

Expectations for Tinnitus Treatment and Outcomes: A Survey Study of Audiologists and Patients

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Abstract

Background: Roughly 10–15% of the general population is affected by tinnitus and this percentage is estimated to rise in future. Because there is currently no cure for tinnitus, treatment is limited and is primarily achieved through management of symptoms and counseling.

Purpose: This study compared audiologists' and patients' responses to related survey questions about their expectations regarding tinnitus treatment. Two separate surveys were created, one for patients with tinnitus, and one for practicing audiologists who may treat such patients. The surveys included several related questions, such that comparison of the two could reveal where patients' and audiologists' expectations for tinnitus care were in agreement and areas in which they differed.

Research Design: The surveys for audiologists and adults with tinnitus were 31- and 38-item questionnaires, respectively. Both surveys comprised demographic questions followed by several tinnitus-related questions in either multiple-choice or Likert-scale format.

Study Sample: We received 230 completed Patient Surveys and 68 completed Audiologist Surveys.

Data Collection and Analysis: All survey recruitment was completed online. Responses were collected via the Survey Monkey web tool (<http://www.surveymonkey.com/>). Responses were analyzed within and between surveys and grouped into topical categories (assessment, counseling, current available tinnitus information, satisfaction and expectations, improving tinnitus management). For data within each survey, descriptive statistics and correlation analyses were used. For selected comparisons between surveys, cross-tabulations were used. Hierarchical regression modeling was conducted to further explore (1) the perceived effectiveness of treatment received, and (2) how each group defined treatment success.

Results: Differences were noted between the two groups' responses to the question on the definition of treatment success; audiologists reported decreased awareness (77%), stress/anxiety relief (63%), and increased knowledge of tinnitus (63%) most commonly, whereas patients reported reduction of tinnitus loudness (63%) and complete elimination of tinnitus (57%) most often. The topic of greatest agreement was the desire for more information on tinnitus; 62% of patients felt more information from their healthcare provider would be the most important factor for improved tinnitus management, and 67% of audiologists reported currently having "some access" or less to appropriate resources for tinnitus treatment. Modeling results for effective tinnitus management and definitions of treatment success highlighted the importance of resource access and information sharing for both audiologists and patients.

Conclusions: Patients and audiologists differed in terms of their expectations for successful treatment, with the patients focusing on perceptual factors and the audiologists on the reaction to the sound. Patient satisfaction with tinnitus treatment may be improved through access to more information, specifically,

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more information about current tinnitus treatment options and how these focus on the patient's reaction to the tinnitus rather than the percept itself. Providing credible tinnitus information resources to audiologists, and focusing resources on training a small number of tinnitus specialist audiologists could greatly improve patient satisfaction with the current state of tinnitus palliative care.

Key Words: audiologist, counseling, expectations, management, survey, tinnitus

Abbreviations: ASHA = American Speech–Language–Hearing Association; ENT = ear, nose, and throat physician

INTRODUCTION

Approximately 10–15% of the general population is affected by tinnitus (Davis and Rafaie, 2000) and the numbers may rise in the future (Hall et al, 2011). For most, the disorder of tinnitus is defined by the individual's response to the tinnitus percept, rather than the perception of the tinnitus sound. Tinnitus may occur in individuals at various levels of severity ranging from not being bothersome to extremely severe or disabling. For some individuals with severe tinnitus, the disorder can be debilitating and may lead to social isolation, and in some rare cases, suicide (Dobie, 2004). Tinnitus is often associated with aging (Ferreira et al, 2009), hearing loss (Hall et al, 2011), ototoxicity (Yueh et al, 2003), and a history of noise exposure (Steinmetz et al, 2008). Comorbidity of tinnitus with depression, insomnia, anxiety, hypersensitivity to sounds, and concentration deficits is high (Bartels et al, 2008; Hall et al, 2011; Mohamad et al, 2016). Because there is currently no cure for tinnitus, treatment is limited and is primarily achieved through management of symptoms and counseling (Tyler et al, 2009; El-Shunnar et al, 2011). However, there are no standard or recommended approaches for such treatment or management of tinnitus (Hall et al, 2011; Hoare and Hall, 2011); therefore, audiologists and tinnitus care providers employ different tools and strategies to achieve their goals. This lack of standardization may affect all aspects of tinnitus management including expectations for treatment by both clinicians and patients.

The objective of our study was to survey the expectations of patients and audiologists, with a view toward investigating the expectations brought by them to treatment and determining whether such expectations influence tinnitus management. We chose to concentrate on audiologists for this study because they are typically the primary care provider for chronic tinnitus, once a physician has ruled out any concerns for treatable medical management, and because the majority of tinnitus-specific clinicians are audiologists (Henry et al, 2005; Gander et al, 2011). In the area of tinnitus, no formal survey [search engine keywords: tinnitus survey, tinnitus patient survey, tinnitus patient expectation survey, tinnitus outcome survey, tinnitus management survey] has been completed to understand patients' expectations of the currently available tinnitus treatment/management options. In contrast, several surveys have collected opinions from clinicians

(El-Shunnar et al, 2011; Gander et al, 2011; Hall et al, 2011; Hoare and Hall, 2011; Hoare et al, 2012) although audiologists have not been surveyed exclusively.

We developed two separate surveys, targeted at audiologists and adults with tinnitus, respectively. To better understand their expectations of currently available tinnitus management options, patients were asked about their experience with current tinnitus practice, in what manner they would improve tinnitus management, and what they consider to be successful treatment. Opinions were solicited from audiologists regarding current knowledge about tinnitus, current management practices and future improvements in their practice, and expectations regarding success of therapies. In addition to some unique questions, the two surveys included many related or comparable questions as well. For example, on the survey for audiologists, a question was, "How effectively do you feel you are able to treat or manage those with tinnitus?" and the corresponding question included on the patient survey was, "How effectively is your healthcare provider able to treat or manage your tinnitus?"

Although we collected responses to several queries, in this article we focus on two principal questions that allow us to better understand the different expectations of patients and audiologists with respect to treatment. We report first on the primary outcomes of the surveys using descriptive statistics and then use secondary regression analyses to investigate two key questions on treatment expectations: (a) the perceived effectiveness of tinnitus management received or provided, and (b) how each group defined treatment success.

METHODS

Two similar, but separate, surveys were developed based on available literature. One survey was intended for adults who experience tinnitus (Patient Survey, Tables 1 and 2), and the other survey was designed for audiologists (Audiologist Survey, Tables 3 and 4). Survey construction was influenced by published guidelines for survey development (Burns et al, 2008). The questions were inspired by literature concerning tinnitus treatment, existing questionnaires and/or surveys that have been used in tinnitus (El-Shunnar et al, 2011; Gander et al, 2011; Hall et al, 2011; Hoare and Hall, 2011; Hoare et al, 2012), or other clinical research (Oskay-Özcelik et al, 2007; Halpert et al, 2010; Mitera

Table 1. Demographics of Respondents to the Patient Survey

Question	N (of 230)	%
Recruitment (58 responses collected): How did you hear about this survey?		
ATA	42	72.4
University of Illinois Research Laboratory	5	8.6
Other*	11	19.0
Gender: What is your gender?		
Male	140	60.9
Female	90	39.1
Transgender	0	0
Age: In what year were you born?		
≤30	26	11.3
31–40	23	10.0
41–50	39	17.0
51–60	76	33.0
61–75	60	26.1
≥76	6	2.6
Race/ethnicity: With which race/ethnicity group do you most identify with?		
Caucasian	202	89.4
Asian	9	4.0
Hispanic	5	2.2
Multiracial	3	1.3
African American	1	0.4
Native American	1	0.4
Pacific Islander	0	0
Do not wish to answer	5	2.2
Other	4	1.7
Education: What is the highest level of education you have earned?		
Less than high school	4	1.7
High school diploma or GED	23	10.0
Some college	74	32.2
Bachelor's degree	72	31.3
Advanced degree	57	24.8
Approximate household income		
<25,000	28	12.2
25,000–50,000	46	20.0
51,000–75,000	44	19.1
76,000+	100	43.5
No response	12	5.2
Tinnitus (58 responses collected): Do you have tinnitus (ringing or buzzing in the ear), or do you not?		
Yes	58	100.0
No	0	0
Tinnitus severity: On a scale of 1–5 how severe is your tinnitus?		
Not at all severe	6	2.6
Not very severe	34	14.8
Moderately severe	106	46.1
Very severe	60	26.1
Extremely severe	24	10.4
Tinnitus onset (58 responses collected): When did you first notice your tinnitus?		
<1 year ago	12	20.7
1–5 years	21	36.2
6–15 years	13	22.4
16–25 years	7	12.1
>25 years	5	8.6
Tinnitus laterality (58 responses collected): In which ear do you hear your tinnitus?		
Both ears	34	58.6
Left ear	14	24.1
Right ear	2	3.4
Inside my head but not necessarily from my ears	8	13.8

Table 1. Continued

Question	N (of 230)	%
Is the tinnitus constant or present all of the time? (58 responses collected)		
Yes	52	89.7
No	5	8.6
Unsure	1	1.7
Comorbidities: Which of the following do you currently experience?		
Hearing loss	148	64.3
Anxiety	99	43.0
Hyperacusis	98	42.6
Sleeplessness	84	36.5
Depression	74	32.2
Other*	44	19.1
None of the above	18	7.8

Note: *Indicates written response option. ATA = American Tinnitus Association; GED = General Education Development diploma.

et al, 2012). Once the surveys were assembled, they were reviewed by a focus group consisting of five practicing audiologists. The Patient Survey was further reviewed by a group of ten adults with tinnitus who had participated in studies conducted by our laboratory. Surveys were then modified based on feedback from both focus groups. The Survey Research Laboratory, affiliated with the University of Illinois at Chicago, was consulted before and after focus group modifications for editing.

The Audiologist and Patient Surveys were 31- and 38-item questionnaires, respectively. Both surveys included demographic questions followed by several tinnitus-related questions in multiple-choice or Likert-scale format. Portions of the surveys were adaptive and not every participant saw each question depending on the individual's answer on particular questions. For example, a participant with tinnitus was only presented with the questions regarding the information/procedures/tests their healthcare provider collected/completed if they had answered the preceding question regarding having seen a provider for their tinnitus in the affirmative. Several questions included an option for written responses, primarily to expand on the multiple-choice options provided, although a discussion of the text-based responses is outside the scope of the present article. Questions with open-ended response options are indicated by * in the tables. Based on a pilot study conducted in our laboratory, the questionnaires were estimated to be completed in 10–15 min.

Recruitment

Respondents were recruited in several ways. Audiologists were recruited online through the social media site Facebook (<http://www.facebook.com>). The link to the survey for audiologists was also posted to separate web pages hosted by the AAA, and by the American Speech–Language–Hearing Association (ASHA). All audiologists who had “liked” one of the above associations on Facebook were able to see the posting. The link to the Audiologist Survey was e-mailed directly to audiologists who were

members of ASHA's Special Interest Group 6, Hearing and Hearing Disorders: Research and Diagnostics and Special Interest Group 7, Aural Rehabilitation and Its Instrumentation. Audiologists were also recruited through personal contact via e-mail, in which the link to the survey was sent directly in the body of the e-mail.

Tinnitus patients were recruited online through the American Tinnitus Association. The invitation to the Patient Survey was advertised directly on the association's Facebook page, where the posted link then directed potential respondents to the survey. The survey link for adults with tinnitus was also transmitted via a weekly newsletter administered through the University of Illinois at Urbana-Champaign, which is e-mailed to all university employees. Personal contact via e-mail through colleagues, audiologists, and hearing aid manufacturer personnel was also used as a recruitment tool for adults with tinnitus, in which the link to the survey was sent directly within the body of the e-mail. Exemption from the Institutional Review Board affiliated with the University of Illinois at Urbana-Champaign (IRB Protocol Number: 14043) was obtained because these were anonymous Internet-based surveys that fulfilled the requirements for such an exemption.

Data Collection and Analysis

We received responses from 364 adults with tinnitus and 99 audiologists. In the analysis, we included data from the 230 adults with tinnitus and 68 audiologists who completed the entire survey. Across the questions, the response rate was between 96% and 100%. Surveys were available for five consecutive months via the Survey Monkey (<http://www.surveymonkey.com/>) web tool. Confidentiality was maintained as no identifying information such as name, e-mail address, social security number, or IP address was collected. All data downloaded from the Survey Monkey web page were stored in a password-protected electronic format. Due to an error in data collection, only 58 responses were collected for five of the demographic questions in the Patient Survey. The affected questions are indicated in Table 1.

Table 2. Patient Survey Results

"Assessment" Questions (see also Figures 1 and 2)		N (of 230)	Proportion (%)
15	Have you seen a healthcare provider (i.e., Ear, Nose, and Throat physician, audiologist, family physician, etc.) for your tinnitus?	230	
	Have seen a provider		96.1
	Have not seen a provider		3.9
16	You indicated that you "have seen a provider" in question #15, who have you been seen by? (Check all that apply)	221	
	Audiologist		70.4
	Family care physician		43.5
	Psychologist		11.7
	Nurse		5.2
	ENT		70.0
17	When you saw the healthcare provider, what was your primary complaint or concern?	221	
	Tinnitus		86.1
	Hearing		13.9
18	Which of the following information/procedures/tests did your healthcare provider ask/complete with you? (Check all that apply)	221	
	Hearing test		87.4
	If tinnitus is in right ear, left ear, or both		68.7
	When tinnitus began		63.9
	What tinnitus sounds like		58.7
	Medications you take daily/weekly		53.5
	Loudness of tinnitus		47.4
	Cause of tinnitus		43.9
	General health		41.3
	QOL due to tinnitus		33.0
	Pitch of tinnitus		32.6
	Dizziness/vertigo		27.0
	Questionnaires		20.4
	Information about diet		13.9
	None of the above		0.9
19	Which of the following treatment options have you received for your tinnitus? (Check all that apply)	221	
	Advice/reassurance		27.0
	Medications		23.0
	Information leaflets		21.7
	Amplification		20.9
	Acoustic devices		16.5
	Recommendations or information regarding diet		14.3
	Stress management		12.6
	Counseling		10.0
	Specialized counseling (CBT)		8.7
	None		30.0
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"Counseling" Questions			
21	How important is counseling as a part of your tinnitus management?	229	
	Not at all important		22.7
	Not very important		28.8
	Moderately important		28.4
	Very important		13.5
	Extremely important		6.6
25	How beneficial would participating in a support group be to people with tinnitus?	229	
	Not at all beneficial		10.5
	Not very beneficial		23.1
	Moderately beneficial		38.4
	Very beneficial		19.7
	Extremely beneficial		8.3

Table 2. Continued

26	Have you ever been told by a healthcare provider "there is nothing that can be done to help your tinnitus"?	228	
	I have never been told		19.7
	I have been told		80.3
27	What types of counseling (related to tinnitus) do you prefer to receive? (Choose all that apply)	224	
	Info about tinnitus (causes, treatment options, etc.)		77.4
	Counseling regarding options for mgmt/coping		50.9
	Counseling targeting emotional distress		25.2
	Other*		5.2
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"Current Available Tinnitus Information" Questions			
23	How much access do you feel you have to appropriate resources for treatment of tinnitus?	229	
	No access at all		18.8
	Very little access		41.0
	Some access		27.9
	A lot of access		9.6
	A great deal of access		2.6
28	Has your healthcare provider told you where to find additional information about tinnitus?	226	
	My provider has told me		18.6
	My provider has not told me		81.4
34	Where have you looked for information on tinnitus? (Check all that apply)	227	
	Internet		94.3
	Audiologists		54.3
	Physicians		47.4
	Brochures or pamphlets		37.0
	Journal articles		31.3
	Friends or word of mouth		27.4
	Newspaper/magazines		26.1
	Support groups		17.0
	I have never looked for information on tinnitus		2.2
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"Satisfaction and Expectations" Questions (see also Figures 3 and 4)			
20	Do you feel your expectations for tinnitus treatment have changed since the first time you noticed your tinnitus?	221	
	Yes		42.1
	No		39.4
	Unsure		18.5
22	How effectively is your healthcare provider able to treat or manage your tinnitus?	224	
	Not at all effectively		56.3
	Not very effectively		26.3
	Moderately effectively		13.8
	Very effectively		2.2
	Extremely effectively		1.3
24	How pleased do you think your healthcare provider would be with the treatment outcome or management of your tinnitus?	229	
	Not at all pleased		19.7
	Not very pleased		27.9
	Moderately pleased		35.4
	Very pleased		15.7
	Extremely pleased		1.3
29	During a typical appointment, does your healthcare provider spend adequate time with you regarding your tinnitus?	226	
	More than enough		3.9
	Enough		41.3
	Not enough		53.0
30	Does your healthcare provider address all your questions regarding tinnitus?	223	
	Does address all my questions		42.6
	Does not address all my questions		57.4

Table 2. Continued

	Your treatment outcome has been...	226	
31	Not at all successful		48.7
	Not very successful		30.1
	Moderately successful		18.1
	Very successful		2.2
	Extremely successful		0.9
32	What are your treatment expectations? (Check all that apply)	226	
	Medication		28.7
	Amplification		24.8
	Vitamins/herbal supplements		24.3
	Acoustic devices		23.5
	Stress management		23.0
	Specialized counseling (such as TRT or CBT)		22.6
	Advice/reassurance		20.9
	Information leaflets		17.8
	Counseling		14.3
	I have no expectations		36.5
33	How do you define or determine success for tinnitus treatment or management? (Check all that apply)	227	
	Reduction of tinnitus loudness		62.6
	Complete elimination of tinnitus		57.4
	Partial relief from tinnitus		57.4
	Decreased awareness or increased habituation		47.0
	Stress/anxiety relief		31.7
	Increased knowledge of tinnitus		30.0
	Habituation to tinnitus		29.1
	Temporary relief from tinnitus		28.3
	Change in the sound quality of tinnitus		22.2
	Reassurance that the tinnitus is not a threat		19.6
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"Improving Tinnitus Management" Question			
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35	How might tinnitus management be improved overall? (Check all that apply)	227	
	Increased information from healthcare provider		62.2
	Increased information about tinnitus online		47.8
	Easier access to audiologists		25.7
	Support groups		25.7
	Easier access to physicians such as ENT		25.2
	More time with provider		21.7

Note: *Indicates written response option. CBT = cognitive behavioral therapy; QOL = quality of life; TRT = tinnitus retraining therapy.

Questions on the surveys were clustered into six categories: demographics, assessment, counseling, current available information, satisfaction and expectations, and improving tinnitus management. Questions were analyzed and results are reported by category. All analyses within or between surveys were implemented in Microsoft Excel (Microsoft, <http://www.microsoftstore.com>) and SPSS v.21 software (IBM, www.ibm.com/software/analytics/spss/) with an alpha level set to 0.05.

For data within surveys, descriptive statistics and correlation analyses were used. Continuous variables were summarized as means and standard deviations, and ordinal and categorical variables were summarized as percentages. Correlations were calculated for determining relationships between certain questions within each survey, as reported in the Results section. Three types of correlations were used: Pearson's (r) correlation when both variables were continuous, Kendall's tau (r_{τ}) correlation

when both variables were categorical, and point biserial (r_{pb}) correlations if one variable was dichotomous. Data across surveys were compared by cross-tabulation descriptive statistics, when questions were complementary and response formats were identical.

Hierarchical Regression Modeling

In addition, we conducted hierarchical regression modeling to specifically investigate two questions, separately for each survey: (a) How effectively did the provider manage to treat their tinnitus (Patient Survey) or how effectively did they treat their patients (Audiologist Survey)? (b) How did each group define treatment success? Due to the nature of the data, we employed linear models for question 1 and logistic models for question 2.

In the Patient Survey models the demographic factors of age, duration of tinnitus, and severity of tinnitus were

Table 3. Demographics of Respondents of the Audiologist Survey

Question	N (of 68)	%
Recruitment: How did you hear about this survey?		
Personal contact	35	51.5
ASHAs Special Interest Group 6	10	14.7
The AAA Facebook page	1	1.5
ASHAs Special Interest Group 7	1	1.5
The ASHA Facebook page	0	0
Other*	21	30.9
Audiologist: Are you an audiologist?		
Yes	68	100.0
No	0	0
Gender: What is your gender?		
Male	7	10.3
Female	61	89.7
Transgender	0	0
Age: In what year were you born?		
≤30	14	20.6
31–40	12	17.6
41–50	16	23.5
51–60	18	26.5
61–75	8	11.8
≥76		
Race/ethnicity: With which race/ethnicity group do you most identify with?		
Caucasian	59	88.1
Asian	4	5.9
African American	1	1.5
Hispanic	0	0
Native American	0	0
Pacific Islander	0	0
Multiracial	0	0
Do not wish to answer	3	4.4
No response	1	1.5
Highest earned degree: Which is the highest degree you have earned?		
Master's	9	13.2
Doctorate	53	77.9
PhD	6	8.8
Years of experience: How many years have you been a practicing audiologist?		
<1 year	7	10.3
1–5 years	10	14.7
6–10 years	5	7.4
>10 years	46	67.6
No. of Patients seen with recently reported tinnitus in the past 3 months: In the past 3 months, approximately how many patients with recently reported tinnitus have you seen?		
1–20	32	47.1
21–40	9	13.2
41–100	18	26.5
101–160	5	7.4
161–200	2	2.9
>200	2	2.9
What is the typical duration of an initial appointment in which tinnitus is discussed?		
<15 minutes	7	10.3
16–30 minutes	13	19.1
31–45 minutes	7	10.3
46–60 minutes	18	26.5
61–90 minutes	9	13.2
>90 minutes	7	10.3
I do not offer appointments in which a patient's tinnitus is discussed	7	10.3

Table 3. Continued

Question	N (of 68)	%
Center/facility is well known for tinnitus treatment: Is the facility where you work a well-known center/facility for tinnitus treatment, or is it not well known as a center/facility for tinnitus treatment?		
Yes	17	25.0
No	51	75.0

Note: *Indicates written response option.

treated as covariates. For the Audiologist Survey models, the demographic factors of years of clinical experience and patient caseload per month were treated as covariates. In all regression models the demographic (control) variables were entered first into the model and subsequent steps entered a single predictor in each instance. Predictors were chosen based on significant correlation with the respective dependent variable, resulting in eight questions for the Patient Survey and six questions for the Audiologist Survey. For the patient models, the question on “tinnitus duration” was excluded from this set because of incomplete responses. For the audiologist models, the question “How beneficial do you feel support groups would be for tinnitus patients?” was not included because audiologists are not expected to have direct experience with support groups, and the majority do not have access to such groups (Gander et al, 2011). This resulted in seven predictors for the patient treatment effectiveness model and five predictors for the audiologist treatment effectiveness model. For consistency, in the models of treatment success we chose to replicate the questions used in the models for treatment effectiveness and also included the dependent variable used in the respective treatment effectiveness models. Therefore, the models for treatment success included eight predictors for the patient model and six for the audiologist model. Effect sizes were estimated as Cohen’s f^2 for the linear regressions and the odds ratio for the logistic regressions. Steps were taken to assess regression quality: no outlier data values were found, residuals were normally distributed, there was no evidence of homoscedasticity, errors were independent, and there was no evidence of strong multicollinearity (all tolerance scores >0.2).

RESULTS

Complete data collected from the surveys are reported in Tables 1–4 and Figures 1–4. Only relevant and significant results related to experimental hypotheses are presented.

Patient Survey

Of the 230 respondents who completed the entire survey, 90% reported constant tinnitus. The mean age was 52 yr and 39% were female. Tinnitus severity (Table 1) was most commonly rated as “moderately severe” (46.1%). Complete participant demographic information is provided in Table 1 and results from other questions in Table 2.

Demographic Correlations

Participants who rated their tinnitus with higher severity less often found that their provider answered their tinnitus-related questions [$r_{pb}(221) = -0.214, p = 0.001$], and more often admitted to being told “there is nothing that can be done to help your tinnitus” [$r_{pb}(226) = 0.155, p = 0.019$]. Severity was positively correlated with the opinion that counseling is an important part of their tinnitus management [$r_r(227) = 0.136, p = 0.015$] and negatively correlated with level of patient education [$r_r(228) = -0.248, p < 0.001$]. Participants who reported their tinnitus to be more severe were less likely to report that their healthcare provider(s) would be pleased with the management of their tinnitus [$r_r(227) = -0.156, p = 0.005$] and less often rated their tinnitus treatment outcome as successful [$r_r(224) = -0.160, p = 0.006$].

Assessment: The majority of patients (96%) reported seeing a provider regarding their tinnitus, most commonly an ear, nose, and throat physician (ENT) and an audiologist (see Table 2 for a complete breakdown of healthcare providers visited). Participants who had seen a provider most frequently reported their provider had completed a hearing test (87%). They also reported at lower rates that they were asked about the location of their tinnitus (69%) and about its onset (64%). With regards to treatment options tried or received, participants most often reported no treatment (30%) or being given advice/reassurance (27%), followed by medications (23%).

Satisfaction and Expectations: In rating the effectiveness of their healthcare provider, participants responded “not at all effectively” most frequently (56%) (Table 2). When participants were asked to rate how pleased their healthcare provider would be with the treatment outcome or management they most often reported “moderately pleased” (35%) followed by “not very pleased” (28%). In rating their treatment outcome, results were mostly negative, with the most commonly reported answer being “not at all successful” (49%) followed by “not very successful” (30%). Regarding treatment expectations for tinnitus, results revealed “no expectation” (36%) as the most common answer, followed by “use of medication” (29%).

Satisfaction and Expectation Correlations

Participants who rated their treatment outcome highly more often rated the effectiveness of their

Table 4. Audiologist Survey Results

"Assessment" Questions (see also Figures 1 and 2)		N (of 68)	Proportion (%)
14	Which of the following information do you obtain when taking a case history or completing diagnostic testing on a patient with reported tinnitus? (Check all that apply)	68	
	Quality of tinnitus		98.5
	Audiologic assessment or information		92.6
	Time of onset		92.6
	QOL due to tinnitus		86.8
	Laterality of tinnitus		83.8
	Dizziness/vertigo assessment or information		75.0
	Overall general health, via questionnaire(s)		70.6
	Tinnitus loudness		67.6
	Cause of tinnitus		64.7
	Pitch of tinnitus		61.8
	Tinnitus pulsatility		57.4
	Tinnitus severity via questionnaire(s)		50.0
	Diet		39.7
	Psychological conditions via questionnaire(s)		19.1
	I do not take a case history		0
15	For each treatment listed below, please indicate whether you offer or use it to treat tinnitus.	68	
	Amplification		94.1
	Advice/ reassurance		76.5
	Counseling		76.5
	Information leaflets		72.1
	Acoustic devices		63.2
	Recommendations or information regarding diet		48.5
	Stress management		41.2
	Specialized counseling (CBT)		29.4
	Medications		8.8
	Other		19.1
	I do not offer/use any of the above treatments		0
17	Please indicate whether you offer/use the following tools for treatment outcomes.	68	
	Questionnaires		52.9
	I do not use any outcome assessments		39.7
	Structured interview		36.8
	Psychoacoustic measure		20.6
	Other		2.9
"Counseling" Questions			
19	How important is counseling as a part of a plan for managing tinnitus?	68	
	Not at all important		0
	Not very important		0
	Moderately important		8.8
	Very important		36.8
	Extremely important		54.4
22	How useful is negative counseling (i.e., "there is nothing you can do") as a part of tinnitus treatment?	68	
	Not at all useful		61.8
	Not very useful		32.4
	Moderately useful		5.9
	Very useful		0
	Extremely useful		0
23	Do you counsel patients on what they should expect from tinnitus treatment?	68	
	Counsel		80.9
	Do not counsel		19.1

Table 4. Continued

24	What types of counseling (related to tinnitus) do you prefer to use? (Choose all that apply)	66	
	Information about tinnitus (causes, Tx options, etc.)		92.6
	Counseling regarding options for mgmt/coping		77.9
	Counseling targeting emotional distress		51.5
	Other*		4.4
27	How beneficial do you feel support groups would be for tinnitus patients?	67	
	Very beneficial		34.3
	Somewhat beneficial		58.2
	Not beneficial		7.5
<hr/>			
"Current Available Tinnitus Information" Questions			
<hr/>			
18	How much access do you think you have to appropriate resources for the treatment of tinnitus?	68	
	No access at all		1.5
	Very little access		13.2
	Some access		42.6
	A lot of access		32.4
	A great deal of access		10.3
25	Do you provide patients with information about where to find additional tinnitus resources?	68	
	Provide		86.8
	Do not provide		13.2
30	Which of the following resources do you personally use for information on tinnitus? (Check all that apply)	65	
	Journal articles		80.9
	Fellow audiologists		73.5
	Internet		70.6
	Sales reps/trainers for device companies		55.9
	Brochures or pamphlets		51.5
	Physicians of other healthcare providers		26.5
	Newspaper/magazines		14.7
	Friends or word of mouth		10.3
<hr/>			
"Satisfaction and Expectations" Questions (see also Figures 3 and 4)			
<hr/>			
	How effectively do you feel you are able to treat or manage those with tinnitus?		
20	Not at all effectively	68	4.4
	Not very effectively		13.2
	Moderately effectively		52.9
	Very effectively		25.0
	Extremely effectively		4.4
21	If asked for your opinion, how satisfied would you say your patients are with the treatment or management of their tinnitus?	68	
	Not at all satisfied		1.5
	Not very satisfied		7.4
	Moderately satisfied		64.7
	Very satisfied		23.5
	Extremely satisfied		2.9
28	Which of the following criteria do you use to define or determine success for tinnitus treatment or management? (Check all that apply)	66	
	Varies depending on patient and complaints		83.8
	Decreased awareness or increased habituation		76.5
	Reassurance that the tinnitus is not a threat		69.1
	Stress/anxiety relief		63.2
	Increased knowledge of tinnitus		63.2
	Habituation to tinnitus		60.3
	Partial relief from tinnitus		58.8
	Reduction of tinnitus loudness		48.5
	Temporary relief from tinnitus		33.8
	Complete elimination of tinnitus		17.6
	Change in the sound quality of tinnitus		4.4

Table 4. Continued

"Improving Tinnitus Management" Question		
31	How might tinnitus management be improved in your clinic or overall? (Check all that apply)	65
	More audiologist graduate program training	58.8
	Option to refer to psychologists	51.5
	Better referral options to ENT or neurotologists	35.3
	Using more tinnitus assessment measures	35.3
	Support groups at the clinic	33.8
	Distribution of more brochures or pamphlets	32.4
	Longer appointment times	29.4
"Tinnitus Training" Question		
29	What tinnitus training have you received or attended (if any)?	67
	Attended conference(s)	66.2
	Manufacturer training	61.8
	Took a class as a part of graduate program	57.4
	Self-taught through literature review	51.5
	Training from other clinicians in practice	38.2
	Online course	38.2
	I have not received any tinnitus training	2.9

Note: *Indicates written response option. CBT = cognitive behavioral therapy; QOL = quality of life; Tx = treatment.

provider favorably [$r_r(219) = 0.534, p < 0.001$], more often indicated that their provider would be pleased with the treatment outcome/management [$r_r(224) = 0.418, p < 0.001$], and were more likely to feel that their provider spent more than enough time with them regarding their tinnitus [$r_r(223) = 0.296, p < 0.001$]. Those same participants were more likely to indicate that their provider had shared additional tinnitus resources with them [$r_{pb}(223) = 0.319, p < 0.001$] and that their provider had addressed their questions regarding tinnitus [$r_{pb}(220) = 0.311, p < 0.001$].

Participants who highly rated their provider's ability to manage tinnitus were more likely to rate highly their provider's satisfaction with the treatment/management [$r_r(222) = 0.460, p < 0.001$], and were also more likely to agree that their provider spent adequate time with them during a typical appointment [$r_r(219) = 0.279, p < 0.001$] and that their provider addressed their questions regarding tinnitus [$r_{pb}(216) = 0.337, p < 0.001$]. Participants who gave a high rating for their provider's satisfaction with the outcome/management of their tinnitus were more likely to report that their provider answered their questions during a typical appointment [$r_{pb}(221) = 0.297, p < 0.001$], and spent sufficient time with them regarding their tinnitus [$r_r(224) = 0.263, p < 0.001$]. Participants who reported that their healthcare provider addressed all of their tinnitus related questions during a typical appointment were more likely to state that their provider spent enough time with them [$r_{pb}(220) = 0.474, p < 0.001$].

Improving Tinnitus Management: The most frequently reported answers in this section were increased information about tinnitus from the provider (62%) and increased information about tinnitus online (48%) (see Table 2).

Audiologist Survey

Of the 68 completed surveys, 68% of the respondents had been practicing for >10 yr. The mean age of the respondents was 45 yr, and 90% were female. The majority of respondents were from Illinois (59%), but a total of 21 states in the United States were represented. Full participant demographics are reported in Table 3 and results from other questions in Table 4.

Demographics Correlations

Audiologists who were older in age and who had more experience were more likely to indicate that they provided tinnitus patients with information about where to find additional resources [$r_{pb}(66) = 0.300, p = 0.013$ and $r_{pb}(66) = 0.323, p = 0.007$, respectively]. The audiologists who did not work in a "well-known" center/facility for tinnitus treatment less often reported that their patients were satisfied with their tinnitus treatment [$r_{pb}(66) = 0.494, p < 0.001$], less often reported having adequate access to appropriate resources for tinnitus treatment/management [$r_{pb}(66) = 0.334, p = 0.005$], and less often indicated that they effectively managed those with tinnitus [$r_{pb}(66) = 0.320, p = 0.008$].

Assessment: When asked about information they obtained via case history, audiologists most often asked questions regarding sound quality of tinnitus (99%) and onset of tinnitus (93%), respectively. Table 4, Question 14, shows the complete breakdown of information gathered by audiologists using a case history. When asked about which treatments they employ, hearing aids was the most common answer (94%). Only 60% of audiologists reported using outcome measures of any kind; of these,

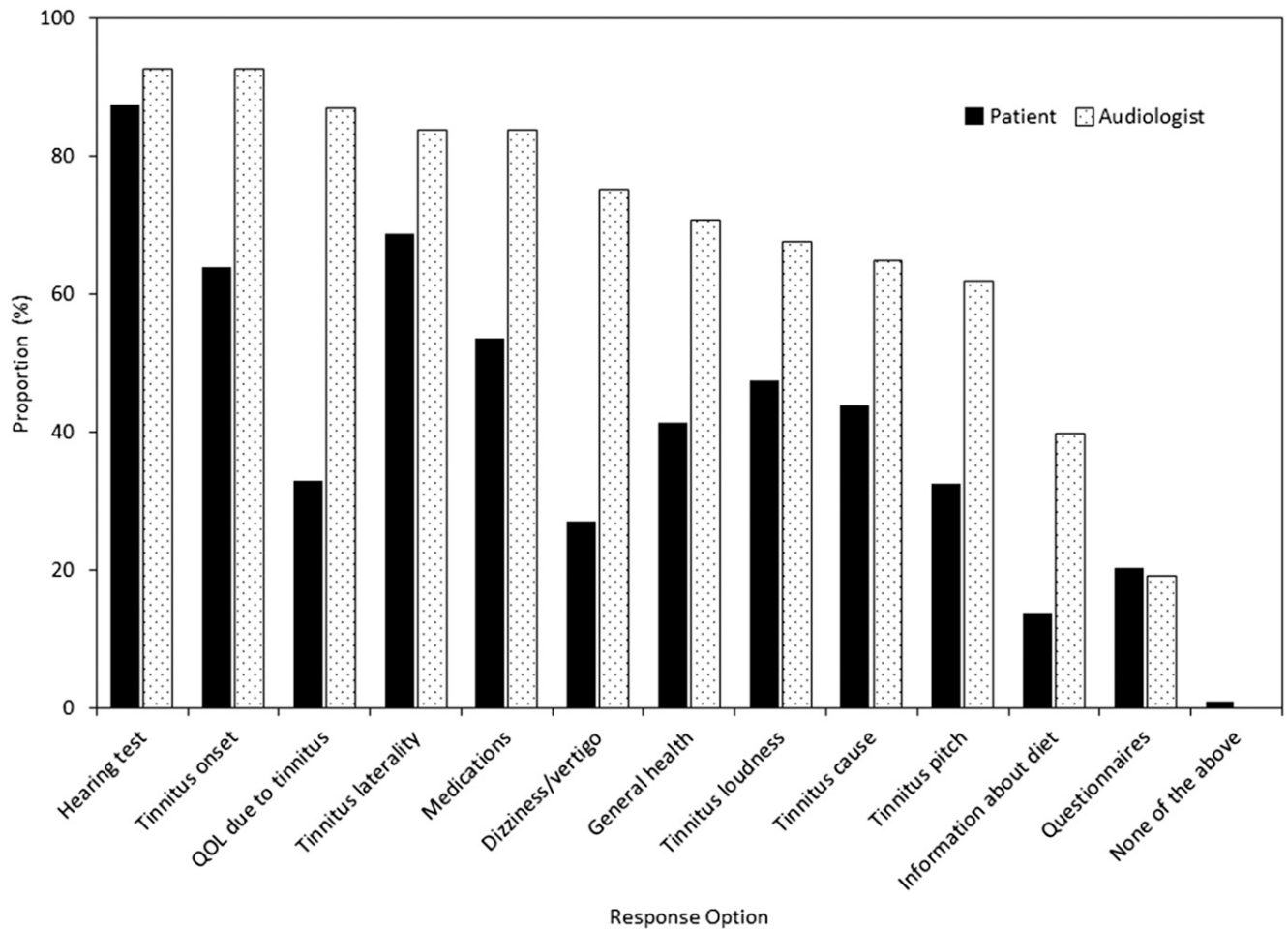


Figure 1. Assessment information obtained based on Patient Survey Question 18 (221/230 responses), “Which of the following information/procedures/tests did your healthcare provider ask/complete with you? (Check all that apply)” and Audiologist Survey Question 14 (68/68 responses), “Which of the following information do you obtain when taking a case history or completing diagnostic testing on a patient with reported tinnitus? (Check all that apply).” QOL = quality of life.

53% reported using questionnaires and 37% reported using structured interviews.

Current Available Information: Audiologists most often reported having “some access” (43%) to current information about tinnitus. When asked about which sources they used for information about tinnitus, the most commonly reported answers were journals (81%) followed by fellow audiologists (74%) and the Internet (71%).

Current Available Information Correlations

Audiologists who reported having sufficient access to appropriate resources for treatment/management of tinnitus more often indicated they can effectively treat/manage the tinnitus symptoms of their patients [$r_{\tau}(66) = 0.406, p < 0.001$], more often indicated a high patient satisfaction [$r_{\tau}(66) = 0.386, p < 0.001$], and more often provided patients with information about where to find additional tinnitus resources [$r_{pb}(66) = 0.259, p = 0.033$].

Satisfaction and Expectations: In rating their own effectiveness in treating/managing tinnitus symptoms, the majority rated their ability as “moderately effective” (53%). In regard to their satisfaction with their ability to help treat or manage their tinnitus, “moderately satisfied” (65%) was the most common rating. When audiologists were asked how they define or determine success for tinnitus treatment, a patient-specific (“varies depending on the patient and the patient’s complaints”; see Q.28 of Figure 4 and Table 4) outcome was indicated most often (84%). This outcome is not surprising given the patient-centered approach often employed for tinnitus management. The next most common answer was decreased awareness of tinnitus (77%), followed by stress/anxiety relief (63%) and increased knowledge of tinnitus (63%).

Satisfaction and Expectation Correlations

Audiologists who rated their ability to treat/manage tinnitus effectively as high also more often rated their patient’s satisfaction as high [$r_{\tau}(66) = 0.674, p < 0.001$].

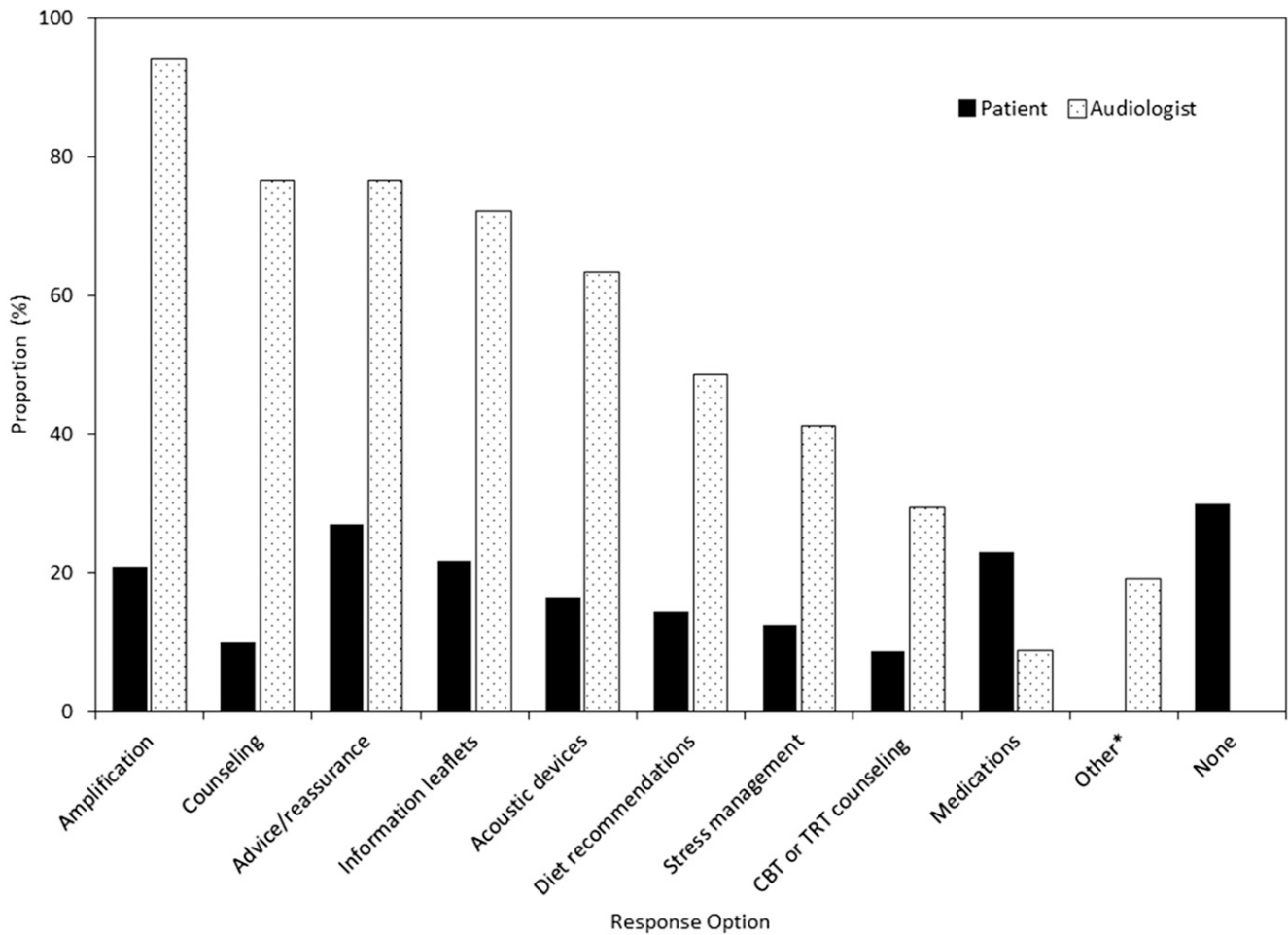


Figure 2. Treatment received (Patient) or treatment offered/used (Audiologist) based on Patient Survey Question 19 (221/230 responses), “Which of the following treatment options have you received for your tinnitus? (Check all that apply)” and Audiologist Survey Question 15 (68/68 responses), “For each treatment listed below, please indicate whether or not you offer or use it to treat tinnitus.” *Indicates written response option. CBT = cognitive behavioral therapy; TRT = tinnitus retraining therapy.

Improving Tinnitus Management: To improve tinnitus management in their individual clinics or in general, audiologists suggested more training of audiologists in graduate programs (59%) and the option of referrals to psychologists (52%).

Comparing Responses between Patient and Audiologist Surveys

Besides qualitatively comparing the responses, we conducted cross-tabulation or contingency table analysis to directly assess significant differences between the two surveys. When probed about the treatment options both groups had tried, the most common patient response was none (30%) followed by advice/reassurance (27%), whereas the audiologists most commonly answered hearing aids (94%) followed by counseling (77%) and advice/reassurance (77%). With regard to access to appropriate resources for treatment of tinnitus (defined as “a lot” or “great deal” of access, Table 2: Q.23 and Table 4: Q.18),

the responses between groups were significantly different ($\chi^2(4) = 51.28, p < 0.0001$) and the audiologists’ response more often indicated availability of sufficient access to appropriate resources (43% in audiologists versus 13% in patients). When both groups were asked where they have looked for information about tinnitus, the most commonly reported patient response was the Internet, whereas the most common answer for audiologists was journals. In comparing the patients’ rating of the effectiveness of their provider’s ability to manage tinnitus (Table 2: Q.22) versus providers’ perception of their own effectiveness in managing tinnitus (Table 4: Q.20), the results differed significantly ($\chi^2(4) = 104.62, p < 0.0001$). The providers’ self-ratings tended to be more affirmative with regard to treatment effectiveness with 82% of respondents choosing either “moderately,” “very,” and “extremely” effective compared to 17% of patients rating their providers as either “moderately,” “very,” or “extremely” effective.

In comparing patient responses to the question (Table 2: Q.24) of how pleased their provider would

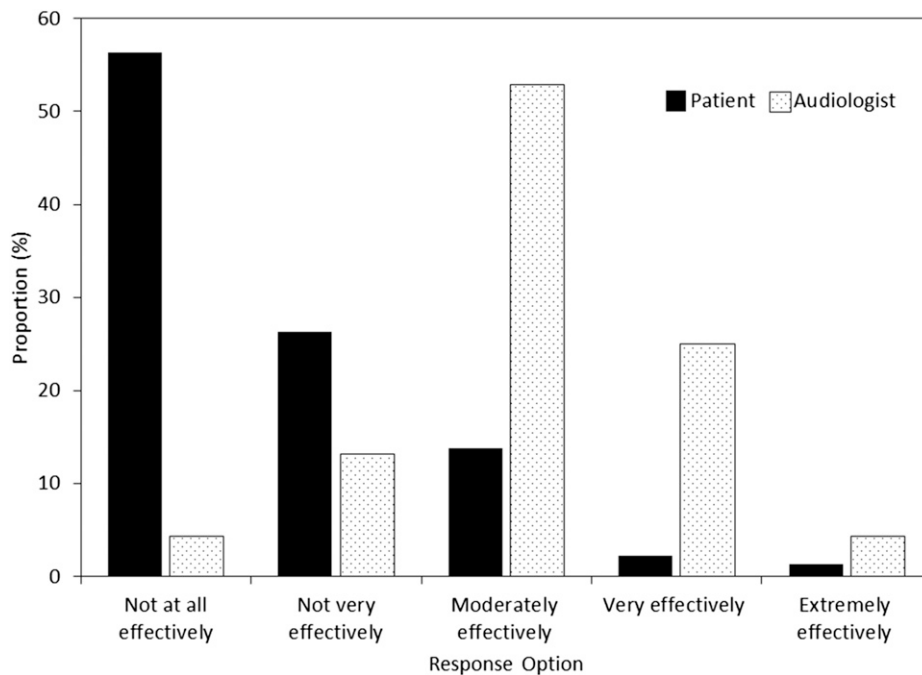


Figure 3. Treatment effectiveness based on Patient Survey Question 22 (224/230 responses), “How effectively is your healthcare provider able to treat or manage your tinnitus?” and Audiologist Survey Question 20 (68/68 responses), “How effectively do you feel you are able to treat or manage those with tinnitus?”

be with the treatment/management outcomes to audiologist responses to the question (Table 4: Q.21) of how satisfied they believe their patients are with their ability to treat or manage the patient’s tinnitus, the results between the two groups differed significantly ($\chi^2(4) = 34.14, p < 0.0001$). About 52% of patients reported that their provider would be either moderately, very, or extremely satisfied with their outcomes, whereas 91% of providers reported that their patients were either moderate, very, or extremely satisfied with the outcomes.

When asked how they define success for tinnitus treatment/management, the most common patient responses were reduction of loudness (63%) followed by complete elimination of tinnitus (57%) and partial relief (57%), while the most common audiologist responses were patient-specific (84%), decreased awareness of tinnitus (77%), and reassurance tinnitus is not a threat (69%); this question is explored more using regression models in the next section. In considering improvements to tinnitus management, the most common patient response was increased information about tinnitus from the healthcare provider (62%), whereas the most frequently reported answer for audiologists was more training in graduate programs (59%).

Regression Modeling

We constructed regression models to explain the effect of different variables on treatment effectiveness and definitions of treatment success; the results are shown in Tables 5–10. For the hierarchical linear regression of

patient ratings of treatment outcome (see Table 5 for full details on the hierarchical regression), no significant variables were found from the control predictors (Table 5, Model 1). A significant model was obtained [$F_{(4,210)} = 33.460, p < 0.001$] with the addition of the predictor variable “your treatment outcome has been . . .” (Table 5, Model 2). Further significant changes in the model were achieved with the addition of the following variables that were all significant in the final model (Table 5, Model 8), listed here in order of contribution to the regression: (a) “your treatment outcome has been . . .” [$t_{(214)} = 5.979, p < 0.001$; entered at Model 2], (b) “how pleased do you think your care provider would be with the treatment outcome . . .” [$t_{(214)} = 4.167, p < 0.001$; entered at Model 3], “how important is counseling . . .” [$t_{(214)} = 3.405, p = 0.001$; entered at Model 7], and “how much access . . . to appropriate resources” [$t_{(214)} = 2.339, p = 0.02$; entered at Model 4]. The overall regression explained 52% of the variance.

For the hierarchical linear regression of audiologist ratings of treatment outcome (see Table 6 for full details on the hierarchical regression), no significant variables were found from the control predictors (Table 6, Model 1). A significant model was obtained [$F_{(3,64)} = 25.638, p < 0.001$] with the addition of the predictor variable “how satisfied would you say your patients are . . .” (Table 6, Model 2). Further significant changes in the model were achieved with the addition of “access to resources” (entered at Model 3). The following variables were significant in the final model (Table 6, Model 6): “how satisfied would you say your patients are . . .”

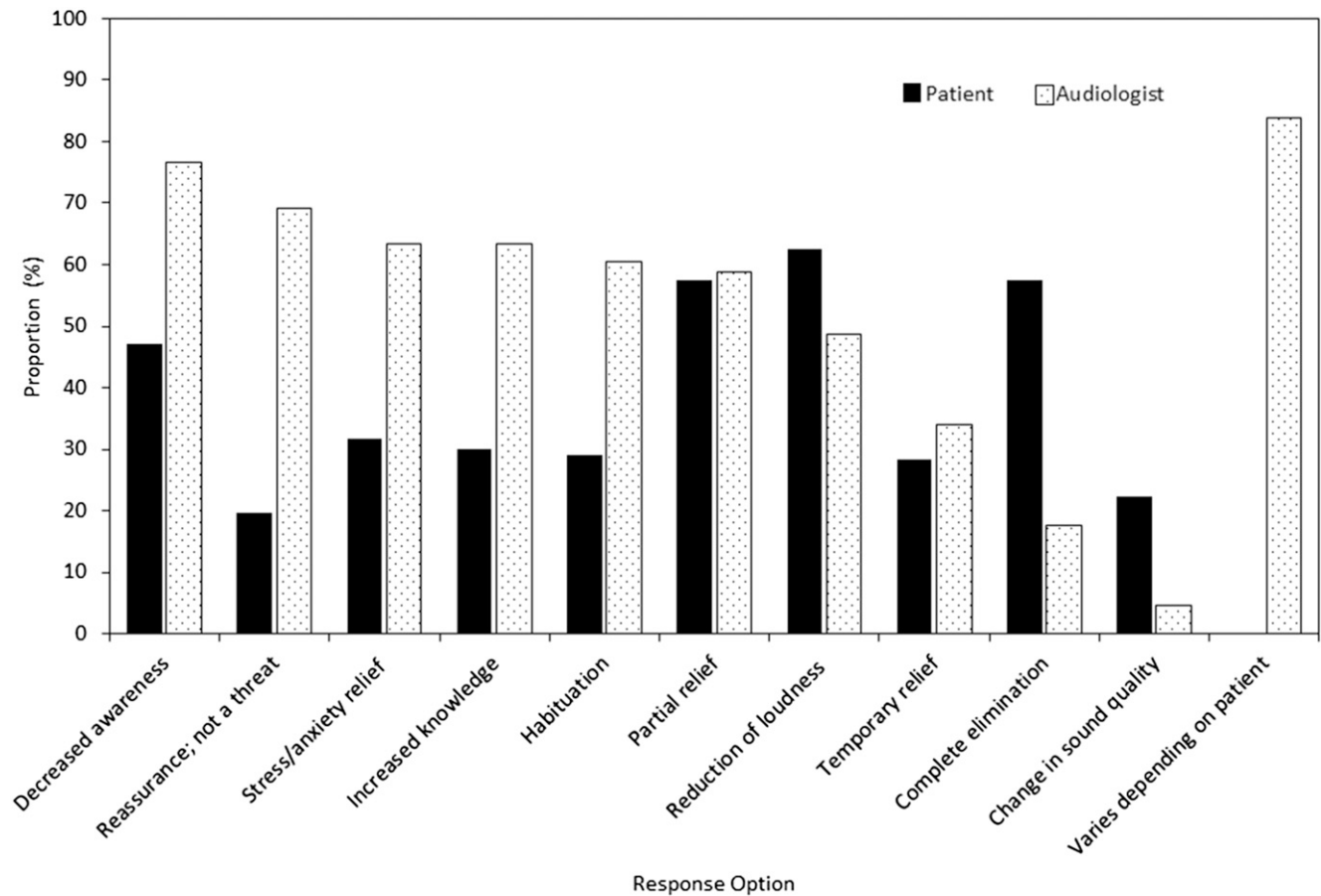


Figure 4. Determination/definition of success for treatment based on Patient Survey Question 33 (227/230 responses), “How do you define or determine success for tinnitus treatment or management? (Check all that apply)” and Audiologist Survey Question 28 (66/68 responses), “Which of the following criteria do you use to define or determine success for tinnitus treatment or management? (Check all that apply).”

[$t_{(67)} = 5.536, p < 0.001$; entered at Model 2] and “access to resources” [$t_{(67)} = 2.032, p = 0.047$; entered at Model 3]. The overall regression explained 61% of the variance.

For the analysis of treatment success definition, we chose to construct two regressions for each survey based on responses that were among the most common and represented the expectations for each group: “reduced loudness” (Audiologists 48%, Patients 63%) and “decreased awareness” (Audiologists 76%, Patients 47%).

In the hierarchical logistic regression of patient ratings of treatment success for the answer “reduced loudness” (see Table 7 for full details on the hierarchical regression) the control variables were not significant [$\chi^2(3) = 4.086, p = 0.252$; Table 7, Model 1]. The regression reached significance [$\chi^2(4) = 9.371, p = 0.022$] with the addition of “resource access” (Wald $\chi^2(1) = 5.189, p = 0.023$; Table 7, Model 2); however, no additional variables were significant in the regression. The hierarchical logistic regression of patient ratings of treatment success for the answer “decreased awareness” (see Table 8 for full details on the hierarchical regression) had no significant predictors in the control variables [$\chi^2(3) = 3.766, p = 0.288$; Table 8, Model 1]. The regression reached significance [$\chi^2(4) = 15.765, p = 0.003$

with the addition of “how would you define your treatment outcome” (Wald $\chi^2(1) = 11.069, p = 0.001$; Table 8, Model 2). No additional predictors were significant in the model.

In the hierarchical logistic regression of audiologist ratings of treatment success for the answer “reduced loudness” (see Table 9 for full details on the hierarchical regression) the control variables were not significant [$\chi^2(2) = 1.108, p = 0.575$; Table 9, Model 1]. The regression reached significance [$\chi^2(3) = 8.080, p = 0.044$] with the addition of “resource access” (Wald $\chi^2(1) = 6.136, p = 0.013$; Table 9, Model 2); however, no additional variables approached significance in the regression. In the hierarchical logistic regression of audiologist ratings of treatment success for the answer “decreased awareness” (see Table 10 for full details on the hierarchical regression) the control variables were not significant [$\chi^2(2) = 1.116, p = 0.572$; Table 10, Model 1]. A significant regression change [$\chi^2(1) = 4.064, p = 0.044$] was achieved with the addition of “Do you counsel patients on expectations?” [Wald $\chi^2(1) = 4.163, p = 0.041$; Table 10, Model 2]; however, the full regression with predictor variables and control variables was not significant [$\chi^2(3) = 5.180, p = 0.159$; Table 10, Model 2]. No additional predictors were significant in the model.

DISCUSSION

The primary goal of this study was to investigate the expectations that tinnitus patients and audiologists bring to treatment and determine whether such expectations influence tinnitus management. The main finding was that each group had differing opinions regarding successful treatment of tinnitus. After a patient-specific outcome definition (84%), audiologists most commonly reported decreased awareness (77%), reassurance that tinnitus is not a threat (69%), stress/anxiety relief (63%), and increased knowledge of tinnitus (63%) as being goals for successful treatment, whereas patients reported reduction of tinnitus loudness (63%), complete elimination of tinnitus (57%), and partial relief (57%) most often. The focus by patients on perceptual factors rather than reactions to the tinnitus indicates that patients' expectations of current treatments for tinnitus may not align with predicted outcomes of such treatments. The topic of greatest agreement was the desire for more information on tinnitus; 62% of patients felt more information from their healthcare provider would be the most important factor for improved tinnitus management, and 67% of audiologists reported "some access" or less to appropriate resources for tinnitus treatment. Using linear regression modeling for effective tinnitus management, we found resource access and information sharing to be significant predictors for both audiologists and patients. Logistic regression modeling for definitions of treatment success also indicated access to resources and information sharing as relevant predictors for each group. Over the following sections, we discuss these findings in detail.

Areas of Agreement between Patients and Audiologists

A strong agreement between the two groups was the desire to obtain more information about tinnitus. Patients agreed that their providers had performed hearing tests and asked them basic questions about their tinnitus. Interestingly those participants who stated having a "great deal of access" to tinnitus resources also noted satisfaction with their provider's effectiveness, with the amount of time their provider spends with them, and with their provider's willingness to answer their questions. These participants were also more satisfied with their treatment/management outcome. These findings may indicate that access to information, whether it is in the form of answering questions or handing out brochures, could have a significant impact on the outcome of tinnitus management. This aligns with findings from surveys on other clinical conditions, such as eye care (Dawn et al, 2005) and irritable bowel syndrome (Halpert et al, 2010).

The modeling results for treatment success and treatment effectiveness reiterated the importance of "resource

Table 5. Patient Survey Hierarchical Linear Regression Model for Expectation of Treatment Outcome

Variables	Unadjusted		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	β	p	β	p	β	p	β	p	β	p	β	p	β	p	β	p	β	p
Age	0.109	0.105	0.129	0.064	0.080	0.146	0.053	0.311	0.048	0.347	0.047	0.360	0.047	0.354	0.046	0.351	0.048	0.333
Gender	0.067	0.321	0.101	0.144	0.023	0.672	0.046	0.378	0.058	0.261	0.063	0.224	0.065	0.207	0.052	0.298	0.054	0.285
Severity	-0.086	0.199	-0.093	0.173	0.010	0.850	0.042	0.426	0.040	0.437	0.043	0.396	0.054	0.295	0.021	0.684	0.021	0.681
Q.31	0.621	<0.001	0.614	<0.001	0.614	<0.001	0.473	<0.001	0.429	<0.001	0.409	<0.001	0.402	<0.001	0.368	<0.001	0.363	<0.001
Q.24	0.532	<0.001					0.308	<0.001	0.278	<0.001	0.269	<0.001	0.262	<0.001	0.243	<0.001	0.240	<0.001
Q.23	0.397	<0.001							0.166	0.002	0.154	0.005	0.145	0.009	0.132	0.015	0.127	0.020
Q.29	-0.344	<0.001									-0.077	0.161	-0.048	0.418	-0.035	0.543	-0.026	0.663
Q.30	-0.337	<0.001											-0.081	0.165	-0.111	0.056	-0.111	0.055
Q.21	0.328	<0.001													0.176	0.001	0.176	0.001
Q.28	-0.284	<0.001															-0.037	0.490
R Square			0.029		0.389		0.461		0.484		0.489		0.494		0.521		0.522	
Change in R Square			-		0.360		0.072		0.023		0.005		0.005		0.027		0.001	
p			-		<0.001		<0.001		<0.002		0.161		0.165		<0.001		0.490	

Note: N = 215.

Table 6. Audiologist Survey Hierarchical Linear Regression Model for Expectation of Treatment Outcome

Variables	Unadjusted		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β	p	β	p	β	p	β	p	β	p	β	p	β	p
Q.6	-0.107	0.384	-0.093	0.453	-0.039	0.662	-0.075	0.374	-0.066	0.426	-0.063	0.457	-0.067	0.428
Q.11	-0.139	0.257	-0.129	0.298	-0.05	0.557	-0.057	0.49	-0.06	0.465	-0.056	0.498	-0.054	0.515
Q.21	0.736	<0.001			0.727	<0.001	0.617	<0.001	0.583	<0.001	0.571	<0.001	0.614	<0.001
Q.18	0.507	<0.001					0.223	0.021	0.204	0.033	0.19	0.063	0.208	0.047
Q.23	-0.376	0.002							-0.142	0.99	-0.152	0.091	-0.15	0.096
Q.19	0.355	0.003									0.041	0.675	0.021	0.831
Q.13	-0.320	0.008											0.087	0.369
R Square			0.028		0.546		0.583		0.601		0.602		0.608	
Change in R Square			-		0.518		0.037		0.018		0.001		0.006	
p			-		<0.001		0.021		0.099		0.675		0.369	

Note: N = 68.

access” for both patients and audiologists. It is difficult to know what was exactly understood as “resource access” by the respondents, but the results indicate that greater access to different options provide feelings of being equipped to provide/receive successful tinnitus management. Resource access was the only significant predictor in both the patient and audiologist models of loudness reduction as a definition of treatment success. Here it is likely that respondents were referring to intervention options to modify the tinnitus percept. Notably, “loudness reduction” was the most common response by patients for the different options of treatment success definition.

Unfortunately, information-sharing strategies are not yet universally employed (Tunkel et al, 2014). Many respondents (81%) in our study stated that their providers had not told them where they could find more information pertaining to tinnitus. Those patients who felt they were being referred to proper information were much more highly satisfied. Based on our findings, adults with tinnitus most commonly used the Internet as a source for tinnitus information, and so it is imperative that ENTs and audiologists promote high-quality credible websites such as that of the American Tinnitus Association (www.ata.org). Recent work (Fackrell et al, 2012) has shown how healthcare websites (e.g., American Tinnitus Association, British Tinnitus Association) can improve their content regarding tinnitus care and serve as a centralized resource for the latest research and current views on evidence-based practice. Clinicians, including audiologists, may need to rely on several websites and curate this information for their patients. Due to the fast-moving nature of research in the field, clinics devoted to hearing healthcare may designate one specialist in tinnitus to get regular updates from conferences, meetings, and published literature.

Results from both surveys agreed in regards to improving tinnitus management. The patient group requested more information in general, from the provider and via online sources. The audiologist group requested more training; standardization of audiological training in tinnitus management would go a long way toward ensuring equitable patient experience. Presently, a lack of consensus regarding tinnitus appears to affect all aspects of its management from resources, tools or strategies, evaluation, outcome measures, referral mechanisms, patient profiles, and the topic of this article, expectations. However, there have been recent efforts to remedy the situation (e.g., Department of Health, 2009; Tunkel et al, 2014; Hall et al, 2015).

With respect to the United States, audiologists should be equipped to answer tinnitus-related questions, because it is within their scope of practice (AAA, <http://www.audiology.org/publications-resources/document-library/audiologic-guidelines-diagnosis-management-tinnitus-patients>). Only 43% of audiologists reported that they have “a lot of access” or “a great deal of access” (summed responses) to appropriate tinnitus resources. Thus, there is need for greater training

Table 7. Patient Survey Hierarchical Logistic Regression Model for Definition of Treatment Success (Reduction of Loudness)

Variables	Unadjusted		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	B	p	B	p	B	p	B	p	B	p	B	p	B	p	B	p	B	p
Age	0.004	0.655	0.002	0.866	0.004	0.719	0.004	0.698	0.004	0.695	0.004	0.720	0.004	0.724	0.004	0.725	0.004	0.672
Gender (female)	0.431	0.131	0.356	0.232	0.393	0.193	0.369	0.228	0.353	0.250	0.347	0.260	0.338	0.274	0.334	0.282	0.334	0.266
Severity	0.212	0.157	0.233	0.128	0.218	0.159	0.205	0.192	0.237	0.142	0.244	0.134	0.248	0.129	0.263	0.110	0.263	0.104
Q.23	-0.303	0.032	-0.333	0.023	-0.307	0.047	-0.301	0.053	-0.301	0.053	-0.309	0.050	-0.317	0.047	-0.335	0.038	-0.335	0.027
Q.31	-0.249	0.109	-	-	-0.087	0.613	-0.047	0.794	-0.047	0.794	-0.071	0.713	-0.086	0.668	-0.105	0.598	-0.105	0.497
Q.21	-0.116	0.323	-	-	-0.121	0.350	-0.121	0.350	-0.121	0.350	-0.124	0.337	-0.127	0.332	-0.110	0.405	-0.110	0.408
Q.24	-0.089	0.510	-	-	-	-	-	-	-	-	0.055	0.737	0.051	0.759	0.037	0.825	0.037	0.878
Q.29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
More than enough	-0.385	0.581	-	-	-	-	-	-	-	-	1.229	0.789	1.229	0.789	1.116	0.889	1.008	0.992
Enough	-0.086	0.763	-	-	-	-	-	-	-	-	1.068	0.835	1.068	0.835	0.955	0.895	0.866	0.689
Q.30	-0.061	0.829	-	-	-	-	-	-	-	-	-	-	-	-	1.332	0.420	1.350	0.403
Q.28	0.039	0.913	283.420	-	278.134	-	277.879	-	277.003	-	276.891	-	276.799	-	276.145	-	274.855	-
-2LogL	-	-	-	-	5.286	-	0.255	-	0.875	-	0.113	-	0.092	-	0.654	-	1.291	-
Change in -2LogL	-	-	-	-	0.020	-	0.610	-	0.350	-	0.740	-	0.760	-	0.420	-	0.260	-
p	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: N = 219.

of audiologists through Doctor of Audiology programs, conferences, and workshops and better availability of information to them. Audiologists should be aware of credible sources such as the American Tinnitus Association or ASHA’s websites. Not surprisingly, audiologists who had more experience were more likely to provide patients with information about where to find additional resources. The correlations point to better satisfaction with treatment outcomes with increased access to appropriate tinnitus information.

Areas of Disagreement between Patients and Audiologists

Apart from the differences in expectations regarding treatment success, there were other differences in opinions of the two groups. An interesting finding was that while over 90% of audiologists reported offering/using amplification, only about 25% of tinnitus patients reported using them. Whereas hearing aids (for amplification and as noise generators) are often suggested in multiple guidelines (Tunkel et al, 2014), and offered by audiologists (Kochkin and Tyler, 2008; McNeill et al, 2012; Shekhawat et al, 2013), the majority of tinnitus patients in the current study did not pursue or adopt them as a part of their tinnitus management strategy. Interestingly, in the Kochkin and Tyler (2008) survey study, although 60% reported some relief from hearing aid usage, 22% of the respondents reported major relief from tinnitus symptoms due to amplification, a number similar to the one from our study. Several factors such as type of hearing aid (only amplification or a combination device with noise generators), cost, degree of hearing loss, how they are used, severity of tinnitus, and so on, may affect their usage. Unfortunately, we did not probe this issue further and future studies should parse out the aspects beneficial to tinnitus amelioration by hearing aids. Another disagreement between audiologists and patients was observed regarding the importance of counseling in the management of tinnitus, with the audiologists considering it “extremely” or “very important” in far greater numbers. It could be possible that the patient population understood the term “counseling” differently than the audiologists and so a separate study is needed to investigate the differences in understanding. Although the great majority of audiologists rated negative counseling as unfavorable, many patients report that they had been subject to negative counseling by a healthcare provider in the past, which should also be studied further. In rating the effectiveness of the provider, the patient population tended to rate providers’ effectiveness significantly lower than the clinicians rated their own effectiveness. This perhaps indicates that better communication between patients and audiologists is needed. It would be important for audiologists to monitor the level of satisfaction of their patients, both with their provider and with their treatment/management.

Table 8. Patient Survey Hierarchical Logistic Regression Model for Definition of Treatment Success (Decreased Awareness of Tinnitus)

Variables	Unadjusted		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	B	p	B	p	B	p	B	p	B	p	B	p	B	p	B	p	B	p
Age	0.006	0.542	0.009	0.363	0.007	0.506	0.007	0.489	0.007	0.505	0.007	0.469	0.008	0.434	0.008	0.434	0.009	0.402
Gender (female)	-0.388	0.155	-0.511	0.073	-0.406	0.166	-0.426	0.148	-0.448	0.131	-0.439	0.140	-0.426	0.154	-0.422	0.158	-0.400	0.183
Severity	-0.063	0.657	-0.064	0.663	0.031	0.844	0.032	0.831	0.055	0.720	0.048	0.758	0.051	0.744	0.043	0.787	0.055	0.734
Q.31	0.612	0.001	0.570	0.001	0.529	0.003	0.529	0.003	0.496	0.007	0.538	0.006	0.572	0.004	0.564	0.005	0.616	0.003
Q.28	0.726	0.039	0.726	0.039	0.298	0.438	0.298	0.438	0.261	0.500	0.287	0.462	0.415	0.309	0.417	0.307	0.507	0.223
Q.30	0.505	0.064	0.505	0.064	0.258	0.395	0.258	0.395	0.258	0.395	0.281	0.359	0.445	0.191	0.456	0.183	0.541	0.122
Q.24	0.201	0.126	0.201	0.126	0.298	0.438	0.298	0.438	0.258	0.395	-0.093	0.568	-0.083	0.610	-0.088	0.593	-0.058	0.730
Q.29	0.421	0.545	0.421	0.545	0.298	0.438	0.298	0.438	0.258	0.395	-0.093	0.568	-0.083	0.610	-0.088	0.593	-0.058	0.730
More than enough	0.421	0.545	0.421	0.545	0.298	0.438	0.298	0.438	0.258	0.395	-0.093	0.568	-0.083	0.610	-0.088	0.593	-0.058	0.730
Enough	0.218	0.426	0.218	0.426	0.298	0.438	0.298	0.438	0.258	0.395	-0.093	0.568	-0.083	0.610	-0.088	0.593	-0.058	0.730
Q.21	0.095	0.402	0.095	0.402	0.298	0.438	0.298	0.438	0.258	0.395	-0.093	0.568	-0.083	0.610	-0.088	0.593	-0.058	0.730
Q.23	-0.003	0.984	-0.003	0.984	0.298	0.438	0.298	0.438	0.258	0.395	-0.093	0.568	-0.083	0.610	-0.088	0.593	-0.058	0.730
-2LogL			300.764		288.765		288.162		287.441		287.113		285.674		285.606		283.084	
Change in -2LogL			-		12.000		0.602		0.721		0.328		1.438		0.068		2.522	
p			-		0.001		0.438		0.396		0.567		0.230		0.794		0.112	

Note: N = 220.

Setting Expectations

One of the major issues raised by our study pertains to setting of expectations between the audiologist and the tinnitus patient. The importance of setting expectations and their impact on subsequent treatment have been noted in several studies related to tinnitus (Tyler et al, 2001) and to other neurological and neuropsychiatric conditions (Beauregard, 2009), including chronic pain (Klinger and Flor, 2014), and efforts are underway to integrate it in healthcare with objective metrics such as surgery (Waljee et al, 2014). In the study by Tyler et al (2001), different strategies for setting expectations are discussed, primarily based on enhancing the placebo effect (de Saintonge and Herxheimer, 1994; Brown, 1998). These simple strategies include instilling confidence and providing hope to the patient. One can instill confidence by being perceived as an experienced professional, demonstrating understanding of the problem, and creating a clear therapy plan. Similarly, the audiologist should show that they sincerely care about the patient while not misleading the patient (Tyler et al, 2001). Another simple way to begin treatment and aligning expectations may be to start by asking patients, "What is it you would like to achieve?" The audiologists can work to set patient expectations that align with current evidence. Specifically, patients should be aware that while there are treatments available that have been shown to improve various outcomes in certain subgroups of tinnitus patients there is no "universally effective treatment or cure." We recommend against costly and invasive interventions. Given the lack of evidence for clearly choosing one treatment over another, the most cost-effective treatment should be attempted first.

Comparison with Published Survey Studies

Results from our study align to some extent with the findings of Hoare et al (2012), who found that audiologists reported they are satisfied with their services for tinnitus patients. In the Hoare et al (2012) study, the most common answer as to a definition of successful tinnitus management was "patient empowerment" (38% of responses), which was attained via patient education and involvement in their own therapy. In our survey, audiologists reported decreased awareness of tinnitus (77%) and stress and anxiety relief (63%) when asked about the definition of successful tinnitus management. And unlike our study, most audiologists in the Hoare et al (2012) study also reported that they have sufficient resources to provide effective treatment services. It is important to note the study was of a British population; perhaps this suggests that audiologists in the United Kingdom believe that they have more access to resources for managing tinnitus. In the current study, the majority of audiology

Table 9. Audiologist Survey Hierarchical Logistic Regression Model for Definition of Treatment Success (Reduction of Loudness)

Variables	Unadjusted		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	B	p	B	p	B	p	B	p	B	p	B	p	B	p	B	p
Q.6	-0.193	0.404	-0.209	0.368	-0.316	0.204	-0.285	0.260	-0.272	0.287	-0.274	0.287	-0.316	0.230	-0.305	0.244
Q.11	0.022	0.595	0.027	0.530	0.033	0.462	0.034	0.459	0.036	0.438	0.036	0.439	0.031	0.525	0.029	0.562
Q.18	0.717	0.020			0.785	0.013	0.678	0.036	0.625	0.078	0.636	0.092	0.794	0.055	0.801	0.053
Q.23	1.386	0.051					1.040	0.160	1.090	0.148	1.096	0.148	1.475	0.085	1.568	0.072
Q.19	0.418	0.275							0.164	0.717	0.159	0.727	0.326	0.507	0.452	0.382
Q.13	0.553	0.329									-0.056	0.933	0.121	0.859	0.386	0.605
Q.20	0.258	0.376											-0.533	0.233	-0.256	0.635
Q.21	0.224	0.542													-0.609	0.373
-2LogL			93.101		86.129		83.977		83.845		83.838		82.353		81.554	
Change in -2LogL			-		6.973		2.152		0.132		0.007		1.486		0.798	
p			-		0.008		0.142		0.717		0.933		0.223		0.372	

Note: N = 68.

respondents use hearing aids, directive counseling, sound generators, and habituation therapies in the management of their tinnitus patients. Our findings also support what the British study by El-Shunnar determined regarding referral rates. Both studies showed that tinnitus referrals are primarily being sent to ENTs (on average 82%) and other audiologists (on average 12%), and very few are being referred to psychologists or psychiatrists (<1% in both cases). Further, in both studies providers were asked to rate their level of satisfaction with how they manage tinnitus and ratings were moderate in both.

Caveats and Future Directions

In reviewing and analyzing the patient data, it is important to keep in mind that 82.6% rated their tinnitus as moderately severe or worse, which could potentially bias some of the results, as these are individuals who are suffering and may tend to be more negative about tinnitus. It is much more likely that a person with “severe” tinnitus would visit the American Tinnitus Association’s website than someone with “mild” tinnitus. However, this same group may be better informed about current treatment approaches than a group that is not bothered by tinnitus; nevertheless, their expectation for a “cure” may not be in line with their actual knowledge. It is also important to note that with a large sample size it is relatively easy to get several significant correlations. When there is a significant result, it is important to also note the strength of the correlation itself. Although we have attempted to control for different types of correlation bias as much as possible (e.g., Kendall’s tau (r_{τ}) and point biserial (r_{pb}) make fewer assumptions than Pearson’s (r) correlation), this study is exploratory in nature and may identify trends to aid in further analysis. In future survey studies, it will be important to define exactly what “resource access,” “sufficient information,” and “counseling” are for both populations. It would be beneficial to break down this current study and do several, more in-depth survey studies for each of the six categories defined in the current study. Breaking down the sections may produce more reliable and detailed information.

It would also be beneficial for audiologists to be recognized as the field experts in the area of tinnitus and tinnitus management. It appears as though no one group of providers (ENTs or audiologists) have taken the initiative over tinnitus management. It is worth pointing out that the majority of audiologists rated both their patients’ satisfaction as well as their own effectiveness as moderate. Decreased awareness, or habituation, was the most common answer by audiologists for defining tinnitus treatment success, which aligns with current research (Henry et al, 2010; Hoare and Hall, 2011; Hoare et al, 2012). The next step for audiologists should be to determine which counseling program, such

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Table 10. Audiologist Survey Hierarchical Logistic Regression Model for Definition of Treatment Success (Decreased Awareness of Tinnitus)

Variables	Unadjusted		Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7	
	B	p	B	p	B	p	B	p	B	p	B	p	B	p	B	p
Q.6	-0.222	0.451	-0.241	0.414	-0.223	0.459	-0.183	0.544	-0.176	0.561	-0.254	0.424	-0.267	0.401	-0.233	0.473
Q.11	0.034	0.551	0.038	0.503	0.046	0.454	0.049	0.410	0.047	0.431	0.049	0.411	0.044	0.464	0.055	0.384
Q.23	1.350	0.040			1.358	0.041	0.990	0.173	0.922	0.204	0.917	0.208	0.945	0.204	1.145	0.149
Q.20	0.688	0.056					0.497	0.204	0.371	0.375	0.169	0.723	0.495	0.409	0.479	0.432
Q.13	1.897	0.078							1.539	0.165	1.443	0.197	1.791	0.132	1.888	0.112
Q.18	0.640	0.067									0.394	0.372	0.440	0.328	0.312	0.520
Q.2	0.578	0.200													-0.875	0.275
Q.19	0.424	0.318													0.506	0.392
-2LogL			73.085		69.021		67.324		64.721		63.892		62.997		62.260	
Change in -2LogL					4.064		1.698		2.603		0.829		0.895		0.737	
p					0.044		0.193		0.107		0.363		0.344		0.391	

Note: N = 68.

as cognitive behavioral therapy (Henry and Wilson, 2000), Tinnitus Retraining Treatment (Jastreboff and Jastreboff, 2002), Progressive Tinnitus Management (Henry et al, 2010), Tinnitus Activities Treatment (Tyler et al, 2007), or mindfulness-based therapies (Roland et al, 2015), they are most confident in, regarding effectiveness of the therapy and their application of it, and to start implementing it in their clinic if they have not done so already. While it may not be practical for every audiologist to become proficient in tinnitus management, it may be beneficial to have at least one designated tinnitus provider in large facilities or identify local providers who are specialized in this area.

CONCLUSIONS

Our study suggests that although there is currently disagreement between what patients and audiologists consider successful treatment for tinnitus, improvements in tinnitus management may be simpler than previously thought. In particular, patients should be provided with more information about current tinnitus treatment options and the focus of these treatments should be on the patient’s reaction to the tinnitus rather than the percept itself. Providing credible tinnitus information resources to audiologists and focusing resources on training a small number of tinnitus specialist audiologists could greatly improve patient satisfaction with the current state of tinnitus palliative care. With this in mind, we have added an appendix of links to portals with vetted information that is likely to be helpful to patients, clinicians, and researchers.

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APPENDIX

LIST OF USEFUL ONLINE RESOURCES FOR READERS

Name	Web Address	Notes
ASHA Practice Portal Page on tinnitus and hyperacusis	http://www.asha.org/Practice-Portal/Clinical-Topics/Tinnitus-and-Hyperacusis/	Vetted practice guidance
American Academy of Audiology	http://www.audiology.org/publications-resources/document-library/audiologic-guidelines-diagnosis-management-tinnitus-patients	Vetted practice guidance
American Tinnitus Association	www.ata.org	Resource for patients, clinicians, and researchers
British Tinnitus Association	www.tinnitus.org.uk	Resource for patients, clinicians, and researchers
Ida Institute	http://idainstitute.com/toolbox/tinnitus/	Suite of tools for assessing and managing tinnitus