THE EFFECT OF CHEERLEADING ON THE FEMALE SINGING VOICE

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ABSTRACT

THE EFFECT OF CHEERLEADING
ON THE FEMALE SINGING VOICE

By

Paul Eugene Bravender

The problem of this study is to determine whether or not participation in cheerleading activities inhibits the natural function of the female singing voice.

Experimental Design

To provide the necessary information for the solution of the problem the following experiment was designed:

1. Samples of voice recordings of female subjects who have been cheerleaders for a minimum of three years.

2. Samples of voice recordings of female subjects who have never been cheerleaders, i.e., a control group.

3. A panel of auditors who are experts in the field of vocal sound production. This panel will be asked to identify those subjects exhibiting any degree of vocal dysfunction.

In all, twenty-three cheerleaders and twenty-four control group members were recorded. For various reasons, such as the inability of subjects to perform musical scales, or poor recordings, only nineteen subjects from each group were used.

Each subject sang an ascending scale, starting on A (220 Hz) and ascending as high as possible; and a descending scale, again starting on A (220 Hz) and going to the lower limit of the range. A tape recording of these samples was prepared for auditors. The auditors were given score sheets which gave them the opportunity to evaluate each subject in the following ways:

1. A written musical scale, upon which each auditor was to indicate the pitch level at which any register change took place.

2. A numerical scale, (0 = none, 1 = slight, 2 = moderate, 3 = severe) within which the auditors were asked to indicate the degree of damage or dysfunction observed.

The following data were obtained:

1. Forty-two percent of the cheerleading group exhibited a moderate-to-severe level of dysfunction (2.0), while only five percent of the control group were found at this level.

2. The cheerleading group has a composite score more than twice that of the control group, (1.5 vs. 0.7)

indicating a significantly higher level of vocal dysfunction among the cheerleaders as a group.

Based on the accumulated data the following conclusions can be drawn:

1. Long term (three years or more) participation in cheerleading results in a statistically higher incidence of severe dysfunction in the female voice, as manifest in a high degree of hoarseness and the inability to phonate throughout the full compass of the normal female voice range.

2. Long term participation in cheerleading results in a statistically higher incidence of loss of vocal clarity, even if less than severely dysfunctional.

3. Because of the conclusions above, and within the limits of this study, females who are interested in using their voices for singing should refrain from cheerleading.

4. No conclusions could be reached regarding pitch level of register change in cheerleading subjects.

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER I

INTRODUCTION

Purpose

The purpose of this study is to provide information concerning the effect of cheerleading upon the female singing voice.

Problem

The problem of this study is to determine whether or not participation in cheerleading activities inhibits the natural function of the female singing voice.

Terminology

Bernoulli Effect: Suction produced by the fact that air in motion has less density or pressure than air that is not in motion; its application in phonation is important in that the vocal bands can be drawn together to vibrate merely by the passage of air between them.[1]

Chest Voice: The lowest register of the human voice (called the "heavy Mechanism" by Vennard), characterized by a firm closing of the glottis for a relatively long period of time, allowing an almost explosive burst of air to be built up between successive openings of the glottis, and creating a greater amplitude of vibration.[2]

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[1] William Vennard, SINGING, the Mechanism and the Technic, (New York: Carl Fischer, Inc., 1968), p. 42.

[2] Ibid.

Contact Ulcer: An open lesion produced by friction between the arytenoid cartilages. Common among men who abuse their voices. Rare among women.[3]

Phonation: The act of producing vocal sound by the adduction of the vocal folds simultaneously with the expiration of air form the lungs.

Vocal Dysfunction: Any condition which interferes with the efficiency of phonation, manifested in abnormalities of vocal clarity, range, and point of transition from chest voice.

Vocal Nodules: A general term encompassing a large variety of benign growths on a vocal fold, usually occurring at the junction of the anterior and middle third of one or both folds, edematous in early stages and progressing to a fibrous state. They are the result of vocal trauma, and are a virtual anathema to clear vocal production in speaking or singing. Common among women who abuse their voices.[4]

Experimental Design

To provide the necessary information for the solution of the problem the following experiment was designed:

1. Collect samples of voice recordings of female subjects who have been cheerleaders.

2. Collect samples of voice recordings of female subjects who have never been cheerleaders, i.e., a control group.

3. Establish a panel of auditors who are experts in the field of vocal sound production. This

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[3] Ibid., p. 241.

[4] Henry J. Rubin, M.D., "The Role of the Laryngologist in Management of Dysfunction of the Singing Voice," NATS Bulletin, May, 1966, p. 24.

panel will be asked to identify those subjects exhibiting any degree of vocal dysfunction.

To execute the above design the following conditions will be necessary:

1. Recorded samples of voices must be provided to allow the panel of auditors to make objective comparisons. It was decided that a musical scale starting on A (220 Hz.) and ascending to the highest tone possible for each subject would offer the following:

   a. samples of chest voice singing in the lower female range

   b. the range selected would be reasonable for all subjects

2. There must be established a statistical design which will reveal any possible correlation between cheerleading and the incidence of vocal dysfunction.

Delimitations of the Study

Only female subjects will be used in this study.

For the control group, only subjects who have not had formal vocal training will be used in order to protect the objectivity of the study.

Background of the Problem

It has been the experience of voice teachers that those female students who have been cheerleaders

frequently exhibit some degree of phonational difficulty. Hoarseness, limited range, and carrying the chest voice too high are but some of these symptoms. In some cases, visual examination of the vocal folds by an otolaryngologist has revealed actual physical damage to the vocal folds themselves, in the form of vocal nodules. The following citations will support this contention:

> Chest voice singing appears to be a normal and healthy use of the female voice unless it is carried upward to extremely high pitches or produced with too much force. Under such circumstances it would not be surprising to find hoarseness caused by swollen vocal folds . . . Cheerleading falls in this latter category but with one additional observation. Early commitment to cheerleading is much more damaging to the female voice. The extreme force used in the shouting, pushing the chest voice upward to the extremely high pitches, has left many young girls with a set of atrophied vocal folds, usually considered permanent damage, or with vocal muscles which will not respond to certain pitches. Should you be testing female voices and discover one which cannot produce tones in the area of D, E, and F, just above third space C, you may discover a young lady who was a cheerleader. The normal "upper middle voice range" is most often the location of a break in the voice of young ladies who have yelled too loudly, on pitches too high, and who have become hoarse, often with laryngitis, too many times. Nature will not put up with such continued abuse.[5]

The following footnote was appended to this article by the Editor, Louis H. Diercks: "Cheerleading,

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[5]J. Loren Jones, "What Happens in Singing," The Choral Journal, May 1975, p. 6.

particularly for girls has been found the cause of nodules on the larynx to an alarming extent."[6]

An examination of the literature in the field of cheerleading has revealed but two works: Cheerleading by Newt Loken, and Cheerleading, Pep Clubs and Baton Twirling, by Stella S. Gilb. The information contained relating to the proper use of the voice is meager. The following citation from the Loken text is the only instruction in either book concerning proper vocal technique:

> A good method of improving the cheering or yelling techniques is to place a hand on your abdomen and yell "fight." The sound should originate from the stomach. You should feel the tightening of the adbominal muscles when yelling.[7]

In another suggestion concerning how a voice may be protected (which supports the claim that cheerleading is abusive to the voice), Loken suggests "soundlessly moving the lips" when the voice is not in good condition.[8]

No references were found concerning the subject of phonation. Without proper phonation, the efficiency of breath support which Loken describes could, in itself,

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[6]Ibid.

[7]Newt Loken, Cheerleading, (New York: The Ronald Press Company, 1961), p. 12.

[8]Loken, op. cit., p. 12.

be detrimental to good vocal health. Vennard's comparison between plosive phonation and that which utilizes the Bernoulli Effect will serve to illustrate the ultimate source of the problem:

> This is how vibration is initiated by the aspirate [h]. Breath is flowing while the glottis is closing by action of the interarytenoid muscles. When the vocal muscles are nearly enough together, the Bernoulli Effect sucks them into vibration before the cartilages have approximated (it may even be an imperfect approximation...the sequence of aerodynamic factors is as follows: first the flow of breath sucks the glottis shut; this stops the flow momentarily, whereupon breath pressure blows the glottis open again: air flow recommences and the cycle repeats.[9]

> The Glottal Plosive: If the glottis closes first, and then breath pressure is applied, the vibration will begin with an explosion of air as the pressure overcomes the muscular tension. The Bernoulli Effect will then become a part of the process, it is true, but too late. The muscular adjustment is not the same . . . . Friction is thus created between the vocal processes as the cartilages are further drawn together, and sometimes repeated glottal plosives actually produce contact ulcers between the cartilages . . . . The glottal plosive is really a slight cough. The whole larynx tenses for it. The explosion is one which laryngologists agree is damaging to the delicate structures.[10]

According to Vennard, then, cheerleaders should avoid the heavy glottal plosive and utilize a phonational adjustment which would depend on the Bernoulli Effect. The question then arises concerning the degree

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[9]Vennard, op. cit., p. 42.

[10]Vennard, op. cit., p. 42.

of difficulty involved in acquiring such skill. Singers, for example, devote a large amount of time concentrating on proper phonation. Many teachers believe that it is the very cornerstone of a healthy singing technique. During the course of this investigation no evidence has been found to suggest that cheerleaders receive any training in developing healthy phonational technique.

The problem is compounded by the fact that cheerleaders' activities are not limited to participation in once-a-week athletic contests. Many cheerleading squads have regular practice sessions previous to and following the athletic event. This does two things: it contributes to vocal fatigue, and it does not allow vocal rest. The problem of excessive demand on the voice has been recognized by Gilb, who suggests:

> When an emergency arises, such as getting ready to cheer for the first football game, I would suggest as many practice sessions as it is possible to have. As the season progresses, so do the cheerleaders, and the number of practices may be lessened. Three a week may be necessary when the members of the cheerleading group are beginners; however, two a week is the recommended number.[11]

Gilb does not, however, suggest that the reason for limiting practice sessions is the protection of the voice. In discussing the length of the practice

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[11]Stella S. Gilb, Cheerleading, Pep Clubs and Baton Twirling (Lexington, Ky: Hurst Printing Co., 1955), p. 36.

session Gilb states, "anything less than an hour appears to be a waste of time."[12]

A valid question may be raised as to whether vocal dysfunction is a result of the cheerleading activity or whether it existed prior to participation in the activity. However, this question can be answered by the realization of the fact that one of the criteria for the selection of cheerleaders is vocal quality: "Cheerleaders should have a clear, commanding voice."[13]

In summary, singers are trained in proper phonational techniques, while cheerleaders are not; the burden of practice sessions and performances at athletic contests with incorrect phonation leads to vocal trauma. Personal experiences, the experience of many other voice teachers, and research which shows little or no knowledge of proper vocal techniques on the part of cheerleading coaches indicate that sufficient evidence exists to acknowledge the presence of a significant problem in the direct correlation of cheerleading and vocal dysfunction.

An examination of Thesis Abstracts from 1872 to the present reveals no other research in the area of cheerleading as a possible cause of vocal dysfunction.

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[12]Ibid., p. 37.

[13]Loken, op. cit., p. 12.

CHAPTER II

RELATED RESEARCH

Although an examination of available literature has failed to reveal any research specifically correlating cheerleading and vocal dysfunction, a number of works have been published reporting phonational dysfunction as a result of vocal hyperfunction; i.e., the kind of vocal abuse which may occur through participation in cheerleading. The reports examined are from the disciplines of Laryngeal Pathology and Speech Pathology. As such they are primarily concerned with the function of the speaking voice. All are in agreement with the basic tenet that vocal dysfunction is primarily a result of vocal abuse. The following citations will serve to illustrate the general accordance with this hypothesis.

In a paper reporting on the incidence of vocal nodules in children, Wilson supplies an excellent definition of vocal abuse:

> Vocal abuse may be defined as the improper use of the voice as a result of too high pitch, excessive air pressure against the under surfaces of the bands, excessive talking and prolonged vigorous

> use of the voice such as screaming, (and) shouting . . .[1]

In the above definition, every item suggested is a factor in cheerleading, with the exception of excessive talking.

Margaret C. L. Greene, Speech Therapist at Stoke Mandeville Hospital in England, in commenting on the relative importance of such vocal abuse states: "Dysphonia can be caused by structural abnormalities, disease, purely psychological disturbance, or faulty habits of voice production; the majority of voice disorders fall into the latter category."[2] Greene goes on to explain the sequence of events that occur in the development of one kind of dysfunction:

> A strained voice is always the result of faulty voice production. The over-exertion of the intrinsic laryngeal muscles while speaking, singing or shouting results in permanent muscular strain which impairs the delicate precision necessary to the movements of the vocal cords in phonation. The thyroarytenoid muscles may only lack tone and appear flabby in appearance, but in severe cases of strain they may remain permanently bowed. This internal tensor weakness produces either breathiness of voice or cracking due to abrupt changes in pitch. The difficulty in phonation is accompanied by a natural impulse to force the voice, thus producing mounting muscular tension . . . As

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[1]D. Kenneth Wilson, Ph.D., "Children with Vocal Nodules," Journal of Speech and Hearing Disorders, February 1961, Vol. 26, No. 1, p. 19.

[2]Margaret C. L. Greene, The Voice and Its Disorders, (New York: The MacMillan Company, 1959), p. 67.

> greater effort is used, the extrinsic muscles of the larynx may become involved, the voice becoming harsh and strident, yet breaking easily, with the false cords pressing down upon the true cords which offer increased resistance to breath pressure by the strength of their adduction. At the same time the voice is forced well above its normal pitch.
>
> In such cases the delicate membranous coating of the larynx may become sensitive and the focus of infection by micro-organisms. Chronic laryngitis and sore throats are frequently the result of bad habits of voice production. When the movements of the cords are hindered by laryngitis the activity of the ventricular bands becomes greater and in continual straining to produce the voice these may eventually participate in phonation . . . Such a voice is excruciating to hear and to produce.[3]

This vocal strain may take on other aural manifestations, such as breathiness, as described by Greene:

> If the vocal cords are insufficiently tensed by the action of the thyroarytenoid muscles or adducted by the transverse arytenoid, a certain amount of unvibrated air is allowed to escape through them. The voice produced lacks volume and resonance and is weak or asthenic, breathy and husky. This type of voice is sometimes called paretic but this is an unsuitable term since the vocal muscles are not affected with paresis (slight paralysis). If their movements are impaired as a result of vocal abuse, the weak and breathy voice is one of the many symptoms of vocal strain described above.[4]

If the vocal strain is allowed to go uncorrected, vocal nodules may develop. Again, quoting Greene:

> The nodules which form on the outer edge of the cords and cause severe disphonia are

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[3]Greene, op. cit., p. 68.

[4]Ibid., p. 75.

> the direct outcome of vocal abuse and the individual's habitual method of forcing the voice. Vocal nodules, therefore can be regarded as an advanced stage in vocal strain.[5]

In addition to the citations mentioned above are those works which report specifically on vocal nodules and other functional disorders. The citations given below indicate the uniformity of medical opinion regarding such vocal abuse.

In 1962 Dr. Godfrey E. Arnold, M.D., published a paper dealing with vocal nodules, in which he stated:

> After a great number of theories had been proposed to explain the cause of vocal nodules and polyps, it is now generally understood that these pathologic new growths are the mechanical result of faulty or excessive vocal use. They may be likened to callouses on the hands or corns on the toes which are caused by mechanical pressure from tools or tight shoes. Many authors agree on the direct mechanical cause by hyperkinetic movements of phonation.[6]

Other descriptions of activities leading to vocal difficulties might also serve as definitions of the demands placed upon cheerleaders. Brodnitz states quite clearly:

> Some of the factors that combine to produce the pattern of vocal hyperfunction are . . . abuse of the voice in work that involves shouting

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[5]Ibid., p. 78.

[6]Godfrey E. Arnold, M.D., "Vocal nodules and polyps: laryngeal tissue reaction to habitual hyperkinectic disphonia," Journal of Speech and Hearing Disorders, August 1962, Vol. 27, No. 3, p. 205.

> or speaking with excessive loudness, faulty voice production . . . a range that exceeds the natural limits.[7]

Greene states that "Vocal strain occurs most frequently in those whose occupations make severe demands upon the voice."[8]

The criteria for the selection of cheerleaders may actually predetermine the onset of vocal difficulties. According to Loken, cheerleaders "must be full of pep, vibrant . . . ."[9] Cheerleaders are also frequently selected on the basis of athletic talent. Arnold has found that these two factors alone can be predisposing factors to the formation of phonational difficulties:

> According to clinical experience, these tissue reactions to chronic irritation are seen mostly in persons of pyknic or athletic body type.
>
> A second predisposing factor is seen in the psychosomatic constitution or personality structure. Numerous authors have remarked on the general observation that nodules and polyps are seen mostly in voceriferous and aggressive personalities . . .
>
> This author has repeatedly drawn attention to the fact that hyperkinetic disphonia is regularly associated with the sthenic type of pyknic or athletic body build.

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[7]Friedrich S. Brodnitz, M.D., "Vocal rehabilitation in benign lesions of the vocal cords," Journal of Speech and Hearing Disorders, February, 1958, Vol. 27, No. 4, p. 113.

[8]Greene, op. cit., p. 69.

[9]Loken, op. cit., p. 12.

> Thus we find the circle closed by the following correlation. Hypertrophic reaction of hyperplastic mucosa in the muscular body type is associated with aggressively hyperkinetic movements of phonation and a tendency to formation of vocal nodules or polyps.[10]

The following citation by Greene offers a concise statement of the conditions under discussion:

> Constant shouting obviously imposes a strain upon the voice. The trained speaker or singer can produce a considerably louder voice when performing in a theater than the average person when shouting, but the trained voice suffers no injury because it is properly produced.[11]

This lack of proper training in phonational techniques on the part of cheerleaders is of prime importance. As Wilson states:

> West, Ansberry and Carr maintain that if the voice is properly used, no amount of vigorous vocalization can damage the edges of the vocal cords. Wells states that friction and impact seem to cause the nodules . . .
>
> Berry and Eisenson estimate that vocal abuse probably accounts for the development of the granuloma in 90 per cent of the cases.[12]

The works here cited are not intended to be an exhaustive presentation of all forms of vocal abuse. The purpose of including these references is, however, sufficient to indicate the relationship between vocal strain and vocal nodules and to present a representative

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[10] Arnold, op. cit, p. 206.

[11] Greene, op. cit., p. 69.

[12] Wilson, op. cit., p. 19.

group of citations showing the uniformity of expert opinion regarding the definition, cause, and results of vocal abuse. Both Loken and Gilb speak of the activity of the cheerleader totally in terms of "yells." The cheerleader's main function would seem to involve a great deal of activity which, as is defined in the citations above, constitutes vocal abuse.

Conclusions Concerning Related Research

1. Vocal abuse has two separate and distinct characteristics:
   a. overuse, in terms of duration, force, and range
   b. faulty techniques of production
2. Vocal abuse frequently leads to vocal dysfunction, especially when both characteristics are present simultaneously. This dysfunction can take one of several forms:
   a. vocal strain
   b. permanent muscular atrophy
   c. vocal nodules
3. Cheerleading encourages vocal abuse.

CHAPTER III

METHODS AND PROCEDURES

Selection of Subjects

The criteria for selecting subjects are as follows:

1. a minimum of three years participation in cheerleading
2. no formal vocal training
3. presently or recently involved in cheerleading

The following criteria were established for members of the control group:

1. no participation in cheerleading
2. no formal vocal training
3. ages compatible with those of the cheerleading subjects

The subjects were contacted through:

1. interviews with cheerleading coaches and other high school personnel
2. advertisement in the Eastern Echo, the student newspaper at Eastern Michigan University
3. personal references

Recording of Subjects

The cheerleading subjects were recorded "in the field," i.e., at the various high schools represented, and in voice studios at Eastern Michigan University and Michigan State University. Subjects were given a practice session prior to having their voices recorded. The sessions were approximately fifteen minutes in length.

The control group members were recorded at Eastern Michigan University.

In all, twenty-three cheerleaders and twenty-four control group subjects were recorded. Three of the cheerleaders and four of the control group were unable to match pitch and were eliminated from the study. One of the samples from the cheerleading group was eliminated because of a malfunction in recording equipment, giving a total of nineteen acceptable samples of cheerleaders' voices,and twenty of control group members. One control sample was eliminated by random choice to give an equal number of samples for comparison. The samples were then numbered one through nineteen for cheerleaders, and twenty through thirty-eight for control samples. They were then arranged on a master tape recording in random sequence. This tape was then edited and copied to produce another master tape, on which each sample was announced by number. Each sample was repeated. The auditors had no way of knowing whether they were

listening to a sample of a cheerleader or a control group number. All subjects sang an ascending scale, starting on A (220 Hz.) and ascending as high as possible, and a descending scale, again starting on A (220 Hz.) and going to the lower limit of the range.

Selection of Auditors

It was determined that the panel of auditors would include not only experienced voice teachers but also experts in speech pathology. The following persons consented to serve as auditors:

1. Dr. Leo Deal, Ph.D., Chairman of the Department of Audiology and Speech Sciences, Michigan State University;

2. Ms. Carol Haynes, Clinical Supervisor of Speech Pathology, Michigan State University, (Certificate of Clinical Competence of the American Speech and Hearing Association);

3. Ms. Carolyn M. Hagey, third year doctoral student in Speech Pathology at Michigan State University;

4. Dr. J. Loren Jones, D. Mus. Ed., a member of the voice staff at Michigan State University, a voice teacher and performer of many years' experience;

5. Mr. Gean Greenwell, Past President of the National Association of Teachers of Singing, retired Chairman of the Voice area at Michigan State University,

voice teacher and performer of great experience, former member of the New York City Opera Company;

6. Mrs. Leona Witter, member of the voice staff at Michigan State University, teacher and performer of many years' experience, and a former member of the New York City Center Opera Company;

7. Mr. Ernest Brandon, member of the voice staff of Eastern Michigan University, Master's Degree in Voice from the University of Illinois;

8. Ms. Veronica August, member of the voice staff at Eastern Michigan University, Master's Degree in Voice from Indiana University.

At each of the hearings, the auditors were given score sheets which provided the following vehicles for evaluation:[1]

1. a chart of the musical scale for the auditors to indicate the pitch level at which any register changes took place,

2. a numerical scale, (0 = none, 1 = slight, 2 = moderate, 3 = severe) within which the auditors were asked to indicate, by circling the appropriate number, the degree of damage or dysfunction observed,

3. a space for individual comments. Each auditor was also given written instructions covering the use of the score sheet.

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[1]See Appendix for sample score sheets.

Pretraining of the auditors was accomplished by playing two "trial" samples, one of which was judged to be a normal, undamaged voice (to be graded "0," or no damage), and one which was judged to be a severely damaged voice (to be graded "3"). The preceding parameters were determined with the assistance of Mr. David Palmer, Speech Pathologist at Eastern Michigan University. The auditors were instructed to utilize two unused sample reporting spaces to practice using the grading sheet; they were also instructed not to discuss their individual opinions throughout the hearing.

The equipment used for this project was the Sony stereophonic tape recorder, model number TC 252. This machine has a power of 45 watts, a frequency response of 30-18,000 Hz at 7 1/2 ips, and a signal to noise ratio of 50 dB. The tape copying was done through direct line to an identical machine; the tape was played for the auditors on the same machine on which the samples were originally recorded.

Confirmation of Auditor Response

Sample numbers 22 and 28 were played again as sample numbers 39 and 40. This was done without the knowledge of the auditors, as a means of checking consistency of auditor response. In each instance, there

was no variation of response from any auditor. Consistency was unanimous.

The mean score for each subject was determined. The standard "t" test for independent means was applied to the findings of the auditors to eliminate the chance factor:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s^2}{N_1} + \frac{s^2}{N_2}}}$$

A t score of 3.64 was obtained, indicating a difference beyond the .01 level of confidence. This difference in the performance of the two groups (cheerleaders and control group) would occur by chance less than one time in a hundred. Therefore, there is a true difference in the performance of the groups. Specifically, the auditors judged the cheerleaders' voices to be significantly (noticeably--to their ears) more damaged than those of the non-cheerleaders.

CHAPTER IV

PRESENTATION AND INTERPRETATION OF THE DATA

This study was designed to examine two specific kinds of data of differing significance:

1. Primarily, to determine whether or not participation in cheerleading activity on a long term basis is damaging to the female voice.

2. Secondarily, to determine whether or not the register change out of chest voice is altered due to cheerleading.

The results of the tests for register change were inconclusive for the following reasons:

1. A surprising number of subjects sang the entire exercise in only one register. Some sang the entire range in chest voice register, while others sang completely in head voice. No change of register occurred in these samples.

2. Due to different pedagogical and professional backgrounds, some of the auditors were unable to distinguish register changes. Because of this, there was a lack of consensus concerning the exact pitch level for this change.

3. Under existing conditions the change of register was too subtle to be instantly recognizable.

4. In some cases, the condition of the subjects' voices was unclear. This precluded the possibility of determining in which register she was singing.

It was hoped that it would be possible to draw some correlation between the pitch level of register change and participation in cheerleading, but no such conclusion can be made, based on this study. However, it was possible to draw some conclusions regarding the correlation between the degree of vocal damage or dysfunction and participation in cheerleading activities, as the following graphic representations will show.

Figure 1 shows how each auditor judged each subject, in terms of vocal dysfunction, on a scale of 0 - 3; also included is the mean score for each subject. (The circled figures represent the scores of the cheerleading group.)

Figure 2 shows the results of only the control group; Figure 3 represents the same information regarding the cheerleading group. In both instances composite scores of each group are included.

Sample Number	Jones	Deal	Hagey	Haynes	Witter	Greenwell	August	Brandon	Average
(1)	2	3	1	2	1	0	0	2	1.4
2	1	1	0	1	2	0	0	0	0.6
(3)	3	3	3	3	3	3	3	3	3.0
4	0	0	.5	0	0	0	0	1	0.2
(5)	0	0	1	0	0	0	0	0	0.1
6	1	1	0	0	0	0	0	1	0.4
7	0	2	1	2	1	0	1	1	1.0
8	1	1	.5	1	1	0	1	1	0.8
9	1.5	1	0	1	0	0	0	2	0.7
10	1	1	0	1	0	0		2	0.7
11	1	3	1	0	0	0	0	0	0.6
(12)	2	3	3	3	2		2	3	2.6
(13)	2	1	2	3	0	0	1	2	1.4
(14)	2	1	2	2	0	0	0	3	1.3
15	3	3	3	3	3	3	3	3	3.0
16	0	1	0	0	0	0	0	2	0.4
(17)	3	3	3	3	1	0	2	3	2.3
(18)	0	0	2	0	0	0	0	2	0.5
(19)	2	2	2.5	2	2	3	2	2	2.2
(20)	1	2	1	0	0	0	1	2	0.9

Figure 1.--Auditor Response.

Sample Number	Jones	Deal	Hagey	Haynes	Witter	Greenwell	August	Brandon	Average	
(21)	1	1	0	2	0	0	1	2	0.9	
22	1	1	0	1	0	0	0	1	0.5	
(23)	1	1	1	1	0	0	1	1	0.8	
24	1	0	0	1	0	0	0	0	0.3	
(25)	2	1	0	1	0	2	0	1	0.9	
26	1	1	0	0	0	0	0	0	0.3	
(27)	0	0	0	0	0	0	0	0	0.0	
(28)	3	3	3	3	3	3	3	3	3.0	
(29)	3	3	3	3	3	3	3	3	3.0	
(30)	0	1	0	0	0	0	0	1	0.3	
31	1	1	0	1	0	0	1	1	0.6	
32	2	1	1	2	0	0	1	0	0.9	
(33)	2	3	3	3	1	0	2	2	2.0	
(34)	2	3	3	3	3	0	1	1	2.0	
35	.5	1	0	0	0	0	0	0	0.2	
36	1.5	2	2	1	0	0	2	1	1.2	
37	2	3	2	1	1	0	1	2	1.5	
38	0	0	0	0	0	0	0	0	0.0	
39	1	1	0	1	0	0	0	1	0.5	*
(40)	3	3	3	3	3	3	3	3	3.0	*

Note: As a means of checking auditor consistency, sample number 22 was replayed as sample number 39; sample number 28 was replayed as sample number 40. This was done without the auditors' knowledge.

Figure 1.--Continued.

Sample Number	Jones	Deal	Hagey	Haynes	Witter	Greenwell	August	Brandon	Average
1	1	1	0	1	2	0	0	0	0.6
2	0	0	.5	0	0	0	0	1	0.2
3	1	1	0	0	0	0	0	1	0.4
4	0	2	1	2	1	0	1	1	1.0
5	1	1	.5	1	1	0	1	1	0.8
6	1.5	1	0	1	0	0	0	2	0.7
7	1	1	0	1	0	0		2	0.7
8	1	3	1	0	0	0	0	0	0.6
9	3	3	3	3	3	3	3	3	3.0
10	0	1	0	0	0	0	0	2	0.4
11	1	1	0	1	0	0	0	1	0.5
12	1	0	0	1	0	0	0	0	0.3
13	1	1	0	0	0	0	0	0	0.3
14	1	1	0	1	0	0	1	1	0.6
15	2	1	1	2	0	0	1	0	0.9
16	.5	1	0	0	0	0	0	0	0.2
17	1.5	2	2	1	0	0	2	1	1.2
18	2	3	2	1	1	0	1	2	1.5
19	0	0	0	0	0	0	0	0	0.0
Composite Score									0.7 *

Note: Since the last control group sample from Figure 1 is a repetition of an earlier sample, it is not included here in the computation of the composite score.

Figure 2.--Control Group.

Sample Number	Jones	Deal	Hagey	Haynes	Witter	Greenwell	August	Brandon	Average
1	2	3	1	2	1	0	0	2	1.4
2	3	3	3	3	3	3	3	3	3.0
3	0	0	1	0	0	0	0	0	0.1
4	2	3	3	3	2		2	3	2.6
5	2	1	2	3	0	0	1	2	1.4
6	2	1	2	2	0	0	0	3	1.3
7	3	3	3	3	1	0	2	3	2.3
8	0	0	2	0	0	0	0	2	0.5
9	2	2	2.5	2	2	3	2	2	2.2
10	1	2	1	0	0	0	1	2	0.9
11	1	1	0	2	0	0	1	2	0.9
12	1	1	1	1	0	0	1	1	0.8
13	2	1	0	1	0	1	0	1	0.9
14	0	0	0	0	0	0	0	0	0.0
15	3	3	3	3	3	3	3	3	3.0
16	3	3	3	3	3	3	3	3	3.0
17	0	1	0	0	0	0	0	1	0.3
18	2	3	3	3	1	0	2	2	2.0
19	2	3	3	3	3	0	1	1	2.0
Composite Score									1.5 *

Note: Again, as in Figure 2, only the first 19 samples were used to compute the composite score.

Figure 3.--Cheerleading Group.

An examination of Figures 2 and 3 will show that the cheerleading group has a composite score more than twice that of the control group (1.5 vs. 0.7), indicating a significantly higher level of vocal dysfunction among the cheerleaders as a group. Of even greater significance, however, is the number of individuals who are found at or above the 2.0, or moderate-to-severe level of damage, as Figures 4 and 5 show. (Figure 6 is a composite of Figures 4 and 5.)

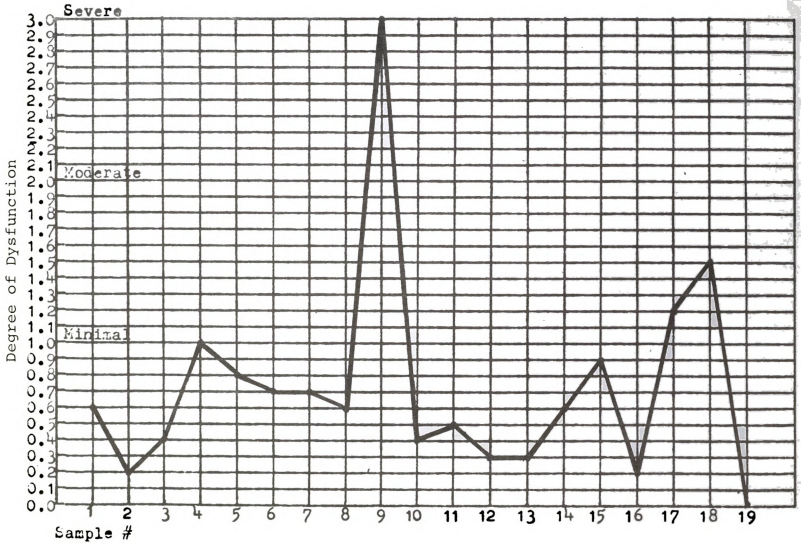


Figure 4.--Degree of Dysfunction, Control Group.

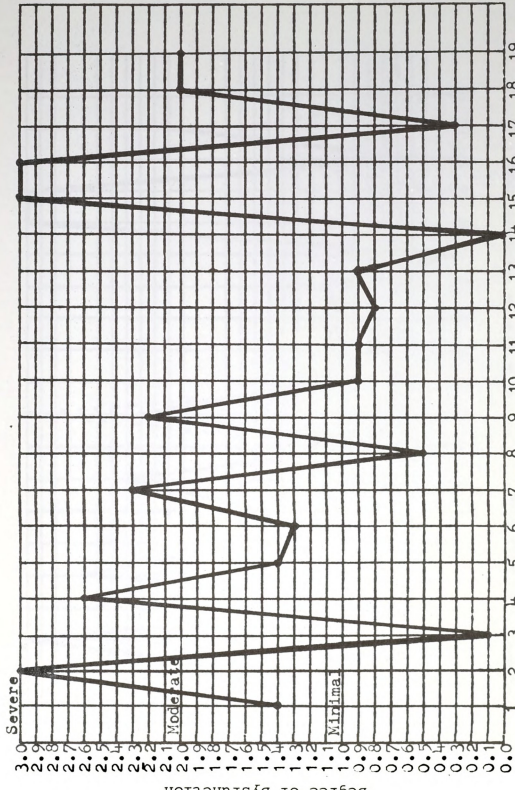


Figure 5.--Degree of Dysfunction, Cheerleading Group.

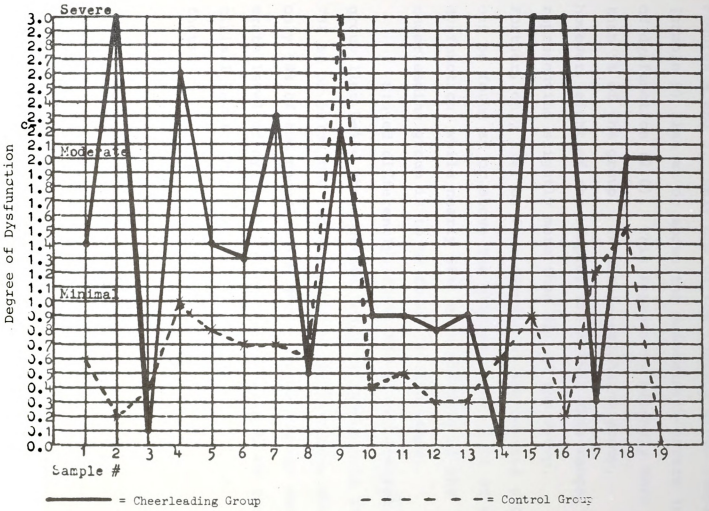


Figure 6.--Composite Degrees of Dysfunction, Cheerleading Group and Control Group.

A significant comparison can be drawn between Figures 4 and 5. Only one of the control group samples (sample 9) lies at or above the moderate-to-severe level of dysfunction (2.0). This represents slightly more than 5% of the group. In the cheerleading group, however, eight of the samples lie within this range, representing slightly more than 42% of the group. Further, only 21%, or four samples of the control group can be found at or above the minimal range (1.0) of vocal dysfunction, while nearly 58%, or a majority of the cheerleading group is to be found in this range.

Stated differently, fully 95% of the control group lies below the moderate level of dysfunction and 79% at or below the minimal level of dysfunction, while only 58% of the cheerleading group lies below the moderate level of dysfunction and only 42% lie below the minimal level. Figures 7 - 9 illustrate the above facts.

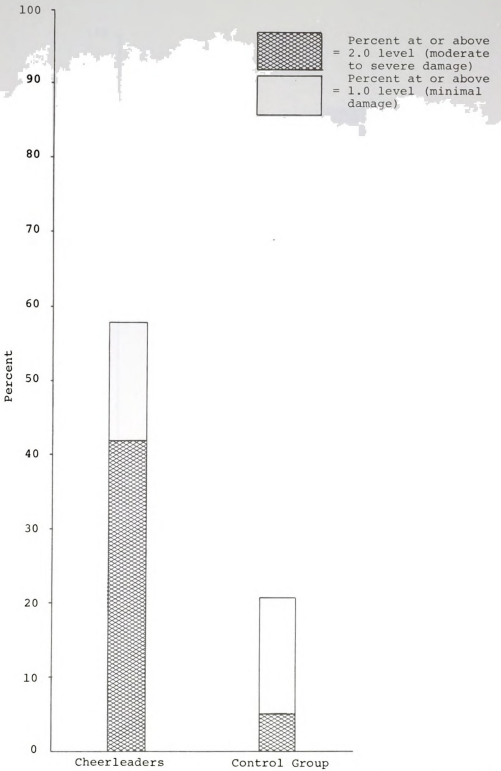


Figure 7.--Percent at or above 2.0 level (moderate to severe damage and percent at or above 1.0 level (minimal damage).

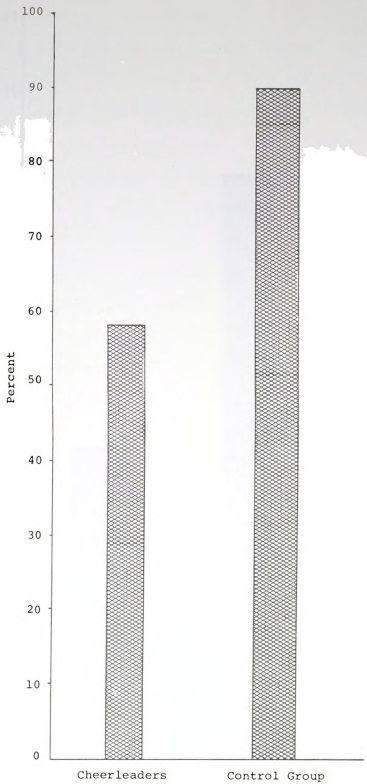


Figure 8.--Percent below the 2.0 level (moderate damage).

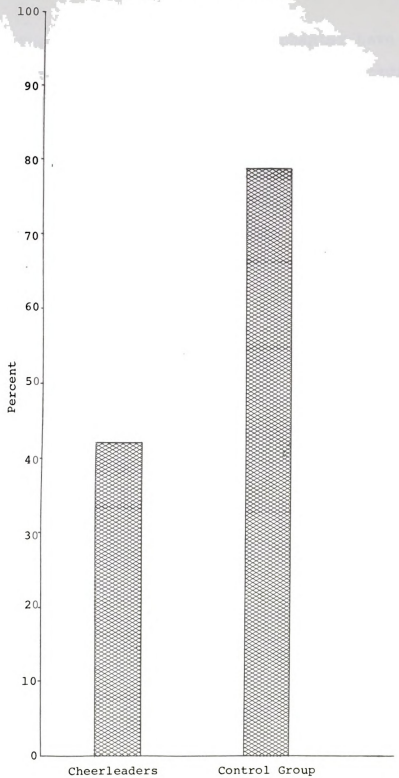


Figure 9.-- Percent below 1.0 level (minimal damage).

Summary

The data presented in this chapter have provided information about the effect of cheerleading on the female voice, completing the experimental design as proposed in Chapter One. Nineteen subjects of both cheerleading and control groups were heard by eight expert auditors who rendered opinions regarding the degree of dysfunction in each voice and the pitch level of register change where possible. While the register change data proved inconclusive, the information about the degree of dysfunction, which was the primary concern of this study, is highly significant. On the basis of this information, the following chapter will be devoted to conclusions regarding the effect of prolonged cheerleading activity on the female voice.

CHAPTER V

CONCLUSIONS

Based on the data presented in the previous chapters the following conclusions can be drawn:

1. Long term (three years or more) participation in cheerleading results in a statistically higher incidence of severe dysfunction in the female voice, as manifested in a high degree of hoarseness and the inability to phonate throughout the full compass of the normal female voice range.

2. Long term participation in cheerleading results in a statistically higher incidence of loss of vocal clarity, even if less than severely dysfunctional.

Of the eight subjects who exhibited obvious vocal dysfunction (determined by the panel of expert auditors), four ultimately were medically examined at the Michigan State University Speech and Audiology Clinic by Dr. Y. Pal Kapur or by Dr. Roger W. Miller of Ypsilanti, Michigan. Four subjects with severe dysfunction did not appear for the medical examination. The results are as follows:

Subject #1: Nodules.

Subject #2: Chronic laryngitis.

Subject #3: Chronic laryngitis.

Subject #4: Acute chronic laryngitis, evidence of physical damage to vocal cords ("both cords are thickened").

The implication of the above conclusions for any young female anticipating involvement in singing is obvious: cheerleading participation on a prolonged basis is contraindicated.

Recommendations for Further Studies

This study makes no determinations regarding the effects of cheerleading of less than three year's duration; therefore, no conclusions can be reached concerning short term participation in cheerleading activities.

There is a definite need for a study to determine the effect of short term participation in cheerleading; e.g., the effect of one year of participation, and a similar study to show the effect of two years of participation.

A continuation and expansion of the present research, over a greater length of time and using a larger number of subjects, would be extremely valuable. Such a study should record subjects before any participation in cheerleading, after one year, after two

years, and again after three years, using the same evaluation methods as developed in this current project.

The testing of a cheerleader's voice quality immediately before and after a football game and again several days later would also provide valuable information.

Another current vocal practice which has many correlaries with cheerleading, and therefore deserves attention, is the effect of "rock" singing on the voice.

All of the above proposed studies could be equally applied to the male voice.

APPENDICES

APPENDIX A

INSTRUCTIONS TO AUDITORS

INSTRUCTIONS TO AUDITORS:

You will hear recorded samples of both cheerleaders' and non-cheerleaders' voices in random order. Each subject will sing an ascending scale, starting on A (220 Hz.), and going upward to the limit of her range; then, again starting on A (220 Hz.), a descending scale, going downward to the limit of her range. In this manner you will hear the quality of each voice throughout its entire compass. You are asked to identify which of those samples exhibit signs of phonational disorders, manifest by lack of clarity, hoarseness, and/or by the inability to phonate throughout the normal voice range. You are also asked to quantify your observations by using the following scale:

0 = perfectly clear voice; no damage

1 = slight lack of clarity or hoarseness through part or the compass of the voice; minimal damage

2 = moderate degree of hoarseness, and/or hoarseness throughout the whole compass of the voice; moderate damage

3 = great degree of hoarseness, and/or inability to phonate throughout normal voice range

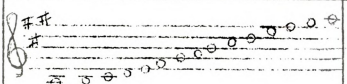
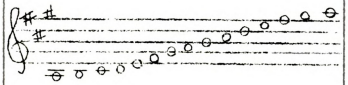
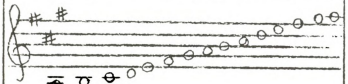
You are also asked to identify the pitch level at which the subjects change from chest voice in the ascending scale passage. In some cases, because of the lack of musical experience on the part of nearly all the subjects, it will not be possible to pin point the precise pitch at which this register change occurs. In those instances, merely indicate the pitch nearest where you believe the change takes place. In other cases, the subject may not actually make a register change, but sing the entire ascending scale passage solely in chest voice, or solely in head voice. In such cases, please write a note to that effect in the space beneath the notated musical scale.

Now look at your score sheets. The number of each sample is indicated in the left hand column, followed by other columns numbered 1, 2, and 3. In column number 1, circle the pitch at which the register change takes place. If no change occurs, please indicate so in the space under the notated scale. In column number 2, circle the number which best indicates your judgement of the condition of the voice of each subject. Column number 3 is reserved for any individual comments you may wish to make. Thank you for your efforts and time dedicated to this research project.

Name_____

APPENDIX B

AUDITOR SCORE SHEET

Sample #	(1) Change from chest voice at: (Circle appropriate pitch)	(2) Degree of damage (0=none, 1=slight, 2=moderate, 3=severe) (circle one)	(3) Comments
		0 1 2 3	
		0 1 2 3	
		0 1 2 3	

APPENDIX C

STATISTICAL ANALYSIS

STATISTICAL ANALYSIS

t-test for independent means

A - cheerleaders; B = control group. Decimals are removed to ease computation.

	A (N_1)	B (N_2)	A2 (N_1)	B2 (N_2)
1.	14	06	196	36
2.	30	02	900	4
3.	01	04	1	16
4.	26	10	676	100
5.	14	08	196	64
6.	13	07	169	49
7.	23	07	529	49
8.	05	06	25	36
9.	22	30	484	900
10.	09	04	81	16
11.	09	05	81	25
12.	08	03	64	9
13.	09	03	81	9
14.	01	06	1	36
15.	30	09	900	81
16.	30	02	900	4
17.	03	12	9	144
18.	20	15	400	225
19.	20	01	400	1
	N_1	N_2	N_1	N_2
	$\sum X = 287$	$\sum X = 140$	$\sum X = 6093$	$\sum X = 1804$

$N = 19$

$\sum X^{N1} = 287$

$\sum X^{N2} = 140$

$\frac{N^1}{X} = 15.1$

$\frac{N^2}{X} = 7.37$

$(\sum X^{N^1})^2 = 82369$

$(\sum X^{N^2})^2 = 19600$

$$S^2 = \frac{\sum_{1}^{N^1} X^2 - \frac{(\sum_{1}^{N^1} X)^2}{N1} + \sum_{1}^{N^2} X^2 - \frac{(\sum_{1}^{N^2} X)^2}{N2}}{N^1 + N^2 - 2}$$

$$S^2 = \frac{6093 - \frac{82369}{19} + 1804 - \frac{19600}{19}}{36}$$

$$S^2 = \frac{6093 - 4335.26 + 1804 - 1031.57}{36}$$

$$S^2 = \frac{1757.74 + 772.43}{36}$$

$$S^2 = \frac{1530.17}{36}$$

$$S^2 = 42.50$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S^2}{N_1} + \frac{S^2}{N_2}}}$$

$$t = \frac{15.1 - 7.37}{\sqrt{\frac{42.50}{19} + \frac{42.50}{19}}}$$

$$t = \frac{7.73}{\sqrt{2.24 + 2.24}}$$

$$t = \frac{7.73}{\sqrt{4.48}}$$

$$t = \frac{7.73}{2.12}$$

$$t = 3.64$$

A t-score of 3.64 indicates a difference beyond the .01 level of confidence. This difference in the performance of the two groups would occur by chance less than one time in a hundred. Therefore, there is a true difference in the performance of the groups. Specifically, the auditors judged the cheerleaders' voices to be significantly more dysfunctional than the voices of the control group.

APPENDIX D

LETTER TO SUBJECTS

Eastern Michigan University
Ypsilanti, Michigan 48197

Paul Bravender
Director, Opera Workshop

Dear Ms.

Thank you for your participation in the study of cheerleading and its effect on the human voice. As a part of this study, Dr. Y. P. Kapur, M.D., a Laryngologist associated with the Speech and Audiology Clinic of Michigan State University, has agreed to examine the throats of participants, free of charge. This examination is indicated in your case because it has been determined by specialists that you are one of eight subjects who exhibit signs of vocal strain. These specialists expressed concern and asked that those showing vocal strain be examined medically, that this condition might be corrected.

Dr. Kapur holds clinics on Monday afternoons from 1:00 to 3:00 at the Speech and Audiology Department on the Campus of Michigan State University. He has asked that these examinations be reserved on either Monday, October 4, or Monday, October 11. Please call the above department at Michigan State University at your earliest convenience, to reserve an appointment. The number is (517) 353-8780.

If you have any questions in this regard, please call me at (313) 487-3414 (office) or (313) 482-3093.

Sincerely,

Paul Bravender

Paul Bravender

EMU
Department of Music
(313) 487-0244

APPENDIX E

REPORTS FROM LARYNGOLOGISTS

ROGER W. MILLER, M.D.
27 South Prospect Street
Ypsilanti, Michigan 48197
TELEPHONE 487-5357

Surgery of the
Ear, Nose, Throat
Head and Neck

November 4, 1976

Mr. Paul Bravender
209 Alexander
Eastern Michigan University
Ypsilanti, Michigan 48197

Re: Lois Brown

Dear Mr. Bravender:

Lois Brown was evaluated today with regard to your study.

Indirect laryngoscopy reveals bilateral submucosal thickening of both vocal cords at the junction of the anterior and middle thirds of the cords. There is no evidence of erythema or other acute reaction in the area.

The finding is compatible with so called singers nodules due to chronic voice abuse.

I hope that the above information is of assitance.

Sincerely,

Roger W. Miller, M.D.

OTOLARYNGOLOGY SERVICES
of the
Audiology and Speech Science Department

Speech and Hearing Clinic
Audiology and Speech Sciences
Michigan State University
East Lansing, Michigan 48824
Telephone: 353-8780, extension 28

History No. 9389

Name: Jeannie Richford **Age:** 3-30-59
145 N Main St
Clarkston, Mi. 48016
Referred by:

HISTORY:

Cheerleader for 4 yrs.
Was hoarse last year. Every time
she had sore voice strain.
also hoarse this year.
Same as last year.

CHIEF COMPLAINT: Has had effonia for
period of 1/2 day.
appears to have no hoarseness
in between seasons.
No cough.

HISTORY

Date Taken_____ Informant_____

13 Family History (blood relatives)
(circle 1 or more)
0-No history of allergy or deafness
1-Allergy
2-Deafness (due to infection)
3-Deafness of obscure origin
4-Medication during pregnancy
(specify)
5-Rh incompatibility
6-Rubella in mother during pregnancy
7-Others

14 Hearing Impairment (circle 1)
0-No history of
1-Periodic mild (questionable)
2-Periodic but definite
3-Definite but not within past year
4-Constant and within past year
5-Constant and severe
6-No definite evidence of hearing at any time

15 Speech (circle 1)
0-No abnormalities noted
1-No attempts at phonation
2-No 3 word phrases (over 30 months of age)
3-Articulatory defect
4-Phonatory defect not as severe as 1 or 2
5-Stuttering
6-Communicative defect

16 Tinnitus & Vertigo (circle 1)
0-No history of
1-Tinnitus
2-Vertigo
3-Tinnitus & Vertigo

17 Ear Infections (circle 1)
0-No history of
1-Ear aches, not within past year
2-Ear discharge, not within the past year
3-Ear aches without discharge in past year
4-Ear discharge within past year
5-Chronic discharge (over 6 weeks inactive)
6-Chronic discharge (over 6 weeks active)

18 Nose and Sinuses (circle 1)
0-No unusual upper respiratory symptoms
1-5 to 6 colds a yr. or 2 to 3 lasting 3 weeks or more (not within past yr.)
2-As in 1 but within past year
3-As in 1 plus chronic nasal obstruction
4-As in 1 plus chronic purulent discharge
5-As in 1 plus chronic productive cough

Comments:

No allergies
No f. n. d.

19 Tonsils (circle 1)
0-No history suggestive of tonsillitis
1-Fever, sore throat, swollen neck glands (not within past year)
2-Fever with colds during past year

20 E.N.T. Surgery (circle 1) DATE BY WHOM
0-None
1-Adenoidectomy
2-T&A
3-Mastoidectomy rt.
4-Mastoidectomy lt.
5-Mastoidectomy **bilateral**
6-Sinus operation
7-Submucous resection
8-Myringotomy

21 Infectious Diseases (circle 1 or more) DATE
0-None
1-Meningitis
2-Mumps
3-Measles
4-Whooping Cough
5-Rubella
6-Chicken Pox
7-Scarlet Fever
8-Syphilis
9-Other (specify below)

22 Hoarseness
0-None
1-Related to voice strain
2-Periodic
3-Continuous (less than 6 weeks)
4-Continuous (more than 6 weeks)
5-Related to upper respiratory infection
6-Accompanied by cough
7-Accompanied by chest infection

23 Allergies
0-None
1-Hay fever
2-Asthma
3-Food Allergies
4-Skin Allergies
5-Bouts of sneezing only
6-Others:

Comments:

I had one throat infection - last yr. No recent infections

See c/o

PHYSICAL EXAMINATION (Contd.)

40 NASOPHARYNX (Circle 1)

0 Normal
1 Small midline adenoids
2 Adenoids encroaching upon tubal orifices
3 Large adenoids, tubal orifices obscured
4 Nasopharynx, full of adenoids
5 Nasopharynx, obscured by pus
6 Tubal orifices oedematous

SINUSES (Circle one for each side)

	Rt.		Lt.	
41	0	42	0	Normal
	1		1	Dark to transillumination
	2		2	Radiologic evidence of infection

LARYNX (Circle one for each side)

	Rt.		Lt.	
43	(0)	44	(0)	Normal
	1		1	Congenital abnormality
	2		2	Vocal nodules
	3		3	Vocal polyp
	4		4	Acute laryngitis
	5		5	Chronic laryngitis
	6		6	Paralysis, unilateral
	7		7	Paralysis, bilateral
	8		8	Contact ulcer
	9		9	Carcinoma

Cords normal
Marked hypopharyngeal, epiglottis c̄ arytenoid injection
Both cords move well

TEMPORAL BONES X-RAYS

	Rt.		Lt.	
45	0	46	0	Normal
	1		1	Mastoiditis
	2		2	Sclerosis
	3		3	Ossicular malformation
	4		4	Fracture of temporal bone
	5		5	Ossicular discontinuity
	6		6	Widening of internal auditory
	7		7	Conformed by polytomography
	8		8	Conformed by pantopaque studies

OTOLARYNGOLOGY SERVICES

of the

DEPARTMENT OF AUDIOLOGY & SPEECH SCIENCES, MSU

Speech and Hearing Clinic
Audiology and Speech Sciences
Michigan State University
East Lansing, MI 48824
Telephone: 353-8780, Ext. 28

History No. 9438 (cheerleader)
Name: Brenda Riock [redacted]
3910 Hart
Webberville, MI 48892
Age: 18
Referred by: Mr. Brewender

HISTORY & CHIEF COMPLAINT:

Williamston - 4 yrs

Has had episodes of hoarseness
which improve c̄ rest.
Never had to quit.
No prolonged hoarseness

HISTORY

Date Taken_____ Informant_____

13 Family History (blood relatives) (circle 1 or more)
0-No history of allergy or deafness
1-Allergy
2-Deafness (due to infection)
3-Deafness of obscure origin
4-Medication during pregnancy (specify)
5-Rh incompatibility
6-Rubella in mother **during pregnancy**
7-Others

Comments:

Sister – not tested
Aunt – multiple

14 Hearing Impairment (circle 1)
0-No history of
1-Periodic mild (questionable)
2-Periodic but definite
3-Definite but not within past year
4-Constant and within past year
5-Constant and severe
6-No definite evidence of hearing at any time

15 Speech (circle 1)
0-No abnormalities noted
1-No attempts at phonation
2-No 3 word phrases (over 30 months of age)
3-Articulatory defect
4-Phonatory defect not as severe as 1 or 2
5-Stuttering
6-Communicative defect

16 Tinnitus & Vertigo (circle 1)
0-No history of
1-Tinnitus
2-Vertigo
3-Tinnitus & Vertigo

17 Ear Infections (circle 1)
0-No history of
1-Ear aches, not within past year
2-Ear discharge, not within the past year
3-Ear aches without discharge in past year
4-Ear discharge within past year
5-Chronic discharge (over 6 weeks inactive)
6-Chronic discharge (over 6 weeks active)

18 Nose and Sinuses (circle 1)
0-No unusual upper respiratory symptoms
1-5 to 6 colds a yr. or 2 to 3 lasting 3 weeks or more (not within past yr.)
2-As in 1 but within past year
3-As in 1 plus chronic nasal obstruction
4-As in 1 plus chronic purulent discharge

Tonsillectomy

Tonsils (circle 1) Comments:
0-No history suggestive of tonsillitis
1-Fever, sore throat, swollen neck glands (not within past year)
2-Fever with colds during past year

20 E.N.T. Surgery (circle 1) DATE BY WHOM
0-None
1-Adenoidectomy
2-T&A
3-Mastoidectomy rt.
4-Mastoidectomy lt.
5-Mastoidectomy bilateral
6-Sinus operation
7-Submucous resection
8-Myringotomy

21 Infectious Diseases (circle 1 or more) DATE
0-None
1-Meningitis
2-Mumps
3-Measles
4-Whooping Cough
5-Rubella
6-Chicken Pox
7-Scarlet Fever
8-Syphilis
9-Other (specify below)

22 Hoarseness
0-None
1-Related to voice strain
2-Periodic
3-Continuous (less than 6 weeks)
4-Continuous (more than 6 weeks)
5-Related to upper respiratory infection
6-Accompanied by cough
7-Accompanied by chest infection

23 Allergies
0-None
1-Hay fever
2-Asthma
3-Food Allergies
4-Skin Allergies
5-Bouts of sneezing only
6-Others:

PHYSICAL EXAMINATION

Principal Complaint:

EARS (Circle 1 for each ear)

Rt.	Lt.	
32 0	33 0	Normal
1	1	Obscured
2	2	Retracted Drum
3	3	Thickened Drum
4	4	Thickened and Retracted Drum
5	5	Inflammed middle ear including secretory otitis media
6	6	Dry perforation
7	7	Perforation with discharge
8	8	Acute Otitis Media
9	9	External Otitis
		Congenital Atresia

IMPRESSION

34 NECK GLANDS (Circle 1)

0 Not palpably abnormal
1 Palpable but not markedly enlarged
2 Moderate to severe enlargement

35 TEETH AND MOUTH

0 Normal
1 Adentia
2 Dental caries: Slight
3 Dental caries: Severe
4 Severe gingivitis with dental caries
5 Severe gingivitis without caries

36 TONSILS (Circle 1)

0 Normal
1 Cleanly removed
2 Tags, not infected
3 Tags, infected
4 Hypertrophied
5 Acute infection
6 Scarring and retraction moderate
7 Signs of severe chronic infection

37 PHARYNX (Circle 1)

0 Normal
1 Acute granular pharyngitis
2 Chronic lymphoid hyperplasia, not severe
3 Chronic severe lymphoid hyperplasia

NOSE (Circle 1 for each side)

Rt.	Lt.	
38 0	39 0	Normal
1	1	Septal obstruction
2	2	Mucous membrane thickening
3	3	Purulent discharge
4	4	Acute rhinitis (watery dischge.)
5	5	Polyps
6	6	Allergic rhinitis
7	7	Purulent discharge and polyps

PHYSICAL EXAMINATION (Contd.)

NASOPHARYNX (Circle 1)

0 Normal
1 Small midline adenoids
2 Adenoids encroaching upon tubal orifices
3 Large adenoids, tubal orifices obscured
4 Nasopharynx, full of adenoids
5 Nasopharynx, obscured by pus
6 Tubal orifices oedematous

SINUSES (Circle one for each side)

	Rt.		Lt.	
41	0	42	0	Normal
	1		1	Dark to transillumination
	2		2	Radiologic evidence of infection

LARYNX (Circle one for each side)

	Rt.		Lt.	
43	0	44	0	Normal
	1		1	Congential abnormality
	2		2	Vocal nodules
	3		3	Vocal polyp
	4		4	Acute laryngitis
	5		5	Chronic laryngitis
	6		6	Paralysis, unilateral
	7		7	Paralysis, bilateral
	8		8	Contact ulcer
	9		9	Carcinoma

TEMPORAL BONES X-RAYS

	Rt.		Lt.	
45	0	46	0	Normal
	1		1	Mastoiditis
	2		2	Sclerosis
	3		3	Ossicular malformation
	4		4	Fracture of temporal bone
	5		5	Ossicular discontinuity
	6		6	Widening of internal auditory
	7		7	Conformed by polytomography
	8		8	Conformed by pantopaque studies

OTOLARYNGOLOGY SERVICES

of the

DEPARTMENT OF AUDIOLOGY & SPEECH SCIENCES, MSU

Speech and Hearing Clinic
Audiology and Speech Sciences
Michigan State University
East Lansing, MI 48824
Telephone: 353-8780, Ext. 28

History No. 9437

Name: Debbie Guerre
703 Willow
Lang mi 48906 (Cheerleader) **Age:** 26

Referred by: Mr. Crowender

HISTORY & CHIEF COMPLAINT:

Cheerleader 7, 8, 9 Grade.
Not since that time.
Has had intermittent hoarseness for
as long as she can remember.
For last 2 yrs it is worse—
hoarseness is worse.
Aphonic e.g. in the morning.
Not sought any medical advice.
Has worked as a waitress - 1 yr.
[illegible] Dec — [illegible]

HISTORY

Date Taken_____ Informant_____

13 Family History (blood relatives) (circle 1 or more)
0-No history of allergy or deafness
1-Allergy
2-Deafness (due to infection)
3-Deafness of obscure origin
4-Medication during pregnancy (specify)
5-Rh incompatibility
6-Rubella in mother during pregnancy
7-Others

Comments:

14 Hearing Impairment (circle 1)
0-No history of
1-Periodic mild (questionable)
2-Periodic but definite
3-Definite but not within past year
4-Constant and within past year
5-Constant and severe
6-No definite evidence of hearing at any time

15 Speech (circle 1)
0-No abnormalities noted
1-No attempts at phonation
2-No 3 word phrases (over 30 months of age)
3-Articulatory defect
4-Phonatory defect not as severe as 1 or 2
5-Stuttering
6-Communicative defect

16 Tinnitus & Vertigo (circle 1)
0-No history of
1-Tinnitus
2-Vertigo
3-Tinnitus & Vertigo

17 Ear Infections (circle 1)
0-No history of
1-Ear aches, not within past year
2-Ear discharge, not within the past year
3-Ear aches without discharge in past year
4-Ear discharge within past year
5-Chronic discharge (over 6 weeks inactive)
6-Chronic discharge (over 6 weeks active)

18 Nose and Sinuses (circle 1)
0-No unusual upper respiratory symptoms
1-5 to 6 colds a yr. or 2 to 3 lasting 3 weeks or more (not within past yr.)
2-As in 1 but within past year
3-As in 1 plus chronic nasal obstruction
4-As in 1 plus chronic purulent discharge

Tonsils (circle 1) Comments:
0-No history suggestive of tonsillitis
1-Fever, sore throat, swollen neck glands (not within past year)
2-Fever with colds during past year

20 E.N.T. Surgery (circle 1) DATE BY WHOM
0-None
1-Adenoidectomy
2-T&A
3-Mastoidectomy rt.
4-Mastoidectomy lt.
5-Mastoidectomy bilateral
6-Sinus operation
7-Submucous resection
8-Myringotomy

21 Infectious Diseases (circle 1 or more) DATE
0-None
1-Meningitis
2-Mumps
3-Measles
4-Whooping Cough
5-Rubella
6-Chicken Pox
7-Scarlet Fever
8-Syphilis
9-Other (specify below)

22 Hoarseness
0-None
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0-None
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5-Bouts of sneezing only
6-Others:

PHYSICAL EXAMINATION (Contd.)

OPHARYNX (Circle 1)

0 Normal
1 Small midline adenoids
2 Adenoids encroaching upon tubal orifices
3 Large adenoids, tubal orifices obscured
4 Nasopharynx, full of adenoids
5 Nasopharynx, obscured by pus
6 Tubal orifices oedematous

SINUSES (Circle one for each side)

Rt.	Lt.	
41 0	42 0	Normal
1	1	Dark to transillumination
2	2	Radiologic evidence of infection

LARYNX (Circle one for each side)

Rt.	Lt.	
43 0	44 0	Normal
1	1	Congential abnormality
2	2	Vocal nodules
3	3	Vocal polyp
4	4	Acute laryngitis
5	5	Chronic laryngitis
6	6	Paralysis, unilateral
7	7	Paralysis, bilateral
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9	9	Carcinoma

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Rt.	Lt.	
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1	1	Mastoiditis
2	2	Sclerosis
3	3	Ossicular malformation
4	4	Fracture of temporal bone
5	5	Ossicular discontinuity
6	6	Widening of internal auditory
7	7	Conformed by polytomography
8	8	Conformed by pantopaque studies

SUMMARY:

DIAGNOSIS:

TREATMENT:

BIBLIOGRAPHY

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Arnold, Godfrey E., M.D. "Vocal nodules and polyps: Laryngeal tissue reaction to habitual hyperkinetic disphonia," Journal of speech and Hearing Disorders, August 1962, Vol. 27, No. 3.

Brodnitz, Friedrich S., M.D. "Vocal rehabilitation in benign lesions of the vocal cords," Journal of Speech and Hearing Disorders, February, 1958, Vol. 27, No. 4.

Gilb, Stella S. Cheerleading, Pep Clubs and Baton Twirling. Lexington, Ky., Hurst Printing Co., 1955.

Greene, Margaret C. L. The Voice and Its Disorders. New York: The MacMillan Company, 1959.

Jones, J. Loren. "What Happens in Singing," The Choral Journal, May, 1975.

Loken, Newt. Cheerleading. New York: The Ronald Press Company, 1961.

Rubin, Henry J., M. D. "The Role of the Laryngologist in Management of Dysfunction of the Singing Voice," NATS Bulletin, May, 1966.

Vennard, William. Singing, the Mechanism and the Technic, New York: Carl Fischer, Inc., 1968.

Wilson, D. Kenneth, Ph.D. "Children with vocal nodules," Journal of Speech and Hearing Disorders, February 1961, Vol. 26, No. 1.

General References

Ash, J.E. and Schwartz, L. "The laryngeal (vocal cord) node," Trans. Amer. Acad. Opthol. Oto-laryng., Volume 48, 1943-44, pp. 323-332.

Berry, M., and Eisenson, J. Speech Disorders. New York: Appleton-Century-Crofts, 1956.

Equen, M. "Laryngeal tumors-voice recordings before and after operation," Ann. Otol., Rhin. and Laryng., Volume 50, 1941, pp. 776-782.

Flatau, T.S. "Chirurgische und funktionelle Behandlung der Stimmlippenknoetchen mit besonderer Beruecksichtigung der Frage der Berufschaedigung," Zschr. Laryngol., Volume 3, 1910, pp. 369-373.

Friedberg, S.A., and Segall, W.H. "The pathologic anatomy of polyps of the larynx," Ann. Otol., Rhin., and Laryng., Volume 50, 1941, pp. 783-789.

Jackson, C.L. "Vocal Nodules," Trans. Amer. Laryn. Assn., Volume 63, 1941, pp. 185-193.

Lowenthal, G. "Treatment of polypoidal laryngitis," Laryngoscope, Volume 68, 1958, pp. 1095-1104.

Mayoux, R., and Girard, P. "Les polypes de la glotta. Etude anatomique et pathogenique," Rev. de Laryng., Volume 60, 1939, pp. 159-165.

Moore, C.P. "Voice disorders associated with organic abnormalities," in L.E. Travis, (Ed.), Handbook of Speech Pathology. New York: Appelton-Century-Crofts, 1957.

Motta, R. "Voce parlata e cantata e polipi delle corde vocali," Il Valsalva, 1942.

Tarneaud, J. Le nodule de la corde vocale. Paris: Maloine, 1935.

Vaheri, E. "Zur Klinik und Pathogenese der Stimmlippenpolypen," Acta Otolaryng.,Volume 29, 1941, pp. 273-286.

Wells, W. "The significance of hoarseness," Ann. Otol., Rhin., and Laryng., St. Louis, Volume 49, 1940, pp. 99-112.

West, R., Ansberg, M., and Carr, A. The Rehabilitation of Speech. (3rd ed.) New York: Harper, 1957.

Withers, B.T. "Vocal nodules," Eye, Ear, Nose Thr., Mon., Volume 40, 1961, pp. 33-38.

Wuesthoff, P.G. "Ein Beitrog zur Genese der Stimmlippen-polypen," Z. Hals-usw. Heilk., Volume 50, 1944, pp. 271-296.

Zerffi, W.A.C. "Vocal nodules and crossed arytenoids," Laryngoscope, Volume 45, 1935, pp. 532-534.