

Measuring Psychological Inflexibility in Adult and Child Hearing Loss

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Abstract

Objective: Hearing loss is a chronic condition that impacts functioning among individuals with hearing loss and caregivers of children with hearing loss. Even though treatments for hearing loss can alleviate functional impairment, psychological factors like psychological inflexibility may interfere with treatment engagement and adherence, undermining the benefits of treatment. Measuring psychological inflexibility may inform care providers' case conceptualization, improving the quality and precision of audiological interventions. Thus, the current study aimed to develop and validate measures of psychological inflexibility in hearing loss for adults and caregivers of children with hearing loss.

Design: Participants were invited to complete an online survey.

Study sample: Our sample comprised adults with hearing loss ($N = 264$) and primary caregivers of children with hearing loss ($N = 275$).

Results: The final versions of Acceptance and Action Questionnaire—Adult Hearing Loss (AAQ-AHL) and Acceptance and Action Questionnaire—Management of Child Hearing Loss (AAQ-MCHL) showed good to excellent internal reliability and concurrent and discriminant validity.

Conclusion: Although the AAQ-AHL and AAQ-MCHL showed acceptable psychometric properties, more tests are needed to further validate these measures and verify their utility in research and clinical settings.

Keywords: psychological inflexibility, hearing loss, assessment, psychometric

Measuring Psychological Inflexibility in Adult and Child Hearing Loss

Nearly 466 million individuals across the globe have debilitating hearing loss, making hearing loss one of the most prevalent chronic health conditions in the world (World Health Organization, 2019). Hearing loss can impact social, emotional, educational, and vocational functioning across the lifespan (e.g., Kamil & Lin, 2015; Kelly & Atcherson, 2011; Taljaard, Olaithe, Brennen-Jones, Eikelboom, & Bucks, 2015). For example, research has linked hearing loss to decreased quality of life with hearing loss being a significant predictor of distress in adults (Nordvik et al., 2018). Hearing loss has also been linked to cognitive decline (Lin et al., 2013), negative mood (Preminger & Meeks, 2010), and an increase in emotional and social loneliness (Pronk et al., 2014).

Caregivers of children with hearing loss may experience similar levels of distress. For example, in a study of 160 mothers of children with profound sensorineural hearing loss, mothers reported lower life satisfaction prior to their child's cochlear implantation and reported loneliness, guilt, fear, and panic (Yiğit, Edizer, Durna, Altay, & Yiğit, 2018). In a literature review of studies exploring the impact of childhood deafness on family life, Jackson and Turnbull (2004) found childhood deafness can impact family interactions (e.g., communication, relationships), family resources (e.g., finding alliances, getting information), parenting (e.g., finding parenting models, understanding how the child learns), and child support (e.g., access to support services, child inclusion).

Even though use of amplification can mitigate the impact of hearing loss on vocational and financial outcomes by nearly 50% (Kochkin, 2005), hearing aid uptake remains relatively low. Research has found individuals' attitudes toward hearing loss—including acceptance of and coping with diagnoses—influence their decision to get hearing aids and use them (Knudsen,

Öberg, Nielsen, Naylor, & Kramer, 2010). The extent to which individuals believe they need treatment has also been shown to influence adherence to treatment recommendations (Ross, Walker, & MacLeod, 2004; Weaver & Grusntein, 2008). Parents or caregivers of children with hearing loss are similarly affected by psychological variables that may influence their engagement in treatment (Muñoz et al., 2016). These findings suggest psychological factors affect how much individuals engage in audiological interventions.

A common response to chronic conditions like hearing loss is to avoid thinking about and coping with the implications of a diagnosis, which can compromise wellbeing. For example, experiential avoidance has been found to mediate the relationship between coping strategies and psychopathology among individuals with chronic pain (Costa & Pinto-Gouveia, 2011), tinnitus (Hesser, Westin, & Andersson, 2014), and insomnia (Bothelius, Jernelöv, Fredrikson, McCracken, & Kaldo, 2015), indicating it plays a role in predicting outcomes in chronic conditions. Moreover, this avoidance may compound the challenges typically faced by individuals with hearing loss or who are caring for someone with hearing loss by decreasing their engagement in treatment or their adherence to treatment recommendations. This is consistent with research showing avoidant or inflexible parenting styles are associated with greater internalizing and externalizing issues in their children or adolescents (Brassell et al., 2016). Thus, it is important to identify variables that may influence whether individuals avoid or are open to thoughts and feelings associated with their or their child's hearing loss diagnosis. Through acceptance, individuals may foster a mindful, values-based approach to hearing management, ultimately improving outcomes (e.g., benefit from amplification, use of communication strategies).

In other contexts, research exploring effective management of chronic pain has found acceptance- and mindfulness-based interventions can mitigate the effects of pain on quality of life and improve symptoms of depression and anxiety (Veehof, Trompetter, Bohlmeijer, & Schreurs, 2016). In audiology, studies have explored the effects of motivational interviewing on hearing aid use, highlighting the potential benefit of therapeutic interactions with respect to helping individuals understand and effectively manage hearing care (Aazh, 2016; Solheim, Gay, Lerdal, Hickson, & Kvaerner, 2018). In addition, prior research indicates audiologists prefer therapeutic practice patterns that foster person- and family-centered care (Laplante-Lévesque, Hickson, & Grenness, 2014) and that audiologists desire more education and training to effectively implement such care (Meibos et al., 2017). Thus, understanding how individuals respond to hearing loss (e.g., lack of acknowledgement, acceptance) may provide insight for how audiologists or other care providers can deliver care and counsel with patients and families in a manner that enhances patient knowledge, increases their ability to navigate the challenges of hearing loss, and improves management of hearing care.

A key psychological variable that may be relevant to audiological settings is psychological flexibility. Psychological flexibility describes a pattern of effective responding to difficult internal experiences wherein the individual practices openness and nonjudgment of these experiences in the present moment so as to successfully pursue personally meaningful activities (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Psychological flexibility is a fundamental aspect of overall wellbeing (Kashdan & Rottenberg, 2010) and impoverished psychological flexibility or *psychological inflexibility* has been consistently linked with maladaptive outcomes (more psychopathology, poorer job performance; Hayes et al., 2006). Psychological inflexibility describes rigid responding to private experiences in a way that

disconnects the individual from the here-and-now and valued living (Hayes et al., 2006). Thus, psychological inflexibility may be thought of as the inverse of psychological flexibility.

Acceptance and commitment therapy (ACT) is a psychological intervention that primarily aims to increase psychological flexibility by teaching acceptance and mindfulness-based strategies (Hayes et al., 2006). It has been used to treat psychological and physical conditions including depression and anxiety (Twohig & Levin, 2017), as well as more chronic conditions such as chronic pain (Veehof et al., 2016), tinnitus (Westin et al., 2011), and stuttering (Beilby, Byrnes, & Yaruss, 2012).

Psychometrically validated measures of psychological inflexibility have been developed for specific patient populations including chronic pain (Chronic Pain Acceptance Questionnaire; Vowles, McCracken, McLeod, & Eccleston, 2008), caregiving (Losada, Márquez-González, Romero-Moreno, & López, 2014), and tinnitus (Tinnitus Acceptance Questionnaire; Westin, Hayes, & Andersson, 2008). Some evidence suggests condition-specific measures of psychological inflexibility may be more useful for tracking outcomes than a general measure like the Action and Acceptance Questionnaire—II (AAQ-II; Bond et al., 2011; Ong, Lee, Levin, & Twohig, 2019).

For individuals with hearing loss, psychologically inflexible responses to deficits in hearing acuity and related thoughts and feelings may manifest as avoidance that compromises quality of life. For example, individuals with hearing loss may isolate themselves from social contexts in which they feel inadequate, shame, or anxiety (Ciorba, Bianchini, Pelucchi, & Pastore, 2012), detracting them from their value of building interpersonal connections. In contrast, a psychologically flexible response would be to be willing to contact and notice those

unpleasant emotions without trying to escape from them while engaging in conversations that are consistent with personal values.

Reducing psychological inflexibility by practicing psychological flexibility may help to improve wellbeing among caregivers of children with hearing loss. For example, some research has found psychological inflexibility is linked to caregiver distress and depression (Jansen et al., 2017; Spira et al., 2007) and ACT has been found to improve depressive and anxious symptoms among dementia caregivers (Losada et al., 2015). In addition, psychological inflexibility may interfere with caregiver responses that support adaptive child outcomes. For instance, a stranger at the supermarket may loudly point out an infant's hearing aids. The mother of this child may initially react to the experience with shame or embarrassment and experience the impulse to remove her child's hearing aids. By exercising psychological flexibility, however, this mother may take a more mindful approach to consider what the hearing aids are doing for her child that she values. For example, she values her child's developing listening and spoken language skills as that is how the rest of the family communicates. By focusing on this value, rather than shame about her child's hearing aids, this mother may consider her child's hearing aids as a tool to enhance the child's listening and language development, resulting in consistent hearing aid use despite the embarrassment she experienced at the supermarket. However, no research has directly examined the relationship between caregiver psychological inflexibility and effective management of hearing loss.

By measuring the extent of a patient's psychological inflexibility, audiologists and other care providers working with individuals with hearing loss and their families may obtain a more complete picture of where patients and families are at in their journey. Specifically, assessment of psychological inflexibility may inform case conceptualization and identify barriers interfering

with treatment adherence. Such information may help audiologists directly work with patients and families to develop a targeted treatment plan that addresses the key barrier to change (e.g., shame) rather than simply provide more technical information.

Currently, no measure of psychological inflexibility exists in the context of hearing loss. Such an instrument would be a welcome addition to the literature pertaining to assessment of psychological inflexibility in the context of physical health conditions. Thus, the purpose of this study was to develop and validate a psychological inflexibility measure in the context of hearing loss for (1) adults with hearing loss and (2) caregivers of a child with hearing loss.

Method

Recruitment

Participants included respondents who: (1) were adults with a permanent hearing loss or primary caregivers of a minor child with a permanent hearing loss, and (2) had the hearing loss identified through formal diagnostic testing measures. An optional incentive of being included in a raffle for a \$25 Amazon gift certificate was offered to participants. Fifty people were randomly selected to receive a gift certificate including 25 adults and 25 caregivers.

Procedure

Study procedures were approved by the Utah State University institutional review board and participants signed an informed consent document prior to research participation. The data were collected over a three-month period from June to August 2018 using an online cross-sectional survey hosted on Qualtrics. Various means of recruitment were used: (1) direct survey links were emailed to prospective participants through national organizations that provide technical and other supports to individuals with hearing loss, (2) survey flyers were posted at various large audiology clinics across the country, and (3) direct survey links were posted in

Facebook groups dedicated to individuals with hearing loss including parents of children with hearing loss.

Item Development

Items for the current measures were based on the Tinnitus Acceptance Questionnaire (TAQ) due to the relationship of both conditions to auditory functioning and previous research validating the TAQ (Westin et al., 2008). Items from the TAQ were based on the AAQ-32 item pool and Chronic Pain Acceptance Questionnaire-Revised (McCracken, Vowles, & Eccleston, 2004; Westin et al., 2008). Items were adapted to change their focus from “chronic tinnitus” to “hearing loss.” A clinical psychologist with expertise in ACT (MT) and an audiologist (KM) reviewed modified items to ensure theoretical coherence and clinical relevance.

Measures

The Acceptance and Action Questionnaire—Adult Hearing Loss (AAQ-AHL) originally contained 14 items assessing psychological inflexibility in the context of hearing loss for adults. Higher scores represent higher psychological inflexibility. Psychometric properties of the measure are reported in the Results section and items included in the final version of the measure are listed in Table 1.

The Acceptance and Action Questionnaire—Managing Child Hearing Loss (AAQ-MCHL) originally contained 14 items assessing psychological inflexibility in the context of parenting a child with hearing loss. Higher scores represent higher caregiver psychological inflexibility. Psychometric properties of the measure are reported in the Results section and items included in the final version of the measure are listed in Table 1.

The Depression Anxiety and Stress Scale (DASS-21; Henry & Crawford, 2005) assesses overall psychological distress with 21 items rated from 0 (*did not apply to me at all*) to 3

(*applied to me very much or most of the time*). Higher scores signify greater distress. The DASS-21 has shown good to excellent internal consistency and convergent and divergent validity (Henry & Crawford, 2005). Cronbach's α s were .95 and .94 in the adult and caregiver samples respectively.

The Work and Social Adjustment Scale (WSAS; Mundt, Marks, Shear, & Greist, 2002) evaluates functional impairment with five items scored from 0 (*not at all impaired*) to 8 (*very severely impaired*). Higher scores indicate more functional impairment. The WSAS has demonstrated acceptable to excellent internal consistency, concurrent validity, and known-groups validity (Mundt et al., 2002). Cronbach's α s were .84 in the adult sample and .90 in the caregiver sample.

The Mental Health Continuum—Short Form (MHC-SF; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011) measures positive mental health (comprising emotional wellbeing, psychological wellbeing, and social wellbeing) with 14 items rated from 0 (*never*) to 5 (*every day*). Higher scores indicate higher levels of positive mental health. The MHC-SF has been found to have good internal reliability, convergent validity, and factorial validity (Lamers et al., 2011). Cronbach's α s were .94 for adults and .92 for caregivers.

The 36-Item Short Form Health Survey (SF-36; McHorney, Ware, & Raczek, 1993) assesses various aspects of general health including physical functioning, emotional wellbeing, and social functioning. It contains 36 items and higher scores represent better general health. Only the Physical Functioning (PF) and Emotional Wellbeing (EW) scales were used in the present study. The SF-36 scales have shown excellent internal consistency, known-groups validity, convergent validity, and discriminant validity (Brazier et al., 1992; McHorney, Ware, Lu, & Sherbourne, 1994; McHorney et al., 1993). Cronbach's α s were .86 for adults and .83 for

caregivers for the EW scale. Cronbach's α s were .92 for adults and .94 for caregivers for the PF scale.

Statistical Analyses

Statistical analyses were conducted with R version 3.5.1 in RStudio (R Core Team, 2018; RStudio Team, 2015) using the following packages: furniture version 1.8.7 (Barrett & Brignone, 2017), psych version 1.8.10 (Revelle, 2018), and tidyverse version 1.2.1 (Wickham, 2017).

Corrected item-total correlations (CITC) and inter-item correlations were examined for conceptual coherence (CITC < 0.30; Nunnally & Bernstein, 1994) and item redundancy (inter-item correlations > .80; Cohen & Swerdlik, 2005).

Following this item-level inspection, we conducted an exploratory factor analysis (EFA) by principal axes using an oblique promax rotation to determine a suitable factor structure for the scale. Number of factors was determined by inspection of eigenvalues (> 1; Kaiser & Rice, 1974) and a scree test (number of factors to the left of the first inflection in a screen plot; Cattell & Vogelman, 1977). Finally, to maximize scale coherence, we removed items with insufficient loadings on the factor based on the EFA (< .45; Tabachnick & Fidell, 2007).

To assess for concurrent and discriminant validity (i.e., to see if scales were correlated with theoretically relevant variables more so than with theoretically less relevant variables), we examined if the AAQ-AHL and AAQ-MCHL predicted various outcomes after accounting for variance explained by psychological distress (DASS-21). We controlled for psychological distress given similar measures of psychological inflexibility have been found to be too strongly correlated with measures of distress (i.e., showed weak discriminant validity; Tyndall et al., 2018; Wolgast, 2014). We ran separate hierarchical regression models with specific outcomes of interest as the dependent variables and the DASS-21 (entered in the first step) and the respective

AAQ scale (entered in the second step) as independent variables. Outcomes tested included functional impairment (WSAS), positive mental health (MHC-SF), emotional wellbeing (SF-36 Emotional Wellbeing subscale), and physical functioning (SF-36 Physical Functioning subscale).

Because the AAQ-AHL and AAQ-MCHL were designed to assess how individuals interact with difficult psychological experiences related to hearing loss, we predicted the AAQ-AHL and AAQ-MCHL would explain significant variance in functional impairment, positive mental health, and emotional wellbeing but not physical functioning, above and beyond the effects of psychological distress.

Results

Sample Description

Adult sample. The majority of the adult sample ($N = 264$) were White (91.7%), at least college-educated (83.7%), and earning at least \$41,000 annually (72.7%). Their mean age was 50.9 ($SD = 17.6$).

Caregiver sample. The majority of the caregiver sample ($N = 275$) were White (85.8%), at least college educated (75.2%), and earning at least \$41,000 annually (86.2%). Their mean age was 39.6 ($SD = 8.2$). They reported a mean age of 8.0 ($SD = 5.7$) for their child.

Acceptance and Action Questionnaire—Adult Hearing Loss (AAQ-AHL)

Exploratory factor analysis. No items had a CITC < 0.30 , indicating conceptual coherence of the 14 items. In addition, none of the items showed significant overlap with another item based on inter-item correlations ($r > .80$; Cohen & Swerdlik, 2005) so none were removed for redundancy. Based on the Kaiser and Rice (1974) criterion and scree test, we decided on a one-factor solution that accounted for 44.1% of the variance (see Figure 1). Items 11 and 12 were

removed due to insufficient factor loadings. Cross-loadings were not considered due to the one-factor solution. This left a total of 12 items in the AAQ-AHL (see Table 1).

Internal reliability. Internal consistency of the 12-item AAQ-AHL was excellent ($\alpha = .92$). The range of CITCs was .49 to .77 indicating the remaining 12 items are conceptually coherent (Nunnally & Bernstein, 1994).

Description and scoring of AAQ-AHL. The final 12-item version of the AAQ-AHL measures psychological inflexibility of adults in response to difficult thoughts and feelings related to their own hearing loss (e.g., frustration). Specifically, based on a reading of the included items, the AAQ-AHL appears to more heavily measure experiential avoidance, cognitive fusion, disconnection from values, and behavioral avoidance. Items are rated from 0 (*never true*) to 6 (*always true*). Items 1, 2, 5, and 6 are reverse-scored. That is, a score of 6 should be assigned 0, a score of 5 should be assigned 1, and so on before calculating a total score. Individual item scores are summed up to create a total score. Higher scores reflect higher psychological inflexibility. A copy of the AAQ-AHL with scoring instructions is provided in Appendix A1.

Concurrent and discriminant validity. Regression results for the AAQ-AHL are reported in Table 2. The AAQ-AHL significantly predicted functional impairment, positive mental health, and emotional wellbeing after controlling for the effects of psychological distress. Additional variance explained by the AAQ-AHL was 34.8%, 12.5%, and 3.0%, respectively ($ps < .01$). It did not explain significant variance in physical functioning above and beyond psychological distress. These findings indicate the AAQ-AHL was significantly associated with variables linked to psychological wellbeing (i.e., functional impairment, positive mental health, and emotional wellbeing) even after accounting for the effects of psychological distress. It was

not significantly associated with physical functioning independent of psychological distress. This pattern was consistent with our predictions that the AAQ-AHL would be significantly linked to functional impairment, positive mental health, and emotional wellbeing but not physical functioning.

Acceptance and Action Questionnaire—Managing Child Hearing Loss (AAQ-MCHL)

Exploratory factor analysis. Items 2, 5, 6, 7, and 11 had CITC < .30 and were removed during item-level inspection. None of the items had inter-item correlations exceeding .80 so none were removed for redundancy. However, given low CITC (.31) and inter-item correlations (range = .00 to .09) for item 1, it was also removed at this stage. Results from an EFA with the eight-item AAQ-MCHL indicated a one-factor solution (variance explained = 43.6%; see Figure 2 for scree plot). No items were removed from the scale for insufficient factor loadings, leaving a total of eight items in the AAQ-MCHL (see Table 1). Cross-loadings were not considered due to the one-factor solution.

Internal reliability. Internal consistency of the eight-item AAQ-MCHL was good ($\alpha = .85$). CITCs ranged from .43 to .72 indicating conceptual coherence within the one-factor scale.

Description and scoring of AAQ-MCHL. The final eight-item version of the AAQ-MCHL measures psychological inflexibility of caregivers in response to difficult thoughts and feelings related to their child's hearing loss (e.g., grief). Specifically, the items appear to emphasize the experiential avoidance, cognitive fusion, and behavioral avoidance aspects of psychological inflexibility. Items are rated from 0 (*never true*) to 6 (*always true*). Individual item scores are summed up to create a total score. Higher scores reflect higher caregiver

psychological inflexibility. A copy of the AAQ-MCHL with scoring instructions is provided in Appendix A2.

Concurrent and discriminant validity. Findings from the AAQ-MCHL regression models are presented in Table 3. The AAQ-MCHL significantly explained an additional 10% of variance in functional impairment after accounting for psychological distress ($p < .001$). It did not significantly predict positive mental health, emotional wellbeing, or physical functioning. That is, the AAQ-MCHL was significantly associated with functional impairment but not positive mental health, emotional wellbeing, or physical functioning when controlling for the effects of psychological distress. This pattern was partially consistent with our predictions that the AAQ-MCHL would be significantly related to functional impairment and not with physical functioning but did not support our predictions that the AAQ-MCHL would be linked to positive mental health and emotional wellbeing.

Discussion

The current study evaluated the psychometric properties of two measures of psychological inflexibility in the context of hearing loss: the AAQ-AHL for adults with hearing loss and the AAQ-MCHL for caregivers of children with hearing loss. The AAQ-AHL showed excellent internal reliability and concurrent and discriminant validity. Consistent with the theoretically expected pattern, the AAQ-AHL significantly predicted psychologically relevant outcomes (i.e., functional impairment, positive mental health, and emotional wellbeing) but not physical functioning. These findings preliminarily suggest the AAQ-AHL may be a useful measure for assessing psychological inflexibility among adults with hearing loss as it relates to psychological wellbeing.

The AAQ-MCHL has promise as a measure of psychological inflexibility in caregivers of children with hearing loss but future researchers can assist in answering a few questions. On the positive side, the AAQ-MCHL showed acceptable internal consistency. However, further investigation into its concurrent and discriminant validity is needed given this investigation only evaluated validity using measures that assessed caregiver functioning whereas the AAQ-MCHL taps into parenting styles more so than caregiver functioning. This may explain why the AAQ-MCHL only significantly predicted functional impairment but not positive mental health or emotional wellbeing.

Our study provides some data on the utility of these measures of psychological inflexibility for hearing loss and suggest the AAQ-AHL and AAQ-MCHL could potentially be useful tools for assessing this construct especially in relation to predicting psychological outcomes. This may have clinical implications as audiologists may be interested in incorporating assessment of hearing loss psychological inflexibility in their treatment plan and using it to shape intervention and patient goals. For example, if patients report significant functional impairment, audiologists may use different intervention strategies depending on whether impairment is related to audibility (e.g., device programming) or to difficulty coping with the thoughts and feelings associated with hearing loss. In the case of caregivers of children with hearing loss, high scores on the AAQ-MCHL may indicate a need for discussion between the caregivers and audiologist on how to cope with difficult thoughts and feelings surrounding their child's hearing loss in order to support caregiver functioning.

Limitations and Future Directions

Although we evaluated concurrent and discriminant validity by controlling for the effects of psychological distress and compared variance explained for psychological and physical

outcomes, more robust tests of validity are needed. For example, given evidence suggests context-specific measures like the AAQ-AHL typically demonstrate incremental validity over a generic measure of psychological inflexibility (Ong et al., 2019), future studies could include more general measures like the AAQ-II to test if the AAQ-AHL provides a more precise assessment of psychological inflexibility. Furthermore, administering theoretically unrelated measures (e.g., of social desirability) would more clearly verify discriminant validity of both measures. In addition, assessing child outcomes or caregiver treatment behavior for the AAQ-MCHL would have provided a more holistic context for evaluating the function of the AAQ-MCHL. Caregiver outcomes are not perfectly correlated with child outcomes or caregiver treatment behavior so it is likely that psychometric results would be different if other outcomes were used to evaluate validity. Outcomes relevant to psychological inflexibility around parenting a child with hearing loss include child problem behavior, treatment attendance, and adherence to audiologist recommendations (e.g., at least 10 hours/day of hearing aid use). However, these constructs are difficult to assess given unreliability of self-report data and need for collaboration with audiology clinics to access such information. Thus, researchers should work with clinics or use more accurate tracking methods to determine if the AAQ-MCHL significantly predicts these other outcomes, which would bolster confidence in its criterion validity. At present, we recommend further modification to and psychometric evaluation of the AAQ-MCHL before it is used in research and clinical settings. In addition, our study solely relied on cross-sectional data, precluding inferences regarding the capability of these measures to predict future outcomes or the temporal relationship between variables (e.g., it is possible that adults with hearing loss with higher functioning find it easier to respond more effectively to thoughts and feelings associated with hearing loss).

Overall, more information on the psychometric properties of these measures are needed to verify whether they are adequately measuring the constructs they purport to measure.

Evaluating test-retest reliability (i.e., do scores remain the same over longer periods of time without intervention), predictive validity (i.e., do scores longitudinally predict relevant outcomes), and treatment sensitivity (i.e., do scores move in the expected direction in response to intervention) would provide more data on the utility of the AAQ-AHL and AAQ-MCHL and ascertain if they are worth the additional burden placed on patients or research participants to complete them.

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Table 1

Factor Loadings and Items for the Acceptance and Action Questionnaires for Hearing Loss (Adult and Caregiver Versions; AAQ-AHL and AAQ-MCHL)

		Factor loading
AAQ-AHL		
1	* I am leading a full life, despite my frustration with hearing loss.	.767
2	* My life is going well, despite negative thoughts and feelings about my hearing loss.	.637
3	My frustration with hearing loss has made me less involved in activities I enjoy.	.706
4	I wish I could control negative thoughts and feelings about my hearing loss.	.765
5	* Frustration with hearing loss does not interfere with my goals.	.532
6	* Despite negative thoughts and feelings about my hearing loss, I can still take care of my responsibilities.	.514
7	I struggle to get things done because of my frustration with hearing loss.	.772
8	I need to manage negative thoughts about my hearing loss to have control over my life.	.793
9	My negative thoughts and feelings about my hearing loss lead me to avoid situations.	.815
10	I worry about what others think of my hearing loss.	.617
11	My hearing loss has changed me as a person.	.439
12	I suppress negative thoughts and feelings related to my hearing loss.	.413
13	I spend a lot of time thinking how things would be for me without hearing loss.	.704
14	Frustration with my hearing loss keeps me from effectively treating and managing it.	.651
AAQ-MCHL		
1	* I am parenting how I would like, despite my frustration with my child's hearing loss.	
2	* My parenting is going well, despite negative thoughts and feelings about my child's hearing loss.	
3	My frustration with my child's hearing loss has negatively affected my parenting.	.690
4	I wish I could control negative thoughts and feelings about my child's hearing loss.	.793
5	* My frustration with my child's hearing loss does not affect the goals I set for my child.	

	Despite negative thoughts and feelings about my child's hearing loss, I can still take care of my parenting responsibilities.	
6	*	
	I struggle to get parenting tasks done because of frustration with my child's hearing loss.	
7		
8	I need to manage negative thoughts about my child's hearing loss to be a better parent.	.698
9	My negative thoughts and feelings about my child's hearing loss lead me to avoid situations.	.777
10	I worry about what others think of my child's hearing loss.	.525
11	My child's hearing loss has changed me as a parent.	
12	I suppress negative thoughts and feelings related to my child's hearing loss.	.602
13	I spend a lot of time thinking how things would be for me without my child's hearing loss.	.651
14	Frustration with my child's hearing loss keeps me from effectively treating and managing it.	.480

Note. Items preceded by an asterisk were reverse scored. Bolded items are included in the final measure.

Table 2

Regression Models with Depression Anxiety and Stress Scale (DASS-21) and Acceptance and Action Questionnaire—Adult Hearing Loss (AAQ-AHL) as Independent Variables

	B	SE	<i>t</i>	<i>p</i>	R ²	R ² Δ
WSAS						
DASS-21	0.028	0.041	0.68	.497	.254	
AAQ-AHL	0.504	0.035	14.36	<.001	.602	.348
MHC-SF						
DASS-21	-0.376	0.072	-5.254	<.001	.357	
AAQ-AHL	-0.464	0.061	-7.611	<.001	.482	.125
SF-36: EW						
DASS-21	0.015	0.068	0.227	.821	.012	
AAQ-AHL	-0.162	0.058	-2.823	.005	.042	.030
SF-36: PF						
DASS-21	-0.499	0.156	-3.205	.002	.078	
AAQ-AHL	-0.063	0.132	-0.475	.635	.075	-.003

Note. WSAS = Work and Social Adjustment Scale; MHC-SF = Mental Health Continuum—Short Form; SF-36 = 36-Item Short Form Health Survey; EW = Emotional Wellbeing; PF = Physical Functioning.

Table 3

Regression Models with Depression Anxiety and Stress Scale (DASS-21) and Acceptance and Action Questionnaire—Managing Child Hearing Loss (AAQ-MCHL) as Independent Variables

	B	SE	<i>t</i>	<i>p</i>	R ²	R ² Δ
WSAS						
DASS-21	0.281	0.053	5.340	<.001	0.214	
AAQ-MCHL	0.391	0.066	5.956	<.001	0.314	0.100
MHC-SF						
DASS-21	-0.700	0.067	-10.387	<.001	0.369	
AAQ-MCHL	-0.059	0.084	-0.697	.487	0.368	-0.001
SF-36: EW						
DASS-21	-1.385	0.100	-13.92	<.001	0.541	
AAQ-MCHL	-0.116	0.118	-0.981	.328	0.541	<.001
SF-36: PF						
DASS-21	-0.768	0.152	-5.043	<.001	0.141	
AAQ-MCHL	-0.144	0.181	-0.796	.427	0.140	-0.001

Note. WSAS = Work and Social Adjustment Scale; MHC-SF = Mental Health Continuum—Short Form; SF-36 = 36-Item Short Form Health Survey; EW = Emotional Wellbeing; PF = Physical Functioning.

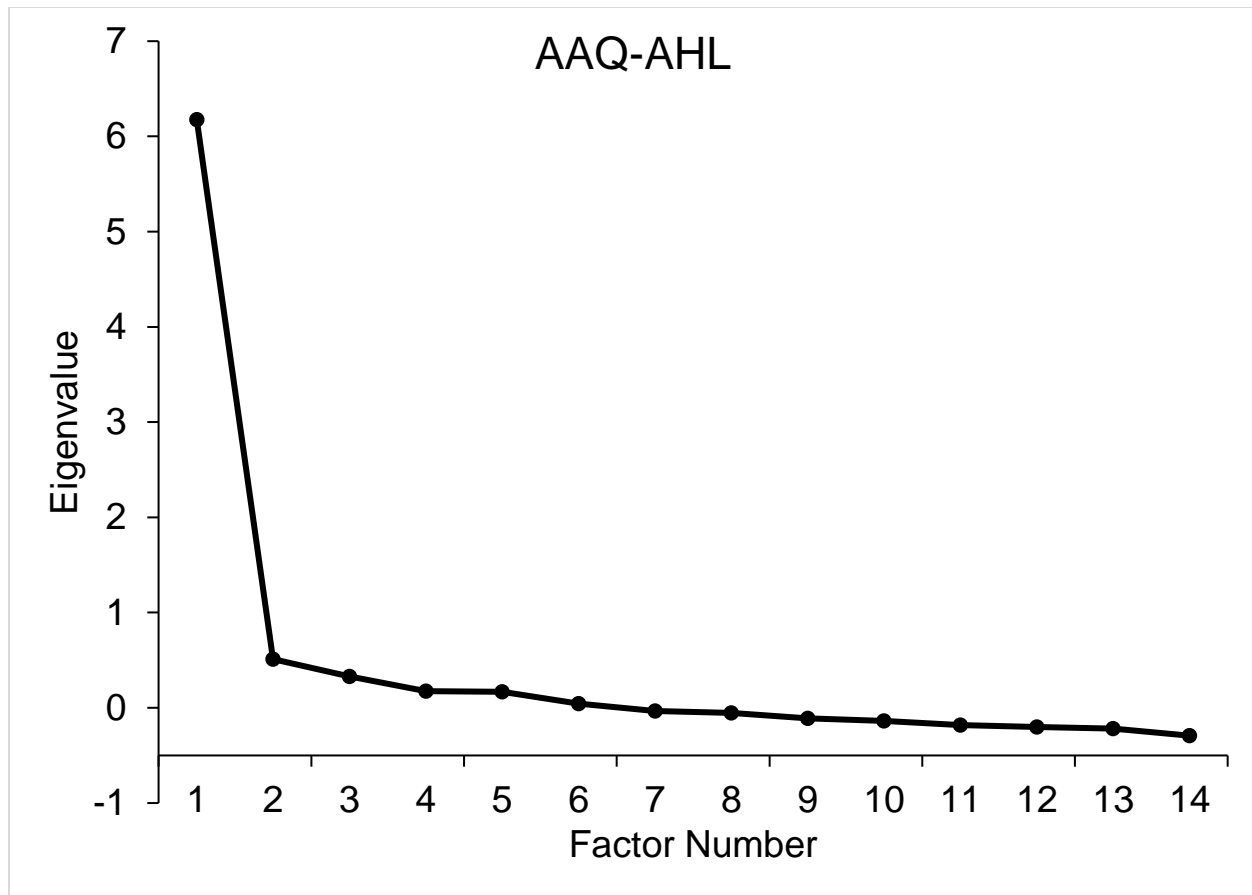


Figure 1. Scree plot for Acceptance and Action Questionnaire—Adult Hearing Loss (AAQ-AHL).

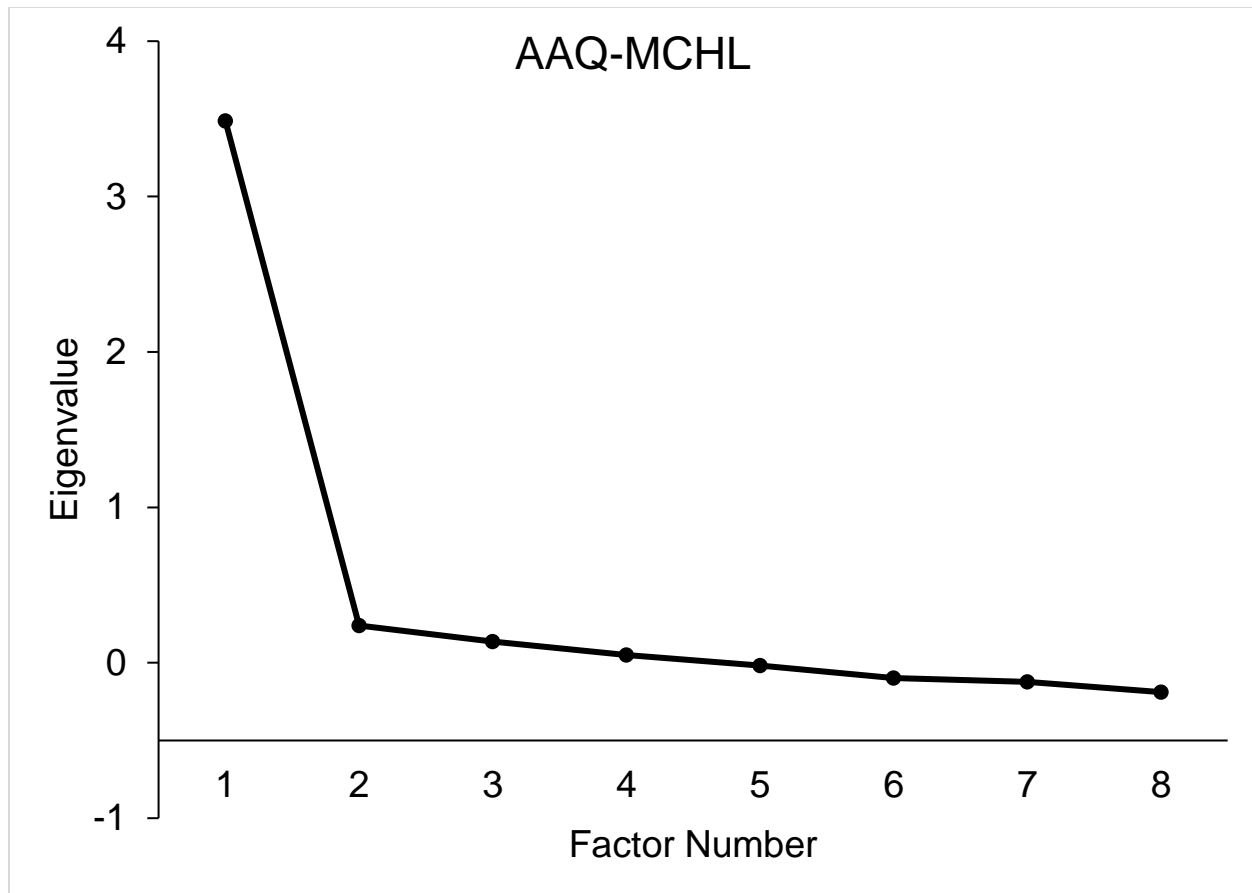


Figure 2. Scree plot for Acceptance and Action Questionnaire—Managing Child Hearing Loss (AAQ-MCHL).

Appendix A1
Acceptance and Action Questionnaire—Adult Hearing Loss (AAQ-AHL)

In this questionnaire, we use the term “frustration” to describe negative thoughts and feelings about hearing loss. Please replace the word “frustration” with thoughts and feelings about your hearing loss that bother you the most.

0	1	2	3	4	5	6
Never true	Very rarely true	Seldom true	Sometimes true	Often true	Almost always true	Always true

1. I am leading a full life, despite my frustration with hearing loss.
2. My life is going well, despite negative thoughts and feelings about my hearing loss.
3. My frustration with hearing loss has made me less involved in activities I enjoy.
4. I wish I could control negative thoughts and feelings about my hearing loss.
5. Frustration with hearing loss does not interfere with my goals.
6. Despite negative thoughts and feelings about my hearing loss, I can still take care of my responsibilities.
7. I struggle to get things done because of my frustration with hearing loss.
8. I need to manage negative thoughts about my hearing loss to have control over my life.
9. My negative thoughts and feelings about my hearing loss lead me to avoid situations.
10. I worry about what others think of my hearing loss.
11. I spend a lot of time thinking how things would be for me without hearing loss.
12. Frustration with my hearing loss keeps me from effectively treating and managing it.

Scoring instructions: Reverse score 1, 2, 5, and 6. Sum item ratings to get a total score.

Appendix A2

Acceptance and Action Questionnaire—Managing Child Hearing Loss (AAQ-MCHL)

In this questionnaire, we use the term “frustration” to describe negative thoughts and feelings about your child’s hearing loss. Please replace the word “frustration” with thoughts and feelings about your child’s hearing loss that bother you the most.

0	1	2	3	4	5	6
Never true	Very rarely true	Seldom true	Sometimes true	Often true	Almost always true	Always true

1. My frustration with my child’s hearing loss has negatively affected my parenting.
2. I wish I could control negative thoughts and feelings about my child’s hearing loss.
3. I need to manage negative thoughts about my child’s hearing loss to be a better parent.
4. My negative thoughts and feelings about my child’s hearing loss lead me to avoid situations.
5. I worry about what others think of my child’s hearing loss.
6. I suppress negative thoughts and feelings related to my child’s hearing loss.
7. I spend a lot of time thinking how things would be for me without my child’s hearing loss.
8. Frustration with my child’s hearing loss keeps me from effectively treating and managing it.

Scoring instructions: Sum item ratings to get a total score.