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Is it the sound or your relationship to it?
The role of acceptance in predicting tinnitus impact

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Abstract

Tinnitus is an experience of sound in the absence of an appropriate external source. A symptom that can accompany most central or peripheral dysfunctions of the auditory system, tinnitus can lead to significant distress, depression, anxiety, and decreases in life quality. This paper investigated the construct of psychological acceptance in a population of tinnitus patients. First, a cross-sectional study (N=77) was conducted in which a tinnitus specific acceptance questionnaire was developed. Results showed that a Tinnitus Acceptance Questionnaire (TAQ) generated good internal consistency. A factor solution was derived with two factors: activity engagement and tinnitus suppression. Second, a longitudinal study (N=47) investigated the mediating role of acceptance on the relationship between tinnitus distress at baseline and tinnitus distress, anxiety, life quality, and depression at a 7 month follow up. The results showed full mediation of activity engagement for depression and life quality at follow up, partial mediation for tinnitus distress, and no mediation for anxiety. The role of acceptance in the negative impact of tinnitus distress merits further investigation.

Key words: Tinnitus, acceptance, mediation analysis, tinnitus distress, defusion, longitudinal.
Tinnitus and acceptance

Introduction

Tinnitus is defined as the experience of sound(s) in the absence of any appropriate external sound source (Tyler, 2000). In a majority of cases, tinnitus is associated with a hearing loss caused by auditory trauma or aging (Eggermont & Roberts, 2004). Tinnitus patients commonly describe their sounds as a constant ringing, hissing, whistling or buzzing, although many other experiences are reported. Prevalence studies suggest that 10-15% of the general population suffer from tinnitus, and 10 - 20% of those that do (0.5-3% of the general adult population) have severe tinnitus (Andersson, Baguley, McKenna, & McFerran 2005). Severe tinnitus often has a notable impact on life quality. Psychological distress in a variety of forms, such as depression, anxiety, sleep disturbance, and concentration difficulties, are commonly reported along with severe tinnitus (Andersson, 2002).

A variety of medical treatments have been tested for tinnitus. Unless there is a clear medical cause behind the tinnitus such as nerve compression by blood vessels, silence is rarely achieved, and most medical treatments have limited success (Andersson et al., 2005). As a result, various psychological techniques have been developed aimed at reducing the negative impact of tinnitus even when the sound itself persists. Of these cognitive behavior therapy (CBT) is the best supported. In CBT for tinnitus, treatment is focused on management of tinnitus distress and associated problems (Andersson, 2002). Treatment components in CBT for tinnitus, such as cognitive restructuring and training to focus attention, are designed to increase the patients’ control of the maladaptive thoughts and feelings associated with the disorder (Henry & Wilson, 2001). The results of a meta-analysis showed that psychological treatment studies, of which a majority had used a CBT approach, had a good effect on decreasing the distress associated with tinnitus (Cohen’s $d=.80$), whereas the results regarding tinnitus loudness, sleep and depression were less promising (Andersson & Lytkens, 1999). A recent Cochrane review came to a similar conclusion (Martinez Devesa, Waddell, Perera, &
Theodoulou, 2007). Actual mediational analyses are rare, however, and the processes of change that account for the impact of CBT for tinnitus are largely unknown. Furthermore, there is a good deal of room for improvement in the impact of CBT, and thus refinements and alternatives are needed.

Within the behaviour therapy framework considerable progress has been made in recent years by focusing on the patient’s relationship to distressing experiences rather than the experiences themselves (Hayes, 2004). A wide variety of acceptance and mindfulness methods have evolved based on this conception that seem to provide a new way forward for many disorders (Hayes, Follette, & Linehan, 2004). To date, this new avenue has not been explored with tinnitus in the published literature, with the exception of a pilot study on the effects of mindfulness meditation (Sadlier, Stephens, & Kennedy, 2008).

Psychological acceptance is a process of actively taking in thoughts, memories, feelings and bodily sensations in a specific situation without having to follow or change them (Hayes, Strosahl & Wilson, 1999). In many disorders, the attempt to eliminate unwanted private experiences is associated with higher levels of psychopathology (Hayes et al., 1996). These include depression, anxiety, trauma, substance use, general mental health and other problems (see Hayes, Luoma, Bond, Masuda & Lillis, 2006 for a recent review). Acceptance undermines an unhealthy link between private experiences and overt behaviour, in which distress leads to avoidant or self-focused forms of adjustment that in turn produce additional distress. The therapeutic work with acceptance attempts to change the function rather than the content or frequency of thoughts, feelings and sensations, so that more useful behaviours can occur even in the presence of aversive private experiences (Hayes, Strosahl et al., 1999).

Outcome studies on acceptance-based methods such as Acceptance and Commitment Therapy (ACT: Hayes et al., 1999) not only suggest that these methods apply to a wide range of
behavioural health problems, but also that their effects are mediated in part by changes in acceptance and related processes (Hayes et al., 2006).

The picture in behaviour medicine is similar. Chronic pain may be especially relevant to the present topic because as with sound perception in tinnitus, complete elimination of pain is rarely a realistic goal. In chronic pain, acceptance is associated with fewer health care visits and reduced use of analgesic medications (McCracken, Carson, Eccleston & Keefe, 2004), increased functional level and adjustment (McCracken, 1998; McCracken & Eccleston, 2003) and better mental health (Viane et al., 2003). Both laboratory (Hayes, Bissett et al., 1999; Masedoa, & Esteve, 2006); and clinical studies (Dahl, Wilson, & Nilsson, 2004; McCracken, Vowles, & Eccleston, 2005) show that acceptance-based treatment methods have a positive impact on pain tolerance and the psychological problems associated with chronic pain.

The role of acceptance in chronic tinnitus has not yet been investigated with the exception of a single correlational study, which found positive correlations between tinnitus distress and the use of any coping strategy (e.g., the more use of coping the more distressed experienced). Acceptance was the only exception, for which a negative correlation was found (Andersson, Kaldo, Strömgren, & Ström, 2004). Acceptance was however measured with a single item, suggesting the need for a more comprehensive measure of acceptance in tinnitus. Developing such a measure seems especially important given how much acceptance is at odds with previous conceptualizations of tinnitus distress (e.g., Scott, Lindberg, Melin, & Lyttkens, 1990; Sirois, Davis, & Morgan, 2006), and thus the potential for innovation and new directions. The aim of the present studies was to develop a self-report measure of tinnitus specific acceptance and then to investigate its role in the impact of tinnitus on psychological functioning.

Study I

Method
Participants

Participants were 77 patients with chronic tinnitus, who had sought treatment for their condition at the local audiology department. Forty-seven were drawn consecutively in an initial wave and 30 more in a second wave. The mean age of the two samples was 50.6 (SD = 12.1; 51% female), and 50.8 years (SD = 12.16; 47.4% female), respectively. The average duration of tinnitus was 6.3 years (SD = 8.2). In terms of work 45.5 % worked full time. Among those with reduced employment, tinnitus was the single reason, or part of the reason in 28.6 % of the cases. To assess the hearing of the participants pure tone average thresholds were obtained from 45 of them with the mean result of 14.0 dB HL (SD=10.1) for the better ear (0.5, 1, 2, and 4 kHz), indicating no or very mild hearing loss. For the other 32 patients more recent audiograms were unavailable. Masking levels were measured on all patients to assess the required level of sound to suppress tinnitus from conscious awareness. This was done using broad band white noise, obtaining a mean of 51.6 dB (SD=16.0).

Study Design and Procedure

The purpose of Study I was to develop the Tinnitus Acceptance Questionnaire (TAQ). Items for the TAQ were largely created by modifying items from existing acceptance questionnaires to make them suitable for tinnitus patients. As a comparison we also included the Acceptance and Action Questionnaire (AAQ-9) (Hayes et al., 2004) in its original version, but items for the AAQ-32 were also used to generate tinnitus items. The AAQ-9 is a 9-item Likert type scale questionnaire that measures general levels of experiential avoidance and acceptance (Hayes et al., 2004). The AAQ was developed in three steps over a period of years, from a 64 item pool, to a 32 pool, and finally to the 9 item version. The AAQ has adequate reliability for a short scale (Cronbach’s $\alpha = .70$; Hayes et al., 2004) and is generally scored so that a high score indicates high experiential avoidance or low acceptance. The
Swedish translation of AAQ used in this study was made by Retamal (2004) and has been standardised using a Swedish sample.

Development of the *Tinnitus Acceptance Questionnaire (TAQ).* In the present study the AAQ-32 item pool was used to generate tinnitus items, along with the Chronic Pain Acceptance Questionnaire-Revised (McCracken, Vowles & Eccleston, 2004). The CPAQ emerged from the original item pool for the AAQ, as modified by Geiser (1992) to apply to chronic pain content. The CPAQ has been shown to be highly useful in predicting pain related distress and disability (McCracken et al., 2004). Seven of the TAQ items were adapted for tinnitus from the CPAQ-R, and two from the AAQ-32. Three additional items were created thematically to fill in content areas, following the same item style as the AAQ and CPAQ. Each of the 12 items was rated on a 7-point Likert scale (1=Never true, 7=Always true), with 8 reversed items in the scoring.

The draft TAQ was piloted on a group of 8 tinnitus patients not included in the present study, who were asked to comment on the questionnaire. Items were reworded to make them more understandable based on participant feedback. The TAQ and AAQ-9 were then administered to the participants in Study I. There was no overlap between TAQ and AAQ-9 in terms of item content. TAQ items are shown in the Appendix.

*Analysis*

Statistical analyses were performed using SPSS 11. A principal components factor analysis with Varimax rotation was conducted, with a limit for eigenvalues set at 1.0 and a limit for factor loadings at 0.4 (Kline, 1994). Frequency distributions were examined for each item in order to identify skewness and frequency distribution. Finally, the correlation between the two acceptance measures was assessed.
Results and Discussion

The means of TAQ and AAQ were 40.24 (SD = 12.23) and 34.2 (SD = 7.93) respectively. TAQ had a median of 39.0, a kurtosis of -0.50 (SD = 0.55) and a skewness of 0.13 (SD = 0.28). The internal consistency for TAQ was Chronbach’s alpha $\alpha = .89$ and for AAQ $\alpha = .56$. For each item the full range of the scale was endorsed and an adequate frequency distribution was obtained. Examining each single item showed that the means of each item was close to the middle value 3 on 6 out of 12 items (items 4, 7, 8, 10 and 11). For the remainder of the items, the mean was closer to 4, which indicates a slight tendency to score above the midpoint. The results of TAQ were not associated with either sex or age.

A principal components analysis was conducted resulting in two orthogonal factors with eigenvalues > 1, where factor 1 had an eigenvalue of 5.66 and factor 2 an eigenvalue of 1.76. The number of factors was confirmed by checking a scree-plot. The factor loadings are presented in Table 1.

In total the two factors explained 61.8 % of the variance in the TAQ. Factor 1 accounted for 47.2 % of the variance and factor 2 14.7 %. The factors were named 1) *activity engagement* (pursuit of life activities regardless of tinnitus) and 2) *tinnitus suppression* (attempts to control and suppress thoughts and feelings related to tinnitus). The correlation between the factors was $r(75) = .30, p = .009$, indicating that while the two sub-scales were distinguishable they continued to be related. The correlation between factor 1 and the entire scale was $r(75) = .94, p = .0001$ and between factor 2 and the entire scale $r(75) = .59, p = .0001$. The internal consistency for the factors were $\alpha = .91$ and $\alpha = .70$ respectively. Similar patterns of results have been seen with the AAQ (Bond & Bunce, 2003), and for that reason both subscale and total scores were calculated. To examine the construct validity of the TAQ as a measure of acceptance the correlation between TAQ and AAQ was calculated, using the total TAQ score. This correlation was $r(74)=.35, p=.002$, indicating that tinnitus specific
acceptance was part of a general response pattern, but that less that 13% of the variance in the TAQ could be specified by knowing the AAQ scores alone.

The more important initial question to be asked about tinnitus specific acceptance as assessed by the TAQ is whether it can begin to make sense of the poor psychological outcomes in chronic tinnitus. This was examined by looking longitudinally at the development and exacerbation of psychological problems in a sample of chronic tinnitus patients, accessing whether these changes over time could be accounted for by tinnitus specific acceptance.

Study II
Method

Participants

Participants were the 47 patients with chronic tinnitus in the initial wave of recruitment described in Study I. Two participants dropped out at follow-up, leaving 45 completing the second assessment phase.

Study Design and Procedure

A longitudinal design with self-report measures collected at baseline and at a 7 month follow up was employed. The predictor variable was initial tinnitus distress, as measured by Tinnitus Handicap Inventory (THI; Newman, Jacobson & Spitzer, 1996). The dependent variables were life quality, depression, tinnitus distress and anxiety at follow up. Acceptance was assumed to be a mediator and was measured using the AAQ and the TAQ. As with Study I, the primary analyses used the total score for the TAQ as the best overall measure of acceptance.

Questionnaires

The AAQ-9 and the TAQ were described in Study I. In addition to demographic and general information questions, the following measures were obtained.
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_Tinnitus Handicap Inventory (THI)._ THI is an inventory widely used in tinnitus research and in clinical contexts to assess tinnitus-related distress and handicap (THI; Newman, Jacobson & Spitzer, 1996). Consisting of 25 items THI grades the distress on a scale between 0-100 (Newman et al., 1996), with each item rated on a three point scale (scored 0, 2 or 4). Adequate test-retest reliability and internal consistency has been established (Newman et al., 1996; Newman, Sandridge, & Jacobson, 1998). THI also has a high convergent validity with other measures of tinnitus distress (Baguley, Stoddart, & Hodgson, 2000). In a factor analysis conducted by Baguley and Andersson (2003) they found strong support for a unifactorial solution. The inventory’s internal consistency for the total scale in this factor analysis amounted to $\alpha = .93$.

_Quality of Life Inventory (QOLI)._ QOLI measures life quality in 16 domains such as health, work, education and love (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992). A Swedish validation of QOLI has been done on participants suffering from post traumatic stress disorder and in a non clinical sample (Paunovic & Öst, 2004). Results showed internal consistencies of $\alpha = .84$ and .80 for the PTSD patients and non clinical sample respectively.

_Hospital Anxiety and Depression Scale (HADS)._ This is a commonly used instrument when screening for anxiety and depression among somatic patients (HADS; Zigmond & Snaith, 1983). The HADS consists of 14 items divided into two subscales; HADS-anxiety and HADS-depression (Zigmond & Snaith, 1983). In a comprehensive review Hermann (1997) concluded that the scale had good reliability and acceptable sensitivity and specificity. HADS internal consistency ranges from $\alpha = .80$ to .93 regarding the anxiety scale and between $\alpha = .81$ and .90 for the depression scale. The scales two-dimensional structure has been confirmed in a number of factor analyses and the scales are divided in a clinically relevant manner. With regards to tinnitus patients the depression scale has shown greater sensitivity and specificity than the anxiety scale (Svedlund, Zöger & Holgers, 2003).
Analytic Strategy

Linear regression models were used to test the effect of the mediator variable (acceptance) on each dependent variable. First the predictor variable, tinnitus distress \((X)\) measured at baseline was regressed on each of the dependent variables \((Y)\) measured at the seven-month follow up. Second, the predictor variable at baseline was linearly regressed on the mediation variable \(M\) measured at baseline, and at follow-up. Third, the predictor variable \(X\) at baseline and the mediation variable \(M\), at baseline and follow-up respectively, were simultaneously regressed on each of the dependent variables \((Y)\) measured at follow-up.

According to the definition of mediation provided by Baron and Kenny (1986), variable \(M\) is considered a mediator if (1) \(X\) significantly predicts \(Y\) (i.e., \(c \neq 0\) in Figure 1), (2) \(X\) significantly predicts \(M\) (i.e., \(a \neq 0\), in Figure 1), and (3) \(M\) significantly predicts \(Y\), controlling for \(X\) (i.e., \(b \neq 0\) in Figure 1). To establish mediation, a previously significant relation between the independent and dependent variables should no longer be significant, when path \(a\) and \(b\) are controlled for. The strongest demonstration of this, defined as full mediation, occurs when path \(c\) becomes zero. The \(c\) in the top panel of Figure 1 represents the simple (i.e., total) effect represented by (1) above. The indirect effect, \(c'\) in the lower panel of Figure 1, is defined as the effect of \(X\) on \(Y\) after controlling for \(M\).

Although the present study is vastly underpowered to examine mediation in a more demanding way, the statistical significance of the difference between \(c\) and \(c'\) paths was assessed by considering the statistical significance of the cross product of the \(X \rightarrow M\) path \((a\), as represented by “2” above) and the \(M \rightarrow Y\) path \((b\) as represented by “3” above), or \(ab\). In finite datasets it has been shown that \(ab = c - c'\) (Preacher & Hayes, 2004). Typically, the statistical significance of the cross product of the coefficients is assessed using the multivariate delta logic of the Sobel test applied to that cross product (Preacher & Hayes, 2004), which was the approached used here.
Results

Table 2 shows the means and standard deviations on the self-rapport questionnaires at baseline and at follow up. In addition to formal measures, general and demographic questions showed that at follow up, 7 of the 40 participants had received treatment for their tinnitus (i.e. group information, relaxation training, counselling, medicine and sound generators). Tinnitus had changed for 36% of the patients. For 43.7% tinnitus had increased, for 12.5% it had decreased, and for 43% it had fluctuated.

Causal Steps Assessment of Mediation of Tinnitus Distress by Acceptance

Regression analyses examined the relation between the THI taken at baseline and the outcome variables at follow up (c path). The results show that tinnitus distress significantly predicted life quality ($\beta = -.35, p = .02$), depression ($\beta = .46, p = .00$), tinnitus distress ($\beta = .74, p = .00$) and anxiety ($\beta = .44, p = .00$) at follow up.

The THI was then regressed on the mediators (the $a$ path). Results showed that tinnitus distress significantly predicted tinnitus specific acceptance in the form of the TAQ both at baseline ($\beta = -.77, p = .00$) and at follow up ($\beta = -.66, p = .00$). Separating the TAQ in the two factors tinnitus distress significantly predicted activities engagement at baseline ($\beta = -.79, p = .00$) and at follow up ($\beta = -.68, p = .00$). No significant results were found regarding tinnitus suppression and this factor was therefore dropped in the further presentation of data.

Significant results were found using general acceptance in the form of AAQ at baseline ($\beta = .61, p = .00$) and at follow up ($\beta = .51, p = .00$) respectively.

The third step in the regression analyses assessed whether there was a relationship between the mediators at baseline and the seven-month outcomes controlling for tinnitus distress at baseline (the $b$ path). The analyses show follow-up activities engagement as assessed by the TAQ to be a significant predictor of life quality ($\beta = .54, p = .00$), depression ($\beta = -.55, p = .00$) and tinnitus distress ($\beta = -.38, p = .01$). Regarding life quality and
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depression the results show full mediation as path c in these cases becomes zero. No significant relation was found with anxiety. Similar results were found using the full scale of TAQ.

In this third step no significant results was found using baseline TAQ values. Further no significant results were found using the AAQ. Results are presented in Table 3 and 4.

Cross Products of Coefficients Test

Finally Sobel tests were calculated. Activity engagement at follow up, as measured by TAQ, significantly mediated the influence of baseline tinnitus distress on follow up life quality (Sobel $z = -2.85$, $p = .00$), depression (Sobel $z = 3.07$, $p = .00$), and tinnitus distress (Sobel $z = 2.75$, $p = .00$). Similar results were found using the full scale of the TAQ. Moreover tinnitus specific acceptance, measured with the full TAQ scale at baseline was a marginally significant mediator between tinnitus distress at baseline and that shown at follow up (Sobel $z = 1.70$, $p = .09$). None of the Sobel tests using the AAQ, either at baseline or follow up, were significant on any outcome measure, indicating that none of these outcomes were mediated by general levels of experiential avoidance in this population, but were in several areas by tinnitus specific areas of experiential avoidance.

Role of Background Variables

Correlations between the self-report measures and background/follow up variables were explored. Reduced employment initially showed a negative correlation with QOLI $r (41) = - .43$, $p = 0.006$, and a positive correlation with TAQ $r (42) = .31$, $p = 0.049$, at follow up. The remaining background variables showed no significant associations. Moreover, scores on the questionnaires at seven months follow up, were not associated with variables such as sex, age, duration of tinnitus, tinnitus masking level or pure tone average. Whether participants had or had not received or thought about seeking medical health care was the only follow up question for which a significant mean difference was found. This was on the HADS-
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14.

depression with a difference of $F(41) = 13.93, p = .001$, and a higher score among those who had sought health care. None of the other follow up variables resulted in any significant mean differences.

Discussion

The aim of the present investigation was to develop a self-report measure of tinnitus specific acceptance and to investigate its role in the impact of tinnitus on psychological functioning and well-being. In Study I a tinnitus specific measure of acceptance was developed with good internal consistency and satisfying test-retest reliability. Findings indicated a two-factor solution on the TAQ, with two factors which were named activity engagement and tinnitus suppression. The main results of Study II was that the acceptance factor activity engagement showed full mediation for depression and life quality at follow up, and partial mediation for tinnitus distress. These results underscore the importance of acceptance for the well-being of distressed tinnitus patients.

The acceptance factor activity engagement can be said to be conceptually related to the theories behind behavioural activation, an empirically supported treatment component in behaviour therapy for depression (Jacobson et al., 1996). Considering that clinical tinnitus patients are a group where about 35-40% are clinically depressed (Zöger, Holgers & Svedlund, 2001), it is possible that experiential avoidance and resulting lack of activation might be an important factor for explaining tinnitus distress. It could also be of relevance to include behavioural activation as an adjunct to other treatment ingredients in CBT for tinnitus (Andersson, 2002). Further, methods derived from ACT could be useful as a means of fostering an attitude of not letting tinnitus stand in the way of engaging fully in rewarding behaviour. Our clinical experience is that distressed tinnitus patients can become preoccupied with attempts to reduce or control their symptoms (tinnitus, fatigue etc.), sometimes becoming less engaged with previously valued activities. The factor tinnitus suppression only contained
three items, but can still be seen as a rather direct measure of experiential avoidance, which can be regarded as the opposite of acceptance (Hayes et al., 2004). In fact, the items all measure the wish to be able to control the tinnitus and the ability to suppress the sensation. This indirect way of measuring acceptance is not without problems, and it could be argued that this factor is of less interest as a measure of tinnitus-related acceptance than if the TAQ had all its items phrased directly as signaling acceptance of the symptom. In fact, only items 1-3 have this format. On the other hand it is not necessarily feasible to ask direct questions regarding acceptance as this can be seen as obtrusive by patients, who often by definition do not accept their condition. Therefore, the indirect way of measuring acceptance by asking questions relating to experiential avoidance is probably a more feasible approach. The fact that tinnitus suppression was not related to tinnitus distress in our study and therefore was dropped from further analysis is an interesting finding worth commenting on. Actually this is in line with previous research on tinnitus and suppression (Andersson, Jüris,, Classon, Fredrikson, & Furmark, 2006), showing that suppression is ambiguously related to tinnitus distress and can even be beneficial for tinnitus sufferers, at least in the short run.

It is of value to further consider what acceptance is and how it is best measured in tinnitus patients. The correlations found between our measure of tinnitus specific acceptance and tinnitus distress raise the suspicion that aspects of acceptance (or rather the absence of acceptance) are always present when answering questions regarding tinnitus distress. The question if self-reported distress can be seen as an entity separate from acceptance should be explored, since experiences and sensations you have accepted by definition are those you no longer are struggling with. This points at a need to investigate acceptance in more than one response domain, for instance in experimental settings and as operationalised behaviour (Westin, Östergren & Andersson, In press).
Other possibilities exist in the choice of dependent, mediator and independent variables in the analysis of the longitudinal data in this study. From a clinical point of view acceptance can be regarded as a mediator, but it could also be seen as an outcome following treatment. To explore this further we reversed the analysis putting depression, anxiety and quality of life as possible mediators and acceptance as outcome. Results showed that depression symptoms as measured by the HADS-D, was the only measure with significant results, partially mediating the relation between tinnitus distress and tinnitus acceptance. The results were however not as strong as those presented in this paper. Moreover, in a theoretically driven conceptualization acceptance can never be seen as an outcome as in its definition it is referred to as a means of reaching desired behavioural outcomes, and not as an end in itself. The causal pathways in our analysis are in this respect in line with the previous literature on ACT (Hayes et al., 2006).

Since a majority of people with tinnitus are only moderately distressed by their tinnitus and manage to live with their symptom without any intervention (Andersson et al, 2005), seeking help is probably in itself a strong indicator of low willingness to experience tinnitus. This might lead to a range restriction for the acceptance scores as well as the tinnitus distress scores. Bearing this in mind it would be interesting to examine persons who have not sought help for their tinnitus, to see how they have managed to come to terms with their symptom. We suspect that acceptance is a common reaction, but this assumption should be investigated in epidemiological studies. Another way would be to only include tinnitus patients who had just started to experience the symptom as a chronic state, since this group would be more likely to show a more substantial change in tinnitus distress and life quality depending on what strategy they chose for dealing with their new predicament.

Our sample had approximately the same mean scores as a non clinical group of Americans on the AAQ-9 (Hayes et al., 1999a), and close to the same value as a non clinical
group of Swedes on the QOLI (Paunovic & Öst, 2004). The high mean score on QOLI is of particular interest since other patient categories, such as persons with anxiety disorders (Paunovic & Öst, 2004), usually score much lower compared to non-clinical groups. The mean score on the THI were in line with previous studies with tinnitus patients (Baguley & Andersson, 2003), and same was the case regarding the mean value on the HADS-anxiety subscale (Andersson, Kaldo-Sandström, Ström, & Strömgren, 2003). Means on HADS-depression were however somewhat lower than previously observed in a Swedish tinnitus sample (Andersson et al., 2003). It is interesting to note that the tinnitus minimal masking level was not correlated with any of the self-report measures included in this study. This is in line with previous research showing non-existing or non-linear associations between tinnitus distress and tinnitus masking levels (Andersson & McKenna, 1998).

The participants in study II differed from other tinnitus patients in certain respects. To start with, this tinnitus sample had an exceedingly high degree of reduced employment due to tinnitus, with a total of 26% of the sample working reduced hours at least partially due to tinnitus, which is lower than usually observed (Andersson, 2000). This is especially interesting since the level of employment is the only background variable that was shown to be related to the outcome measure life quality.

On half of the items on the TAQ the participants had high ratings. Reviewing the content of these items in relation to these responses suggests that tinnitus might not entail a substantial change in the patients way of life and life quality after all. This speculation is supported by the high mean score on QOLI. Maybe this can be interpreted as an example of how life quality sometimes can be independent of somatic symptoms and distress in life.

In this study, the AAQ-9 was found to have a poor internal consistency. Some participants reacted negatively to the questionnaire items and found the questions hard to understand and irrelevant to their situation. While this might relate to the translation, we
cannot exclude the possibility that the AAQ-9 is less suitable for this patient group. A revision of the AAQ is currently underway to deal with this reliability problem, which is not unique to the present study.

While there are limitations of this study one of its strengths concerns the fact that the study had a longitudinal design makes it more justified to draw conclusions regarding causality. However, among the limitations is the fact that the TAQ was not measured at mid-point between baseline and follow-up and the fact that the sample size was small. A further limitation could be that tinnitus distress is known to vary over time and that is difficult to say in what phase of these cycles the participants were in when they were recruited to the study.

The tinnitus specific acceptance measure developed in this study could be further refined. Moreover, this study could be repeated with a sample with a more recent onset of tinnitus. To further investigate the use of acceptance as a strategy for tinnitus patients it would be desirable to examine patients who manage to live with their tinnitus without seeking medical help. They could for instance be compared with clinical tinnitus patients to see whether differences between the groups regarding psychoacoustic properties of tinnitus, acceptance, tinnitus distress, depression, anxiety, life quality and sleeping disability. Finally it would be interesting to conduct a clinical study in which an ACT treatment was compared to a CBT or other established treatment methods for tinnitus.

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Appendix. TAQ-items

Direction: Below you will find a number of statements. Please rate the truth of each statement as it applies to you. Use the following rating scale to make your choices:

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>Very true</td>
<td>Rarely true</td>
<td>Sometimes true</td>
<td>Often true</td>
<td>Almost always true</td>
<td>Always true</td>
</tr>
</tbody>
</table>

For instance, if you believe a statement is “Often true”, you would circle number 6 on the row following the statement.

Items:

1. I am leading a full life, even though I have chronic tinnitus.
2. My chronic tinnitus has led me to decrease my engagement in former activities…
3. My life is going well, even though I have chronic tinnitus….
4. It is necessary for me to control my negative thoughts and feelings concerning tinnitus….
5. Despite tinnitus, I can draw up and stick to a certain course in my life….
6. When my tinnitus increases I can still take care of my responsibilities…
7. I will be in better control of my life if I can control my negative thoughts about tinnitus.

8. My tinnitus leads me to avoid certain situations...

9. My tinnitus changes me as a person...

10. I have to struggle to get things done when I have tinnitus...

11. I strive to suppress aversive thoughts and feelings related to tinnitus...

12. I spend a lot of time thinking how things would be for me, without chronic tinnitus...

Scoring:

Reverse score items: 2, 4, 7, 8, 9, 10, 11, 12.
Table 1. *Factor loadings on Tinnitus Acceptance Questionnaire. Loadings above >.40 in bold*

<table>
<thead>
<tr>
<th>Item</th>
<th>Activity engagement</th>
<th>Tinnitus suppression</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.80</td>
<td>-.14</td>
</tr>
<tr>
<td>2</td>
<td>.70</td>
<td>.30</td>
</tr>
<tr>
<td>3</td>
<td>.83</td>
<td>.08</td>
</tr>
<tr>
<td>4</td>
<td>.08</td>
<td>.87</td>
</tr>
<tr>
<td>5</td>
<td>.80</td>
<td>.03</td>
</tr>
<tr>
<td>6</td>
<td>.79</td>
<td>.08</td>
</tr>
<tr>
<td>7</td>
<td>.07</td>
<td>.66</td>
</tr>
<tr>
<td>8</td>
<td>.51</td>
<td>.37</td>
</tr>
<tr>
<td>9</td>
<td>.81</td>
<td>.26</td>
</tr>
<tr>
<td>10</td>
<td>.70</td>
<td>.34</td>
</tr>
<tr>
<td>11</td>
<td>.15</td>
<td>.74</td>
</tr>
<tr>
<td>12</td>
<td>.81</td>
<td>.21</td>
</tr>
</tbody>
</table>
Table 2. Means and standard deviations of the outcome and predictor variables at baseline and at follow-up.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th></th>
<th>Follow up</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>AAQ</td>
<td>33.60</td>
<td>8.67</td>
<td>34.20</td>
<td>7.93</td>
</tr>
<tr>
<td>HAD-A</td>
<td>6.81</td>
<td>4.26</td>
<td>6.82</td>
<td>3.94</td>
</tr>
<tr>
<td>HAD-D</td>
<td>4.38</td>
<td>3.54</td>
<td>5.11</td>
<td>4.26</td>
</tr>
<tr>
<td>TAQ</td>
<td>38.52</td>
<td>10.95</td>
<td>40.24</td>
<td>12.23</td>
</tr>
<tr>
<td>TAQ Factor 1</td>
<td>31.15</td>
<td>9.79</td>
<td>7.67</td>
<td>3.91</td>
</tr>
<tr>
<td>TAQ Factor 2</td>
<td>7.43</td>
<td>3.15</td>
<td>32.45</td>
<td>10.40</td>
</tr>
<tr>
<td>THI</td>
<td>43.28</td>
<td>19.31</td>
<td>36.74</td>
<td>17.85</td>
</tr>
<tr>
<td>QOLI</td>
<td>2.41</td>
<td>1.48</td>
<td>2.24</td>
<td>1.61</td>
</tr>
</tbody>
</table>

AAQ = Acceptance and Action Questionnaire, HADS-A = Hospital Anxiety Scale, HADS-D = Hospital Depression Scale, TAQ = Tinnitus Acceptance Questionnaire, THI = Tinnitus Handicap Inventory, QOLI = Quality of Life Inventory.
Table 3. Results of regression analyses expressed as standardized Beta- coefficients (unstandardized coefficients, std. error) with the TAQ- factor activities engagement at baseline as M and tinnitus distress at baseline as X.

<table>
<thead>
<tr>
<th></th>
<th>X on Y (c)</th>
<th>M on Y controlling for X (b)</th>
<th>X on Y controlling for M (c’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life quality (QOLI)</td>
<td>-.35* (-.03, .01)</td>
<td>09 (.02, .04)</td>
<td>-.28 (-.02, .02)</td>
</tr>
<tr>
<td>Depression (HAD-D)</td>
<td>.46** (.10, .03)</td>
<td>-.09 (-.04, .10)</td>
<td>.39 (.09, .05)</td>
</tr>
<tr>
<td>Anxiety (HAD-A)</td>
<td>.44** (.09, .03)</td>
<td>.24 (.10, .09)</td>
<td>.62** (.13, .04)</td>
</tr>
<tr>
<td>Tinnitus distress (THI)</td>
<td>74* (.67, .10)</td>
<td>-.20 (.38, .31)</td>
<td>.56** (.53, .15)</td>
</tr>
</tbody>
</table>

*p<0.05, **p<0.01

Note: The X on M (a) path is (β= -.79, p=.00).
Table 4. Results of regression analyses expressed as standardized Beta-coefficients (unstandardized coefficients, std. error) with the TAQ- factor activities engagement at follow-up as M and tinnitus distress at baseline as X.

<table>
<thead>
<tr>
<th></th>
<th>X on Y (c)</th>
<th>X on M (a)</th>
<th>M on Y controlling for X (c)</th>
<th>X on Y controlling for M (c')</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life quality (QOLI)</td>
<td>-.35* (-.03, .01)</td>
<td>-.68** (-.35, .06)</td>
<td>.54* (.09, .03)</td>
<td>.02 (.00, .02)</td>
</tr>
<tr>
<td>Depression (HAD-D)</td>
<td>.46** (.10, .03)</td>
<td>- .55** (-.23, .07)</td>
<td>.09 (.02, .04)</td>
<td></td>
</tr>
<tr>
<td>Anxiety (HAD-A)</td>
<td>.44** (.09, .03)</td>
<td>-.25 (-.10, .08)</td>
<td>.27 (.05, .04)</td>
<td></td>
</tr>
<tr>
<td>Tinnitus distress (THI)</td>
<td>.74* (.67, .10)</td>
<td>-.38** (-.68, .23)</td>
<td>.48** (.43, .12)</td>
<td></td>
</tr>
</tbody>
</table>

* p<0.05, ** p<0.01

Note: The X on M (a) path is (β = -.68, p=.00).
Caption

Figure 1. a) Illustration of a direct effect b) Mediation analysis model. $X$ affects $Y$ indirectly through $M$. (From Preacher & Hayes, 2004)
a)

\[ X \xrightarrow{c} Y \]

b)

\[ M \]

\[ X \xrightarrow{a} M \xrightarrow{b} Y \xrightarrow{c'} Y \]