Web-based perceived present control intervention for voice disorders: A pilot study

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Abstract

Objectives: Voice disorders are common and negatively affect various life domains such as occupational functioning and emotional well-being. Perceived present control, a factor that is amenable to change, may reduce the effect of voice disorders on these outcomes. This pilot study aimed to (1) establish the feasibility, usability, and acceptability of a web-based perceived present control intervention for individuals with voice disorders and (2) gather preliminary data on the effectiveness of the intervention. This study is the first to assess whether a web-based psychological intervention would decrease self-reported voice handicap in this population.

Methods: Participants ($N = 20$) were recruited from an otolaryngology clinic at a large, Midwest university and the surrounding urban community and completed a three-week web-based intervention that incorporated psychoeducation and written exercises on increasing perceived present control.

Results: Supporting feasibility, the intervention components had high completion rates (75–95%). Most participants planned to continue the perceived control exercises after study completion

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and would recommend the intervention to others, demonstrating usability and acceptability. There was a significant decrease in self-reported voice handicap (Voice Handicap Index-10) from pretest ($M = 18.38$, $SD = 4.41$) to posttest ($M = 15.22$, $SD = 4.55$) with a large effect size (within-group $d = -0.86$, $p < .05$).

Conclusions: Focusing on perceived present control as a teachable skill may be a useful addition to voice disorder treatment armamentarium. Future studies will incorporate a comparison group and larger sample sizes to assess further the role of perceived present control interventions in voice care.

1. Introduction

Voice disorders are common in the general population, with a 30% lifetime prevalence rate¹. Voice disorders can negatively affect various life domains, including occupational and social functioning, daily communication, quality of life, and emotional well-being¹⁻⁶. Therefore, it is important to identify factors that may reduce the effects of voice disorders on these outcomes, particularly factors that are amenable to change.

One such factor is perceived present control^{7,8}, which is defined as beliefs about what one can currently control about a stressful event, such as how one thinks or feels about an event. This is in contrast to past control (i.e., what one could have done to prevent an event from happening) and future control (i.e., what one can do in the future to prevent an event from recurring). In studies of patients with voice disorders, perceived present control was related to less voice handicap^{9,10}, with moderate to large effect sizes. For example, in a large cross-sectional study, higher levels of perceived present control were more strongly related to lower voice handicap than were lower levels of distress (e.g., depression, anxiety)⁹. In a longitudinal study, baseline levels of perceived present control predicted voice handicap three weeks later, even after controlling for general control beliefs and distress¹⁰. In addition, perceived present control appeared to buffer the effects of voice handicap on distress, such that voice handicap was more strongly related to distress among those who perceived less present control over their voice problems⁹.

Qualitative studies also indicate the importance of perceived control among individuals with voice disorders. In one qualitative study¹¹ examining patient perspectives on the relations between psychological factors and voice symptoms, more adaptive emotional and behavioral responses, and more improvement in voice, were reported by participants who perceived greater perceived present control. Another qualitative study¹² of patients with voice disorders ($N = 15$) found that all patients discussed the importance of “being in control.” Specifically, participants discussed how they viewed their vocal health as dependent on their own behavior. This demonstrates the general importance of perceived control in this patient population, which is also discussed in a review¹³ on strategies to improve outcomes in patients with functional dysphonia.

Perceived present control has also been found to be related to positive outcomes in college students without voice disorders. Specifically, using cross-sectional, longitudinal, and prospective designs, perceived present control was related to less general distress (e.g., perceived stress), event-specific distress (e.g., symptoms of posttraumatic stress disorder),

and physical health in college students^{8,14}. These relations were significant controlling for a range of factors that also are important to mental and physical health, including social support, coping strategies, general control beliefs, neuroticism, and prior trauma exposure^{8,14}.

Based on the above findings from student samples regarding the positive effects of perceived present control, a brief online intervention was developed to teach students to focus on what they can control in the present as a way of coping more effectively with stress. The intervention contained modules consisting of videos of an expert explaining the benefits of perceived present control, examples from others who have focused on perceived present control, and present control exercises. In the first randomized controlled trial, participants who completed the perceived control intervention reported fewer symptoms of stress, depression, and anxiety three weeks post-intervention than those in the comparison group, who received psychoeducation about stress¹⁵. The average effect size across four outcomes was small to moderate. Additional clinical trials have further established the efficacy of the perceived control intervention for reducing stress-related symptoms^{16–19}. Increases in perceived present control also appeared to be the mechanism of change in symptoms^{15,17}.

Given that this brief online intervention has been found to increase perceived present control and that higher levels of present control are related to lower self-reported voice handicap, increasing perceived present control through a brief online intervention might also reduce voice-related handicap. It has been suggested that voice disorder treatment approaches should take psychological factors into consideration^{13,20}, and one group has shown that cognitive behavioral therapy administered by speech pathologists can improve voice outcomes as well as psychological and overall well being²¹. However, no treatments explicitly aim to increase perceived present control. Thus, to our knowledge, the present study was the first to assess whether a perceived present control intervention would decrease voice handicap among individuals with voice disorders. This perceived control intervention was adapted from the intervention described above^{16–19} to be relevant to those with voice disorders and was delivered via an online format, which reduces resource constraints (e.g., cost, time, transportation) compared to in-person approaches.

The primary objectives of this pilot study were to establish the feasibility, usability, and acceptability of a web-based perceived present control intervention among a sample of individuals with voice disorders. A secondary objective was to gather preliminary data on the efficacy of the intervention for decreasing self-reported voice handicap, the primary outcome. Secondary outcomes were increases in present control (the proposed mechanism of change) and decreases in psychological distress and perceived stress.

2. Materials and methods

2.1 Participants

Participants for this study (Institutional Review Board #1507S75003) were recruited from the otolaryngology clinic at a large, public university medical center in the Midwest and from the urban community surrounding the university from April 2016 through October 2017. Both types of participants were included to assess feasibility and seek feedback from a

broader sample. All participants were adults between the ages of 18–80 years of age who were experiencing a voice problem. Other inclusion criteria included a score ≥ 11 on the Voice Handicap Index-10 (VHI10)^{22,23}, interest in using an online program to help manage some of the stresses of having a voice problem, regular reliable internet access, and no concurrent clinical treatment such as speech therapy. The reason for the latter constraint was to isolate the effect of the intervention, which would have been more difficult to measure if participants underwent speech therapy simultaneously. We excluded participants with a known diagnosis of a structural or neurological laryngeal problem to avoid potential ceiling effects or other influences on the VHI-10 that might be encountered if participants had a motion abnormality or vocal fold lesion. Recruitment was done on a rolling basis. Participants were allowed 14 days to begin the intervention after consenting to participate before being excluded from the study.

2.1.1 Clinic patient participants—Patients seen in the voice clinic and diagnosed with primary muscle tension dysphonia were invited to participate if they met the inclusion criteria. They were approached in person or by phone by study staff after their first clinic visit. Eligibility was determined by reviewing patients' clinical records and, when relevant, confirmation of speech therapy start dates. Of 24 eligible patients, 11 (46%) consented (10 of whom began the study), 9 (38%) declined, and 4 (17%) did not respond to phone messages left by the research team.

2.1.2 Community participants—Community participants self-identified with a voice disorder in response to study fliers in the community and contacted study staff via phone or email. Fliers were posted in locations such as coffee shops, community co-ops, music schools, and music departments at local universities and colleges. Eligibility of potential community member participants was determined through their completion of an online eligibility questionnaire and a screening call with a member of the study team to review and confirm the information. Of the 13 eligible community members, 10 (77%) consented and completed at least some pretest measures (one did not complete the intervention but was included in the intent-to-treat analyses), 0 declined, and 3 (23%) did not respond to the messages left by the research team.

The final sample consisted of 20 participants: 10 university medical clinic patients and 10 recruited from the community. The majority of the sample identified as female ($n = 12$; 60%). Of those who provided sociodemographic information, the majority ($n = 13$; 65%) identified as White and not Hispanic/Latinx ($n = 12$; 60%). Two participants had completed graduate school, four had completed a bachelor's degree, and one had completed an associate degree.

2.2 Materials and Procedure

2.2.1 Web-based intervention—All participants completed baseline measures of their voice and other assessments (listed below) prior to starting the intervention. The intervention was adapted from previous online perceived present control interventions for stress management in college students¹⁵ and modified to focus on perceived present control over

voice disorders. The original intervention drew upon Bandura's work²⁴ on sources of self-efficacy by incorporating vicarious experiences, social persuasion, and mastery experiences.

The initial educational module incorporated multiple components. Vicarious experiences were provided via narrated presentations of people with voice disorders describing their experiences regarding perceived present control. Social persuasion and psychoeducation were incorporated via expert presentation of research on the benefits of perceived present control for people with voice disorders by a psychology professor. Perceived past, present, and future control were described, and the positive outcomes associated with perceived present control were highlighted. Mastery experiences were provided through online exercises designed to teach participants to focus on perceived present control. These exercises asked participants to write about what aspects of their voice problem were outside of their control, what aspects of their voice problem they could control, what actions they had taken, what additional actions they could take in the future, and when they would accomplish such actions. Feedback was solicited on the initial module immediately following completion.

After three to four days, participants completed their first written perceived present control exercise, similar to the one at the end of the initial educational module, which focused on things one could control in the present to manage a voice problem. Participants repeated this guided practice exercise focused on present perceived control up to twice a week for three weeks, so that up to six additional written perceived present control exercises could be completed. Additional resources in the form of "Helpful Tips" were available but were not required reading; these resources included links to brief descriptions of evidence-based strategies for improving vocal hygiene and dealing with physical symptoms, emotional symptoms, and others' opinions.

The final assessment, which immediately followed the last guided practice exercise, included the same assessments administered at baseline. Participants were then asked for feedback about how often they applied the information they learned in the intervention, as well as on usability and acceptability. Participants were given one week to access each of the exercises and the post-test. The whole intervention took approximately three weeks to complete.

The intervention was developed using PHP and JavaScript and was compliant with the Health Insurance Portability and Accountability Act. The workflow (including timelines, email reminders and milestone completion) of the study was fully integrated into the web application, which was hosted on a Red Hat Enterprise Linux Server (release 6.9). Participants were automatically sent email reminders for module completion and when it was time to move on to the next module. They were given 14 days to complete the initial assessment and module, and 3 to 4 days to complete each written practice exercise, followed by the final assessment. All communications between the end users (e.g., participants, researchers) and webserver were encrypted using industry-standard Secure Hash Algorithm-256-based Secured Socket Layer certificates.

2.3 Outcome Measures

2.3.1 Voice handicap—Self-reported voice handicap was measured at pretest and posttest as the primary outcome using the VHI-10^{22,23}. The VHI-10 assesses how participants perceive their voice handicap and the effects of their voice on daily life across three domains: functional, physical, and emotional. Participants rated statements such as “My voice makes it difficult for people to hear me” on a 0 (*never*) to 4 (*always*) scale. Norms have been established for the VHI-10²⁵. The validity of scores on the VHI-10 is similar to the VHI, and VHI-10 scores are reliable in both non-clinical and clinical samples of individuals with voice disorders^{23,26}. Cronbach’s alpha in the present sample was .66 at pretest and .78 at posttest.

2.3.2 Perceived present control—Perceived present control was measured at pretest and posttest as a secondary outcome intended to assess the intervention’s proposed mechanism of change. Perceived present control was assessed using the 8-item present control subscale of the Perceived Control over Stressful Events Scale⁸ adapted to assess perceived control over voice disorders⁹ (see Appendix A).

Participants rated their agreement with statements such as “I have control over my day-to-day reactions to the voice problem” on a 1 (*strongly disagree*) to 4 (*strongly agree*) scale. Scores on the perceived present control subscale have adequate reliability and reliability in college student samples⁸ and reliability in clinical samples of patients with voice disorders^{9,10}. Cronbach’s alpha in the present sample was .83 at pretest and .72 at posttest.

2.3.3 Psychosocial distress—Psychosocial distress was measured at pretest and posttest as a secondary outcome using the 18-item Brief Symptom Inventory (BSI-18)²⁷. The BSI-18 assesses three forms of psychosocial distress: somatic concerns, depression, and anxiety. Participants rated how often they had experienced various symptoms (e.g., “nervousness or shakiness inside,” “nausea or upset stomach”) in the last seven days on a 0 (*not at all*) to a 4 (*extremely*) scale. The validity of scores on the BSI-18 has been demonstrated in various patient samples^{27–29}. Reliability has been established in clinical samples of patients with voice disorders⁹. Cronbach’s alpha in the present sample was .86 at pretest and .89 at posttest.

2.3.4 Perceived stress—Perceived stress was measured at pretest and posttest as a secondary outcome using the 4-item version of the Perceived Stress Scale (PSS-4)³⁰. The PSS-4 evaluates the degree to which individuals appraise life as stressful. Participants rated how often they had been experiencing certain thoughts or feelings (e.g., “confident about your ability to handle your personal problems?”) on a 0 (*never*) to 4 (*very often*) scale. The PSS-4 has been demonstrated to have similar validity to the 10-item PSS³⁰ and reliability in clinical samples of patients with voice disorders⁹. Although the PSS-4 has lower internal consistency reliability than the longer versions³⁰, the 4-item version was chosen to minimize participant burden. Cronbach’s alpha in the present sample was .50 at pretest and .82 at posttest.

2.3.5 Feasibility, usability, and acceptability—Feasibility was measured with regard to module and perceived present control exercise completion rates. Usability and acceptability were measured with multiple choice and open-ended questions created by the research team based on measures used in other web-based intervention studies¹⁵ (see Appendix B). Questions with responses options “yes,” “no,” and “undecided” were: Do you plan to continue perceived control exercises like these on your own, now that the study is over?; If you knew someone with a voice problem, would you recommend this resource to them?; If you had ongoing difficulty with a voice problem, would you return to this resource? Open-ended questions were: What was the most important or interesting thing you learned from this program?; If you found this program helpful, please explain why it was helpful to you; If you have any ideas for improving the program, please describe below. Participants also were asked what format (e.g., online resource, working with a counselor or therapist, learning from a speech pathologist) would be most helpful for learning the information in the program.

2.4 Data analyses

Data were analyzed using SPSS version 24. All primary and secondary outcome variables were examined for outliers at pretest and posttest. Grubbs’ test demonstrated one outlier outside of the three standard deviation range for self-reported voice handicap ($z = 3.02$) at posttest. Visual inspection of the histogram indicated adequate normality; thus, no participant data were removed for extreme responses. Including the items for all primary and secondary outcome variables across time, Little’s test of missing completely at random for multivariate data³¹, which is conservative for small samples, was not significant, $\chi^2(1,534) = 21.65, p > .99$, indicating that missingness did not appear to depend on the variables in the dataset. To estimate missing data, joint model multiple imputation was conducted, which is the preferred imputation method to deal with missing data in small samples³². Using an intent-to-treat approach, any participants who completed pretest measures were included in the analyses. Results for all analyses were pooled across ten imputations. Degrees of freedom in multiple imputation were calculated assuming infinite complete data degrees of freedom^{33,34}.

Paired t -tests were used to assess change in the primary and secondary outcomes from pretest to posttest. The standard for a minimal important difference on the VHI-10 is estimated to be 4 or 6 points^{35,36}. Owing to the preliminary nature of the study, and because no minimal important difference has yet been identified for muscle tension dysphonia, the more lenient cutoff of 4 points was used. Within-group effect sizes from pretest to posttest accounted for the correlation between measures across time and were calculated according to this formula: $d = \frac{M1 - M2}{SD_{pooled} \sqrt{1 - r}}$. Confidence intervals for all effect sizes assumed a non-central t distribution³⁷ and were calculated using the pt function in R Statistical Software. Because of the preliminary nature of the data, effect sizes were reported for both significant and nonsignificant within-group differences.

3. Results

3.1 Descriptive Information

At baseline, the mean total VHI-10 score across all participants was 18.38 ($SD = 4.41$). The highest voice handicap mean item scores were in the emotional items ($M = 2.15$, $SD = 0.84$), followed closely by the physical items ($M = 2.10$, $SD = 0.57$). Participants reported the lowest voice handicap mean scores in the functional items ($M = 1.56$, $SD = 0.53$).

3.2 Feasibility, usability, and acceptability

Feasibility was measured in terms of completion of various aspects of the web-based intervention. The completion rates were 95% (19 out of 20 participants) for the initial psychoeducation module and 75% (15 out of 20) for the posttest. The six additional written perceived present control exercises had a 56% completion rate. With the exception of two participants, everyone who completed the posttest did so within 24 hours.

Regarding usability and acceptability, most participants reported that they “often” (47%) or “somewhat” (33%) applied the information in the intervention in their daily life. Two participants (13%) said that they applied the information a little bit and one (7%) said not at all. No participants applied the information “very often.” Most participants (67%) reported that they planned to continue perceived control exercises like these on their own after completion of the study, 20% reported that they would not continue and 13% were undecided. Most participants (73%) said that they would recommend this resource to someone they knew with a voice problem. Nearly half (47%) of participants reported that they would return to this resource if they had ongoing difficulty with a voice problem (vs. 33% “no” and 20% “undecided”). Slightly more than half (53%) favored an online resource (either a similar or more personalized one) as the most helpful for getting the information provided in this program whereas 47% preferred learning the information from a speech pathologist or therapist.

Qualitative feedback provided by the participants also provided information on usability and acceptability. Nine to 13 participants answered the open-ended questions regarding why the program was helpful to them (if they found it helpful), the most important thing that they learned from the program, and what ideas they had for improving the program, if any. Regarding what the participants found helpful, some commented specifically on the ability to learn perceived control skills ($n = 6$) and others commented more generally about gaining a different “perspective” or “outlook” ($n = 3$). For instance, one participant stated: “I found that the idea of being very focused and practical by staying in the present and determining what I can and can’t control was a method that could help me.” Another wrote, “Answering the questions allowed me to take a few moments to gather my thoughts and feelings about my vocal issues, bring them down to a more manageable, containable level, and therefore come up with practical ways to address the issues proactively, instead of being consumed by insecurity and fear of the future.” Some participants stated that the intervention helped them feel “less alone” ($n = 2$), increased their awareness ($n = 2$), and provided helpful reminders that they needed to do work or take action to improve their situation ($n = 4$). Regarding the most important thing they learned from the program, participants reported learning about

perceived control ($n = 4$), feeling motivated to take action ($n = 2$), and knowing that others feel similarly ($n = 2$). Others appreciated learning about being honest with themselves, the impact of stress on their voice, and how to stay calm when having voice issues. Regarding areas of improvement, some participants ($n = 4$) mentioned issues with the questions asked (e.g., questions across different measures being too similar) or an interest in pursuing speech therapy ($n = 3$, community participants). Other comments requested an easier way to return to the exercises and daily reminders.

3.3 Primary outcome

Table 1 contains means and standard deviations at pretest and posttest for both primary and secondary outcomes. Self-reported voice handicap scores (primary outcome) significantly decreased from pretest to posttest with a large effect size, $d = -0.86$, 95% CI $[-1.06, -.08]$. The average change score was 3.16 points. Using the four-point cutoff for a minimal important difference, six participants (30%) had meaningful decreases in self-reported voice handicap scores. All but four participants had decreased self-reported voice handicap scores from pretest to posttest. Of these four, the average increase was 2.25 points on the VHI-10.

3.4 Secondary outcomes

Paired t -tests assessing changes in perceived present control, psychological distress and perceived stress from pretest to posttest also were conducted. Regarding perceived present control, although the increase from pretest to posttest was not significant, the effect size was moderate, $d = 0.49$, 95% CI $[-0.11, 0.81]$. There also was no significant decrease in psychological distress from pretest to posttest; the effect size was small and in the expected direction, $d = -0.22$, 95% CI $[-0.61, 0.23]$. Similarly, there was no significant change in perceived stress from pretest to posttest, and the effect size was small to moderate in the expected direction, $d = -0.44$, 95% CI $[-0.76, 0.08]$.

4. Discussion

This is the first study of an innovative web-based intervention designed to reduce self-reported voice handicap through increasing perceived present control among individuals with voice disorders. The primary objectives of this pilot were to assess the feasibility, usability, and acceptability of the intervention. Preliminary data on the efficacy of the intervention for decreasing self-reported voice handicap (primary outcome) and increasing perceived present control and decreasing psychological distress and perceived stress (secondary outcomes) were reported as well.

Regarding feasibility, the intervention components had high completion rates, with 75.95% of participants completing the initial educational module and final assessment and feedback. This is comparable to rates in a meta-analysis of randomized controlled trials of vocal rehabilitation³⁸, which found an 85% average completion rate, with higher-quality studies having the highest rates (range = 20% to 90%). Participants in the present study also completed more than half (56%) of the available additional present perceived control exercises on average. These rates are comparable to or higher than completion rates for a similar intervention in college student samples¹⁷.

Data on usability and acceptability were promising in that most (67%) participants planned to continue the perceived control exercises after study completion and most (73%) would recommend the intervention to others. This suggests that the concept of increasing perceived present control may resonate well with this population, as it targets specific actions that can be taken by individuals with voice disorders. However, slightly less than half of participants (47%) reported that they would personally return to this resource if they had an ongoing voice problem. It is possible that some participants may have felt that they had already maximized the potential benefits of the program. Further refinements to the intervention taking into account feedback solicited from the participants will be used to improve future versions of the intervention.

In terms of efficacy, there was a significant decrease in self-reported voice handicap from pretest to posttest with a large effect size (within-group $d = -0.86$). This effect size is comparable to within-group effect sizes in a study³⁹ comparing two different intervention approaches (comprehensive voice rehabilitation program and vocal function exercises) for functional dysphonia (within-group $d = -0.62, -1.17$), both of which were considered effective in reducing voice handicap. The effect size in our study is also comparable to the average between-group effect size ($d = -1.07$) in a review⁴⁰ of in-person interventions for functional dysphonia (similar to the sample in the present study) for reducing self-reported voice problems. It is encouraging that the web-based intervention in the present study had an effect size comparable to in-person treatments that may be longer, although, unlike the studies in this review, our pilot study did not have a control group.

The pre-to post-change in VHI-10 scores observed in this study approaches the minimal important difference identified for vocal fold paralysis³⁶, but is smaller than a minimal important difference described in a broad population of patients with voice disorders³⁵. No estimate of minimal important difference specific to muscle tension dysphonia currently is available. Pretest VHI-10 scores in the present study were comparable to those in other studies^{39,41}. The average VHI-10 score at posttest in the present study was still in a range considered to be abnormal²⁵, confirming that this intervention should not be considered a stand-alone treatment, and may be more useful in conjunction with speech therapy.

Regarding the other outcomes in the present study, the increase in perceived present control (within-group $d = 0.49$) and decreases in psychological distress (within-group $d = -0.22$) and perceived stress (within-group $d = -0.44$) were not statistically significant, due to the small sample size; however, the effect sizes were small to moderate and in the expected directions, which is promising. Furthermore, these effect sizes were similar to those in other studies using the perceived present control intervention with larger samples of college students, in which the differences were statistically significant (e.g., perceived stress within-group $d = -0.36$ to -0.68 ^{15,19}).

This pilot study has limitations consistent with its preliminary nature. First, because there was no control group, change cannot be assumed to be attributed to the intervention. Participants may have reported improvements in distress given the expectation of participating in a psychological intervention. We did not assess whether they previously or currently were in psychotherapy. Second, a follow-up assessment was not conducted to

assess the stability of change over time. Third, the sample consisted of both clinic and community participants to solicit feedback from a broader sample; the latter group was recruited based on self-reported diagnoses that were unconfirmed by medical providers. Recruitment methods also varied due to practical constraints; the clinic group had more face-to-face contact and the community group was recruited via email and telephone. Face-to-face contact was an option for the community group, but was not requested by any participants. Laryngoscopy was available only for clinic participants, potentially increasing the heterogeneity of represented voice disorders, although community participants were excluded if they had a known laryngeal abnormality. In addition, each group was small, limiting our ability to make meaningful comparisons across groups or to conduct subgroup analyses. Overall, participants may differ from those who elected not to participate, as participants might be more motivated to change. Fourth, scores on one of our scales (the perceived stress measure) had low internal consistency at pretest. Results concerning this measure, which was a secondary outcome, should be interpreted with caution. Finally, although the intent of the web-based intervention was to reduce resource constraints (e.g., cost, time, transportation) for individuals with voice disorders, the online format of the intervention may be less accessible than face-to-face options for individuals who do not use such technology.

Despite these considerations, the findings on feasibility, usability, acceptability, and efficacy in the present study are promising. The findings provide preliminary evidence for the effectiveness of web-based interventions teaching perceived present control to individuals with voice disorders. Based on these findings, we plan to pursue further investigations in this area. Future directions include a randomized controlled trial of the intervention versus a comparison arm with a larger sample size to provide more information on the efficacy of this intervention approach. Future research could also incorporate sub-group analyses, such as assessing whether participants with particular baseline levels of voice handicap or perceived present control benefit most from the intervention, as has been found in college student samples⁴². Given variable rates of completion of available exercises, future work will also examine whether there is a dose-dependence, or a threshold of number of exercises needed to achieve a meaningful change in self-reported voice handicap. It would also be interesting to observe whether the differences in self-reported voice handicap are reflected in differences in auditory perceptual ratings or instrumental measures of voice.

The present study also has implications for clinical practice. For instance, the qualitative feedback following the intervention suggested that many participants were interested in learning about perceived present control in conjunction with speech therapy. As the web-based intervention was not intended to replace existing therapies but rather to facilitate or amplify their effects, a specific focus on perceived control could be a useful adjunct to voice treatment, either via web-based interventions or as a component of in-person treatment⁴³ with voice care providers. Although providers may already teach aspects of perceived control to their patients (e.g., practicing speech therapy exercises⁴⁴), it may be helpful for providers to assess and teach perceived present control strategies and their benefits more explicitly. Combinations of direct (e.g., techniques focusing on voice production components) and indirect (e.g., techniques focused on factors that maintain or contribute to voice problems) have been found most effective for voice disorders⁴⁰. As patients with voice

disorders who received psychotherapy have been found to show more improvement in their general well-being and distress⁴⁵, including perceived present control as a teachable skill for patients may be a useful addition to our treatment armamentarium.

5. Conclusions

In this small pilot study, a web-based intervention targeting perceived present control appeared feasible, usable, and acceptable to individuals with voice problems. A preliminary assessment of its efficacy showed a large effect size for the primary outcome of reduced self reported voice handicap. Overall, feedback about the intervention was very positive. Future studies will include comparison arms, larger sample sizes, and subgroup analyses to further assess the potential value of targeting perceived present control in those with voice disorders.

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Appendices

Appendix A

Perceived Control over Stressful Events Scale: Present Control subscale⁸ (adapted to assess perceived control over voice disorders⁹)⁸ (adapted to assess perceived control over voice disorders)

These questions ask about your sense of control over your voice problem.

Please note that some statement are worded such that if you AGREE with the statement, you are indicating that you DO have control, and other statements are worded such that if you AGREE with the statement, you are indicating that you DO NOT have control.

Please indicate how you feel about your voice problem:

1 = strongly disagree

2 = disagree somewhat

3 = agree somewhat

4 = strongly agree

1. There **isn't** much I can do to help myself feel better about this problem.
2. How I deal with the voice problem now is under my control.
3. I **don't** have much control over my emotional reactions to this problem.

4. When I am upset about the voice problem, I can find a way to feel better.
5. I have control over my day-to-day reactions to the voice problem.
6. There **isn't** much I can do to keep the voice problem from affecting me.
7. I have control over how I think about the voice problem.
8. My reaction to the voice problem is **not** under my control.

Appendix B

Usability and acceptability measures

1. How often have you applied the information in this program in your daily life?

Not at all

A little bit

Somewhat

Often

Very often

2. What was the most important or interesting thing you learned from this program?

3. How helpful was this program overall? 1 (Not at all helpful) to 5 (Very helpful)

4. If you found the program helpful, please explain why it was helpful to you.

5. How helpful was the educational material at the beginning of the program (videos, self-guided exercise)? 1 (Not at all helpful) to 5 (Very helpful)

6. How helpful were the biweekly exercises? 1 (Not at all helpful) to 5 (Very helpful)

7. How helpful were the additional tips? 1 (Not at all helpful) to 5 (Very helpful)

8. Do you plan to continue perceived control exercises like these on your own, now that the study is over?

Yes

No

Undecided

9. If you knew someone with a voice problem, would you recommend this resource to them?

Yes

No

Undecided

10. If you had ongoing difficulty with a voice problem, would you return to this resource?

Yes

No

Maybe

11. What format do you think is most helpful for getting the information you learned in this program?

Online resource like this one

Online resource that is more personalized

Working with a counselor or therapist

Learning from my speech pathologist

12. If you have other ideas for improving the program, please describe them below.
We appreciate your input

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Table 1

Means, standard deviations, and paired *t*-tests comparing pretest and posttest scores

Outcome	<i>N</i>	Pretest	Posttest	<i>t</i>	Within-group <i>d</i> [95% CI]
Voice handicap	20	18.38 (4.41)	15.22 (4.55)	-2.52 *	-0.86 [-1.06, -0.08]
Perceived present control	20	2.97 (0.57)	3.22 (0.37)	1.54	0.49 [-0.11, 0.81]
Psychological distress	20	0.68 (0.48)	0.59 (0.48)	-0.68	-0.22 [-0.61, 0.23]
Perceived stress	20	2.45 (0.72)	2.16 (0.70)	-1.34	-0.44 [-0.76, 0.08]

Note. Voice handicap = Voice Handicap Inventory-10. Perceived present control = Voice-specific Perceived Control over Stressful Events Scale. Psychological distress = Brief Symptom Inventory-18. Perceived stress = Perceived Stress Scale-4.

*
p < .05