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Songbirds Must Sing: How Artistic Voice Users Perceive Their Voice in Times of COVID-19

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Summary: Objective. The COVID-19 pandemic has led to a critical disruption in the music and performing arts industry, and affected singers and other artists. This study was designed to examine the effect of this unique time on artistic voice users, the way they perceive their voice and their voice-related behaviors.

Methods. A total of 110 participants volunteered for the study: 57 professional artistic voice users (34 singers and 19 actors) and a control group of 53 nonprofessional voice users. All participants completed three questionnaires related to their self-assessment of their voice, their voice difficulties, vocal training, and current stress in the time of the COVID-19 pandemic.

Results. Compared to the controls, artistic voice users were more concerned about their voice ($P < 0.001$), practiced their voice more often ($P < 0.001$), and experienced more anxiety and stress ($P < 0.05$). In addition, within the professional group, singers reported practicing their voice in the time of the COVID-19 significantly more than actors ($P < 0.01$).

Conclusions. Professional artistic voice users experience the COVID-19 pandemic as a stressful time, with negative effects on their well-being and specifically on their voice. This should be considered in the treatment and maintenance of their voice and professional career at current and future stressful times.

Key Words: Actors—Artistic voice—COVID-19—Singers—Voice.

INTRODUCTION

The COVID-19 pandemic has created a new, unfamiliar, and unusual condition, both globally and locally. The “stay at-home” restrictions, together with the enforced physical distancing policy, have led to a critical disruption of personal and community life, of industry and economy, and especially of the world of culture and art. Most countries have adopted a policy of prohibiting group gathering. This has led to global cancelation of numerous performances, music festivals, concerts, musical tours, and even stopped studio recordings and rehearsals for an unknown period. After approximately 2 months, several countries have gradually started to examine “back to normal” strategies. Nonetheless, it is expected that the singing and music industry would return to performing live in front of audiences long after other industries return to normal activity due to the specific nature of the music industry, which gathers large crowds in close proximity, making physical distancing practically impossible.

In addition to the general policies advocated by local and global authorities, it was also reported that the public are less likely to attend future musical and singing events, even when they are allowed.¹ Moreover, people are more inclined to return to visiting museums, zoos, and sport events than to attending concerts or music shows.² This ongoing condition, along with the restrictions on gathering, imposes special

difficulties on the artistic voice users. They are prohibited from practicing, rehearsing, performing, and expressing themselves in front of an audience. Furthermore, performance cancellation policies and the uncertainty about their professional and financial future raise the artists’ concerns, worries, and even anxiety.³ This is pertinent, first, because live performances are the most substantial income source for these artists.⁴ Second, musicians and singers are generally more likely to struggle with stress, anxiety, and even with substance abuse.^{4,6} Hence, a pandemic like the COVID-19, which stops all professional activities, dramatically impacts singers and performers.

Interestingly, the vast majority of medical research on artistic voice users focuses on vocal attrition, and highlights the importance of reducing trauma to the larynx and the vocal folds due to strenuous, or over use.^{5,7} However, the situation evoked by the COVID-19 pandemic has introduced a new and challenging condition, in which singers and actors use their voices to a lesser extent than they do normally. This unique situation imposed on the voice artists may be termed “voice avoidance,” yet its physiological, behavioral, and emotional ramifications are unknown.⁸ In addition, professional vocalists are used to closely interacting with their peers, band- or orchestra-members, as well as with their conductors, singing teachers and voice therapists. Being deprived of these contacts for feedback and support may cause additional stress. The uniqueness of this condition, and the immense need to communicate and perform for their audience, has driven many artists to conduct online performances. And indeed, such virtual concerts are performed by numerous singers in almost all musical genres.

The present study was a preliminary attempt to examine how artistic voice users perceive this period of “voice avoidance” imposed on them during the time of the COVID-19. Specifically, we were interested to learn whether they experience changes in their voice and voice-related behaviors, and

Accepted for publication July 27, 2020.

Declarations of interest: none.

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Journal of Voice, Vol. 36, No. 4, pp. 586.e1–586.e5
0892-1997

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<https://doi.org/10.1016/j.jvoice.2020.07.030>

whether this may be related to their stress and anxiety. Moreover, because the current circumstances could prompt stress and anxiety over existential, financial, and social issues for all people, it was deemed necessary to include in this study a control group of nonprofessional voice users.

MATERIALS AND METHODS

Study design and participants

This study was approved by the Tel-Aviv University Ethics Committee (#0001314-1), and it was conducted after all participants have completed and signed an informed consent form. The study was designed as an observational cross-sectional study, using an online survey constructed for it. The survey was distributed to professional artistic voice users through local singers and actors associations, as well as through voice teachers and coaches, and by addressing voice or singing students in local contemporary and classical music training programs. The control group consisted of nonprofessional speakers who volunteered for the study. They were recruited randomly from university staff and students and from related family members and acquaintances. The sampling procedure in both groups was a combination of convenience and snowball sampling. All participants were native Hebrew speakers who live in the center of Israel.

As the COVID-19 pandemic created a unique and dynamic situation, it was deemed necessary to limit the time allocated for data collection. Hence, data were collected over a period of 1 week (last week of April 2020). During that time, local regulations enforced full quarantine for all people, and a “stay-at-home” policy. Accordingly, all schools, colleges, industry, and public areas were closed, including all kind of social gathering and artistic performances. The only exceptions were vital medical treatments and purchasing grocery products.

Of the total of 110 study participants, 57 (51.8%) were professional voice users and 53 (48.2%) were controls. Within the professional group, 34 (66.7%) were singers and 19 (33.3%) were actors. Power analysis, performed with G*Power v.3.1.9.4 software,⁹ showed that these group sizes were sufficient to detect medium-sized group differences, as expressed by Cohen's *d* of about 0.50, with error probability of 0.05 and power of 0.80.

Approximately two-thirds (64.5%) of the sample were women. Participants' age ranged from 18 to 70 years ($M = 37.72$, $SD = 13.70$). The majority of the participants were married (61.8%), nonsmokers (86.4%), and did not report heartburn (83.6%). All these characteristics were not significantly different between the professionals and the control group, as shown by a *t* test and chi-squared tests (all $P > 0.10$).

Measures

A *Voice COVID-19 questionnaire* (VC-19) was designed for the present study. It included 20 items accompanied by a

five-point response scale ranging from 0 = “Never” to 4 = “Always.” The questionnaire was intended to cover five content areas: (1) General concern about voice (one item); (2) Current voice difficulties (six items); (3) Vocal training (two items); (4) Current stress (four items); and (5) Vocal hygiene (seven items). Questionnaire items and psychometric data are presented in the Results section.

Singing Voice Handicap Index (SVHI-10)¹⁰ is a short-form instrument for assessing self-perceived singing voice problems. Its 10 items are accompanied by five-point response scale ranging from 0 = “Never” to 4 = “Always.” This questionnaire was completed only by singers. A summative score was computed of all SVHI-10 items, with internal consistency (Cronbach's coefficient alpha) of 0.88.

Generalized Anxiety Disorder (GAD-7)¹¹ is a seven-item self-report questionnaire designed to assess person's current anxiety level. The response scale ranged from 0 = “Never” to 3 = “Almost every day.” A summative score was computed for all GAD-7 items, with Cronbach's alpha of 0.88. It should be noted that within this study, the SVHI-10 and the GAD-7 questionnaires were administered only as a means for validation of the main study questionnaire, and not for providing additional collaborative data.

Statistical analysis

Analyses were performed with SPSS v.25 software. Structure validity of the VC-19 questionnaire was tested with a Principle Component Analysis followed by factor analysis with Varimax rotation. Loadings of at least 0.45 were considered sufficient for ascribing an item to a factor. Scale reliabilities were assessed as internal consistency with Cronbach's coefficients alpha. Coefficients of 0.70 and above were considered as supporting reliability. Descriptive statistics of research variables, all of which are continuous, were calculated as means and standard deviations, and correlations between them were estimated as Pearson coefficients. Comparisons between research groups were performed with *t* tests. All results with error probability $P < 0.05$ were considered as statistically significant.

RESULTS

Psychometric analysis of the VC-19 questionnaire

The first item of the VC-19 questionnaire, “I worry about my voice,” was designed to serve as a single-item “General concern” measure. The responses to the remaining 19 items were subjected to a Principle Component Analysis, which yielded six components with eigenvalues greater than unity. Scree test (Cattell criterion) suggested that four of them should be retained for rotation, with the eigenvalue of the fourth factor being 1.48, and that of the next factor being 1.19. This four-factor structure generally replicated the initial questionnaire design, and is presented in Table 1.

The “vocal hygiene” construct fared poorly in this analysis. The item “I sing more than usual” was loaded on the

TABLE 1.
Summary of the Results of the Factor Analysis Performed on the Voice COVID-19 Questionnaire (Factor Loadings, Eigenvalues, and Percent of Explained Variance)

Item	Voice Difficulties	Vocal Training	Current Stress	Vocal Hygiene
My voice is more hoarse than usual	0.73			
My voice sounds differently than usual	0.78			
It is difficult for me to sing loudly	0.67			
Reaching high notes is more difficult	0.80			
I feel pain while singing	0.59			
My singing ability has changed	0.78			
I practice my voice		0.92		
I perform vocal warmup exercises		0.93		
I sing more than usual		0.71		
I worry about my financial state			0.53	
I feel stressed			0.63	
I worry about my health			0.79	
I worry about my family's health			0.77	
I speak more than usual				0.54
My dietary habits have changed				
I smoke more than usual				
I shout more than usual				0.72
I drink more water than usual				
I consume more alcohol than usual				0.62
Eigenvalue	4.90	2.10	1.70	1.48
Percent of explained variance	25.8	11.06	8.92	7.78

Note: Loadings lower than 0.45 are not shown in the Table.

“vocal training” factor, thus it was decided to add it to this factor. The items “My dietary habits have changed,” “I smoke more than usual,” and “I drink more water than usual” were not loaded highly on any factor and hence were omitted from the factor. The remaining three items of the “vocal hygiene” factor exhibited poor reliability ($\alpha = 0.44$), and thus also could not be used; leading to omission of this construct from the analyses. The remaining three composite scales were calculated as sums of item scores and exhibited acceptable reliability, with $\alpha = 0.85$ for “voice difficulties”; $\alpha = .86$ for “vocal training”; and $\alpha = 0.69$ for “current stress.” The validated CV-19 questionnaire is presented in the appendix, for future research and clinical application.

Descriptive analysis

Distribution of research measures and their intercorrelations are presented in Table 2. As expected, the one-item “general concern” about own voice was positively correlated with all other research measures, both voice-specific and related to general stress. The “voice difficulties” scale was significantly correlated with both “vocal training” and “current stress” scales. It was also strongly correlated with the SVHI-10 scores. In addition, data show a strong correlation between the “current stress” scale and the GAD-7 scores.

As noted, SVHI-10 scores were collected only from the professional singers. The mean score obtained for this group was higher than the equivalent scores reported for singers without voice problems by the scale developers (Mean =

TABLE 2.
Distribution and Intercorrelations (Pearson Coefficients) of Research Measures

Measure	Mean	SD	General Concern	Voice Difficulties	Vocal Training	Current Stress	SVHI-10
General concern	1.35	1.09	—				
Voice difficulties	3.13	3.20	0.51 [†]	—			
Vocal training	5.90	4.68	0.47 [†]	0.31 [†]	—		
Current stress	8.33	2.76	0.36 [†]	0.38 [†]	0.19*	—	
SVHI-10	13.18	6.80	0.50 [†]	0.77 [†]	−0.03	0.12	—
GAD-7	5.41	3.89	0.30 [†]	0.28 [†]	0.16	0.51 [†]	0.24

* $P < 0.05$.

† $P < 0.01$.

‡ $P < 0.001$.

TABLE 3.
Comparison of Research Measures Between Professionals and Control Groups

Measure	Research Group		t Value
	Professionals Mean (SD)	Control Mean (SD)	
General concern	2.00 (0.96)	0.66 (0.73)	8.16 [‡]
Voice difficulties	7.65 (4.64)	4.02 (3.97)	4.39 [‡]
Vocal training	5.35 (2.92)	0.74 (1.04)	11.20 [‡]
Current stress	8.89 (2.61)	7.72 (2.80)	2.28*
GAD-7	6.19 (4.33)	4.57 (3.19)	2.23*

* $P < 0.05$.

† $P < 0.01$.

‡ $P < 0.001$.

8.40, SD = 0.71; N = 99), $t(37) = 4.32$, $P < 0.001$ (degrees-of-freedom were adjusted to account for unequal variances in the two samples).

Comparison of research groups

The distribution of the research variables is presented separately for the two research groups (voice professionals and controls) in Table 3. As shown, the voice professionals exhibited higher scores on all scales, compared to the controls, and all group differences were statistically significant. Data also show that although all measures yielded significant group differences, the voice-specific "general concern," "voice difficulties," and "vocal training" subscales demonstrated relatively larger differences between the groups, compared to the more general "current stress" scale and the GAD-7 scores.

Finally, the differences between the singers and actors within the "professional" group on all subscales of the VC-19 and in GAD-7 scores were examined. A significant difference was found between the two subgroups in "vocal training," with singers exhibiting higher levels of "vocal training" (M = 6.13, SD = 2.76) than actors (M = 3.79, SD = 2.64), $t(55) = 3.06$, $P = 0.003$. No significant differences were found for all other measures (detailed statistics are not presented).

DISCUSSION

The VC-19 questionnaire developed for this study included four major factors that differentiated between voice artists and controls during the time of the COVID-19 pandemic. The "voice concern" and "voice difficulties" subscales were intercorrelated and correlated with all other measures, indicating that those who experience more difficulties are also more anxious and concerned about their voice. The strong correlation between GAD-7 and the "current stress" subscale of the VC-19 confirms the experience of stress at the time of the study, especially among the artistic voice users.

Artistic voice users versus controls

The artistic voice users experienced more difficulties with their voice, compared to controls. In addition, they scored significantly higher on both GAD-7 and on the "current stress" subscale. The explanation to these findings may be twofold. First, it is suggested that voice artists are more influenced than others by the special condition of the COVID-19 pandemic, both professionally and economically, as well as psychologically.^{3,8} Because they view vocalizing and performing a basic necessity, being deprived of these is stressful to them. Second, artistic voice users are more prone to stress and anxiety in general.¹² Hence, this unique condition is experienced by them more gravely than by others. This conclusion is also supported by the higher scores on the SVHI-10 questionnaire exhibited by the singers in our study, compared to normative values.¹⁰ This indicates heightened self-awareness and concern about voice during the time of the study. These findings highlight the importance of professional and psychological support for this population in general, and especially during unusual and stressful times.

Singers versus actors

Singers and actors exhibited similar scores on all study measures, with the only exception of the "voice training" subscale. In other words, while singers and actors reported similar concerns about their voice and similar levels of anxiety, the singers have reported practicing their voice more during this time. This is explained by the differences in professional education and vocal training of singers and actors,¹³ which may have led to lower vocal awareness in actors. Consequently, singers tend to channel their stress to practicing, more than actors do.

Strengths and weakness of the study

This study is unique as it is the first to empirically examine and quantify the subjective experience of artistic voice users during the specific time of the COVID-19. As such, it provides a valid and reliable measure of this unusual experience. An additional strength is the fact that it captured the unique condition evoked by the pandemic, at its social and vocational restriction peak, as all data were collected within a single week.

Three limitations of the study should be noted. First, sample size was restricted by the time constraints, in an attempt to balance between capturing the specificity of the condition and acquiring a sufficient sample size. Therefore, a larger sample of artistic voice users may have provided additional insights. Second, our study was intended to examine professional artistic voice users as a whole. Therefore, we did not inquire about their laryngeal condition or prior treated voice disorders. Consequently, our sample may include both healthy and dysphonic participants. Future research may examine potential differences between these subgroups. Finally, the current study examined a group of artistic voice users and compared them to a group a nonprofessional

voice users. Future research may use individual case studies or in-depth interviews, to provide additional individual perspectives on this condition.

CONCLUSION

Voice professionals and especially singers experience the COVID-19 pandemic as a stressful time, which bears negative effects on their voice. This is aggravated as they are not allowed to practice and perform regularly, and they lack their needed feedback and support. Providing continuous practice and support, even during strenuous times, may improve their functional and emotional status.

Acknowledgment

We wish to acknowledge and dedicate this manuscript to the memory of Ms. Dana Yedwab, our beloved teacher and colleague, who passed away at the time this publication was in preparation.

APPENDIX

COVID-19 Voice (CV-19) Questionnaire

Please respond to the following questions based on your experience over the past two weeks, during the time of the COVID-19 pandemic.

		Never			Always		
1.	I worry about my voice	0	1	2	3	4	
2.	My voice is more hoarse than usual	0	1	2	3	4	
3.	My voice sounds differently than usual	0	1	2	3	4	
4.	It is difficult for me to sing loudly	0	1	2	3	4	
5.	Reaching high notes is more difficult	0	1	2	3	4	
6.	I feel pain while singing	0	1	2	3	4	
7.	My singing ability has changed	0	1	2	3	4	
8.	I practice my voice	0	1	2	3	4	

(Continued)

(Continued)

		Never			Always		
9.	I perform vocal warmup exercises	0	1	2	3	4	
10.	I sing more than usual	0	1	2	3	4	
11.	I worry about my financial state	0	1	2	3	4	
12.	I feel stressed	0	1	2	3	4	
13.	I worry about my health	0	1	2	3	4	
14.	I worry about my family's health	0	1	2	3	4	

REFERENCES

1. F. Richter, "Americans hesitant to return to normal," 2020. [Online]. Available at: <https://www.statista.com/chart/21392/americans-ready-ness-to-return-to-normal-activities/>. Accessed May 10, 2020.
2. C. Dilenschneider, "Return to normal activities," 2020. [Online]. Available at: <https://www.colleendilen.com/wp-content/uploads/2020/04/Return-to-normal-activities-April-20.png>. Accessed May 10, 2020.
3. M.S. Roberts, "Classic FM," 2020. [Online]. Available at: <https://www.classicfm.com/artists/sir-simon-rattle/worry-desperately-london-orchestra-coronavirus/>. Accessed May 10, 2020.
4. A.M. Yglesias, "Recording academy musicares," 2018. [Online]. Available at: <https://www.grammy.com/musicares/news/report-musicians-more-likely-struggle-mental-health-substance-abuse>. Accessed May 10, 2020.
5. Benninger M, Murry T, Johns M. *The Performers' Voice*. San Diego, CA: Plural Publishing; 2015.
6. Ortiz Bragues A. *Music Performance Anxiety: A Comprehensive Update of the Literature*. Cambridge: Cambridge Scholars Publishing; 2019.
7. Sataloff RT. *Professional Voice*. 4th ed San Diego, CA: Plural Publishing; 2017.
8. E. Heller, "University of Washington," 2020. [Online]. Available at: <https://careers.uw.edu/blog/2020/04/13/being-a-professional-artist-in-the-time-of-covid-19-thoughts-from-an-opera-singer/>. Accessed May 10, 2020.
9. Faul F, Erfeldler E, Buchner A, et al. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Methods*. 2009;41:1149–1160.
10. Cohen S, Statham M, Rosen C, et al. Development and validation of the Singing Voice Handicap-10. *Laryngoscope*. 2009;119:1864–1869.
11. Spitzer R, Kroenke K, Williams J, et al. A brief measure for assessing generalized anxiety disorder. *Arch Inter Med*. 2006;166:1092–1097.
12. Marchant-Haycox S, Wilson G. Personality and stress in performing artists. *Personal Individ Differ*. 1992;13:1061–1068.
13. de Mallet Burgess T, Skilbeck N. *The Singing and Acting Handbook: Games and Exercises for the Performer*. New York: Routledge; 2000.