

Measuring Unfamiliar Listeners' Attitudes towards Adductor Spasmodic Dysphonia

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INTRODUCTION

As the principal means of communication, the human voice is one of the strongest indicators of an individual's emotions, personality, and well-being. A person's voice may influence a listener's perception about his or her communication partner in a number of ways (Lallh & Rochet, 2000). In fact, the human voice is such a compelling characteristic that listeners can reliably estimate a speaker's physical characteristics (age, height, weight, sex) based on his/her voice, and make judgments regarding personality traits as well (Amir & Levine-Yundof, 2012; Bruckert et al., 2010; Krauss, Freyberg & Morsella, 2001). However, whether these perceived personality traits are accurate is questionable, and may lead to bias and psychosocial penalty for those with voice disorders.

For example, listeners appear to create a chain of associations based on a speaker's voice characteristics. This is called a "vocal stereotype" in the behavioral sciences literature; it is also known as the "spread or halo effect" (Wright, 1960) in the disability literature. In this process, a perceived dysfunction in one domain (e.g., voice production) may generalize to perceived inadequacy in another domain (e.g., reduced intelligence). For example, an individual whose voice is considered "attractive" may also be associated with positive biological and physiological characteristics, such as facial attractiveness, by listeners (Zuckerman & Driver, 1989). In the same vein, individuals with voice disorders may not only be perceived as having more severe voices than age- and sex-matched controls (Cannito, Murry, & Woodson, 1994), but speakers with voice disorders are also perceived as less intelligent (Lass, Ruscello, Bradshaw, & Blankenship, 1991), and less confident (Galacek & Neiman, 1994). Consequently, a voice disorder has the potential to alter how a person is perceived in society, as a whole. Thus,

knowledge about attitudes is important to understand for the purposes of counseling individuals with communication disorders, as well as providing education for the public.

A number of studies have shown that communication partners exhibit negative attitudes towards speakers with voice disorders, but little is known about attitudes towards speakers with a specific neurological voice disorder, called spasmodic dysphonia (SD). SD is a disorder that affects intrinsic laryngeal muscle control during purposeful speech (Ludlow, 2011). Little is known about the etiology of spasmodic dysphonia, but it is described as a focal laryngeal dystonia that does not severely interfere with breathing, crying, laughter or shouting (Tanner, 2005). SD has been classified as a “task specific” dystonia, meaning that only certain vocal tasks provoke the ensuing vocal spasms (Roy, Gouse, Mauszycki, Merrill, & Smith, 2005). Adductor spasmodic dysphonia (ADSD) is the most common variant of this voice disorder and may account for over 80% of spasmodic dysphonia cases (Ludlow, 2011). In this type of SD, the laryngeal adductor muscles spasm, resulting in overclosure (hyperadduction) of the vocal folds during speech, cutting off voice, and giving it a tight or strained quality (Ludlow, 2011).

Since the 1980’s, localized injection of botulinum toxin (BOTOX) has been the most commonly used treatment for effective and temporary relief of symptoms related to ADSD (Duffy & Yorkston, 2003). The injections result in a substantial degree of improvement for most patients (Bender, Cannito, Murry, & Woodson, 2004) whose vocal symptoms may range in severity. However, most studies show that despite positive outcomes related to voice quality, speech intelligibility, and psychosocial impact, individuals treated by BOTOX continue to function at levels below those of healthy controls (Bender et al., 2004). In addition, one recent study showed that listeners judged the voices of individuals with ADSD as significantly older,

less confident and more tearful (Isetti, Xuereb, & Eadie, 2014). In other words, judgments extended beyond voice quality to other personality attributes and attitudes.

While this previous study examined a few listener attitudes about ASD, no study has systematically examined attitudes in this clinical population using a validated instrument. One broad objective of this study, therefore, is to address a gap in the literature by understanding how communication partners react to speakers with this voice disorder. A second objective is to determine whether a communication partner's attitudes are amenable to change. This is important to consider when providing public education and counseling advice to patients. For example, it is not known whether it is simply enough to tell a communication partner that "I have a voice disorder called spasmodic dysphonia," or whether provision of additional information about SD could potentially reduce bias. Before these questions may be answered, we need to review the literature related to measuring attitudes about voice disorders in general, spasmodic dysphonia specifically, and about methods of changing attitudes.

Measuring attitudes towards voice disorders

Measuring and assessing attitudes towards voice disorders is an important area of study, as attitudes generally form an individual's perception of a person, group of people, or event, and can affect social interactions. Attitude formation is thought to involve some combination of cognitive, affective, and behavioral experiences (Triandis, 1971). Attitudes towards ideas, people, and in this case, voice disorders can be either positive or negative.

To date, many methods have been used to measure attitudes. Attitudes can be captured qualitatively by asking individuals to describe how they perceive a concept, person, or voice. A second method of measuring attitudes is through quantitative analysis using rating scales, anchored by contrasting adjective pairs (e.g., Ma & Yu, 2013). For example, when examining

listener attitudes towards an individual's voice, listeners may be provided with bipolar adjectives "good" and "bad," or "beautiful" and "ugly." They are then asked to make a judgment on a line that indicates how "good" or "bad" the voice is perceived to be; ratings are translated to a number based on how close the ratings are to the endpoints.

In 1957, Osgood, Suci, and Tennenbaum conducted an extensive study which led to the design of a widely accepted semantic differential instrument. As a result of a factor analysis, Osgood showed that 50 bipolar scales could be arranged into three meaningful factors, and reduced to 22 items that encompassed the following: *Evaluation*, *Potency*, and *Activity*. Bipolar adjectives that were arranged under *evaluation* were aimed at capturing general observations and impressions (e.g., "good" or "bad", "positive" or "negative"); bipolar adjectives arranged under *potency* were aimed at capturing attitudes towards the strength of an individual (e.g., "strong" or "weak"); and bipolar adjectives arranged under *activity* were aimed at capturing information about the individual's level of activity (e.g., "active" or "passive") (Osgood, Suci, & Tannenbaum, 1957). This semantic differential instrument's validity has been supported across numerous studies (Heise, 1965).

A number of studies have used Osgood's approach to measuring attitudes about individuals with voice disorders, such as dysphonia due to vocal nodules, cysts, polyps, laryngeal webs, and papilloma; it also has been used to assess attitudes about resonance disorders due to palatal myoclonus (Altenberg & Ferrand, 2006; Amir & Levine-Yundof, 2013; Lallh & Rochet, 2000; Ma & Yu, 2013). Ma and Yu (2013) used Osgood's semantic differential instrument to measure listener attitudes towards speech samples produced by six children with voice disorders. They found that attitude ratings of children with dysphonic voices were less

favorable than children with healthy voices. Children with voice disorders were rated as having more negative intelligence, personality traits, social traits, and physical appearance.

In another recent study conducted by Amir and Levine-Yundof (2013), 74 naïve listeners (individuals who had not been previously exposed to dysphonia and did not have any knowledge on the topic) evaluated recorded voice samples of 6 dysphonic and 6 non-dysphonic speakers. Bipolar adjective pairs were utilized to gauge whether dysphonic speakers were viewed more negatively than healthy speakers. Results indicated that listeners judged dysphonic speakers negatively across all 12 scales (*positive-negative, healthy-ill, successful-loser, sexy-repulsive, smart-stupid, sociable solitary, strong-weak, masculine-feminine, decisive-hesitant, active-passive, aggressive-gentle, tense-calm*) (Amir & Levine-Yundof, 2013). Specifically, the results showed that people with dysphonia were perceived as being significantly less attractive, less potent, more aggressive and tense, and less agreeable and reliable than non-dysphonic controls (Amir & Levine-Yundof, 2013).

Lalh and Rochet (2000) measured listeners' attitudes toward people with voice and resonance disorders using a semantic differential instrument composed of 22 bipolar adjective pairs. Results showed that individuals with voice and resonance disorders were considered significantly more negative, less pleasant, less intelligent, and less attractive than speakers with normal voices. The results support the fact that the way a person sounds can affect perceptions of personal attributes that have little or nothing to do with the message conveyed (Lalh & Rochet, 2000). Comparisons were also made between individuals with dysphonic voices and those with hypernasal resonance; results showed that individuals with hypernasal resonance were rated significantly more negative than those with dysphonic voices (Lalh & Rochet, 2000), demonstrating that attitude ratings may differ between voice disorders.

The results from the literature show that unfamiliar listeners are clearly biased against individuals with voice disorders (Amir & Levine-Yundof, 2013; Lallh & Rochet, 2000; Ma & Yu, 2013). In addition, there is some evidence to show that there may be a hierarchy among different types of voice disorders, and that listeners differentially penalize speakers based on severity (Altenberg & Ferrand, 2006). Because ADSD results in vocal quality that is uniquely different than other voice disorders, and because it varies in severity, it cannot be assumed that results from previous studies will generalize to this specific population. It is therefore necessary to examine attitudes towards individuals with ADSD, whose voices are uniquely characterized by a strained-strangled quality.

Attitudes Toward Spasmodic Dysphonia

Very few studies have examined impressions about SD that go beyond voice quality. First, Silverman and Hummer (1989) asked 20 unfamiliar listeners to make 81 bipolar attribute ratings (e.g., natural/unnatural) for a single female speaker with ADSD. Results revealed that 42 out of 81 ratings were significant. The speaker was regarded as: depressed, emotional, and incompetent, among others. Because results were based on a single female speaker with severe ADSD and no healthy speakers served as controls, it is difficult to generalize these findings.

Next, a recent qualitative study investigated listeners' perceptions that go beyond voice quality in ADSD speech (Nagle, Eadie, & Yorkston, under review). Nine inexperienced listeners were interviewed after judging speech samples from 10 females with ADSD. Results showed that listeners made assumptions about the speakers that went beyond the speech characteristics. With no other information, listeners assumed the speakers were ill, were

smokers, or were even “mentally challenged”. Results suggested that characterization of negative attitudes within this population needs further study.

Finally, Isetti et al. (2014) recently examined listeners’ impressions of 20 speakers with ASD when compared to age- and sex-matched controls. They found that unfamiliar listeners judged speakers with ASD as sounding significantly older, less confident, and more tearful than their control counterparts. This result indicates that individuals with ASD are at risk for being more negatively judged because of their voice disorder (Isetti et al., 2014). However, one limitation of the Isetti et al. (2014) study was that only a few attributes were studied, and only one was a personal attribute (e.g., confidence). As a result, there could be additional attributes that are perceived by listeners that are unknown. To date, no research about attitudes in ASD has used the semantic differential instrument that is widely accepted and used in attitude literature and in prior voice studies. In addition, it is important to examine whether these attitudes are amenable to change so that biases are reduced.

Effect of education on attitudes towards voice disorders

Understanding negative attitudes towards voice disorders is important for helping clinicians counsel patients about how unfamiliar communication partners may react. It is also incumbent upon speech-language pathologists to not only provide clinical services to those with communication disorders, but also to “engage in prevention and advocacy activities” and to “educate the public regarding communication” and its disorders (ASHA, 2007; p. 8). That is, we need to identify a method of shifting listener attitudes if we are to advocate for our clients and prevent biases. Yet, to date, no research has focused on how listener attitudes might be changed for individuals with ASD.

Perhaps the simplest method of shifting attitudes involves the use of written, factual information to educate individuals about a particular disorder. In the medical literature, it has been shown that knowledge of diagnostic labels or case history information prior to examining a patient may cause clinicians to dismiss signs of disorders that are incongruent with the information, or may lead to the perception of a patient having more severe signs of a disorder than what is actually the case (Lopez, 1989). This “expectancy effect” also has been shown for evaluation of voice disorders, where novice listeners increased their severity of judgments when diagnostic information was provided before they rated voice samples (Eadie, Sroka, Wright, & Merati, 2010). Thus, one context that could be important to investigate is mere provision of a diagnostic label, as in the case when a speaker with a voice disorder discloses to a communication partner that “I have a voice disorder called spasmodic dysphonia”. Knowing how listeners react to this kind of information would have implications for counseling, and could be a simple way to reduce biases if knowledge about diagnosis can shift attitudes.

A number of studies have examined additional methods that could affect listeners’ attitudes to shape them in a positive way. Lalh and Rochet (2000) provided written information about voice and resonance disorders (e.g., dysphonia due to vocal nodules, and hypernasality due to palatal myoclonus). They provided information including definitions and causes of the disorders, effects of the disorders on quality of life, and pertinent information about treatment. This information was presented to one group of 40 listeners. A second group of 40 additional listeners received neutral information about human language. After being presented with the information, the listeners made attitude judgments about speech samples from 9 women: 3 with normal voice, 3 with moderate hoarseness, and 3 with moderate hypernasality. In their study, attitude ratings of listeners who read information about voice and resonance disorders did not

differ from the attitude ratings of listeners who read neutral information regarding human language (Lalh & Rochet, 2000). Results from the Lalh and Rochet (2000) study are consistent with those found by Ruscello and Lass (1996). In their study, Ruscello and Lass (1996) developed an educational training program that comprised of lecture information to assess whether attitudes towards children with dysarthria could be changed. They found that ratings did not differ before and after completion of the educational training program. These results suggest that provision of written information alone may not be powerful enough to effect a change in attitudes.

Gilmore (1974) used video and audiotaped samples of 2 individuals who spoke with esophageal voice (i.e., a type of speech used after total removal of the larynx) and 2 control speakers. The speakers simulated a typical work scenario in an audio only context, video context (i.e., silent film), or an audiovisual sample. Half of the listeners were also provided with written information that identified the laryngectomized subjects and a brief explanation of the effects of laryngectomy. Social acceptability of the speakers was measured using a seven-point rating scale ranging from close acceptance (e.g. marriage) to relative rejection (e.g. excommunication). Results showed that esophageal speakers were perceived as being significantly less acceptable than the control speakers, regardless of whether the judgments were based on visual, auditory, or simultaneous visual and auditory presentation. Interestingly, while information about the esophageal speakers raised their acceptability ratings within some criteria (e.g. social, familial closeness), ratings did not increase in positivity within the criterion of public contact (i.e., the listener's willingness to make accommodations for the speaker in formal, competitive, and impersonal realms). This indicated that with information, listeners were still likely to reject laryngectomees from positions that would involve contact with the

general public. In this study, listeners' attitudes were not directly measured using a semantic differential instrument, which makes it difficult to compare with other studies. In addition, the study did not specify whether the information provided to listeners was regarding the social, physical, or psychological impacts of a laryngectomy on the patient or the listener.

One reason why mere provision of information might not change listener attitudes significantly may not only relate to what information is included, but also what might be lacking. While Lallh and Rochet (2000) indicated that they included information about how a voice disorder affects a person's life, listeners may also need information that allow them to take the perspective of the person with the disorder. Because attitude formation involves cognitive, affective, and behavioral components, it might be argued that an effective way of shifting an attitude might involve all three factors. For example, Dampier, Dancer, and Kaiser (1985) examined whether they could change the attitudes of college students towards older people with hearing loss. They presented information that focused on fostering empathy toward elderly people with hearing impairments. They found significantly improved perceptions among the students, as measured by a semantic differential instrument (Dampier et al., 1985). These results underscore the importance of fostering empathy to shift attitudes.

These studies show that educational material solely focusing on the etiology of the disorder may not be enough to change attitudes. In addition to providing basic information, using a video/audio-taped sample of a speaker talking about how his/her life is affected by a communication disorder may be a more compelling method of making a positive change. To positively shift attitudes about voice disorders, listeners may therefore need information that better allows them to take the perspective of the person with the disorder. Throughout disability literature, the effectiveness of this strategy (fostering empathy) in altering listener attitudes has

been shown by using real or fictitious life examples of a person with a disorder to trigger empathy in listeners (Gorenflo & Gorenflo, 1991). As a result, the effectiveness of this methodology will be examined in this study.

Purpose of the Study

The purpose of this study was to explore listeners' attitudes toward individuals with ASD and to identify potential methods that may reduce stigma and shift listeners' attitudes about individuals with ASD. Further knowledge about the negative attitudes towards individuals with ASD would not only help clinicians understand potential psychosocial problems associated with the disorder, but it would also help them target appropriate areas when counseling this patient population. The following research questions were addressed:

1. What are unfamiliar listeners' attitudes towards females with ASD when compared to age-matched controls?
2. Does speech severity affect listeners' attitudes towards females with and without ASD?
3. What is the effect of information (none, provision of a diagnostic label alone, or provision of information along with a personalized video) on listeners' attitudes towards ASD?

METHOD

Design

An experimental comparative study was utilized to examine how unfamiliar listeners judge female ASD speech compared to typical speakers, and to compare the effect of different educational methods on attitude ratings. All procedures were approved by the Institutional Review Board at the University of Washington.

Participants

Three groups of participants in this study included: 1) 15 adult females diagnosed with ADSD; 2) 5 age- and sex-matched controls with no vocal complaints; and 3) 30 unfamiliar listeners. Only female speakers were chosen for this preliminary investigation because ADSD affects women at a rate four times greater than men (Pitman, 2011). All participants were monolingual English speakers and passed hearing screenings at 25dB SPL for the octave frequencies from 250 to 8000 Hz. No speech, language, or voice disorders were reported by the participants, other than the diagnosis of spasmodic dysphonia for the ADSD speaker group. All participants were paid for their participation in the study.

Adductor SD Speakers

The first group of speakers included 15 adult females with a confirmed diagnosis of ADSD. Speakers were comprised of female speakers to control for gender and because females comprise the majority of those affected with ADSD (Pitman, 2011). Most of the speech samples were selected from a database previously collected in the Department of Otolaryngology-Head and Neck Surgery at the University of Washington Medical Center (Eadie et al., 2007). All speakers had a confirmed diagnosis of ADSD, based on assessment by a board-certified laryngologist and speech-language pathologist. Participants reported no other speech or language diagnosis and were receiving botox injections as treatment for ADSD. All recordings used in the study were obtained at the end of a botox cycle, just before the next injection.

Speech samples were selected so that there would be equal representation across speech severity (n = 5 mild; n = 5 moderate; n = 5 severe). The severity of the samples was characterized by the average auditory-perceptual judgments of 3 experienced speech-language pathologists who each had more than 5 years experience with voice disorders. Speech samples

were judged by the clinicians using the Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V; Kempster et al., 2009), which included a number of 100mm visual analog scales for voice parameters (0 = normal; 100 = most severe). Samples were categorized as mild, moderate, or severe based upon the mean overall severity scores. Scores of 10-29 were considered mild, 30-59 were moderate, and 60-100 severe (Karnell et al., 2007). Table 1 summarizes the characteristics of the 15 female ADS/D speakers in this study, including their age and clinician-rated severity. In addition, speakers rated their own vocal effort (0 = no effort, 100 = extremely effortful) and completed a measure of the psychosocial impact of their voice disorder using the *Voice Handicap Index* (Jacobson et al., 1997; 0 = no voice handicap; 120 = severe voice handicap).

Table 1. Demographic characteristics of the 15 female ADS/D speakers including their ages (years), clinician-rated severity, Voice Handicap Index (VHI) scores, and self-rated effort.

Speaker	Age	Severity	VHI	Self-effort
S1	56	Severe	79	30
S2	50	Mild	36	28
S3	62	Mild	58	58
S7	62	Severe	89	64
S8	58	Moderate	51	26
S9	59	Mild	54	19
S11	58	Severe	33	33
S12	37	Mild	70	54
S13	47	Mild	59	35
S14	77	Moderate	63	0
S17	48	Moderate	82	66
S18	66	Severe	74	59
S19	58	Severe	64	12
S20	60	Moderate	105	89
S21	62	Moderate	75	61

Control Speakers

The second group of speakers included 5 age-matched adult females with no history of voice disorders or present vocal complaints. These control speakers were recruited from the

broader Seattle community and were screened by a certified speech-language pathologist to fall within normal limits for voice quality. Their ages, self-rated vocal effort and VHI scores are presented in Table 2. Note that while N5 reported a VHI of 57 (moderate voice handicap), her voice was assessed as within normal limits by the 4 experienced voice clinicians.

Table 2. Demographic characteristics of the 5 age-matched adult female speakers including their ages (years), VHI scores, and self-rated effort

Speakers	Sex	Age	VHI	Self-effort
N1	F	48	15	0
N2	F	56	4	0
N3	F	75	2	14
N4	F	35	8	10
N5	F	65	57	29

Unfamiliar Listeners:

Thirty unfamiliar listeners (15 male and 15 female), between the ages of 18-60 were recruited from the greater Seattle community. The unfamiliar listeners had no prior experience or academic coursework in voice disorders, including spasmodic dysphonia and were all native English speakers. The 30 listeners were randomized into one of three groups of 10 listeners, each composed of 5 males and 5 females. The average age of the first group was 27.9 years (18-60 range). The second group had an average age of 24.9 years (19-35 range), and the third group was on average 25.9 years old (20-35 range).

Data Collection for Speakers

Speech Recordings

ADSD and control speakers were audio-recorded reading Fairbank's Rainbow Passage (Fairbanks, 1960), a common passage used in voice evaluations and research. Speakers were recorded via a headset microphone (AKG C420) using a Tascam DA-P1 digital audio recorder at a sample rate of 44.1 kHz and 16 bits quantization.

The speech samples were edited to include the second sentence (12 words) of the Rainbow Passage (Fairbanks, 1960), which is commonly used in voice evaluation. The speech samples were first normalized for peak intensity using sound editing software (Sony Soundforge) and converted to WAV files. Samples were then entered into a custom-made computer program, which randomized the speaker order presentation and was used to obtain listener responses on the rating scales.

Attitudes Measure

Listeners' evaluation of the different speakers were completed using a semantic differential instrument composed of 22 bipolar adjective pairs, previously used by Osgood et al. (1957), and more recently by those investigating attitudes about voice disorders (Lallh & Rochet, 2000; Ma & Yu, 2013). The semantic differential adjectives included: *intelligent-unintelligent; competent-incompetent; wise-foolish; confident-unsure; reliable-unreliable; cooperative-uncooperative; kind-unkind; friendly-unfriendly; nice-mean; interesting-boring; beautiful-ugly; healthy-sick; attractive-unattractive; attracting-repelling; pleasant-unpleasant; soothing-aggravating; acceptable-unacceptable; approachable-unapproachable; positive-negative; perfect-imperfect; natural-unnatural; graceful-awkward* (see Appendix A). A 100 mm semantic differential scale was used for the attitude rating, with endpoints anchored by the adjectives. For each adjective pair, the attitude rating was measured as the distance (mm) from the negative to the positive end (range: 0-100, with higher scores being positive). The positive and negative ends were counterbalanced across listeners to reduce rating bias. Listeners were instructed that they could mark anywhere along the line. They were also told that the middle point of the line referred to a neutral response for the adjective pair.

Informational Material for Listeners

Three groups of listeners participated in this study (n=10 per group). Listeners in Group 1, the control, received no information regarding spasmodic dysphonia. When they made judgments about the speech samples, they were not provided with labels identifying the speakers and their diagnostic groups. Like Group 1, listeners in Group 2 also received no information about SD. But prior to making their ratings, they were provided with diagnostic labels for the speakers (e.g. “This person has voice disorder called spasmodic dysphonia” or “This person has no voice concerns”). This condition represented a situation in which an unfamiliar communication partner encounters a person with ADSD over the phone, and that person discloses only that they have a voice disorder (and provides no other information). Listeners in Group 3 were provided with information about ADSD prior to making their ratings and labels identifying the diagnoses of the speakers. Specifically, listeners in Group 3 were provided with written, factual information from the National Institutes of Health website that described spasmodic dysphonia (see Appendix B). The information included a definition of the disorder, its cause, what it sounds like, and a diagram of the vocal mechanism. They were also provided with a two-minute video, depicting two individuals (both females) with spasmodic dysphonia. The individuals on the video not only highlighted their speech symptoms, but also revealed broader life effects such as the impact of ADSD on his/her job, relationships and psychosocial well-being. This method was used to trigger empathy in the listeners. To ensure comprehension of the provided material, listeners in Group 3 completed two multiple-choice questions and one true/false question before the rating session.

Listening Procedures

Listening procedures were completed during one session that lasted approximately 60 minutes. All listeners received instructions about using the bipolar adjective scales prior to

performing ratings. They were then asked to listen to each voice sample and rate each sample based on the 22 bipolar adjective scales. Before making their judgments, listeners in groups 2 and 3 were shown a label identifying the speaker as someone with either “a voice disorder called spasmodic dysphonia” or “no voice complaints”.

Speech stimuli were randomized and presented over Samson RH600 headphones at a comfortable volume. The semantic differential scales were presented one at a time in a random order, following the presentation of the entire speech sample. Assignment of positive and negative adjectives to the right and left ends of the scales was also randomized. The listener had the option of re-listening to the sample for a second time for any attribute. However, after making 5 judgments, all listeners were required to hear the stimulus sentence again. This procedure ensured that listener’s perceptual memory of the voice did not drift across the 22-item rating process. Five samples were repeated for intrarater reliability. As a result, listeners judged 25 speakers (15 ADSD + 5 control + 5 repeated) x 22 judgments per speaker = 550 judgments per listener in a session that lasted approximately one hour. Listeners controlled the rate of presentation of the stimuli, and therefore took breaks as needed.

Reliability

Intrarater reliability was calculated by repeating 5 randomly selected samples (25%) for each listener group. Two judgments were considered to agree if they fell within 21.5 mm on each 100mm scale. This value was chosen for agreement because it is equivalent to within one scale value on a 7-point scale, and has been commonly used in assessing attitudes as well as voice quality (probability due to chance = .39; Eadie et al., 2010; Lallh & Rochet, 2000). Listeners in Group 1 were on average 74% (SD = .073) in agreement. For listeners in Group 2,

82% (SD = .06) of their original and repeated judgments agreed. Finally listeners in Group 3 showed an average 80.6% (SD = .88) agreement between their judgments.

Interrater reliability was determined by calculating the difference between each listener's rating for every stimulus with the average listener's judgment for the same stimulus (Eadie et al., 2010). Ratings within 21.5 mm also were considered in agreement. The mean percentage agreement was calculated for each listener group for each of the 22 attitude measures. Results showed that listeners in Groups 1, 2, and 3 were reliable for making judgments, with averages and standard deviations of 65.5% (SD = .07), 75.6% (SD = .05), and 49.7% (SD = .07), respectively.

Data Analysis

Before performing statistical calculations to test for listener group differences relative to the experimental questions, the investigators performed a principal components analysis on the data to determine which attributes contributed to factor constructs and which did not. This analysis was performed to strengthen the validity of the semantic differential instrument by removing items that did not correlate well with other items. A principal components analysis (PCA) was performed and results first were evaluated by examining the magnitude of eigenvalues. Results revealed 3 factors with eigenvalues greater than 1, which were also visually inspected and confirmed using a Scree plot. The ratio of the first eigenvalue to the second eigenvalue was 4:1, and the first factor explained 60.5% of the total variance. The second factor explained 15.8% of the total variance, and the third factor explained 8.1% of the total variance.

As a consequence, a principal factor analysis using all responses to each of the attitudes scales for each listener (66 variables: 22 scales x 3 listener groups) was then completed with 3

factors extracted, followed by a Varimax method (Kaiser, 1958) of orthogonal rotation of factors. The Measures of Variable Sampling Adequacy (Kaiser, 1970) (.89) and Bartlett's Test of Sphericity (Bartlett, 1951) ($\chi^2 = 1955.93$, $df = 231$, $p < .01$) indicated that the results of the PCA were sufficient for interpretation of the data. Results revealed a 3 factor structure, predicting 84% of the total variance (factor 1 = 43%; factor 2 = 21%; factor 3 = 20%). Results of the PCA with rotation and factor loadings for the attributes are found in Table 3.

Twelve attributes correlated with the first factor (*Social Desirability*), on which they all loaded very highly (.67 - .92). The 12 attributes that loaded onto the first factor included: *attractive-unattractive, pleasant-unpleasant, soothing-aggravating, acceptable-unacceptable, natural-unnatural, healthy-sick, attracting-repelling, perfect-imperfect, graceful-awkward, approachable-unapproachable, beautiful-ugly, positive-negative* (see Table 3).

Five attributes loaded onto the second factor (.70 - .96), and were related to *Personality*. The 5 attributes that loaded onto the 2nd factor included: friendly-unfriendly, kind-unkind, nice-mean, interesting-boring, cooperative-uncooperative (see Table 3 for loadings). Finally, a third factor related to *Intellect* was represented by 5 attributes (loadings ranging from .71-.86), and included: wise-foolish, competent-incompetent, intelligent-unintelligent, confident-unsure, reliable-unreliable (see Table 3).

Table 3. Rotated component matrix with 3 factor loadings across the 22 attributes, ordered from strongest loadings to weakest.

	Component 1: Social Desirability	Component 2: Personality	Component 3: Intellect
attracting-repelling	0.92	0.179	0.266
pleasant-unpleasant	0.917	0.192	0.230
soothing-aggravating	0.896	0.129	0.276
acceptable-unacceptable	0.895	0.052	0.303
natural-unnatural	0.891	0.054	0.338
healthy-unhealthy	0.883	-0.84	0.152
attractive-unattractive	0.876	0.114	0.276
perfect-imperfect	0.853	0.160	0.361
graceful-ungraceful	0.793	0.284	0.420
approachable-unapproachable	0.765	0.414	0.312
beautiful-ugly	0.693	0.367	0.161
positive-negative	0.676	0.468	0.309
friendly-unfriendly	0.127	0.961	0.063
kind-unkind	0.148	0.943	0.058
nice-mean	-0.011	0.929	0.024
interesting-boring	0.232	0.735	0.219
cooperative-uncooperative	0.207	0.7	0.424
wise-foolish	0.154	0.305	0.855
competent-incompetent	0.455	0.102	0.835
intelligent-unintelligent	0.384	0.165	0.809
confident-unsure	0.418	-0.064	0.796
reliable-unreliable	0.465	0.289	0.706

Attitudes

To answer the experimental questions, data from the semantic differential scales were first averaged for each speaker to create a Social Desirability subscore (based on 12 attributes), a Personality subscore (based on 5 attributes), and an Intellect subscore (based on 5 attributes) for listeners in each group. A score for each speaker was generated across all listeners within each group (10 listeners per group x 20 speakers x 12 judgments = 2400 judgments per speaker for Social Desirability subscores; 10 listeners per group x 20 speakers x 5 attributes = 1000 judgments per speaker for Personality subscores; and 10 listeners per group x 20 speakers x 5

attributes per speakers for Intellect subscores). For the purposes of the analysis, a larger score indicated more “positive” attitudes. A 4 x 3 ANOVA was then performed (with one within subjects variable of speaker severity group: 4 levels (control) normal, mild ADSD, moderate ADSD, and severe ADSD) and one between subjects variable of listener group with 3 levels: no information, diagnostic label only, information and video) for each of the three subscores. Post hoc tests were completed where appropriate.

RESULTS

Tables 4–6 show the mean ratings for the 3 attribute subscores (Social Desirability, Personality, and Intellect) across listeners in each group as a function of severity. Higher numbers indicate more positive ratings.

Table 4. Mean ratings of *Social Desirability* attributes across listener groups, based on severity.

	Group 1: No Education		Group 2: Labels Only		Group 3: Labels, Information, Video	
	M	SD	M	SD	M	SD
Normal	64.38	5.65	68.61	6.1	62.4	4.48
Mild	51.51	15.47	51.58	11.87	52.67	11.75
Moderate	50.58	10.12	51.13	6.29	49.39	7.91
Severe	37.71	11.17	39.82	6.96	39.09	8.63
Mean	51.05	10.60	52.79	7.805	50.89	8.20

Table 5. Mean ratings of *Personality* attributes across listener groups, based on severity.

	Group 1: No Education		Group 2 Labels Only		Group 3: Labels, Information, Video	
	M	SD	M	SD	M	SD
Normal	57.91	7.80	62.2	9.41	52.38	8.67
Mild	51.21	8.90	58.7	6.14	51.94	4.96
Moderate	53.14	13.58	63.63	9.42	58.83	10.14
Severe	54.58	7.01	62.31	4.49	59.76	4.46
Mean	54.21	9.38	61.73	7.36	55.73	7.05

Table 6. Mean ratings of *Intellect* attributes across listener groups, based on severity.

	Group 1: No Education		Group 2: Labels Only		Group 3: Labels, Information, Video	
	M	SD	M	SD	M	SD

Normal	65.80	7.35	65.08	2.55	62.49	6.69
Mild	57.14	16.03	57.32	9.17	54.12	13.04
Moderate	58.27	10.59	57.92	7.13	58.24	5.9
Severe	52.28	8.29	56.98	6.26	55.14	9.38
Mean	58.38	10.56	59.32	6.28	57.50	8.75

To answer to our experimental questions, three 4 X 3 ANOVAs were performed for each of the attribute subscores (Social Desirability, Personality, Intellect). First, results for the Social Desirability subscore revealed a significant main effect for severity ($F(3, 36) = 21.07, p < .001$). The main effect of listener group (none vs. labels only vs. information and video) was not significant. No significant interaction was found.

Post hoc testing (multiple t-tests with Bonferonni corrections) revealed that control speakers were judged as having significantly higher scores ($M = 65.13$) for Social Desirability than all of the SD speakers. There were no significant differences found between mild ($M = 51.92$) and moderate SD speakers ($M = 50.36$). However, the mild and moderate SD speakers were rated as significantly better scores for Social Desirability attributes than the severe ($M = 38.87$) SD speakers.

Results of the ANOVA for Personality subscores did not reveal any significant main (severity or listener group) or interactions ($p > .05$). Finally, results for the Intellect subscore showed a significant main effect for severity ($F(3, 36) = 3.78, p < .05$). Specifically, control speakers were rated as having significantly better Intellect subscores ($M = 64.46$) than severe SD speakers ($M = 54.80$). No significant differences were found among any other groups (mild SD speakers, $M = 56.19$; moderate SD speakers, $M = 58.15$). In general, however, scores decreased as severity increased.

Because of the significant main effects found between control and SD speakers for the Social Desirability and Intellect subscores, one-way ANOVAs were conducted on attributes that loaded onto those two factors as follow-up tests. The summary scores for the 17 attributes (12 for Social Desirability, 5 for Intellect) differentiated by speaker severity are presented in Table 7.

Table 7. Mean listener ratings by attribute for speakers of varying severity (normal (norm), mild (mi) SD, moderate (mod) SD, severe (sev) SD) across the three listener groups.

Attribute	Component	Group 1: No information				Group 2: Labels Only				Group 3: Labels, Information, Video			
		Norm	Mil	Mod	Sev	Norm	Mil	Mod	Sev	Norm	Mil	Mod	Sev
intelligent- unintelligent	Intellect	63.94	57.56	61.22	51.78	65.5	59.26	58.68	57.62	64.06	56.45	61.93	60
competent - uncompetent	Intellect	70.7	61.44	63.1	54.62	71.8	63.1	62.92	60.36	65.91	58.09	61.91	55.8
confident - unsure	Intellect	61.54	52	51.3	45.7	57.76	41.74	44.08	43.42	60.22	48.26	51.33	46.95
reliable - unreliable	Intellect	73.44	59.48	62.94	55.06	71.6	66.94	65	62.92	67.09	56.35	60.87	56.78
wise - foolish	Intellect	59.42	55.22	52.8	54.28	58.72	55.54	58.92	60.6	55.18	51.47	55.18	56.17
beautiful-ugly	Social Desirability	55.82	41.88	42.62	36.74	57	49.18	47.92	41.06	54	52.56	52.09	51.04
acceptable - unacceptable	Social Desirability	76.34	68.6	69.66	52.76	85.38	71.3	68.28	57.76	85.63	74.18	67.53	56.31
soothing - aggravating	Social Desirability	60.42	49.56	46.48	34.42	63.48	48.14	44.34	35.52	56.38	50.51	41.33	37.85
attracting - repelling	Social Desirability	58.94	46.8	47.26	34.5	63.06	46.64	45.46	35.46	57.77	51.05	44.95	36.93
healthy - unhealthy	Social Desirability	71.7	56.42	50.24	20.88	79.72	49.72	50.84	22.74	81.26	58.84	48.53	18.42
pleasant - unpleasant	Social Desirability	64.18	51.88	52.86	40.62	69.46	48.64	48.9	37.46	59.60	55.2	47.42	38.47
attractive - unattractive	Social Desirability	55.98	45.52	44.76	31	56.62	44.78	40.52	29.3	50.24	48.42	44.64	35.98
approachable - unapproachable	Social Desirability	69.78	56.22	54.1	44.52	73.7	59.46	61.86	52.52	61.91	53.62	56.13	45.07
graceful - awkward	Social Desirability	60.88	46.68	47.44	37.04	70.08	51.78	50.1	42.62	57.85	48.47	50.64	43.25
perfect - imperfect	Social Desirability	59.7	45.26	43.9	32.06	60.6	45.02	44.02	36.48	52.78	40.27	38.8	28.82
natural - unnatural	Social Desirability	73.82	55.44	53.8	41.9	84.28	57.78	56.34	38.64	77.62	53.11	50.91	33.31
positive - negative	Social Desirability	64.94	53.8	53.76	46.06	59.9	46.52	54.92	48.2	53.71	45.71	49.62	43.6

Using Bonferonni corrections with alpha set at .0029 ($p = .05/17$), multiple ANOVAs were conducted. First, for the attributes of *intelligence*, *competence*, *confidence*, *wise*, and *positive*, no significant effects were found. Several significant effects were shown for severity. First, for the attribute of *reliable*, listeners judged control speakers ($M = 70.71$) significantly more reliable than mild SD speakers ($M = 60.92$) or severe SD speakers ($M = 58.25$) ($F(3,36) = 430.64, p < .002$). This attribute was the only one that loaded onto the *Intellect* factor that showed a significant result alone.

All of the other significant effects were found for attributes that loaded onto the *Social Desirability* factor. For *acceptability*, listeners judged control speakers ($M = 82.45$) significantly better than both moderate SD speakers ($M = 68.49$) and severe SD speakers ($M = 55.61$; $F(3,36) = 23.73, p < .001$). Similarly, for the attributes of *soothing* and *attracting*, listeners rated control speakers (*soothing* $M = 60.09$; *attracting* $M = 59.92$) significantly better than moderate SD speakers (*soothing* $M = 44.05$; *attracting* $M = 45.89$) and severe SD speakers (*soothing* $M = 35.93$; *attracting* $M = 35.63$; *soothing* $F(3,36) = 15.54, p < .001$; *attracting* $F(3,36) = 15.63, p < .001$). Listeners also rated control speakers as significantly more *approachable* ($M = 68.47$) and *graceful* ($M = 62.94$) than either moderate SD speakers (*approachable* $M = 57.36$; *graceful* $M = 49.39$) or severe SD speakers (*approachable* $M = 47.37$; *graceful* $M = 49.39$; *approachable*: $F(3,36) = 8.43, p < .001$; *graceful* $F(3,36) = 8.29, p < .001$).

Listeners judged control speakers significantly more *healthy* ($M = 77.56$) than mild ($M = 54.99$), moderate ($M = 49.87$) and severe SD speakers ($M = 20.60$; $F(3,36) = 71.86, p < .001$). Mild and moderate SD speakers did not differ from each other, but were rated significantly healthier than severe SD speakers. A similar pattern was observed for

the attribute of *natural* ($F(3,36) = 27.70, p < .001$). Listeners judged control speakers ($M = 78.57$) significantly more natural than mild ($M = 55.44$), moderate ($M = 53.68$), and severe SD speakers ($M = 37.95$). Mild and moderate SD speakers did not differ from each other, but were each rated significantly more natural than severe SD speakers.

Listeners rated control speakers significantly more *pleasant* and *attractive* (*pleasant* $M = 64.41$; *attractive* $M = 54.28$) than moderate SD speakers (*pleasant* $M = 49.73$; *attractive* $M = 46.24$) or severe SD speakers (*pleasant* $M = 38.85$; *attractive* $M = 32.09$; *pleasant*: $F(3,36) = 15.35, p < .001$; *attractive*: $F(3,36) = 12.89, p < .001$). Both mild and moderate SD speakers were also judged significantly more *pleasant* and *attractive* than severe SD speakers. For the attribute of *perfect*, listeners rated severe SD speakers ($M = 32.45$) significantly worse than all other speakers ($F(3,36) = 18.52, p < .001$). Moderate SD speakers ($M = 42.24$) and mild SD speakers ($M = 43.52$) were rated significantly worse than control speakers ($M = 57.69$).

For *beauty*, two significant main effects were found for severity ($F(3,36) = 5.738, p < .0029$) and listener group ($F(2,12) = 12.23, p < .001$). Specifically, listeners rated severe SD speakers ($M = 42.95$) and moderate SD speakers ($M = 47.54$) significantly lower for *beauty* than control speakers ($M = 55.61$). Interestingly, listeners who received labels and educational information judged speakers significantly higher ($M = 52.42$) than listeners in the no education group ($M = 44.27$). In addition, those who received labels ($M = 48.79$) also judged speakers significantly higher for *beauty* than those in the no education group. This was the only main effect observed for listener group.

These findings indicate that some attributes, particularly ones that loaded onto the Social Desirability factor, were more sensitive to differences in severity, while others did not change significantly depending on severity.

DISCUSSION

The primary purpose of this study was to determine whether unfamiliar listeners differentially penalize adult female speakers with spasmodic dysphonia when compared to age-matched controls using a validated attitudes instrument. A second, and related question, asked whether listeners' attitudes differed with regard to severity of speech. Results of these first two questions showed that in general, listeners judge speakers with ADSD significantly worse than controls for attitudes that relate to social desirability. Some attributes were particularly affected by severity (*pleasant, attractive, natural, perfect, and healthy*), with severe ADSD speakers judged worse than those with mild and moderate symptoms, who were worse than control speakers. Attributes related to intellect were not as affected, with differences mostly revealed only between severe ADSD speakers and age-matched controls. Attributes that most strongly related to personality did not seem to be affected. A final question of this study related to whether negative attitudes observed for speakers with ADSD could be changed using one of two methods (provision of diagnostic label or information with an educational video). Neither method appeared to be particularly effective in remediating negative attitudes. These results will next be discussed in the context of previous studies from both the disability and voice disorders literature. Limitations and future clinical and research implications will follow.

Attitudes Toward Spasmodic Dysphonia

The first major finding of this study was that the presence of spasmodic dysphonia significantly affected unfamiliar listeners' attitudes based on judgments of audio samples alone. In particular, results showed that attitudes that related to social desirability attributes, which are heavily related to Osgood's (1957) evaluative category, were negative for speakers with ASD in comparison with control speakers. Speakers with spasmodic dysphonia were rated as less *pleasant*, less *soothing*, less *acceptable*, less *healthy*, less *attractive*, less *attracting*, less *graceful*, less *approachable*, less *beautiful*, and less *natural* than individuals with normal voices. In addition, attitudes related to intellect (in particular, *reliability*) were also significantly different between severe ASD speakers and age-matched controls, with ratings being more positive for control speakers. Interestingly, attributes that were related to personality were not significantly affected. For example, attributes such as *friendly-unfriendly*, *kind-unkind*, *nice-mean*, *interesting-boring*, *cooperative-uncooperative* did not show differences between SD speakers and controls.

Overall, results of this study are consistent with previous studies that have found that speakers with voice disorders are judged more poorly than individuals with normal voices (Amir & Levine-Yundof 2000; Blood et al, 1979; Gelacek & Neiman, 1994; Gilmore, 1974; Lalh & Rochet, 2000), and that negative impressions extend beyond voice quality. For example, a number of studies have used Osgood's approach to measuring attitudes about individuals with voice and resonance disorders (Altenberg & Ferrand, 2006; Amir & Levine-Yundof, 2013; Lallh & Rochet, 2000; Ma & Yu, 2013). Ma and Yu (2013) found that attitude ratings of children with dysphonic voices were less favorable than children with healthy voices. Children with voice disorders were rated as

having more negative intelligence, personality traits, social traits, and physical appearance. Similarly, Altenberg and Ferrand (2006) showed that even individuals with mild voice disorders were rated more negatively than control speakers.

The present study also showed that most of the attributes that were negatively perceived by unfamiliar listeners were related to social desirability, and were less strongly related to intellect, although these differences were revealed between severe ASD speakers with controls. Gilmore (1974) also found consistently negative ratings for attributes within the criterion of public contact for individuals speaking with esophageal voice. Further, Amir and Levine-Yundof (2013) showed that listeners' judgments were significantly more negative for 6 dysphonic speakers than controls for attributes that included both social evaluation and intellect.

Results of this study should also be compared with those who have investigated listeners' impressions of speakers with ASD (Isetti et al., 2014; Nagle, Eadie, & Yorkston, under review; Silverman & Hummer, 1989). For example, Silverman and Hummer (1989) found that listeners judged a single female speaker with ASD as *unnatural*, *unpleasant*, and *incompetent*, among others. Interestingly, some of the same factors that were penalized for the speaker in that study (e.g., *unpleasant*, *unnatural*) were also shown in the present study. Similar to the present study, personality factors measured by Silverman and Hummer (e.g., *trustworthy*, *sincere*) also did not differentiate their speaker. However, in contrast to the present study, Isetti et al. (2014) found that their ASD speakers were judged significantly less confident than control speakers, whereas the attribute of *confidence* did not seem to differentiate speakers in the present study. One reason these differences could have been found relate to both sample size and

speaker characteristics. Isetti et al. (2014) investigated both male and female ADSD speakers (vs. only female speakers in the present study). They also had a larger number of listeners who made judgments, which could have affected the power of the present results. These variables warrant consideration in future studies.

Nagle et al. (under review) recently undertook a qualitative study in which 9 inexperienced listeners were interviewed after judging speech samples from 10 females with ADSD. Results showed that listeners made assumptions about the speakers that went beyond the speech characteristics. For example, with no other information, listeners assumed the speakers were ill, were smokers, or were even “mentally challenged”. Results from the present study appear to validate these results; listeners make assumptions and form negative impressions about the speakers that go beyond voice quality, although this seems to be affected by speech severity.

A second major result from this study revealed that perception of individuals with ADSD becomes increasingly negative as the severity of the disorder increased, particularly for attributes related to Social Desirability. Control speakers were rated significantly better than mild/moderate ADSD speakers, who were rated significantly better than severe ADSD speakers by listeners. This effect was seen for a number of Social Desirability attributes including *pleasant*, *attractive*, *perfect*, *healthy*, and *natural*. For these attributes, there was no significant difference between how mild ADSD speakers and moderate ADSD speakers were judged. One reason why there may have been no observed differences between mild/moderate ADSD speakers is that unfamiliar listeners may not be able to distinguish between mild and moderate spasmodic dysphonia. For example, inexperienced listeners are not as reliable as experienced

listeners in making some types of auditory-perceptual judgments; speakers who fall in the mild to moderate range are often the most difficult to evaluate (Eadie et al., 2007).

These findings are consistent with previous studies showing that as the severity of the disorder increases, increasingly negative attitudes from unfamiliar communication partners may be found (Altenberg & Ferrand, 1996). They also support the conclusion that speakers with spasmodic dysphonia are perceived by listeners as being less socially acceptable than individuals without ASD and that listeners' negative impressions are generalized to areas unrelated to the disorder, supporting the 'spread effect' documented in previous studies (Wright, 1988; Lalh & Rochet, 2000). These results have implications for social interactions between individuals with ASD and unfamiliar communication partners across a wide variety of settings. Whether additional information (e.g., seeing and interacting with the person) during communication would help these attitudes, or whether additional information provided by the speakers (e.g., I have voice disorder called spasmodic dysphonia; or, I have a voice disorder called spasmodic dysphonia which has several effects on my speech and my life) could help is investigated next.

Effect of Information on Listeners' attitudes of Spasmodic Dysphonia

The final major finding of this study was that different levels of information/education did not affect attitudes towards speakers with spasmodic dysphonia, except for the attribute *beautiful-ugly*. Listeners in Group 3, who received written information on spasmodic dysphonia, answered multiple-choice questions, and watched videos of individuals with the disorder, did not differ significantly in their attitudes towards ASD than individuals in Group 1 who received no information on the disorder, or individuals in Group 2 who only received diagnostic labels.

Overall, findings from this study are consistent with previous studies that showed that attitudes are not amenable to change with information or education (Lalh & Rochet, 2000; Ruscello & Lass, 1996). In those studies, however, only written information was provided to listeners, which may have not been enough to shift an attitude that is made up of cognitive, affective, and behavioral components. As a result, our study used an educational video, which highlighted not only specific information about spasmodic dysphonia, but also the consequences and psychosocial effects of spasmodic dysphonia on the speaker's life. This video was made to target an empathetic response in the listeners. However, results revealed that while the listeners were better informed after watching the video (e.g., they all answered the multiple choice questions correctly about ADSD), it was not enough to shift attitudes in general.

In this study, the only attribute that shifted to more positive ratings with the provision of education was *beautiful-ugly*, with listeners rating speakers more positively on this attribute after being exposed to both written information about SD as well as a video depicting two speakers with SD. Another interesting finding was that labels identifying the presence of spasmodic dysphonia (Group 2: Labels only), improved listener ratings of this attribute for ADSD speakers. Individuals in Group 2 who received knowledge of diagnosis (i.e. "This individual has a voice disorder with spasmodic dysphonia") had more positive ratings of ADSD speakers than listeners in Group 1. For this one attribute, at least, mere provision of a diagnostic label was enough to significantly and positively shift an attitude at least as much as information and a personalized video. However, it must be noted that while the results were not significant between the label and educational video groups (Groups 2 and 3), the mean scores for all

groups were in the hypothesized directions (Group 1, no education: $M = 44.27$; Group 2, labels only: $M = 48.79$; Group 3, informational videos: $M = 52.42$) (i.e., with the strongest effect for the education group).

Perhaps one reason that attitude ratings for this one attribute (beautiful) improved with the provision of a label is that listeners were able to attribute the voice to a particular medical etiology rather than wonder and question why the speakers sounded the way they did. Verbal feedback provided by some listeners in Group 1 indicated that they had negative attitudes towards the disordered voices because “they sounded like smokers”. This observation is consistent with findings by Nagle et al. (under review). In this case, provision of a label perhaps clarified this misconception that the disordered voice was linked to lifestyle, personality, or other choices. While no significant effects were found across listener groups for other attributes, there was an increasing trend for the label only to also positively influence the attributes: *approachable-unapproachable* (Group 1, no education: $M = 56.16$; Group 2, labels only: $M = 61.89$) and *graceful-awkward* (Group 1, no education: $M = 48.01$; Group 2, labels only: $M = 53.65$). Thus, it is apparent that merely putting a name on why someone sounds a particular way may have a positive influence. This needs further investigation.

In addition, for the attribute (beautiful), provision of the educational video appeared also to positively influence listeners’ ratings. These results were hypothesized and expected for more attributes. Use of a bigger sample size (listeners in each group) would increase the power of the results and could reveal future group effects. This should be a focus of future study.

Findings from this study have implications on how individuals with spasmodic dysphonia resolve the negative attitudes that exist towards them as communication partners. This study shows that neither acknowledgement of the voice disorder nor provision of additional information detailing how it affects their quality of life seems to have a significant effect on attitudes by listeners. In general, it was expected that attitudes would get better for listeners in the group who watched the videos (Group 3) and who were provided information about ADSD. One possible explanation as to why this did not occur is that in the videos provided to the listeners, the individuals with spasmodic dysphonia admit to hardships that align with some of the attributes measured in the study. For example, in one video, the speaker admits at one point that she has been “depressed, anxious” and “close to a nervous breakdown” as a result of changes in voice caused by spasmodic dysphonia and its effect on her career. In this case, it is possible that because the speakers identified their own vulnerabilities and weaknesses, they in a sense increased those expectations in listeners, who may have validated their impressions.

Instead of this approach, other educational methods such as personally meeting and interacting with an individual with spasmodic dysphonia may influence attitudes towards this voice disorder. Role-playing the disorder may also be more influential as it allows an individual to experience how someone with the disorder may feel. Both of these approaches (meeting and role-playing) target the deeper and more affective side of a person, allowing them to connect with the disorder and the person experiencing it. These approaches have been reported effective in studies of attitudes towards physical disabilities (Anthony, 1972; Yunker & Block, 1979). However, these approaches have not been assessed on studies of voice disorders.

Limitations

There are several limitations of this study that should be considered. Due to time and feasibility constraints, there were only 10 listeners recruited into each listening group. Although speaker scores were based on the average of those 10 listeners' judgments (per attribute), any outliers may have affected overall scores, and as such, could have reduced the power in showing between group differences. For example, one group (Group 3) showed a somewhat weaker interrater reliability for their judgments than listeners in the other two groups. With an increased sample size, the effects from any single listener outliers could be effectively alleviated since results are based on group means. However, because no effects of educational group were observed for any of the subscore measures (based on thousands of judgments), this is an unlikely interpretation.

A second limitation of this study was that listeners only heard a single sentence (2nd sentence of Rainbow passage) upon which to base their attitude judgments. Several other studies have used longer passages for making attitudes judgments (Lallh & Rochet, 2000; Ma & Yu, 2013). However, to increase the sample size of speakers in this study, a shorter passage was deemed acceptable. Listeners were able to hear the sample twice for each judgment, which ensured consistency in their ratings.

A third limitation of this study was the inclusion of only 5 speakers per severity category and inclusions of only female speakers. A larger sample set of normal and disordered voices would allow us to assess the interaction between attitudes and speaker severity more closely. Including male speakers would allow for assessment of similarities and differences in ratings across genders, rendering results more clinically applicable across a larger patient population.

Finally, listeners used in this society were individuals from the Greater Seattle area who had no familiarity with spasmodic dysphonia. Future studies could include listeners of varying familiarity levels to investigate how attitudes might differ with experience with SD.

Implications

Results of this study have implications for sociability and interpersonal relationships in all communicative settings, including those at work, leisure, and in the community. Relationships and social interactions can be hindered if individuals with spasmodic dysphonia are perceived as less *socially acceptable* and *awkward*, *unapproachable* and *unpleasant*. Particularly in today's society where individuals may communicate via telephone for initial job interviews, it is important that we continue to examine impressions about speakers with communication disorders such as spasmodic dysphonia. The results of this study reveal an important area of clinical intervention; as speech-language pathologists, part of our scope of practice includes prevention of communication disorders and providing public education that focuses on reducing negative consequences and attitudes. We also provide direct counseling to those with communication disorders.

Speech-language pathologists working with individuals with spasmodic dysphonia should counsel patients that negative attitudes may be encountered from unfamiliar communication partners. These appear to be related to the severity of speech, thus, speakers undergoing effective botox treatments who are a few weeks post-injection may encounter fewer remarks. Results from this study may also suggest that negative

attitudes may be related more to social desirability factors than to intellect or personality traits, although these results need further study.

Finally, this study shows that changing attitudes is challenging, and cannot be done with explicit teaching and information. Thinking about how individual attitudes towards other stigmatized populations are changed on a larger scale, 1:1 interactions with individuals from stigmatized populations may potentially shift our attitude and judgment towards a population more so than educational information delivered to us by an outside source. Future studies examining attitudes towards spasmodic dysphonia may investigate how 1:1 interactions between those with the condition and unfamiliar partners may shift attitudes about this voice disorder.

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Appendix A

intelligent–unintelligent

competent-incompetent

wise-foolish

confident-unsure

reliable-unreliable

cooperative-uncooperative

kind-unkind

friendly-unfriendly

nice-mean

interesting-boring

beautiful-ugly

healthy-sick

attractive-unattractive

attracting-repelling

pleasant-unpleasant

soothing-aggravating

acceptable-unacceptable

approachable-unapproachable

positive-negative

perfect-imperfect

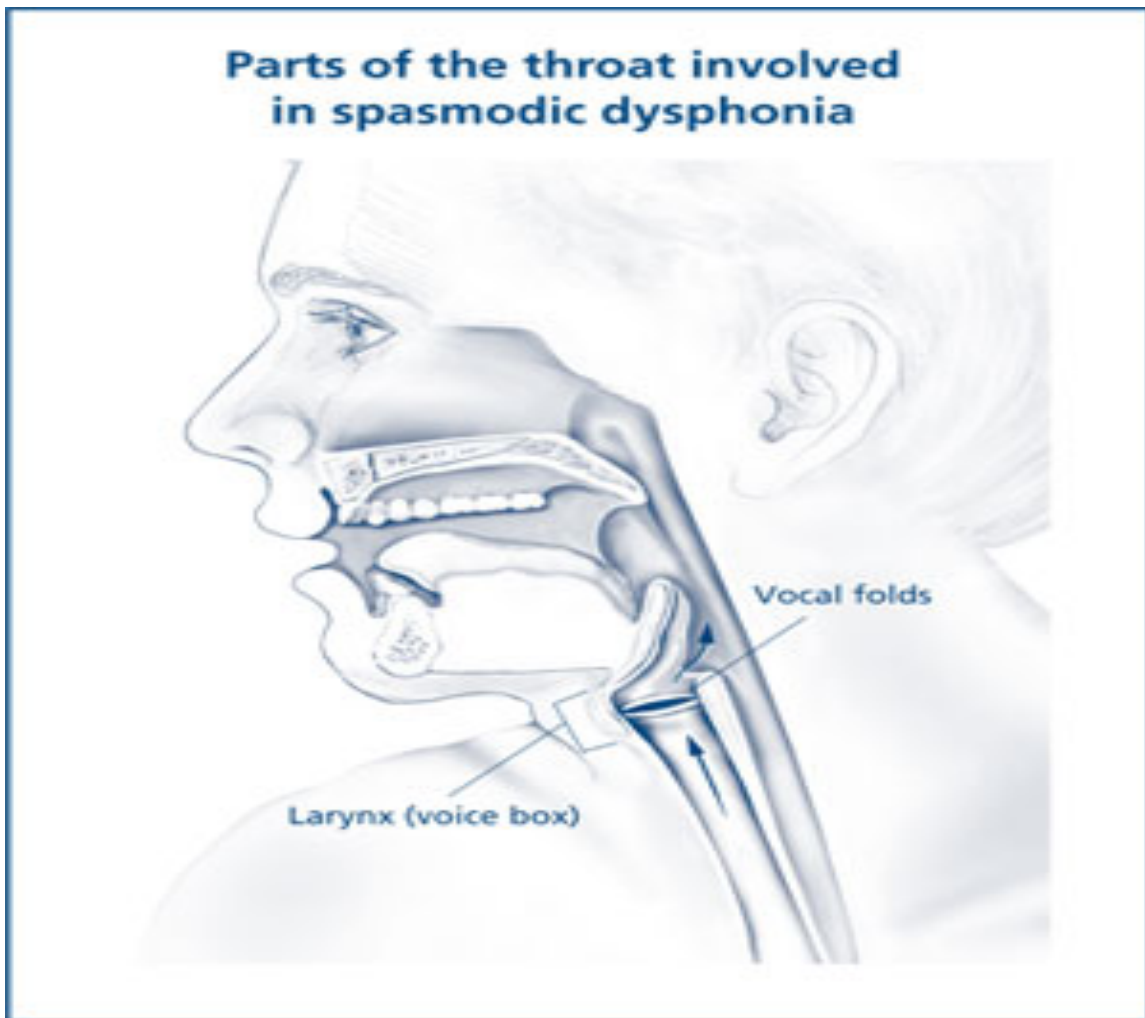
natural-unnatural

graceful-awkward

Appendix B: Written Education for Group 3 Listeners

What is Spasmodic Dysphonia?

Spasmodic dysphonia is a neurological disorder affecting the voice muscles in the larynx, or voice box. When we speak, air from the lungs is pushed between two elastic structures- called vocal folds or vocal cords-with sufficient pressure to cause them to vibrate, producing voice (see figure below). In spasmodic dysphonia, the muscles inside the vocal folds experience sudden involuntary movements-called spasms-which interfere with the ability of the folds to vibrate and produce voice. These vocal spasms are NOT within the person's control.



SD causes voice breaks and can give the voice a tight, strained quality. People with SD may have occasional breaks in their voice that occur once every few sentences. Usually, however, the disorder is more

severe and spasms may occur on every other word, making a person's speech very difficult for others to understand. At first, symptoms may be mild and occur only occasionally, but they may worsen and become more frequent over time. Spasmodic dysphonia is a chronic condition that continues throughout a person's life.

Spasmodic dysphonia can affect anyone. It is a rare disorder, occurring in roughly one to four people per 100,000 people. The first signs of SD are found most often in people between 30 and 50 years of age. It affects women more than men.

Comprehension Questions:

1. Spasmodic dysphonia:
 - a) is just a temporary condition that quickly goes away
 - b) is caused by too much screaming
 - c) is a very common voice disorder
 - d) causes uncontrolled spasms of the vocal cords

2. (circle one) True or False: Spasmodic Dysphonia is a neurologic voice disorder that continues throughout a person's life.

3. Some symptoms of spasmodic dysphonia might be:
 - a) voice breaks
 - b) tight voice
 - c) strained voice
 - d) all of the above