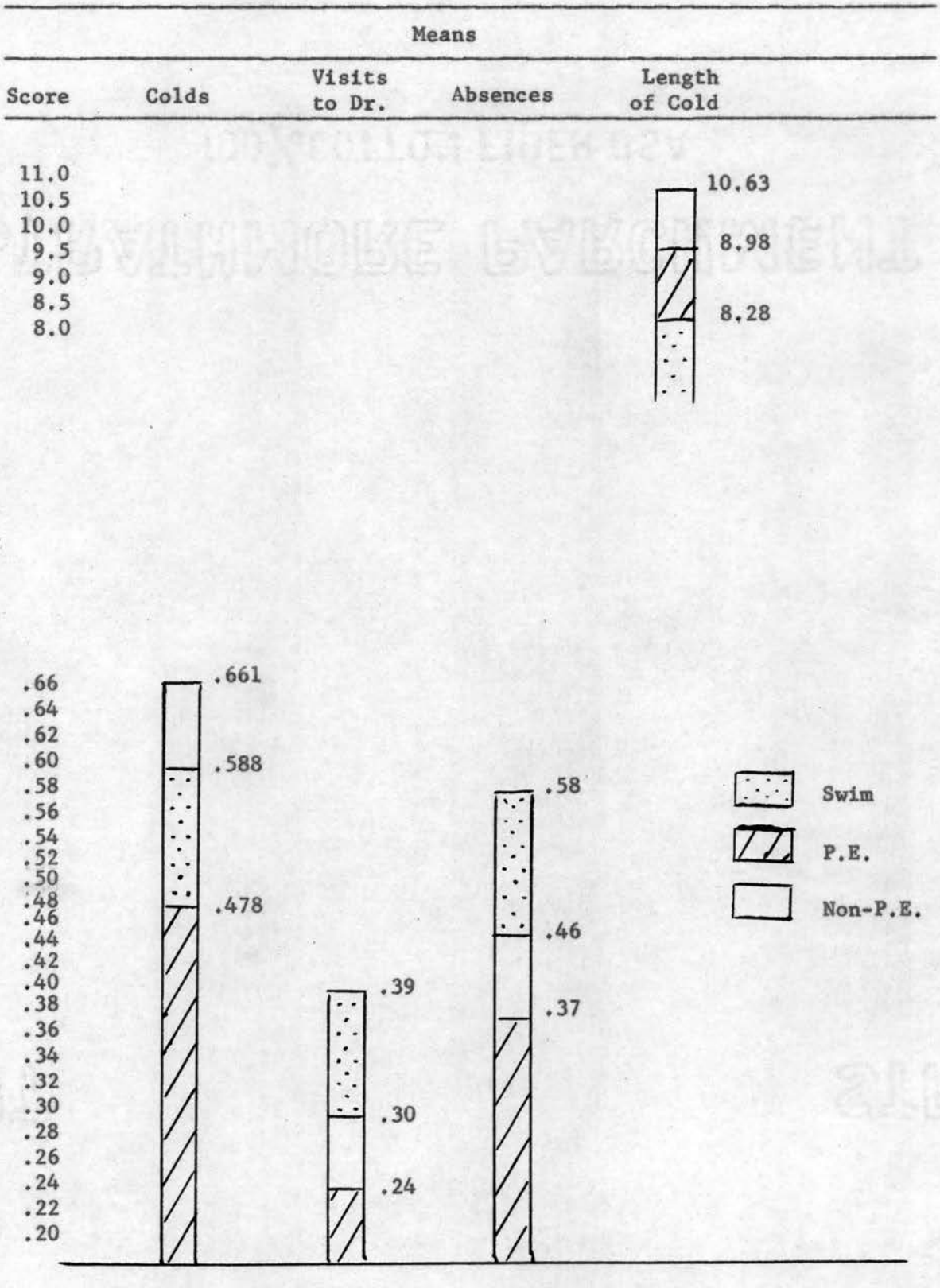


Fig. 1. Comparison of Means for all Three Groups

in this study attended their physical education class but did not participate in the activity because of colds. The swimming group had ninety-two of these days, which was 81 percent of the total; while the physical education group had twenty-two days, which was 19 percent of the total.

In the swimming group, there were sixty-one responses of either yes, no or a numeral for participation in swimming with a cold. Sixteen of these sixty-one answered no, indicating that they did not swim at all with a cold; and the other forty-five answered either yes or a numeral, indicating that they swam at least once with a cold. There were seventy-three responses of either yes, no or a numeral for observation of swimming with a cold. Fourteen of these seventy-three answered no, indicating that they did not observe swimming because of a cold; and the other fifty-nine answered either yes or a numeral, indicating that they observed swimming at least once with a cold.

In the physical education group, there were seventy-one responses of either yes, no or a numeral for participation in swimming with a cold. Only one of these seventy-one answered no, indicating that they did not participate in activity with a cold; and the other seventy answered yes or a numeral, indicating that they participated at least once in activity with a cold. There were thirty-four responses of either yes, no or a numeral for observation of activity with a cold. Thirteen of these thirty-four answered no, indicating that they did not observe activity because of a cold; and the other twenty-one answered either yes or a numeral, indicating that they observed activity at least once with a cold. (See Table VI.)

TABLE VI

NUMBERS PARTICIPATING OR OBSERVING AT LEAST ONE TIME DURING A COLD

| | Participation | | | | Observation | | | |
|---|---|---|---|---|---|---|---|---|
| Groups | Did | % | Did not | % | Did | % | Did not | % |
| Swimming | 45 | 74% | 16 | 26% | 59 | 81% | 14 | 19% |
| Physical education | 70 | 99% | 1 | 1% | 21 | 62% | 13 | 38% |

Subjects Opinion for Cause of Cold

The subjects were asked to list the reason why they thought they caught the colds they recorded. For many colds there was more than one cause listed. All these causes were catagorized and tallied. The results were as follows: (1) fifty-six colds were attributed to becoming chilled, either from extremely cold weather, from sleeping in a draft or from insufficient clothing for the weather, (2) forty-eight colds were attributed to rapid change in temperature, either by warm days and cold nights, or by warm rooms and cold temperatures outside, or by warm temperatures outside and cold air-conditioned rooms, (3) fifty-seven colds were attributed to poor health habits, either by improper diet, insufficient sleep or low resistance level, (4) forty-seven colds were attributed to human contact, (5) seventeen were attributed to swimming class and twenty-one additional colds were attributed to wet clothing or hair, (6) five subjects indicated that they had no idea what caused their colds.

None of the subjects in the physical education group attributed their colds to their physical education class. However, seventeen in the swimming group attributed their colds to swimming.

## Condition of Swimmers' Hair

The subjects in the swimming group were asked to indicate whether they dried their hair completely, partially or not at all. They were also asked to indicate whether they dried their hair with the hair driers, with towels or with nothing. Most of the subjects that answered this question indicated how they dried their hair, but did not indicate the degree of dryness. The methods used for drying hair were totaled for those swimmers who reported colds and for those swimmers who reported no colds.

There were fifty-eight swimmers who reported colds and how they dried their hair. From this group twenty-one used hair driers, twenty-five used towels, and twelve left their hair wet. There were forty-four swimmers who reported no colds and how they dried their hair. From this group seventeen used hair driers, twenty used towels and seven left their hair wet. (See Table VII.)

TABLE VII

HAIR DRYING METHODS OF SWIMMERS

| | With Colds | | Without Colds | |
|---|---|---|---|---|
| Method | Number | % | Number | % |
| Hair driers | 21 | 36% | 17 | 39% |
| Towels | 25 | 43% | 20 | 45% |
| Left Wet | 12 | 21% | 7 | 16% |

## Weather Conditions

A record was kept of the high and low temperature for each day of the study. The daily high and low temperatures and the daily onset of colds are contained in figures 2 and 3. There was no set pattern in the relationship of the lines in the graph. There was at least one inch of rainfall but less than two inches of rainfall on the following dates: October 16, 20, 21, and November 20. The onset of colds for those days ranged from between zero and five.

## Pool Water Conditions

A record of the water temperature and chemical conditions in the swimming pool was kept for each day of the study. Since these conditions were measured in the early morning and if not within normal range were corrected in a few hours, it was decided that no meaningful relationship could be established with these factors.

## University Hospital Treatments

The number of upper respiratory infections and the total number of illnesses treated at the Oklahoma State University Hospital was found for the months of September 1961 through May 1962; September 1962 through May 1963; and September 1963 through February 1964. (See appendix D.) In Table VIII a comparison is given on the percentage of upper respiratory infections to the total illnesses treated at the University Hospital, during the months of October, November and December in the years of 1961, 1962, and 1963. During the months of this study the percentage of upper respiratory infections treated was less than for the same months the two previous years.

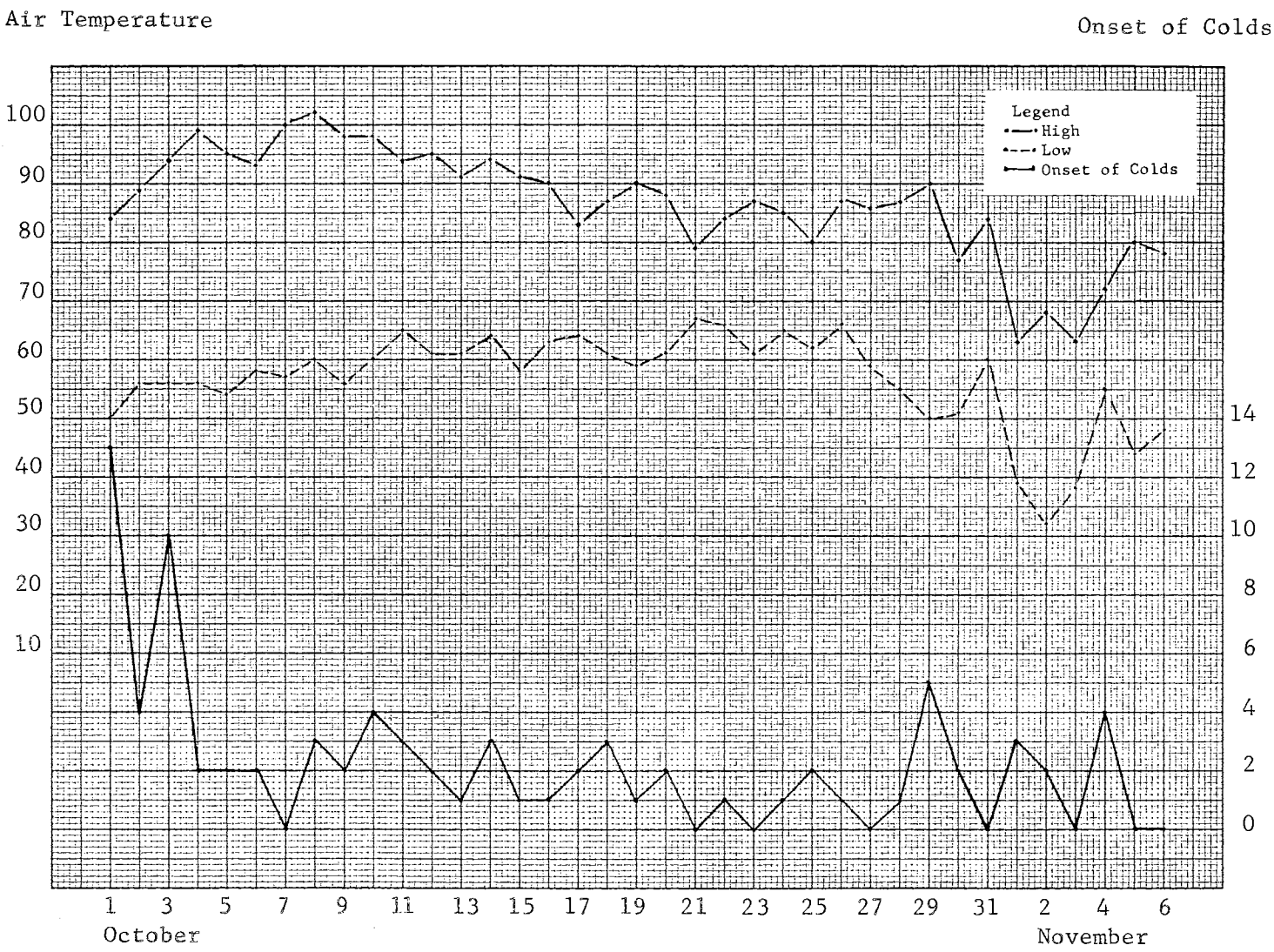


Fig. 2. Comparison of onset of colds and air temperatures in October and November

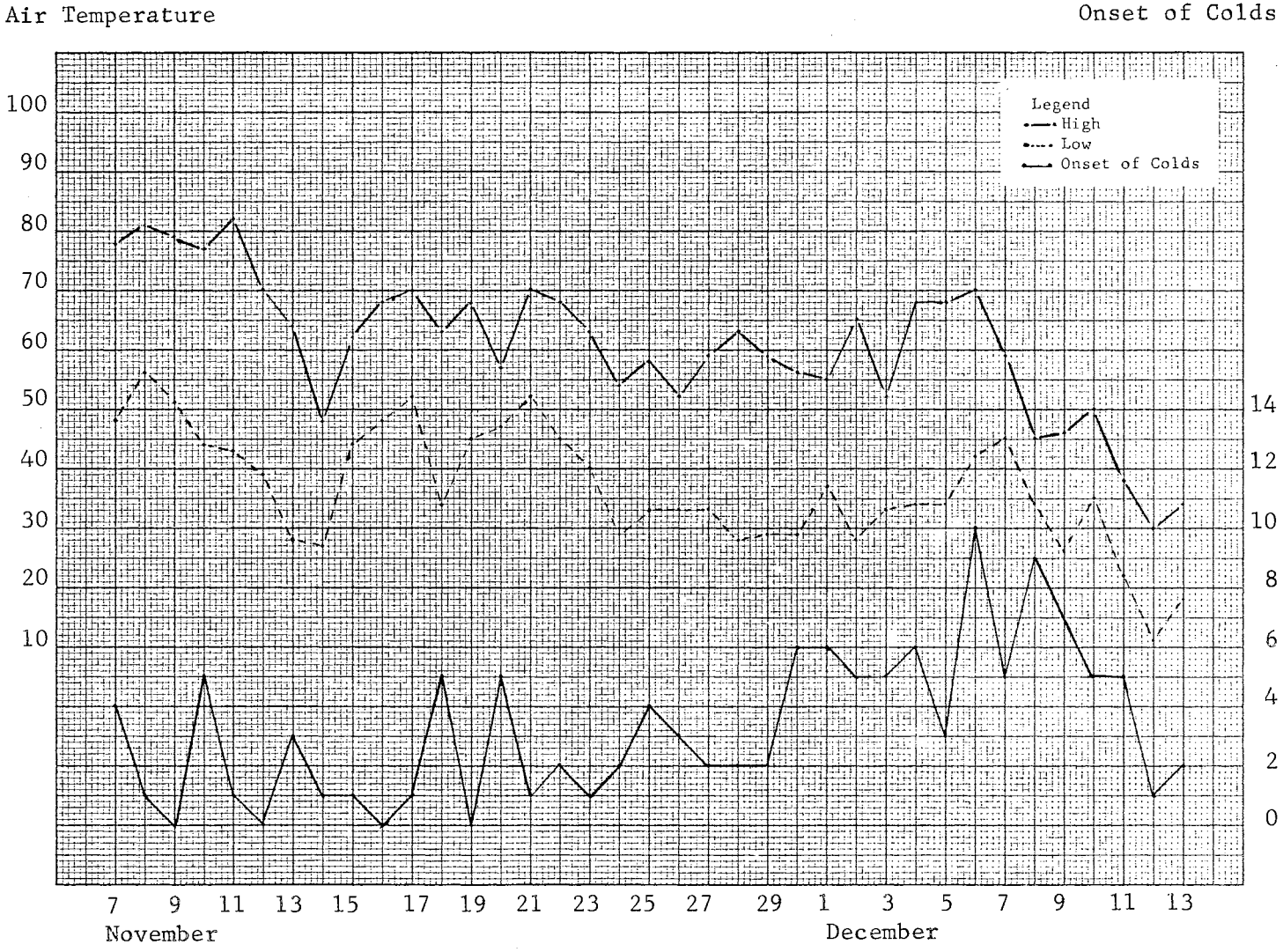


Fig. 3. Comparison of onset of colds and air temperatures in November and December

TABLE VIII

COMPARISON OF UPPER RESPIRATORY INFECTIONS TREATED IN OCTOBER, NOVEMBER AND DECEMBER, 1961, 1962, and 1963

| | Percentage | | |
|---|---|---|---|
| Month | 1961 | 1962 | 1963 |
| October | 19.9 | 27.2 | 12.8 |
| November | 20.8 | 19.7 | 14.6 |
| December | 30.7 | 25.9 | 25.7 |

## Discussion of Results

It should be pointed out that the supervision of the collection of data was by nine different instructors. Furthermore, the completion of the individual cold record cards was inconsistent in form and incomplete.

There was a significant difference between the mean number of colds for the physical education and the non-physical education groups. The physical education group had fewer colds. The difference between the mean of the swimming group and the other groups was not significant. However, the swimming group had slightly more colds than the physical education group and slightly fewer colds than the non-physical education group. This indicated that, in this group, swimming in the winter did not cause any more or less colds.

The difference was not significant between any of the means for the number of visits to a doctor per cold. However, the subjects in the swimming group had more visits to a doctor per cold than did the subjects in the other groups.

Likewise, the difference was not significant between any of the means for the number of absences per cold. Again, the subjects in the swimming group had more absences than did the subjects in the other groups.

There was a significant difference between the mean length of a cold for the swimming group and the non-physical education group. The colds lasted for a shorter period of time for the subjects in the swimming group.

Through a comparison of all the means it was interesting to note that the subjects in the swimming group had more absences and more visits to a doctor per cold. This might indicate that these subjects had more concern about their colds. It might also indicate that these subjects had worse colds. However, these same colds of the subjects in the swimming group had a shorter average duration than did those colds of subjects in the other groups. Therefore, it might be deduced that the subjects in this study that received more medical attention and stayed out of school when a cold was present had a cold for a shorter period of time.

Further analysis of the difference between means revealed that the subjects in the non-physical education group had more colds and these colds lasted for a longer period of time than for the subject in the other groups. This might indicate that for the subjects in this study those who participated in a physical activity had, or developed, more resistance to colds.

The responses made by the subjects in the swimming group and the physical education group on their participation and observation of activity with a cold indicated that they would sooner participate in badminton and body mechanics than in swimming with a cold present. In fact, only 1 percent of the subjects with colds in the physical education did not participate at all in activity as compared to 26 percent subjects in the swimming group.

The subjects in this study indicated that they believed that becoming chilled and sudden changes in temperature caused the majority of colds. The daily onset of colds ranged from zero to thirteen. When comparing the daily onset of colds to the coldest temperatures and the greatest extremes in temperatures no definite pattern could be established. This indicated that the weather conditions did not have a bearing on the cause of colds for the subjects in this study.

Seventeen swimmers attributed their colds to swimming. However, a comparison of the swimmers who reported cold and of the swimmers who reported no colds, on the methods they used to dry their hair, indicated no difference. Therefore, it appeared that the cause of colds for the swimmers in this study was not wet hair.

The comparison of the percentage of upper respiratory infections treated at Oklahoma State University Hospital during the months of this study with the same months during 1961 and 1962 indicated that there were fewer upper respiratory infections during the course of this study than there were in 1961 and 1962.

# CHAPTER V

## CONCLUSIONS

Within the limitations of this study the following conclusions were apparent:

(1) The subjects in the physical education group had fewer colds than did the subjects in the non-physical education group. This was significant at the 5 percent level of confidence.

(2) The subjects in the swimming group, who reported colds, had these colds for a shorter period of time than did the subjects in the non-physical education group. This was significant at the 5 percent level of confidence.

(3) There was no significant difference between any of the groups in the number of visits to a doctor per cold.

(4) There was no significant difference between any of the groups in the number of days of absences per cold.

(5) In this study, more of the subjects with colds in the physical education group preferred to participate in badminton and body mechanics as compared to the subjects with a cold in the swimming group participating in swimming.

(6) The subjects in this study attributed most of their colds to weather conditions.

(7) There was no definite pattern between the daily onset of colds and the weather conditions.

(8) Wet hair did not seem to be a cause of colds.

## Summary

This investigation was undertaken to compare the incidence of colds among college women who swim regularly during the winter months with those who participate in other physical activity and with those who participate in no physical education class. Individual cold record cards were distributed to the 490 subjects, that made up the three groups, for the recording of data concerning colds. This data included: (1) the date of the onset of a cold, (2) the number of visits to a doctor due to a cold, (3) the number of absences due to a cold, and (4) the date of the end of the cold. Differences in group means on these items were tested with a t-ratio. The amount of participation in activity by subjects with a cold was compared between the swimming and physical education groups.

The only statistically significant differences between means were: (1) The subjects in the physical education group had fewer colds than did the subjects in the non-physical education group, which was significant at the 5 percent level of confidence. (2) The subjects in the swimming group had colds for a shorter period of time than did the subjects in the non-physical education group, which was significant at the 5 percent level of confidence.

By comparing all the means it might be assumed that those subjects who received medication and stayed home and took care of themselves had colds for a shorter period of time.

Further analysis of the means revealed that the subjects in the non-physical education group had more colds and these colds lasted for a longer period of time than for the subjects in the other groups. This might indicate that for the subjects in this study those who participated in a physical

activity had or developed more resistance to colds.

The results showed that the null-hypothesis, that there is no difference in the incidence of colds among women who swim regularly during the winter months as compared with women who participate in other physical activities and with women who participate in no physical education class, could be accepted.

## Recommendations

1. For better controls it is recommended that fewer people supervise collection of data. It is further recommended that subjects report the days of no colds as well as the days of colds.
2. Resistance to colds could be further tested among varsity swimmers, athletes in another varsity sport and a control group of non-athletes who share the same housing and eat the same food as do the varsity athletes.

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## APPENDIX A

## INDIVIDUAL COLD RECORD CARDS

INDIVIDUAL COLD RECORD

NAME _____ HPER Class _____ Sec. _____

FILL IN THE BLANKS BELOW COLUMNS 2, 3, 4 AND 5 WITH THE APPROPRIATE NUMBER OF DAYS. USE ONE LINE FOR EACH NEW COLD.

| DATE STARTED 1 | VISITS TO A DOCTOR 2 | DAYS OF CLASSES MISSED 3 | PARTICIPATED IN PE ACTIVITY 4 | OBSERVED PE ACTIVITY 5 | DATE OVER 6 |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |
| 4 | | | | | |
| 5 | | | | | |

INDICATE THE REASON THAT YOU BELIEVE YOU CAUGHT THE COLD ON THE BACK SIDE OF THIS CARD. NUMBER EACH COLD.

## APPENDIX B

### INSTRUCTIONS FOR COMPLETING INDIVIDUAL COLD RECORD

I. Fill in name; last name first
Fill in the date the cold started as soon as possible after the start of the cold.
Complete the other columns as they occur.

II. When does a cold start? For the purpose of consistency
1. Do not count the days you think you might be taking a cold.
2. Do not count a sore throat or allergies.
3. Use only the visible symptoms as criteria of the start of a cold such as: watering eyes, sneezing, coughing and sputum.

III. When is a cold over? For the purpose of consistency
1. When the visible symptoms of a cold leave.
2. If you have a cough that "hangs" on for a number of days or weeks after a cold, consider the cold over when the other visible symptoms leave, and you otherwise feel good.

IV. On the back of the card indicate the reason that you believe you caught the cold. Examples: fatigue, insufficient sleep, improper diet, chilling of the body after exercise, exposure to weather after swimming or other activity, sudden shift in temperature, epidemic, etc.

## APPENDIX C

### RAW DATA

| Swimming Group | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Partici-pation | No Ans. | Obser-vation | No Ans. | Total Days | No Ans. |
| 1 | 0 | | 0 | | 3 | | 1 | | 10 | |
| 2 | 0 | | 1 | | no | | 1 | | | x |
| 3 | 2 | | 2 | | | x | 1 | | 25 | |
| 4 | | x | 1 | | | x | 1 | | 3 | |
| 5 | | x | 1 | | 1 | | 1 | | 21 | |
| 6 | | x | | x | 2 | | | x | 3 | |
| 7 | 0 | | 2 | | no | | 2 | | 10 | |
| 8 | | x | 0 | | 1 | | 0 | | 2 | |
| 9 | 0 | | 0 | | yes | | | x | 3 | |
| 10 | 0 | | 3 | | yes | | 1 | | 9 | |
| 11 | | x | | x | no | | yes | | 7 | |
| 12 | | x | | x | yes | | | x | 6 | |
| 13 | 0 | | 0 | | | x | 4 | | 20 | |
| 14 | 1 | | 1 | | | x | | x | | x |
| 15 | | x | 0 | | | x | | x | 3 | |
| 16 | 0 | | 0 | | | x | 0 | | | x |
| 17 | | x | 0 | | | x | yes | | | x |
| 18 | | x | 0 | | | x | yes | | 7 | |
| 19 | 0 | | 0 | | 2 | | 1 | | | x |
| 20 | 0 | | 0 | | | x | 0 | | | x |
| 21 | 0 | | 1 | | 1 | | 1 | | 3 | |
| 22 | 0 | | | x | | x | 3 | | 7 | |
| 23 | 1 | | 3 | | 0 | | 2 | | 18 | |
| 24 | 0 | | 0 | | yes | | | x | | x |
| 25 | 1 | | 0 | | yes | | | x | 6 | |
| 26 | 0 | | 0 | | yes | | no | | 6 | |
| 27 | 0 | | 2 | | 1 | | 2 | | 5 | |
| 28 | 1 | | 1 | | 1 | | 3 | | 15 | |
| 29 | 0 | | | x | | x | 3 | | | x |
| 30 | 0 | | 1 | | | x | | x | | x |
| 31 | 0 | | 1 | | | x | | x | 3 | |
| 32 | | x | 1 | | | x | 1 | | | x |
| 33 | 0 | | 0 | | | x | 1 | | | x |
| 34 | 1 | | 0 | | 0 | | 1 | | 4 | |
| 35 | 0 | | 0 | | 3 | | 0 | | | x |
| 36 | 2 | | 0 | | 1 | | | x | | x |

Swimming Group (cont'd)

| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Partici-pation | No Ans. | Obser-vation | No Ans. | Total Days | No Ans. |
|---|---|---|---|---|---|---|---|---|---|---|
| 37 | | x | | x | | x | 3 | | 9 | |
| 38 | | x | | x | 2 | | | x | 9 | |
| 39 | 1 | | 1 | | | x | 3 | | 7 | |
| 40 | 1 | | 1 | | 2 | | 1 | | 7 | |
| 41 | 0 | | 1 | | 2 | | 1 | | 5 | |
| 42 | 1 | | 0 | | 1 | | 1 | | 14 | |
| 43 | 1 | | 0 | | yes | | | x | 11 | |
| 44 | 1 | | 1 | | yes | | yes | | 3 | |
| 45 | 0 | | 1 | | | x | | x | 5 | |
| 46 | 2 | | 1 | | | x | 3 | | 10 | |
| 47 | 1 | | 5 | | | x | | x | | x |
| 48 | 1 | | 0 | | 4 | | 2 | | 15 | |
| 49 | | x | | x | | x | | x | | x |
| 50 | | x | 3 | | | x | | x | | x |
| 51 | | x | 3 | | | x | | x | | x |
| 52 | 0 | | 0 | | 0 | | 3 | | 7 | |
| 53 | 0 | | 0 | | 2 | | 1 | | | x |
| 54 | 0 | | 0 | | yes | | no | | 4 | |
| 55 | 0 | | 2 | | | x | | x | | x |
| 56 | 1 | | | x | | x | 3 | | 6 | |
| 57 | 1 | | 0 | | 2 | | 0 | | 23 | |
| 58 | 1 | | 0 | | 0 | | 3 | | 8 | |
| 59 | 1 | | 1 | | | x | 1 | | | x |
| 60 | | x | | x | | x | 1 | | | x |
| 61 | 0 | | 0 | | | x | 1 | | 2 | |
| 62 | 0 | | 0 | | | x | 1 | | | x |
| 63 | 0 | | 0 | | | x | 1 | | | x |
| 64 | 0 | | 0 | | | x | 1 | | | x |
| 65 | | x | 1 | | | x | 3 | | 10 | |
| 66 | | x | 1 | | | x | 1 | | 5 | |
| 67 | | x | | x | | x | | x | 13 | |
| 68 | 3 | | | x | | x | 4 | | 10 | |
| 69 | 4 | | | x | 2 | | 1 | | | x |
| 70 | 0 | | | x | | x | 2 | | 9 | |
| 71 | 1 | | | x | | x | 1 | | | x |
| 72 | 0 | | 0 | | 2 | | 1 | | 10 | |
| 73 | 0 | | 0 | | 1 | | 0 | | 13 | |
| 74 | 0 | | 1 | | | x | 1 | | | x |
| 75 | 3 | | 2 | | yes | | yes | | | x |
| 76 | 0 | | 0 | | no | | no | | 2 | |
| 77 | 0 | | 0 | | 1 | | 0 | | | x |
| 78 | | x | | x | no | | | x | | x |
| 79 | | x | | x | 1 | | | x | 3 | |
| 80 | | x | 1 | | yes | | yes | | | x |

Swimming Group (cont'd)

| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Partici-pation | No Ans. | Obser-vation | No Ans. | Total Days | No Ans. |
|---|---|---|---|---|---|---|---|---|---|---|
| 81 | 0 | | 0 | | yes | | 1 | | | x |
| 82 | 1 | | 3 | | no | | 1 | | | x |
| 83 | 0 | | 0 | | yes | | yes | | | x |
| 84 | 0 | | 0 | | yes | | no | | 4 | |
| 85 | 0 | | 0 | | yes | | no | | | x |
| 86 | 1 | | 3 | | no | | | x | 6 | |
| 87 | 0 | | 0 | | no | | | x | | x |
| 88 | 0 | | 0 | | 0 | | 1 | | | x |
| 89 | 0 | | 0 | | 0 | | 1 | | | x |
| 90 | 0 | | 0 | | yes | | no | | 8 | |
| 91 | 0 | | 0 | | yes | | | x | 7 | |
| 92 | 0 | | 0 | | yes | | | x | | x |
| 93 | 1 | | 0 | | yes | | yes | | 8 | |
| 94 | 0 | | 0 | | yes | | | x | | x |
| 95 | 0 | | 1 | | no | | yes | | 3 | |
| 96 | 0 | | 0 | | | x | 1 | | 5 | |
| 97 | 0 | | 0 | | no | | yes | | | x |
| 98 | 0 | | 0 | | yes | | no | | 6 | |
| 99 | 3 | | 5 | | 2 | | 3 | | 17 | |
| 100 | | x | | x | yes | | | x | | x |
| Total | 39 | 23 | 58 | 18 | 62* | 39 | 92* | 27 | 480 | 41 |

* Yes was counted as one

Physical Education Group

| Cold no. | Visits to Dr. | No. Ans. | Absences | No Ans. | Partici-pation | No Ans. | Obser-vation | No Ans. | Total Days | No Ans. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | | | x | yes | | | x | 9 | |
| 2 | 1 | | 1 | | no | | yes | | 5 | |
| 3 | | x | | x | yes | | | x | | x |
| 4 | | x | | x | 3 | | | x | 7 | |
| 5 | | x | | x | yes | | | x | | x |
| 6 | | x | | x | yes | | | x | | x |
| 7 | | x | | x | yes | | | x | 6 | |
| 8 | 0 | | 0 | | yes | | | x | | x |
| 9 | | x | | x | yes | | | x | 6 | |
| 10 | 0 | | 0 | | yes | | | x | 11 | |
| 11 | 1 | | 1 | | yes | | | x | | x |
| 12 | | x | | x | | x | 1 | | | x |
| 13 | 0 | | 0 | | yes | | | x | | x |

Physical Education Group (cont'd)

| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Partici-pation | No Ans. | Obser-vation | No Ans. | Total Days | No Ans. |
|---|---|---|---|---|---|---|---|---|---|---|
| 14 | | x | | x | yes | | | x | 7 | |
| 15 | | x | | x | yes | | | x | | x |
| 16 | | x | | x | yes | | | x | 9 | |
| 17 | | x | 1 | | | x | yes | | 4 | |
| 18 | | x | | x | | x | yes | | 8 | |
| 19 | 1 | | 0 | | 1 | | 0 | | 4 | |
| 20 | 0 | | 0 | | 2 | | | x | 3 | |
| 21 | 0 | | 0 | | | x | yes | | 5 | |
| 22 | 1 | | | x | yes | | | x | | x |
| 23 | 0 | | 1 | | yes | | 0 | | | x |
| 24 | 0 | | 0 | | 3 | | 0 | | 8 | |
| 25 | 1 | | 0 | | 4 | | 0 | | 12 | |
| 26 | 0 | | 0 | | yes | | | x | | x |
| 27 | 0 | | 0 | | yes | | | x | | x |
| 28 | 0 | | 0 | | yes | | | x | | x |
| 29 | 0 | | 0 | | yes | | | x | | x |
| 30 | 0 | | 0 | | yes | | | x | | x |
| 31 | 0 | | 1 | | yes | | | x | | x |
| 32 | 0 | | 0 | | yes | | | x | 3 | |
| 33 | 1 | | 0 | | yes | | | x | | x |
| 34 | | x | 1 | | | x | | x | | x |
| 35 | 1 | | 1 | | yes | | | x | | x |
| 36 | 0 | | 0 | | yes | | 0 | | | x |
| 37 | 0 | | 0 | | yes | | | x | | x |
| 38 | 2 | | 4 | | yes | | | x | | x |
| 39 | | x | | x | | x | | x | | x |
| 40 | 0 | | 0 | | yes | | | x | | x |
| 41 | 1 | | 0 | | yes | | | x | | x |
| 42 | | x | | x | yes | | | x | | x |
| 43 | | x | | x | | x | | x | 15 | |
| 44 | | x | 1 | | | x | 3 | | 10 | |
| 45 | 0 | | 0 | | yes | | | x | 8 | |
| 46 | 0 | | 0 | | yes | | | x | 13 | |
| 47 | 0 | | 0 | | yes | | 0 | | 4 | |
| 48 | 0 | | 0 | | yes | | | x | 12 | |
| 49 | 0 | | 0 | | yes | | 0 | | | x |
| 50 | | x | 1 | | | x | 1 | | | x |
| 51 | | x | 1 | | | x | 1 | | | x |
| 52 | 0 | | 0 | | yes | | 0 | | 4 | |
| 53 | | x | | x | | x | | x | | x |
| 54 | | x | 1 | | yes | | | x | 26 | |
| 55 | | x | | x | | x | 1 | | | x |
| 56 | | x | | x | yes | | | x | | x |
| 57 | 1 | | 2 | | yes | | | x | 17 | |
| 58 | | x | | x | yes | | | x | 2 | |
| 59 | | x | | x | | x | 1 | | 4 | |
| 60 | 1 | | 0 | | 9 | | 1 | | 15 | |
| 61 | 0 | | 0 | | | x | 1 | | 8 | |
| 62 | | x | | x | | x | 1 | | | x |

Physical Education Group (cont'd)

| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Partici-pation | No Ans. | Ober-vation | No Ans. | Total Days | No Ans. |
|---|---|---|---|---|---|---|---|---|---|---|
| 63 | 0 | | 0 | | yes | | 0 | | 4 | |
| 64 | 1 | | 0 | | yes | | | x | 12 | |
| 65 | 0 | | 0 | | 4 | | | x | 10 | |
| 66 | | x | | x | | x | | x | | x |
| 67 | 0 | | 0 | | yes | | 0 | | 5 | |
| 68 | 0 | | 0 | | yes | | 0 | | 6 | |
| 69 | 1 | | 1 | | yes | | 1 | | | x |
| 70 | | x | | x | 3 | | | x | 9 | |
| 71 | | x | | x | 5 | | | x | 12 | |
| 72 | | x | | x | 1 | | | x | 5 | |
| 73 | | x | 0 | | yes | | | x | | x |
| 74 | 1 | | 0 | | yes | | | x | 15 | |
| 75 | 2 | | 0 | | yes | | | x | 8 | |
| 76 | 1 | | 0 | | yes | | | x | | x |
| 77 | | x | | x | | x | | x | 19 | |
| 78 | 1 | | 1 | | | x | | x | | x |
| 79 | 1 | | 1 | | | x | 0 | | 15 | |
| 80 | 1 | | 0 | | | x | 1 | | 18 | |
| 81 | 0 | | 2 | | 4 | | 1 | | 11 | |
| 82 | 0 | | 0 | | yes | | | x | 4 | |
| 83 | 0 | | 0 | | yes | | yes | | | x |
| 84 | 1 | | 5 | | | x | | x | 22 | |
| 85 | 1 | | 1 | | yes | | yes | | | x |
| 86 | 0 | | 3 | | 1 | | | x | 20 | |
| 87 | 0 | | 1 | | 2 | | | x | | x |
| 88 | | x | | x | 2 | | | x | | x |
| 89 | | x | | x | | x | | x | | x |
| 90 | 0 | | | x | | x | | x | 5 | |
| 91 | 0 | | 0 | | | x | | x | 5 | |
| 92 | | x | | x | | x | | x | | x |
| 93 | 0 | | 0 | | yes | | 0 | | 5 | |
| 94 | | x | 1 | | | x | | x | 4 | |
| 95 | 0 | | 0 | | 1 | | 0 | | 3 | |
| 96 | | x | 2 | | 1 | | 1 | | 5 | |
| 97 | 0 | | 1 | | 1 | | | x | | x |
| 98 | 0 | | 0 | | | x | 1 | | 7 | |
| Totals | 23 | 37 | 36 | 31 | 100* | 27 | 22* | 64 | 476 | 45 |

* Yes was counted for one

Non-Physical Education Group

| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Total Days | No Ans. |
|---|---|---|---|---|---|---|
| 1 | 0 | | 1 | | | x |
| 2 | 0 | | 0 | | 2 | |
| 3 | 0 | | 1 | | 11 | |
| 4 | | x | 1 | | 13 | |
| 5 | | x | | x | 12 | |
| 6 | 0 | | 2 | | 19 | |
| 7 | 0 | | 1 | | 8 | |
| 8 | 0 | | 1 | | 10 | |
| 9 | 1 | | 0 | | 23 | |
| 10 | | x | | x | 7 | |
| 11 | | x | | x | 7 | |
| 12 | | x | | x | 18 | |
| 13 | 0 | | 0 | | 15 | |
| 14 | 0 | | 1 | | 12 | |
| 15 | 0 | | 0 | | 6 | |
| 16 | 0 | | 0 | | | x |
| 17 | | x | | x | 11 | |
| 18 | 1 | | 2 | | 12 | |
| 19 | 0 | | 1 | | 11 | |
| 20 | 0 | | 0 | | 3 | |
| 21 | | x | | x | 28 | |
| 22 | 1 | | 4 | | 15 | |
| 23 | | x | 1 | | 10 | |
| 24 | | x | | x | 8 | |
| 25 | 2 | | 0 | | 14 | |
| 26 | 0 | | 0 | | 24 | |
| 27 | 0 | | 1 | | 7 | |
| 28 | 1 | | | x | 9 | |
| 29 | 0 | | 0 | | 5 | |
| 30 | 0 | | | x | 7 | |
| 31 | 1 | | 2 | | 19 | |
| 32 | 0 | | 0 | | 18 | |
| 33 | | x | | x | 8 | |
| 34 | | x | | x | 9 | |
| 35 | 0 | | 0 | | 5 | |
| 36 | | x | | x | 17 | |
| 37 | 0 | | 0 | | 10 | |
| 38 | | x | 1 | | 4 | |
| 39 | 1 | | 2 | | 4 | |
| 40 | 0 | | 0 | | 6 | |
| 41 | 0 | | 0 | | 15 | |
| 42 | 0 | | 0 | | 30 | |
| 43 | 0 | | 0 | | 14 | |
| 44 | 1 | | 1 | | 18 | |
| 45 | 0 | | 0 | | 5 | |
| 46 | | x | 1 | | 5 | |
| 47 | 1 | | 0 | | 10 | |
| 48 | | x | | x | 16 | |
| 49 | 2 | | 2 | | | x |
| 50 | 0 | | 0 | | | x |

| Non-Physical Education Group (cont'd) | | | | | | |
|---|---|---|---|---|---|---|
| Cold no. | Visits to Dr. | No Ans. | Absences | No Ans. | Total Days | No ans. |
| 51 | | x | | x | 15 | |
| 52 | 1 | | 1 | | 6 | |
| 53 | 0 | | 1 | | 8 | |
| 54 | | x | | x | 6 | |
| 55 | 0 | | 0 | | 18 | |
| 56 | 0 | | 0 | | 10 | |
| 57 | | x | 1 | | 7 | |
| 58 | 1 | | 0 | | 4 | |
| 59 | 0 | | 0 | | 4 | |
| 60 | 0 | | | x | | x |
| 61 | 1 | | 0 | | 6 | |
| 62 | 0 | | 0 | | | x |
| 63 | 0 | | 0 | | 6 | |
| 64 | 0 | | 0 | | 7 | |
| 65 | 0 | | 0 | | | x |
| 66 | | x | | x | 5 | |
| 67 | 1 | | 1 | | 7 | |
| 68 | | x | | x | | x |
| 69 | 1 | | 0 | | 8 | |
| 70 | | x | 0 | | 11 | |
| 71 | 0 | | 1 | | 5 | |
| 72 | 1 | | 0 | | 6 | |
| 73 | 1 | | 1 | | 12 | |
| 74 | 1 | | 2 | | | x |
| 75 | 2 | | 1 | | | x |
| 76 | 1 | | 0 | | | x |
| Totals | 23 | 21 | 35 | 18 | 691 | 11 |

## APPENDIX D

## UPPER RESPIRATORY INFECTIONS AND TOTAL ILLNESSES TREATED AT OKLAHOMA STATE UNIVERSITY HOSPITAL

| Month | Illnesses Treated | Upper Respiratory Infections | Percentage |
|---|---|---|---|
| 1961 | | | |
| September | 3870 | 793 | 20.8 |
| October | 4531 | 904 | 19.9 |
| November | 3496 | 726 | 20.8 |
| December | 3289 | 1010 | 30.7 |
| 1962 | | | |
| January | 3794 | 1237 | 32.6 |
| February | 3652 | 889 | 24.4 |
| March | 3340 | 872 | 26.1 |
| April | 4131 | 1130 | 27.4 |
| May | 3694 | 605 | 16.4 |
| September | 4566 | 993 | 21.7 |
| October | 5490 | 1493 | 27.2 |
| November | 3984 | 774 | 19.7 |
| December | 3052 | 790 | 25.9 |
| 1963 | | | |
| January | 3728 | 1019 | 27.3 |
| February | 3258 | 931 | 28.6 |
| March | 2539 | 661 | 26.00 |
| April | 3575 | 588 | 16.4 |
| May | 2948 | 456 | 15.5 |
| September | 4668 | 868 | 18.6 |
| October | 4165 | 535 | 12.8 |
| November | 3104 | 454 | 14.6 |
| December | 2569 | 660 | 25.7 |
| 1964 | | | |
| January | 3083 | 706 | 22.8 |
| February | 3224 | 720 | 22.3 |

VITA

Dawn Marie Burch

Candidate for the Degree of

Master of Science

Thesis: THE INCIDENCE OF COLDS AMONG COLLEGE WOMEN WHO SWIM REGULARLY DURING THE WINTER

Major Field: Health, Physical Education and Recreation

Biographical:

Personal Data: Born in Wellsville, New York, February 2, 1936, the daughter of D. Warren and Dorothy Ruth Crisjohn.

Education: Attended grade school in Norman and Tulsa, Oklahoma; graduated from Will Rogers High School in 1954; received the Bachelor of Science degree from the Texas Women's University, with a major in Health, Physical Education and Recreation, in May 1958; completed requirements for the Master of Science degree in May 1964.

Professional experience: Instructor, Department of Health, Physical Education and Recreation, Southeast Missouri State College from September 1958 to January 1960; instructor, Department of Health, Physical Education and Recreation, Oklahoma State University from September 1960 to May 1961, and from September 1962 to August 1963. Member of the American Association for Health, Physical Education and Recreation; member of the Oklahoma Association of Health, Physical Education and Recreation.