

Evaluating Voice Characteristics of First-Year Acting Students in Israel: Factor Analysis

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Summary: Hypothesis. Acting students require diverse, high-quality, and high-intensity vocal performance from early stages of their training. Demanding vocal activities, before developing the appropriate vocal skills, put them in high risk for developing vocal problems.

Study Design. A retrospective analysis of voice characteristics of first-year acting students using several voice evaluation tools.

Methods. A total of 79 first-year acting students (55 women and 24 men) were assigned into two study groups: laryngeal findings (LFs) and no laryngeal findings, based on stroboscopic findings. Their voice characteristics were evaluated using acoustic analysis, aerodynamic examination, perceptual scales, and self-report questionnaires. Results obtained from each set of measures were examined using a factor analysis approach.

Results. Significant differences between the two groups were found for a single fundamental frequency (F_0)-Regularity factor; a single Grade, Roughness, Breathiness, Asthenia, Strain perceptual factor; and the three self-evaluation factors. Gender differences were found for two acoustic analysis factors, which were based on F_0 and its derivatives, namely an aerodynamic factor that represents expiratory volume measurements and a single self-evaluation factor that represents the tendency to seek therapy.

Conclusions. Approximately 50% of the first-year acting students had LFs. These students differed from their peers in the control group in a single acoustic analysis factor, as well as perceptual and self-report factors. No group differences, however, were found for the aerodynamic factors. Early laryngeal examination and voice evaluation of future professional voice users could provide a valuable individual baseline, to which later examinations could be compared, and assist in providing personally tailored treatment.

Key Words: Acting students–Acoustic analysis–Aerodynamic–Perceptual evaluation–Self-evaluation–Factor analysis.

INTRODUCTION

Voice disorders can result from anatomic, physiological, or functional abnormal changes in the voice mechanism that interfere with the individual's ability to meet his/her habitual or professional demands of vocal use.¹ Therefore, vocal pathologies can be attributed to: (1) changes in laryngeal structure, physiological, or neurologic function; (2) changes in respiratory or resonance function; or (3) functional, behavioral, or psychological conditions that lead to vocal malfunction or inefficiency.²

Studies on the *prevalence* of voice disorders in the general population have yielded a wide range of results. Apparently, the primary reason for the variability in the reported prevalence is the differences in the definition for "voice disorders," as well as methodology differences between the studies.³ Nonetheless, prevalence of voice disorders in the general population was typically reported to range between 3% and 9%, in which approximately 6% report a *present* voice disorder; more than 28% report ever having a voice problem. In addition, women report

higher occurrence of voice disorder than men,^{4,5} and professional voice users are at higher risk for developing (and reporting) voice disorders.⁶ In Israel, the prevalence of *present* voice disorders in the general population was reported recently to be 15.8%, whereas 34% of the study's participants reported ever having a voice problem.⁷ Similar to the worldwide reports on the higher prevalence of voice disorders among professional voice users, it was reported to range, in Israel, between 26%⁸ and 53%.⁹

It is estimated that 25–35% of the work force can be regarded as professional voice users.¹⁰ Voice professionals are defined as individuals who depend on the consistency of their voice quality on a daily basis as a major aspect of their professional function.¹¹ For these individuals, chronic or even intermittent dysphonia could create a professional predicament that would impact or harm them professionally and financially.¹⁰ The intensive and prolonged use of voice, along with their dependence on it, makes professional voice users more vulnerable to voice disorders. Those who are also particularly dependent on the high quality and stability of their voice (eg, singers or actors) are even more sensitive to slight irregularity or reduction in voice quality and stamina.¹²

The most common adverse *vocal* symptoms reported by voice professionals include hoarseness, voice breaks, vocal weakness and fatigue,^{13,14} increased effort during phonation, difficulties in producing high-pitch tones, and reduction in pitch range.¹⁵ Associatively reported *physical* complaints include shortness of breath,¹⁶ dry throat, laryngeal discomfort, strain, pain, and physical tension.¹⁴ Although most of the reported

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vocal and physical symptoms could have functional or behavioral origin, chronic conditions could result in organic voice disorders. Such organic findings could include laryngeal mucosa irritation, edema,¹⁷ benign mass lesions, or hemorrhage.¹⁸ Indeed, it was reported that laryngeal findings (LFs) among actors include altered vocal folds' vibratory pattern, decreased mucosal wave, vocal fold edema and abnormal vascularity patterns,¹⁷ noninfective laryngitis, asthenia, nodules, and upper respiratory infections.¹⁹ It was also suggested that acoustic analyses of actors' voice could be characterized by high perturbation values and high noise-to-harmonic ratio values.¹⁷

Among voice professionals, actors stand out as a group with special voice demands that could inflict risks on their voice. The actor is often required to phonate during strenuous physical activities. Actors may also experience demanding and stressful lifestyle; traveling; long and irregular work hours; and exposure to rapid differences in ambient temperature, varying humidity conditions, and inhale irritants and allergens on stage. Actors are required to adjust to different performing scenes and cope with varying acoustic conditions, background noise, stage events, or music.²⁰ Furthermore, actors are expected to portray different characters (eg, young or old, unhealthy, loud, and aggressive) to meet the artistic demands of their role. The intended voice does not necessarily match the actor's natural voice and may require phonation during coughing, shouting, and screaming and similar vocal activities that would typically be considered vocal abuse. Consequently, the actor adjusts his/her voice to produce the required voice quality authentically and may introduce damaging effects to the vocal mechanism.^{20,21}

Acting schools usually include in their curriculum, voice training and speech lessons to guide the beginning actors on how to preserve their voice during training years and throughout their professional career. These voice classes are given during the student's years in acting school. Consequently, students

participate in acting classes and other highly demanding vocal activities before they acquire the required knowledge and techniques to preserve their voice. In one of the leading acting school in Israel, for example, first-year students are required to take on themselves a highly intensive course load, which includes many acting, singing, and movement classes. In that school, voice lessons are given only from the second year of the program. This could lead to the students taking on themselves extensive vocal loading before learning proper voice techniques and could impose a high risk for developing voice disorders right at the beginning of their professional career. In addition, many of these students have an out-of-stage lifestyle that consists of working in other jobs and having limited voice rest, which may play an additive role on their voice. Therefore, this study was aimed to explore voice characteristics of the first-year acting students in Israel, using a set of acoustic, aerodynamic, perceptual, and self-evaluative measures. This was done in an attempt to learn whether these sets of measures could provide insight into the voice differences between men and women with and without LFs within this professional population.

METHODS

Participants

After obtaining the approval of our institutional ethics committee and a written consent from all participants, 79 first-year acting school students were included in this study, as part of a 3-year project in which they are followed. The study group consisted of 55 women and 24 men, with a mean age of 24.50 years (range: 21–32 years; standard deviation: 2.11). Table 1 presents the participants' demographic information and a summary of their reported medical condition.

TABLE 1.
Demographic and Reported Medical Condition of All Participants

Participants' Information	Men	Women	Overall
Demographic			
Age (y)	25.44 (2.06)	24.19 (2.03)	24.56 (2.11)
Height (cm)	178.81 (6.40)	163.05 (7.33)	167.84 (10.12)
Weight (kg)	75.83 (13.57)	58.69 (9.08)	63.88 (13.12)
Medical			
Healthy	75.00 (18)	72.72 (40)	73.41 (58)
Allergies	37.59 (9)	29.09 (16)	31.64 (25)
Chronic condition	12.50 (3)	9.09 (5)	10.12 (8)
ENT condition	8.33 (2)	10.90 (6)	10.12 (8)
Heartburn	12.50 (3)	14.54 (8)	13.92 (9)
Hearing	20.83 (5)	7.27 (4)	11.39 (9)
Chronic cold	25.00 (6)	27.27 (15)	26.58 (21)
Medications	33.33 (8)	12.72 (7)	18.98 (15)
Operations	58.33 (14)	25.45 (14)	35.44 (28)
Consumes alcohol	83.33 (20)	67.27 (37)	72.15 (57)
Smoking	50.00 (12)	43.63 (24)	45.56 (36)

Demographic data are presented by group means (standard deviation). Reported medical condition is presented in percentage (numerical values).
Abbreviation: ENT, ear, nose, and throat.

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