Critical Review:
Does transgender voice and communication therapy influence gender perception by listeners among male-to-female transgender individuals?

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Acquiring a sex-appropriate voice has been demonstrated to be a crucial part of the transition process for many TG individuals. This critical literature review examines the effect of voice feminization therapy on perception by listeners among male-to-female transgender individuals. Study designs reviewed included a single-group post-test study, ABA single subject study, two pseudo-randomized clinical trials and one systematic review. Overall, findings suggest that voice feminization therapy for TG women may contribute to increased perceived voice femininity by listeners.

Introduction

Transgender (TG) individuals have a gender identity, or gender expression, that differs from the sex that they were assigned at birth (ohrc.on.ca). Results from the Trans Pulse study suggested that as many as 1 in 200 adults in Ontario, Canada identify as TG (transpulseproject.ca).

Acquiring a sex-appropriate voice has been demonstrated to be a crucial part of the transition process for many TG individuals (McNeill, 2006). A gender-congruent voice has been demonstrated to reduce feelings of gender dysphoria and increase quality of life (American Psychiatric Association, 2016; Hancock, Krissinger, & Owen, 2011). Furthermore, a sex appropriate voice has been suggested to play an important role in TG individuals' health, safety and employment (Serrano, 2013). TG people face less prejudice when they are perceived as cis gender, a concept known as "passing privilege" (Serrano, 2013). Meeting cisgender norms, including vocal qualities, is associated with a reduced risk of harassment and violence, as well as increased employment opportunities (Godfrey, 2015).

Male-to-female (MTF) individuals are those who are assigned male at birth, however, identify and express themselves as female. These individuals are one of the largest groups seeking voice therapy services. While female-to-male TG individuals are often able to achieve their desired voice with hormone therapy, the same does not apply to MTF individuals. MTF individuals must often seek services, including surgery and voice therapy, to achieve their desired voice (Davies, Papp, & Antoni, 2015).

Surgery and therapy aim to make the voice more feminine in quality. Voice pitch, breathiness, intonation, articulation and inflection are aspects of voice that influence perception of gender (Coleman et al., 2012).

At the present moment, literature reviews investigating the efficacy of voice therapy for MTF individuals on perceived femininity by listeners are limited and further investigation is warranted. Further information regarding the efficacy of voice therapy for TG individuals is required in order for clinicians to implement evidence-based care. The current research, in this area, is explored in this critical review.

Objectives

The objective of this paper is to critically review the existing literature regarding the association between voice feminization therapy for TG women and perceived voice femininity by listeners.

Methods

Search Strategy

The computerized databases PubMed and Google Scholar were searched. The following search terms were used.

("trans", "transgender", "transsexual" OR "male-to-female") AND ("voice", "speech", "voice feminization", "speech therapy" OR "voice therapy").

Selection Criteria

Studies were selected for inclusion based on the following criteria: i) All studies included MTF TG individuals, ii) methods included participation in voice feminization therapy with a speech-language pathologist, iii) outcome measures included perceived voice femininity.

Data Collection

Six studies from the literature search met selection criteria for this review. The studies included one Level 1 research evidence study: ABA single subject study (Hancock & Helenius, 2012). Four Level 2 research evidence studies were included: two Level 2a pseudo-randomized clinical trials (Gelfer & Tice, 2013; Gelfer & Van Dong, 2013), one Level 2a+ pseudo-randomized clinical trial (Nolan, Mirisson, Arowojolu, Crowe, Massie, Adler, Chaiet, Francis, 2019) and one Level 2b repeated measures study (Carew, Dacakis & Oates, 2007). Finally, one Level 3 single-group post-test study was included (Hancock, Krissinger & Owen, 2011).

Results

ABA Single Subject Study

An ABA Single Subject is an experimental paradigm in which a single participant serves as their own control participant. During the initial phase A, the dependent variable is assessed, establishing a baseline. During phase B, the treatment is introduced. Lastly, during the final phase A, the dependent variable is assessed for change.

Hancock and Helenius (2012) conducted an ABA single-subject research study to evaluate the effectiveness of voice therapy on a 15-year-old MTF TG adolescent, L.A. Prior to treatment, L.A. had not received any form of voice, speech or language treatment. Therapy consisted of 15 sessions over 7 months, provided by a speech-language pathologist (SLP) student clinician and a supervising SLP who specialized in TG communication. Therapy involved education and counseling about healthy vocal habits, appropriate posture and diaphragmatic breathing, oral resonance, intonation, pitch, voice quality, rate, generalization and stabilization. L.A.'s voice was recorded weekly while performing the same three speech tasks. The following data was gathered pre-treatment, during and two months post-treatment: completion of the Transgender Self-Evaluation Questionnaire (TSEQ) and professional clinical perceptions of LA's voice using the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V). A group of 13 listeners were asked to rate femininity and softness of each of the recordings collected through treatment using a 100 mm horizontal line (femininity: 0=masculine, 100=feminine; softness: 0=hard, 100=soft).

Relevant to this paper, results from listener perceptions demonstrated over 100% increase in ratings of femininity and softness for L.A.'s speech samples, meaning that L.A's voice femininity and softness ratings more than doubled. An important finding included that listener ratings remained consistent even two months post-treatment. As data was only obtained from a single case, it is important not to generalize the results to cases different than L.A.'s.

Strengths of this study included the use of an evidence-based therapy plan and the inclusion of long-term follow up data, which adds to the efficacy of the intervention. Weaknesses included ungeneralizable results due to having data collected of a single subject, the young age of the subject, a lack of a stabilized baseline phase to make comparisons in data, a lack of
intra-rater reliability criterion as well as an inconsistent treatment schedule. Consequently, this study provides equivocal evidence supporting that voice therapy results in increased perceptions of femininity for MTF TG individuals.

Pseudo-Randomized Clinical Trials

A pseudo-randomized clinical trial is a study design in which participants cannot be randomized into participant and control groups due to participant factors (i.e. cisgender or transgender).

Gelfer and Tice (2013) completed a pseudo-randomized clinical trial examining changes in masculinity/femininity ratings and acoustic ratings of MTF TG women immediately following voice therapy and at long-term follow-up (15 months post-therapy). Participants included 5 MTF TG women clients, 5 cisgender male and 5 cisgender women control speakers matched to the TG women by age and height. The TG women provided speech samples pre-therapy, immediately post-therapy and again 15 months after the termination of therapy; the same tasks were used for each of the recordings. The male and female control subjects were recorded only once. There were 52 listeners divided into two groups who first judged the participants' gender and age as foils. Next, listeners judged pleasantness of voice, masculinity and femininity using a 7-point interval rating scale (1 indicating 'very pleasant' for the first scale, 'very masculine' for the second and 'very feminine' for the third). Group 1 judged the pre-test, immediate post-test and control group recordings; group 2 judged the pre-test, long-term post-test and control group recordings.

Specific to this paper, results indicated the listeners perceived the MTF TG women speakers as significantly more feminine in the immediate post-test and long-term post-test compared to the pre-test.

Strengths of the study included the use of criteria for all participants and listeners, two different groups of listeners to control for accurate comparisons between pre- and post-test results, consistent treatment provided across all participants and the collection of both objective and subjective data. Weaknesses included a small sample size, control participants not matched on all characteristics and large individual differences in success rates for participants. Therefore, this article provides suggestive evidence supporting that voice therapy results in increased perceptions of femininity for MTF TG women that persist at least partially for up to 15 months following the termination of therapy.

Gelfer and Van Dong (2013) conducted a prospective treatment study that explored the outcomes of symptomatic voice treatment alongside Stemple's vocal function exercises (VFEs) among a group of MTF TG clients seeking voice feminization. Subjects included; three MTF TG clients, three control female speakers and three control male speakers. The TG clients underwent symptomatic voice therapy and a VFE protocol for 6 weeks. Pre- and posttreatment voice samples along with control voice recordings were judged by unfamiliar listeners based on gender perception and masculinity and femininity ratings on a seven-point equal-appearing interval scale Results demonstrated that listeners continued to identify the TG subjects as male following therapy. However, these MTF individuals were also rated to be significantly more feminine following therapy. Acoustic results demonstrated that the TG subjects appeared more similar to the male speakers before the treatment protocol, and more similar to the female controls following the protocol. The study concluded that symptomatic voice therapy alongside VFEs resulted in higher fundamental frequency and higher perception of femininity.

Strengths of this study include the use of both acoustic and perceptual measures when obtaining data. Weaknesses include that control participants were not matched on all characteristics, thus allowing potential for confounding variables. Although participants were still perceived as male by listeners, there were increases made in femininity ratings by listeners. Overall, this study provides suggestive evidence that voice therapy increases externally rated femininity.

Systematic Review:

A systematic review seeks to identify and appraise empirical research which meets selection criteria.

Nolan et al. (2019) completed a systematic review of the efficacy of surgical and non-surgical voice interventions for MTF TG individuals. Nolan et al. (2019) search databases PubMed, Cinahl Plus, Ovid SP, Web of Science, Science Direct, and Google Scholar for terms related to TG phono-surgery and voice therapy. The search yielded 212 studies, however only 20 were included after being rated by five reviewers for number of participants and appropriate statistical analyses.

Eight studies reported externally rated femininity as rated by trained observers as an outcome measure. Of which, two studies used voice therapy and six studies looked at surgical procedures (endoscopic shortening and laser reduction). Results demonstrated that regardless of intervention, listeners rated MTF voices as more feminine after treatment. Based on this information, the researchers concluded that most MTF individuals will likely benefit from voice therapy as "it is highly satisfactory, raises vocal pitch, increases perceptions of femininity and is noninvasive". However, the authors also noted that endoscopic shortening provided the greatest increase in voice pitch.

Strengths of this study include the exclusion of single-subject study designs and the inclusion of pre- and post-intervention data for seventeen of the twenty studies examined. Weaknesses of this study consist of an unequal amount of surgical and non-surgical studies evaluated with significant skewing of the literature towards endoscopic shortening and a lack of therapeutic regimens for approximately half of the studies investigated. Overall, this study provides suggestive evidence that voice therapy increases externally-rated femininity.

Repeated Measures Study

Repeated-measures design is a research design in which subjects are given more than one treatment and measured on the dependent variable after each.

Carew, Dacakis & Oates (2007) conducted a within group repeated measures study with 10 MTF TG individuals (between 25 to 64 years of age, $M = 40$ years). None of the participants had any previous voice therapy, nor had they undergone sexual reassignment surgery. All subjects participated in five oral resonance therapy sessions that occurred weekly, for 45 minutes. A specific therapy plan was created and administered for the study with goals of increasing lip spreading as well as forward tongue carriage during speech. Participants completed two visual analog scales (VAS) pre- and post-therapy: one indicating their perceived level of femininity in their voice (left = very masculine, right = very feminine); the second indicating their level of satisfaction with their voice (left = very unsatisfied, right = very satisfied).

There were 10 lines along the VAS, each 1 cm apart. Each of the participants recorded a voice sample pre- and post-therapy of a section in "The Rainbow" passage which was presented to 12 listeners (SLP students), who then rated femininity using the same VAS (10 point continuum: left = very masculine, right = very feminine). An acoustic analysis of the recordings was also done to gather data on formant frequencies (f0) during vowel production.

The Wilcoxson signed ranks tests was used for all perceptual data. Relevant to this article, the results revealed that self-ratings of femininity of voice and ratings of voice satisfaction were significantly higher post-therapy among participants. Due to low inter-rater agreement, inferential statistics were not conducted for perceived femininity judged by listeners.

Strengths of this study included the range of ages across participants as voice is not normally distributed in the general population, as well as a study design that allowed for the ability to examine trends and selection bias in the group prior to treatment administration. Weaknesses of the study included the lack of screenings used to recruit participants, a unique treatment plan developed solely for this study, the inconsistent collection measures of voice samples due to changes in room dynamic and equipment, as well as a lack of criteria for listeners. Therefore, this study provides equivocal evidence supporting that oral resonance therapy influences voice femininity perceived by listeners. However, the study provides suggestive evidence that oral resonance therapy increases MTF TG participants' perceptions of voice femininity and satisfaction with their voice.

Single-Group Post-test Study

A single-group post-test study is a study design where the dependent variable is measured after treatment is implemented.

Hancock, Krissinger, & Owen (2011) conducted a single group post-test study to examine whether ratings of femininity and likability of MTF TG women who received voice therapy are related to their quality of life (QoL). Subjects included 20 MTF TG women (age range 23-63, mean 45.8) who had currently or previously enrolled in voice feminization therapy. Each of these subjects evaluated their voice using two VAS measures: one examined how feminine they felt their voice was (0=very masculine, 100=very feminine); the other measured how likeable they felt their voice was (0=dislike, 1000=like). They also evaluated their QoL using TSEQ and Voice Handicap Index (VHI). Five cisgender men and five cisgender women also participated in the study. All 30 participants were recorded while describing Norman Rockwell's "The Waiting Room" picture in order to obtain a speech sample. 25 listeners (12 men, 13 women) were responsible for rating the femininity and likability of the voices using VAS.

Relevant to this article, the results revealed stronger correlations of QoL ratings with speakers' subjective perception of voice post therapy compared to listeners' perceptions more for likability than femininity.

Strengths of this study consist of the inclusion of blinded listeners and the collection of both objective and subjective data. Weaknesses of this study include the lack of conclusive results regarding perceptions judged by the listeners. Therefore, although this study provided equivocal evidence that voice feminization therapy influences gender perception by listeners, it provides suggestive evidence that voice feminization therapy is correlated with increased QoL in TG women.

Discussion

The results of the six studies investigated provide limited suggestive evidence in determining if voice therapy can increase perceptions of MTF TG femininity by listeners. Overall, five of the six studies demonstrated increased perceived femininity following voice therapy. Although results across studies are consistent, the studies had small sample sizes, did not match control participants on all characteristics and did not explain all therapy regimens, allowing for considerable variations between them. Thus, a higher level of evidence and more information is necessary to determine if voice therapy is effective in increasing perceived voice femininity by listeners.

Conclusion

While current research results are promising, a higher level of evidence and more information is necessary to determine if voice therapy is effective in increasing perceived voice femininity by listeners. All studies demonstrated an increase in perceived femininity by listeners, however there were several limitations shared across studies.

Firstly, all studies had small sample sizes. One of the six studies included in this review relied on a single-subject design, and all had small sample sizes (under 20 participants). Therefore, conclusions cannot be generalized to all TG individuals. Secondly, clinical trials were pseudo-randomized, meaning control participants were not matched on all characteristics. This indicates the potential presence of confounding variables within these studies. Similarly, the repeated measures and single-

group post-test studies did not include a control group, thus revealing inconclusive results—it is not known if the increase in perceived femininity by listeners was due to the treatment itself or any other unknown variables. Follow-up intervals are large determinants of the long-term efficacy of intervention. The studies reviewed here, however, had a limited number of these long-term follow-up intervals. Therefore, it is unknown how long the effects from voice feminization therapy may persist. In 3 of the 6 studies included, the type/protocol for voice therapy was not clearly outlined prior to the treatment. This may harm the reliability of the study as treatment protocols that vary greatly can propose a number of confounding variables. Furthermore, not outlining study protocol does not allow for replicability from future researchers. Finally, participants taking voice feminizing hormones were not excluded from 4 of the 6 studies. This acts as a large confounding variable as hormones lead to some increased vocal femininity.

Overall, the current evidence presented for MTF TG voice therapy is equivocal. The above implies the need for additional research in order to determine if voice therapy can increase perceptions of MTF TG femininity by listeners.

Clinical Implications

Speech-language pathologists are responsible for evaluating the effectiveness of their therapy in order to provide evidence-based practice. TG individuals must often pay substantial fees for voice therapy. It is imperative that speech-language pathologists (SLP) and TG individuals be equipped with knowledge regarding the efficacy of this therapy. This review highlights the promise of this therapy, along with the need for clinicians to remain cautious and critical of the evidence. Additionally, this review highlights a role for speech-language pathologists to advocate for and participate in further research on this topic.

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