Tinnitus – an acceptance-based approach

Vendela Zetterqvist
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“I went to the woods because I wished to live deliberately, to front only the essential facts of life, and not, when I came to die, discover that I had not lived. I did not wish to live what was not life, living is so dear; nor did I wish to practise resignation, unless it was quite necessary.  

I wanted to live deep and suck out all the marrow of life…as to put to rout all that was not life, to cut a broad swath and shave close, to drive life into a corner, and reduce it to its lowest terms, and, if it proved to be mean, why then to get the whole and genuine meanness of it, and publish its meanness to the world; or if it were sublime, to know it by experience, and be able to give a true account of it”

HENRY D. THOREAU, Walden
ABSTRACT

Background: Tinnitus is a highly prevalent health condition defined as the perception of sound in the absence of any external or electrical stimulation. For a proportion of those affected, tinnitus creates moderate or severe personal suffering such as interference on mood, sleep and daily functioning. Since there is a lack of effective, validated treatments to remove or diminish tinnitus it is relevant to find ways of helping those who are distressed and disabled by their condition. Cognitive behaviour therapy (CBT) is one of the most empirically validated treatments aiming at reducing tinnitus interference. There is however room for enhancing the treatment effect and the mechanisms responsible for treatment change are largely unknown. Further, there is a lack of theoretical understanding of the factors involved in the development and maintenance of tinnitus interference.

Recently acceptance has been incorporated into a number of empirically oriented cognitive and behavioural treatments. This approach can be considered particularly relevant when dealing with a chronic problem, such as tinnitus. There are a growing number of experimental, correlational and outcome studies, showing that acceptance is related to better functioning and well-being in chronic health conditions.

Aims: The aims of this thesis were 1) to explore the role of acceptance and psychological flexibility in understanding tinnitus interference both experimentally and with a longitudinal design 2) to evaluate the immediate and long-term outcomes of an acceptance based behaviour therapy (Acceptance and Commitment Therapy; ACT) in the treatment of people with tinnitus and, 3) to investigate the relationship between treatment outcome and processes assumed to be the active ingredients of treatment (i.e. acceptance and cognitive defusion).

Methods: Study I (n=47) was an experiment comparing the impact of acceptance to that of thought suppression or a neutral instruction on the ability to maintain attention on an imagery task. Study II (n=47) was a longitudinal trial studying the mediating role of acceptance on the relationship between tinnitus interference at baseline and tinnitus interference, anxiety, life quality, and depression at a seven-month follow-up. Study IV (n=64) was a randomised controlled trial evaluating the immediate and long-term effects of ACT in comparison to those of Tinnitus Retraining Therapy and to a wait list control. Study III (n=24) was a process study where the video recorded sessions of ACT from study IV were observed and rated with regard to client in-session acceptance and defusion behaviour. Temporal relations between treatment outcome and the observer ratings were investigated. Participants in all trials were chronic tinnitus patients, for the most part recruited from different departments of audiology.
Main findings and conclusions: In relation to the first aim results from study I indicated that patients with tinnitus could benefit from an acceptance strategy to handle tinnitus intrusion when performing an attention task. The main finding in this study was a significant difference between the acceptance and the neutral control group regarding length of time with imagery combined with the number of interruptions. In study II tinnitus acceptance had a mediating role on the relationship between tinnitus interference at baseline and life quality, depression and tinnitus interference at follow-up. To conclude some support was found for the notion that acceptance and psychological flexibility may contribute to the understanding of tinnitus interference.

In relation to the second aim of this thesis results from study IV showed that Acceptance and Commitment Therapy had large immediate effects on tinnitus interference in comparison to wait list, and medium effects in comparison to Tinnitus Retraining Therapy. Results were also seen on secondary outcome. At six months, reliable improvement on the main outcome was found for 54.5% in the ACT condition and 20% in the TRT condition. To conclude the results suggest that ACT can reduce tinnitus interference in a group of tinnitus patients with normal hearing.

In relation to the third aim of this thesis the relationship between treatment process and outcome was investigated both in study III and study IV. Results from study III showed that clients’ in-session acceptance and defusion behaviours rated early in therapy were predictors of sustained positive treatment effects of ACT. These associations continued to be substantial even when controlling for the improvement in outcome that had occurred prior to the measurement point of the process variables. This whereas prior symptom change could not predict process variables rated late in therapy. Results from study IV showed that self-reported tinnitus acceptance significantly mediated the immediate outcome of ACT. In sum these findings implicate that acceptance and cognitive defusion are important processes in ACT, related to treatment outcome.
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<td>Acceptance and Action Questionnaire</td>
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<td>Acceptance and Commitment Therapy</td>
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<td>Acceptance and Defusion Process Measure</td>
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<td>AS</td>
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<td>CGI-I</td>
<td>Clinical Global Impression – Improvement scale</td>
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<td>CI</td>
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<td>CTAQ</td>
<td>Chronic Tinnitus Acceptance Questionnaire</td>
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<td>dB HL</td>
<td>Decibel hearing level</td>
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<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
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<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
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<td>HbA1C</td>
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<td>HL</td>
<td>Hearing level</td>
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<td>ICC</td>
<td>Intraclass correlation</td>
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<td>ICF</td>
<td>International Classification of Functioning, Disability and Health</td>
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<td>ISI</td>
<td>Insomnia Severity Index</td>
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<tr>
<td>LEARN</td>
<td>Lifestyle, Exercise, Attitudes, Relationships, and Nutrition</td>
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<td>MANOVA</td>
<td>Multiple analysis of variance</td>
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<td>MBCT</td>
<td>Mindfulness-based cognitive therapy</td>
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<td>MDT</td>
<td>Multidisciplinary treatment and amitriptyline</td>
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<td>Progressive Muscular Relaxation</td>
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<td>Quality of Life Inventory</td>
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<td>Relational Frame Theory</td>
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<td>TAU</td>
<td>Treatment as usual</td>
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<td>TRT</td>
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<td>UK</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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<td>WLC</td>
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INTRODUCTION

Background

Tinnitus is a highly prevalent health condition affecting 10-15% of the population. For a proportion of those affected, tinnitus creates moderate or severe personal suffering such as interference on mood, sleep and daily functioning. Although many treatment alternatives have been developed and tested there is a lack of effective, validated treatments to remove or diminish tinnitus. Thus tinnitus remains a problem for a considerable number of people. In the absence of effective treatments it is of importance to help those who are highly distressed and disabled by their tinnitus.

Cognitive behaviour therapy (CBT) is one of the treatments aiming at reducing tinnitus interference and it has repeatedly been shown to do so in randomised controlled trials. There is however room for enhancing the treatment effects since only 30-45% of those receiving the treatment have been shown to be clinically, significantly improved. Moreover, how CBT for tinnitus exerts its therapeutic effects is largely unknown and there is a lack of theoretical understanding of the factors responsible for explaining how chronic tinnitus becomes a problem.

Recent development in CBT points to the importance of acceptance and psychological flexibility in resolving human suffering. These processes are targeted by several new behaviour therapies one being Acceptance and Commitment Therapy (ACT). There are a growing number of experimental and correlational studies showing that acceptance is related to better functioning and well-being in chronic health conditions. Outcome studies on ACT have shown promising results for patients with chronic pain, type-2 diabetes and epilepsy, and the obtained outcomes have been mediated in part by the suggested processes of the therapy.

This thesis project investigated the role of acceptance and psychological flexibility in understanding tinnitus interference (study I and II). As acceptance appeared to be a relevant process/strategy regarding tinnitus interference, the next step was to target this directly in treatment (study IV). Lastly, in evaluating such treatment effects it was relevant to investigate the relationship between outcome and the process presumed to be responsible for the effect (studies III and IV).

Tinnitus – a hearing problem

According to the World Health Organization, hearing problems are among the top ten most common burdens of disease in medium and high-income countries and they are predicted to increase within the next twenty years (Hasson, Theorell,
The prevalence of tinnitus and hearing problems increases with age and has repeatedly been shown to be related to socioeconomic status and exposure to work related noise. Overall, hearing problems are more common among men than women (Davis & El Refaie, 2000; Palmer et al., 2002).

Tinnitus is defined as the perception of sound(s) in the absence of any appropriate external sound source (Tyler, 2000). Tinnitus patients commonly describe their sounds as a constant ringing, hissing, whistling or buzzing, and tinnitus is distinguished from auditory hallucinations (e.g., voices and music).

There is a clear association between hearing loss and tinnitus and studies indicate that 70 - 80% of tinnitus patients have significant hearing difficulties (Henry, Dennis & Schechter, 2005). The factors responsible for causing hearing loss are also likely to have caused an associated tinnitus. Between 40-60% of those seeking help for tinnitus will also have hyperacusis, a hypersensitivity to ordinary environmental sounds (Andersson, Baguley, McKenna & McFerran, 2005).

Prevalence and natural course
In prevalence studies the term “prolonged spontaneous tinnitus” has been endorsed to define tinnitus sounds with a spontaneous onset, (e.g., not in response to noise) lasting longer than five minutes at the time (Davis & El Refaie, 2000). This criterion excludes brief transient tinnitus, which is a very common experience (Lockwood, Salvi & Burkard, 2001). Tinnitus is considered to be chronic if it lasts for more than six months (Davis & El Refaie, 2000). Tinnitus severity can be conceptualised by different parameters. The first parameter relates to the loudness of the perceived sound or how easily it can be masked by other sounds. The second parameter concerns the reported annoyance or the interference tinnitus has on quality of life, mood, sleep and functioning. In this text the term “tinnitus severity” will be used only when referring to studies using one single measure covering both parameters or when referring to parameter one (loudness/maskability) in which case this will be clearly stated. Parameter two, when studied separately, will be referred to as “tinnitus interference”. The concept “tinnitus annoyance” will occasionally be used when referring to a narrow concept measured on one single item.

A number of epidemiological studies have been carried out in different Western countries, most using the “prolonged spontaneous tinnitus”- criterion (Andersson et al., 2005). Results across studies suggest that 10-15 % of the general adult population experience tinnitus and for a proportion (5 - 30%) of those affected, tinnitus is a significant problem. One of the most comprehensive (n=48 313) prevalence studies to date, with an 80% response rate was the National Study of Hearing conducted in the United Kingdom (UK), estimating a prevalence of 10.1% for prolonged spontaneous tinnitus (Davis & El Refaie, 2000). In a recent Swedish study (n=18 734, 61% response rate) 28% responded that they had tinnitus, whereas 11% had tinnitus often or all the time (Hasson, Theorell, Westerlund & Canlon,
The authors point to a possible increase in prevalence of tinnitus and hearing problems.

There are relatively few studies done on the natural course of untreated tinnitus, of which almost none have a longitudinal design (Andersson et al., 2005). In the National Study of Hearing (Davis & El Refaie, 2000) the participants were asked in retrospect about how their tinnitus had developed over time. For most of the participants (72%) tinnitus loudness had not changed and for 26% it had increased. Annoyance, on the other hand, had decreased for 31%, a development that was most pronounced close in time to onset. Pilgramm et al. (1999) also found no change or continuous fluctuations in loudness to be most common outcome. In their study 19% reported an increase in tinnitus loudness, a percentage similar to the 28% and 35% found in other studies (Stouffer et al., 1991; Hiller & Goebel, 2006). Regarding annoyance no clear linear increase as a function of years since onset was found (Stouffer et al., 1991; Hiller & Goebel, 2006). Smith and Coles (in Andersson et al., 2005) even found that severity of tinnitus was likely to decrease with time. Across studies results show that prevalence of tinnitus seems to increase with age, it is however unclear whether or not tinnitus severity increases or not, here mixed results have been found (Andersson et al., 2005).

Etiology

Tinnitus is a symptom that can accompany most central or peripheral dysfunctions of the auditory system, of which a majority originate in the cochlea (Nuttall, Meikle, & Trune, 2004). In most cases, tinnitus is associated with age related hearing loss, or excessive noise exposure (Eggermont & Roberts, 2004). In a sample of 2369 regular clinical patients from Oregon, 22% reported that their tinnitus was noise related, 17% reported that it was related to a head and neck trauma, 10% reported that it was caused by a ear-nose-throat illness and 12% reported that it was related to other illnesses, medications, stress, surgery, a possible TMJ syndrome or barotrauma (Henry, Dennis & Schechter, 2005).

Spoendlin (in Davis & El Rafaie, 2000) reported the occurrence of tinnitus among patients with different pathological conditions in the inner ear frequently associated with tinnitus. According to him 70% of patients presenting with age related hearing loss have tinnitus, 50%-90% of those with chronic noise trauma and 100% of those with acute noise trauma. For the less common etiologies 100% of those with Menières diease have tinnitus, 50% of those with sudden deafness, 30-90% of those with drug-induced hearing loss and 70% of those with tumour on the vestibular or auditory nerve.

For any pathological process associated with tinnitus, not all subjects with this diagnosis will experience tinnitus (Davis & El Rafaie, 2000). Moreover there is good evidence that tinnitus activity can occur at an anatomical site other than that of the initial pathology. This is the most obvious when the presumed cause of tinnitus is
removed, as for instance after surgical removal of a vestibular schwannoma, when the associated tinnitus often continues (e.g., Baguley, Humphriss, Axon & Moffat, 2005). Thus it has been suggested that the cause must be multifactorial and/or that tinnitus is a threshold phenomena.

There are a number of persons with tinnitus where no obvious otological trigger can be found (Andersson, Baguley et al., 2005). One group reports tinnitus onset following a major life event and another group has tinnitus with trigger factors supposedly belonging to other sensory systems. For instance there is some evidence of a higher than expected prevalence of mandibular dysfunction among those with tinnitus (Rubenstein et al., 1990; Bernhardt et al., 2004). Moreover a reduction of tinnitus has been reported in between 46-96% of patients with concurring tinnitus and temporomandibular disorder as a result of treatment of that disorder (Wright & Bifano, 1997). In many cases the cause of tinnitus is not established (Levine, 2004). For instance in the Oregon sample, 40% reported no known events associated with their tinnitus onset (Henry et al., 2005).

**Pathological mechanisms**

Even in cases where the cause of tinnitus is known, the mechanisms responsible for sustained tinnitus remain unclear (Henry, et al., 2005). A large number of theories and models have been proposed to explain the pathophysiological basis of the tinnitus signal. Most of these involve the cochlea, the auditory nerve, the central auditory nervous system and the interplay between them.

At the level of the cochlea theories have focused on discordant damage of inner and outer hair cells (Jastreboff & Hazell 1993), defects in calcium handling (Zenner & Ernst, 1993; Jastreboff & Hazell 1993) or outer hair cell loss (Kaltenbach et al., 2002). Other theories have focused on naturally occurring opioid dynorphins being released in response to stress thus enhancing the spontaneous release of glutamate from the inner hair cells (Sahley & Nodar, 2001) activating cochlear NMDA (N-methyl-D-aspartate) receptors (Guitton et al., 2003) resulting in altered neural excitability and/or an altered discharge spectrum in type I neurons (Sahley & Nodar, 2001).

At the level of the auditory nerve pathophysiological theories propose an increase, or decrease or abnormal temporal pattern of spontaneous activity in the auditory nerve. Other proposed mechanisms are cross-talk between auditory nerve fibres causing synchronization of spontaneous activity, or an imbalance of firing patterns between tonotropically differentiated auditory nerve fibres (Henry et al., 2005).

At the level of the central auditory nervous system theories propose increased spontaneous activity in the dorsal cochlear nucleus (Brozoski, Bauer, & Caspary, 2002; Kaltenbach & Afman, 2000), and the inferior colliculus (Chen & Jastreboff, 1995) Other theories include possible effects of the efferent auditory system
(Jastreboff & Hazell, 1993), tonotropic reorganisation of central auditory structures (Lockwood et al., 1998) and alterations in serotonin functioning in the auditory nuclei (Simpson & Davies, 2000).

Over the years there have been continued discussions about where tinnitus is generated (Henry et al., 2005). Early theories focused mostly on a cochlear origin. However since tinnitus sometimes prevailed after a surgical section of the auditory nerve this assumption needed to be modified. Current evidence suggests changes in the balance of excitation and inhibition at multiple levels of the auditory pathway due to pathology in the ear and/or auditory nerve to cause changes in central auditory structures (Eggermont & Roberts, 2004). It is suggested that this abnormal auditory output causes reduced inhibition in central auditory structures, hyperexcitability of the central auditory system and reorganization of the central tonotrophic map. These theories and models all focus on cochlear tinnitus. As before mentioned a number of tinnitus patients are presumed to have tinnitus originating from, or at least being modulated by, another sensory or sensorimotor system (Cacace, 2003). A group of tinnitus patients are able to modify their tinnitus somatically by clenching their jaws (Lockwood et al., 1998), contracting their head and neck (Levine, 1999) altering their direction of gaze (Biggs & Ramsden, 2002) or through stimulation of their skin (Cacace et al., 1999a; Cacace et al., 1999b). It has been suggested that the mechanisms behind tinnitus in these cases are most likely activation of broad multimodal networks of neurons and possibly cross modal neuroplasticity (Cacace, 2003).

Classification
There are several different systems for classification of tinnitus existing in parallel. Because of the lack of knowledge about mechanisms underlying tinnitus generation and perception it is hard to reach agreement on one system of classification. The most common way of classifying tinnitus is into the categories objective or subjective (Dobie, 2004). Objective tinnitus is produced by an internal sound source that activates the cochlea, such as blood flow, the sound of muscular contractions, or oto-acoustic emissions, and is at least in theory audible to an external observer. Subjective tinnitus on the other hand has no acoustic source and thus creates no movement in the fluids or hair cells of the cochlea. Dobie (2004) suggests the use of the word somatosounds for objective tinnitus, whereas the term tinnitus should be reserved to describe subjective tinnitus. In this thesis the term “tinnitus” refers to subjective tinnitus fulfilling the “prolonged spontaneous tinnitus”- criterion.

A system of classification with five different dimensions has been suggested (Davis & El Refaie, 2000). The first dimension being pathology – whether or not the tinnitus reaches the prolonged spontaneous criterion and coexists with a hearing loss or is just a transient experience in a normal hearing subject. The second dimension concerns the severity, divided into two categories: acceptable or unacceptable. The third aspect relates to the duration of tinnitus where temporary tinnitus lasts a short
period after noise or drug exposure, whereas permanent tinnitus can be either constant or intermittent. The fourth and fifth dimensions in the classification consist of site of dysfunction (middle ear or sensorineural) and etiology.

A different approach to classifying tinnitus would be the International Classification of Functioning, Disability and Health (ICF), which is a classification of health and health-related domains developed by the World Health Organisation (WHO, 2001). The ICF is based on a bio-psycho-social model and allows and encourages users to document the impact of health conditions on functioning from a biological, an individual and a contextual/societal perspective. All of these levels can influence human functioning.

The biological level concerns aspects of body structure and body function. Regarding tinnitus the relevant body structure and body functions would be the cochlea and auditory nerve, possibly the middle ear, the central auditory nervous system, multimodal neural networks, hearing functions, sleep functions and sustaining attention.

The individual level refers to personal factors, such as coping pattern or personality. In tinnitus the role of coping styles such as maladaptive, passive and effective coping have been investigated (e.g., Budd & Pugh, 1996; Andersson, Kaldo, Strömgren & Ström, 2004). A number of personality traits have also been studied in relation to tinnitus, such as optimism (Andersson, 1996), perfectionism (Andersson, Airikka, Buhrman, & Kaldo, 2005), neuroticism (Zachariae et al., 2000) and locus of control (Budd & Pugh, 1995).

The societal perspective involves both natural environments and man-made environments. Regarding tinnitus this includes aspects such as occupational and leisure noise levels, labour legislation, health insurance, sick-leave policies, work injury insurance policies, the development of hearing aid technology etc. For a person with tinnitus, sound, noise and acoustic environments are particularly important contextual features.

In the ICF functioning is described in terms of Activity as in “the execution of a task or action” and Participation as in “involvement in a life situation” whereas disability is an umbrella term for impairment, activity limitations, and participation restrictions.

**Tinnitus interference and disability – a psychosocial problem**

The fact that only a smaller proportion of all people with tinnitus are moderately or severely distressed by it suggests that different underlying mechanisms are
involved in the generation of the tinnitus signal and the tinnitus interference (Davis & El Refaie, 2000). As with other chronic medical conditions adjustment to tinnitus does not seem to be closely related to the severity of the condition (Budd & Pugh, 1996b). It has repeatedly been found that characteristics of tinnitus such as loudness or pitch are not related to tinnitus interference (Andersson, Baguley et al., 2005). Attias et al. (1995) even found that people who sought help for tinnitus had lower levels of tinnitus - but more psychiatric problems - than those who did not seek help. However, findings have been inconsistent; some revealing that loudness does not predict poorer patient adaptation (e.g., Jakes, Hallam, Chambers, & Hinchcliffe, 1985; Hallam, Rachman, & Hinchcliffe, 1984), others demonstrating significant correlations between audiological characteristics and tinnitus interference (for a summary see Henry & Wilson, 1995). The role of psychosocial variables in the conceptualisation of tinnitus interference is undisputable and their explicatory value has repeatedly been shown to exceed that of audiological characteristics (e.g., Newman, Wharton, & Jacobson, 1997; Andersson & Vretblad, 2000; Zachariae et al., 2000).

In the group who experience tinnitus as a significant problem it is perceived as being intrusive and irritating. In this group non-auditory problems associated with the impairment are common, such as sleep disturbance, emotional distress and disruption of cognitive functioning. Overall it has not been firmly established whether sleep disturbances, emotional distress and cognitive disruption are secondary to tinnitus interference or precedes it (Andersson, Baguley et al., 2005).

Tyler and Baker (1983) studied difficulties experienced by 72 members of a tinnitus self help group and found that 93% of their patients reported that tinnitus had an effect on lifestyle, 56% reported a marked effect on their general health and 70% reported emotional difficulties. Results from the National Study of Hearing conducted in the UK, reported by Davis and El Refaie (2000) showed that 50% of those with tinnitus found it moderately or severely annoying, and 50% reported sleep disturbance as a result of tinnitus. These groups were highly overlapping. In total, 10% reported that tinnitus severely affected their quality of life and 5% reported a severe effect on their ability to lead a “normal” life.

Sleep disturbance
Sleep disturbance is thought to be the single most important aspect of tinnitus (McKenna, 2000). Not only is it the most, or second most common problem reported but also the most significant one (Andersson, Baguley et al., 2005). It has been estimated that between 25-50% of clinical tinnitus patients have sleep problems (Andersson, 2002). Sleep problems are associated with more tinnitus interference, and this association grows stronger with time (Folmer & Greist, 2000). Two relatively large studies with elderly participants have shown that sleep problems are more common for those with tinnitus, than for their peers (Hébert & Carrier,
The amount of sleep problems also differs between those who seek, and those who do not seek help for their tinnitus (Scott & Lindberg, 2000). Insomnia and depression are reported as the most important predictors of tinnitus discomfort and decreased tolerance of the symptoms (Scott, Lindberg, Melin & Lyttkens, 1990).

**Emotional distress**
The relationship between tinnitus and emotional distress or psychiatric problems is well documented, at least in the help-seeking group (Andersson, 2002). Most studies have used self-report measures in their assessments but a number of studies have used structured psychiatric interviews adopting DSM criteria (American Psychiatric Association, 1994). In a clinical setting, 63-77% of tinnitus patients have at least one psychiatric diagnosis (Kaldo, 2008). The prevalence of current depression or mood disorder ranges between 39-60%, whereas the lifetime prevalence amounts to 62-78% (Andersson, 2002). On self-report measures slightly elevated levels of anxiety have also been reported (Stephens & Hallam, 1985) as well as small correlations between anxiety and tinnitus interference (Haford & Anderson, 1991). In a recently published study (n=285) 45% of the variability on tinnitus interference was accounted for by a statistical model including self-reported depression, pure tone average at four high frequencies and state anxiety, with depression as the main contributing factor (Oishi et al., 2011). Erlandsson has suggested that negative reactions to tinnitus could be divided into a depressive subtype and an anxious subtype but this remains to be tested (in Andersson, Baguley et al., 2005). Studies of cognitive bias suggest that tinnitus patients process information in a fashion corresponding either to depressive functioning, anxious vigilance, or both (Andersson & McKenna, 2006). Also, there seems to be an additive effect of co-occurring anxiety and depression on quality of life and coping for tinnitus patients (Bartels et al., 2008).

**Functioning and quality of life**
It has been found that 22-33% of tinnitus patients in a clinical population spontaneously reported not being able to concentrate as a consequence of their tinnitus (Sanchez & Stephens, 1997). Concentration problems have been viewed as secondary to the emotional distress evoked by tinnitus (Andersson, Baguley et al., 2005). There have been a few studies looking at the cognitive performance of tinnitus patients showing that they perform worse than normal hearing subjects and hearing impaired subjects on Stroop tests (Andersson, Eriksson, Lundh & Lyttkens, 2000; Stevens, Walker, Boyer & Gallaugher, 2007) and in different demanding dual task conditions (Hallam et al., 2004; Rossiter et al., 2006; Stevens, Walker, Boyer & Gallaugher, 2007). A shorter reading span than for normal hearing subjects has also been reported (Rossiter et al., 2006). A series of other cognitive tests have been used in these kinds of comparisons were no differences or mixed results were found (Andersson & McKenna, 2006).
In another study El Refaie et al. (2004) assessed the effect tinnitus had on functioning and daily life in a group attending a tinnitus clinic. They found that on a measure of social handicap, on average 46% in the pre-clinic condition reported that tinnitus affected their day-to-day life, including aspects of the extent to which tinnitus interfered with listening to people, concentration, social activities, household activities, enjoying life, and attending to people and tasks. Tinnitus has also been shown to affect the quality of life on all eight scales of the short form 36 (SF36) health survey questionnaire for a group seeking help at a specialist tinnitus clinic, with results comparable to those of people reporting low back pain (Wilson, Lewis & Stephens, 2002). Regarding occupational effects interference with work was spontaneously reported by 4% of those with tinnitus (Tyler & Baker, 1983). Despite the problems possibly associated with tinnitus very few people, at least in Sweden, are on sick leave due to their tinnitus (Andersson, 2000). An expert panel from The World Health Organisation has given moderate to severe tinnitus a disability weight of 0.11 based on estimated limitations in living a normal life (WHO, 2011). This disability weight is comparable to those of mild to moderate agoraphobia and epilepsy (both a weight of 0.11), chronic pelvic pain (0.122), and lower back pain caused by chronic intervertebral disc protrusion (range 0.103–0.125).

According to the UK National Study of Hearing (Davis & El Rafaie, 2000) 7.1% of the population consult a doctor and 2.5% attend a hospital for their tinnitus. Findings indicate that psychological profile and tinnitus related problems such as sleep disturbance, anxiety and depression, rather than aspects of tinnitus itself (such as loudness), are related to help-seeking behaviour (Hallberg & Erlansson, 1993; Kirsch, Blancard & Parnes, 1989; Scott & Lindberg, 2000; Attias et al., 1995). In the non-help-seeking group the prevalence of depression or other psychiatric disorders corresponds quite well to that of the normal population (Wilson et al., 1991).

In sum, for a proportion of those who have tinnitus it creates a significant interference on sleep, mood, functioning, life quality and daily activities, sometimes to such an extent that tinnitus leads to activity limitations, and participation restrictions. Psychosocial variables are critical for the understanding of tinnitus interference and disability.

**Treatments of tinnitus and tinnitus interference**

A large number of different treatments have been proposed and tested with the aim to cure, suppress or, at least diminish tinnitus. Despite some promising alternatives, so far no evident tinnitus specific treatment option can be said to have enough empirical support to be recommended as an effective way to remove or diminish tinnitus for the large majority, or even for specific well-defined sub-groups (Possibly with a few exceptions such as cochlear implantation for the profoundly
deaf). Given the complexity of causes and mechanisms related to tinnitus generation it is highly unlikely that a complete cure for all will ever be found. Here a more clinically useful categorisation system could be helpful in sorting out what patient should be given what treatment. While waiting for effective treatments to be developed and empirically validated it is relevant to help the smaller group of people who are moderately or severely distressed by their tinnitus. A number of treatments have been developed with this aim.

**Surgery and pharmacological treatments**

The role of surgery as a treatment of tinnitus is almost non-existent. Surgery is a relevant treatment only for those whose tinnitus is a part of a syndrome (such as Ménières disease, otosclerosis and vestibular schwannoma), who have no useful remaining hearing in the affected ear and have tried all other treatment options. Decompressive operations can be beneficial in the rare cases when vascular compression of a specific cranial nerve is causing tinnitus (Andersson, Baguley et al., 2005).

Different pharmacological treatments have been evaluated in the management of tinnitus, of which some aim to suppress tinnitus (lidocaine, benzodiazepines, antispasmodic agents, anti-epileptic agents, vasodilators and diuretics) whereas other treatments aim to reduce tinnitus related problems (melatonin). Antidepressants have been evaluated both with regard to their possible effect to reduce tinnitus directly and their possible effect on tinnitus interference (Baldo, Doree, Lazzarini, Molin & McFerran, 2009).

Intravenous injection of local anaesthetic agents such as lidocaine has a relevant impact on tinnitus for approximately 60% of tinnitus patients, a short-lived effect with potentially serious side-effects (Simpson & Davies, 1999). Thus, lidocaine and other anaesthetic agents have not been considered suitable for tinnitus management (Andersson, Baguley et al., 2005). One small, randomised double-blind trial has evaluated the effects of benzodiazepines, separating the anxiolytic effects from tinnitus suppression (Johnsson et al., 1993). Results demonstrated a tinnitus reduction in 76% of the trial patients. However other studies are inconclusive (Henry et al., 2005) and the risk of developing a physical and psychological dependence of benzodiazepines limit their usefulness (Dobie, 1999). Antispasmodic agents, anti-epileptic agents, vasodilators and diuretics have failed to show beneficial effects in tinnitus management (Andersson, Baguley et al., 2005).

The effect of melatonin has been evaluated in a small, randomised, placebo-controlled, double-blind, cross-over trial (Rosenberg, Silverstein, Rowan & Olds, 1998). Results showed no significant differences in improvement on tinnitus interference when comparing melatonin to placebo.
The effects of antidepressant drug therapy on tinnitus has been assessed in a Cochrane review (Baldo et al., 2009). Six randomised controlled placebo comparisons involving 610 patients were included in the review. The authors conclude that there is not yet sufficient evidence to say that antidepressant drug therapy improves tinnitus or tinnitus interference. Some possible benefit was found from tricyclic agents and a subgroup receiving a high dosage of SSRI, but it remains unclear whether such effects are primary or due to an effect on a coexisting depression.

**Sound Therapy**

Sound therapy has been one of the most frequently applied treatments of tinnitus (Andersson, Baguley et al., 2005). It was first introduced as a means of reducing the contrast between the tinnitus signal and the background noise by using a white noise to mask tinnitus and thereby decrease the patient’s perception of it (Hobson, Chisholm & El Refaie, 2010). Initially in sound therapy the tinnitus percept was completely masked, making it inaudible. Later development pointed to the benefits of instead using minimally appreciable white noise to achieve down regulation of tinnitus percept. The rationale behind this shift was that the patient would not be able to habituate to tinnitus if it was made inaudible. Besides distraction and habituation another proposed beneficial process through which sound therapy is suggested to work is through “sound enrichment” such that the white noise acts as a source of stimulation of the central auditory system, compensating for the deprivation of peripheral auditory input. Sound therapy can be delivered with or without an instrument that provides sound directly to the ear. Such instruments are behind the ear or in the ear sound generators producing white noise, hearing aids, combined sound generators and hearing aids, pillow loudspeakers, cd’s and music cassettes.

The effectiveness of sound therapy with regards to tinnitus has been assessed in a recent Cochrane review (Hobson, et al., 2010). Six trials ($n=553$) were included in the review. Two trials compared sound therapy to another treatment, three trials compared different forms of sound therapy and one trial included both types of comparisons. When given counselling, information or relaxation training with or without sound therapy, no additional benefit of sound therapy was shown (Dineen, 1999; Goebel, 1999). Normal hearing subjects seem to benefit more, or at least as much from counselling as from sound therapy (Hazell, 1985). No differences in results have been found when comparing sound therapy devices, combination instruments, hearing aids or exposure to “environmental sounds” (Mehlum, 1984; Hazell, 1985). Further, there are no differences depending on whether the sound therapy is delivered in an intermittent fashion throughout treatment, or starts with complete masking initially (Davis, 2007). In sum the Cochrane review failed to show strong conclusive evidence of the efficacy of sound therapy for tinnitus (Hobson, et al., 2010).
The use of hearing aids to treat tinnitus is commonly applied, even for those who are marginal hearing aid candidates (Henry et al., 2005). Uncontrolled trials have indicated some benefits regarding tinnitus for hearing aid users (Surr, Kolb, Cord & Garrus, 1999; Searchfield, Kaur & Martin, 2010), whereas a controlled trial failed to replicate this finding (Melin, Scott, Lindberg & Lyttkens, 1987).

Tinnitus Retraining Therapy is a treatment combining sound therapy with directive counselling based on a neurophysiologic model of tinnitus (Jastreboff & Hazell, 2004). This model postulates that a number of non-auditory systems in the brain are involved in the perception and annoyance related to tinnitus interference, the main emphasis being on the limbic system and the autonomic nervous system. The aim in TRT is to promote cognitive and emotional habituation to tinnitus. There is a need for controlled trials published in peer-reviewed papers with validated outcome measures to support the efficacy of TRT as a newly published Cochrane review on TRT for tinnitus only found one trial fulfilling their inclusion criteria (Phillips & McFerran, 2010). This one trial compared tinnitus masking with Tinnitus Retraining Therapy and found considerable reduction of tinnitus interference in both groups (Henry et al., 2006). However in the long term follow-up, the TRT treatment showed continued improvement whereas the effects in the tinnitus masking treatment remained stable.

A selection of other treatment options

It has been shown experimentally that electrical stimulation of the ear can reduce or abolish tinnitus (Tyler et al., 2008). Electrical stimulation has been applied to different regions, to the auditory nerve, to the external pinna and tragus, the temporomandibular joint, the upper cervical nerve and to other parts of the body. A number of uncontrolled trials have shown that different kinds of electrical stimulation can have beneficial effects on tinnitus (e.g. Rubinstein, 2003; Konopka, 2001). Controlled studies however suggest that a substantial proportion of the supposed benefit is due to a placebo-effect (Dobie, 1986; Kapkin, 2008). In one large (n=200) uncontrolled trial only 17.9% responded to the stimulation (Vanneste, Plazier & Van de Heyning, 2010). Dobie et al. (1986) concluded that electrical tinnitus suppression can be effective for a small proportion of patients with sensorineural hearing loss and tinnitus.

The evidence of tinnitus suppression following cochlear implantation has been reviewed by Quaranta, Wagstaff and Baguley (2004). Results across studies show that tinnitus is experienced by up to 86% of adult cochlear implant candidates. However only about 30% are bothered by it. Occasionally electrode insertion may induce tinnitus, but this is rare (0-4%). Between 50% and 95% of patients will report complete tinnitus suppression, or reduction of tinnitus intensity and awareness when they use their cochlear implant device. An increment in the tinnitus owing to CI has sometimes been found (0-9%). There is a trend in the literature that multichannel implants had a greater effect on tinnitus than the older single-channel
implants. A cochlear implant is only considered for an individual getting very limited benefits from a hearing aid.

Experimental studies have repeatedly shown encouraging results regarding the suppressive effects repetitive transcranial magnetic stimulation (rTMS) may have on tinnitus (Langguth et al., 2008). However because of small sample sizes, methodological heterogeneity, unclear duration of the achieved effects and high variability of results, this promising potential needs to be explored further before findings can be considered as more than preliminary.

Regarding acupuncture a systematic review found six randomised controlled trials evaluating the treatment effects on tinnitus (Park, White & Ernst, 2000). Two unblinded studies showed a positive result, whereas four blinded studies showed no significant effect of acupuncture. The conclusion is that acupuncture does not reduce tinnitus.

Several different treatments from complementary medicine have been tried with tinnitus such as ginkgo bilboa, dietary supplements, St. John’s wort, homeopathic therapies, reflexology, ear candles and ultrasonic or low-laser stimulation to the ear (Andersson, Baguley et al., 2005). There is no evidence base for these treatments. At best, anecdotal or uncontrolled evidence may exist but the treatments that have been evaluated in controlled trials (homeopathy, ginkgo bilboa, yoga, zinc, low-power laser, ear candles) fail to show consistent results above placebo.

**Psychological treatments**

Different kinds of psychological treatments have been used in the management of tinnitus interference. In this field relaxation techniques and biofeedback are commonly listed as psychological treatments, due to the fact that they in research have been delivered by psychologists in the attempt to help tinnitus patients handle stress, tension and anxiety, primary or secondary to the tinnitus interference (Henry et al., 2005).

Relaxation can be presented and used in different ways. For instance as a passive relaxation or as a self-instructed applied relaxation, as a monotherapy or in combination with other interventions (Andersson, Baguley et al., 2005). Relaxation has often been included as one component in cognitive behaviour therapy of tinnitus interference. Evidence suggests that the best results are achieved when the applied relaxation is used (Davies et al., 1995), and when it is combined with other interventions (Coles & Hallam, 1987). Relaxation, presented alone, has marginal effects on tinnitus interference (Andersson, Baguley et al., 2005).

Biofeedback gave positive results in five early uncontrolled trials, but results from controlled trials are mixed (Andersson, Baguley et al., 2005). Effects seem to be enhanced when biofeedback is combined with another intervention such as
relaxation (White et al., 1986) or cognitive behaviour therapy (Weise, Heinecke & Rief, 2008).

Hypnotherapy was suggested as far back as 1950 and has been evaluated in a number of case studies, in one open study and three controlled studies (Andersson, Baguley et al., 2005). Between 36% and 73% of the treated subjects improved as opposed to between 0% and 25% in the active control conditions (Marks et al., 1982; Attias et al., 1990). Thus results have been promising, however no well-established or validated outcome measures were used to assess outcome.

Psychodynamic and supportive therapy are sometimes applied in tinnitus management but have only been empirically validated in two very early case studies and in a non-randomised controlled trial (Andersson, Baguley et al., 2005; Zöger, Erlandsson, Svedlund & Holgers, 2008). Results from the controlled trial revealed no benefits at the end of the intervention period in comparison to a medicine placebo group and no within-group changes on outcome (Zöger, Erlandsson, Svedlund & Holgers, 2008).

**CBT for tinnitus**

Among treatments aimed at affecting overall-well being and tinnitus interference, Cognitive Behaviour Therapy (CBT) is one of the most frequently reported treatments in published controlled outcome studies (Henry et al., 2005). Independent meta-analyses and systematic reviews show substantial support for CBT as a treatment for adults with tinnitus annoyance and tinnitus interference (Andersson & Lyttkens, 1999; Martinez Devesa, Perera, Theodoulou, & Waddell 2010). A recently published meta-analysis included 15 randomized controlled trials of CBT for tinnitus, with 1091 participants in total (Hesser, Weise, Westin & Andersson, 2011). Reductions on tinnitus interference with statistically significant effect sizes in the moderate range were found both in comparison to wait-list control conditions (Hedges’s $g = 0.70$, 95% CI = 0.56, 0.84) and in comparison to active controls (Hedges’s $g = 0.44$, 95% CI = 0.16, 0.72). The active controls consisted of education, sound therapy, relaxation and yoga. Results showed that improvements were maintained over a follow up period with a median of 6 months, although a significant regression slope estimate indicated that longer-follow ups were associated with smaller effect sizes.

Regarding secondary outcome relevant for distressed tinnitus patients (for instance effect on mood and sleep) the Cochrane Review by Martinez Devesa, et al. (2010) found an effect on depression in comparison to wait-list. In the meta-analysis by Hesser et al. (2011) small but statistically significant positive effect sizes were found on the secondary outcome consisting of a single mood construct with measures of anxiety and depression.
Although CBT is among the most well validated treatment approaches used in tinnitus management, only about 30-45% of those receiving the treatment show clinically significant improvement using the 50% symptom reduction criteria (Kaldo, Levin, Widarsson, Larsen, Andersson, 2008; Kaldo, Cars, Rahnert, Larsen, & Andersson, 2007; Andersson, Porseus, Wiklund, Kaldo, & Larsen, 2005; Kaldo, Larsen, & Andersson, 2004; Andersson, Strömgren, Ström, & Lyttkens, 2002). In response to this, a need has been expressed for ways of enhancing the treatment results of CBT for tinnitus interference (Kaldo, 2008).

Controlled and uncontrolled trials on CBT for tinnitus have been conducted in a number of different countries and different formats (individual treatment, group treatment and guided self-help). The emphasis has been put either on behavioural approach using relaxation techniques and attention controlling skills (e.g. Lindberg, Scott, Melin & Lyttkens, 1988) or on a cognitive approach using imagery training and cognitive restructuring to alter dysfunctional thoughts (e.g. Henry & Wilson, 2001). More recent guided self-help studies have used both behavioural and cognitive approaches while also adding a series of other interventions such as exposure to tinnitus, acoustic training, behavioural hearing tactics, problem-solving and sleep related interventions (stimulus control and sleep restriction). There have been some component analyses investigating which of these interventions are the most effective:

In a small (n=24) early trial (Jakes, Hallam, Rachman & Hincliffe, 1986) the effects of progressive muscle relaxation (PMR) was compared to a combination of PMR and attention-switching training. No additional effects were seen in the combined treatment, but this could be due to a problem with power. Lindberg, Scott, Melin and Lyttkens (1989) compared the effects of 1) relaxation and exposure to environmental sound (combined with attention-switching) to the effects of 2) relaxation and distraction (positive imagery and attention-switching) in a clinical sample (n=27). Both treatments had effects on self-reported loudness, tinnitus interference, and on perceived control. No differences in results were found between the treatments. In another study three forms of cognitive-behavioural therapy: passive relaxation, applied relaxation and cognitive therapy were compared in a group of 47 tinnitus outpatients (Davies, McKenna & Hallam, 1995). Due to a large drop-out from passive relaxation this group was omitted from the data analyses. Both of the remaining treatments had small, short-lived effects on tinnitus interference, tinnitus annoyance and secondary outcome. A small difference in favour of applied relaxation was found on annoyance, when using the pre-treatment scores as a co-variate (due to pre-treatment differences). Henry and Wilson (1998) compared two cognitive interventions in isolation or in combination. Results revealed a significant difference in favour of the attention control and imagery training over cognitive restructuring in the measure of irrational beliefs.
The analysis also showed that the combined treatment condition was superior to the single treatments regarding clinical response rate and psychological distress. In a large controlled trial (Wise, Rief & Goebel, 1998) patients were more satisfied with a combined CBT intervention than by an isolated problem-solving intervention. No difference in outcome was found on tinnitus interference. Another controlled trial (Kröner-Herwig, Frenzel, Fritsche, Schilkowsky & Esser, 2003) compared a cognitive-behavioural group training to two minimal-contact interventions and a wait list control (n=95). One minimal-contact intervention focused on education and the other on relaxation. Results showed larger benefits for those who had received a full CBT treatment. The minimal-contact interventions did not differ from each other but were superior to wait list on tinnitus disability, perception of control, tinnitus awareness, tinnitus interference and well-being. In sum these findings indicate that a combination of different cognitive-behavioural interventions seem to be more effective than singular interventions, and that both cognitive and behavioural techniques have been proven to be effective. It is however still unclear what interventions add to the effect and therefore should be included in the CBT treatment. Also, very little, if anything, is known about what mechanisms are responsible for treatment change (Wilson, 2006).

The cognitive behavioural conceptualisation of tinnitus is loosely based on the first general psychological model of tinnitus introduced by Hallam, Rachman and Hincliffe (1984), proposing that the natural response to tinnitus is habituation as it is an irrelevant signal and should rapidly lose its novelty. According to Hallam et al. (1984) tinnitus interference can be explained by the failure to habituate to the tinnitus signal. The model suggests that situations where such habituation can be expected not to occur include those in which the tinnitus becomes emotionally significant through a learning process, if the nervous system is affected in some way that intervenes with habituation, in cases of high levels of autonomic nervous arousal, with sudden onset of tinnitus or if tinnitus is particularly intense, aversive or unpredictable. Hallam et al. (1984) suggest that attending to tinnitus in a relaxed state should be beneficial through reducing the contingency between the tinnitus signal and arousal. Unfortunately this model has not been thoroughly investigated empirically (Andersson, Baguley et al., 2005) and it lacks the structure and elaboration of cognitive behavioural models for other problems, such as chronic pain (Vlayen & Linton, 2000). Thus, so far in tinnitus research the models of interference drawing from behaviour analysis have focused on very basic respondent learning principles such as habituation and classical conditioning. Very little research or scientific discussion has been devoted the role of operant behaviour in tinnitus interference and disability. This is somewhat surprising as operant conditioning in chronic illness has been a topic of research for some time (Fowler, Fordyce & Berni, 1969) and an operant behavioural pain treatment model was introduced by Fordyce and colleagues in the early 70’s (e.g. Fordyce et al., 1973).
In summary, CBT is a supported treatment for tinnitus, but there is room for improving both the outcome of CBT-treatment and the theoretical understanding of mechanisms involved in tinnitus interference and treatment change. The rationale in CBT for tinnitus has so far been fairly coping-oriented, teaching the patient to use relaxation techniques, background sounds and attention-switching as self-management skills. Recently, acceptance has found its way into a number of empirically oriented cognitive and behavioural treatment approaches. This approach can be considered particularly relevant when dealing with a chronic problem, such as tinnitus.

The usefulness of an acceptance approach to tinnitus interference

When coping is useless or maladaptive
Persons with severe tinnitus have a tendency to try out several coping strategies, regardless of their effects (George & Kemp, 1991). It has been suggested that the most frequently used coping strategies for distressed tinnitus patients were those aiming at regulating the level of emotional reaction to tinnitus (Dineen, Doyle & Bench, 1997) and at least male patients are more likely to adopt avoidant coping strategies compared to persons with noise-induced hearing loss, but no tinnitus (Hallberg, Erlandsson & Carlsson, 1992).

Budd and Pugh (1996a; 1996b) have reported two factor analytic studies investigating coping strategies used by tinnitus patients assessed by their own measure Tinnitus Coping Styles Questionnaire (Budd & Pugh, 1996a). In the first of these, three coping style factors were found which were labelled maladaptive, passive and effective coping. Maladaptive and passive styles were significantly associated with increased tinnitus severity, depression and state anxiety. Effective coping on the other hand was significantly associated with less anxiety but unrelated to the measures of tinnitus severity or depression. In the second study maladaptive and effective coping were the only factors identified. Maladaptive coping included strategies such as fantasizing about not having tinnitus; telling others how unpleasant the “noises” were; listening to the “noises”; going to bed and/or sleeping during the day to get away from tinnitus; avoiding social situations because of tinnitus and using a pillow speaker. This factor was again related to worse outcome regarding tinnitus severity, depression and anxiety. The second factor “effective coping” included strategies such as positive self-talk; trying not to think about tinnitus; thinking of something pleasant rather than concentrating on tinnitus and staying busy or active as a distraction from tinnitus. Interestingly this second factor was unrelated to tinnitus severity, depression and anxiety suggesting that so called “effective coping” was not helpful. The strategies listed under “effective coping” were not so unlike the attention-switching and positive imagery
coping taught in CBT for tinnitus. These results were confirmed in a study by Zachariae et al. (2000) who examined a wide variety of measures on psychosocial factors (e.g. depression, anxiety, personality characteristics, social support and coping) and tinnitus characteristics (e.g. tinnitus loudness and pitch match, subjective loudness, duration) and found that maladaptive coping showed the strongest relation to tinnitus interference, whereas effective coping showed no relation to tinnitus interference. Another study conducted by Sullivan et al. (1994) found that avoidant coping was associated with tinnitus disability, when controlling for levels of depression.

Two studies used the Tinnitus Coping Strategies Questionnaire (Henry & Wilson, 1995). The first study found no differences in frequency or benefit of coping strategies among those reporting high as opposed to those reporting low tinnitus interference (Henry & Wilson, 1995). There was however a trend that the more distressed patients used more coping strategies. In a later replication (Andersson, Kaldo, Strömgren, & Ström, 2004) results revealed that a more frequent use of coping strategies was associated with more tinnitus interference, even when controlling for the level of anxiety, depression and anxiety sensitivity. In this study most coping strategy items (73%) showed positive significant relationships with tinnitus interferences with only one item ‘I continue with my daily life as though the tinnitus is not there’ showing a significant correlation in the other direction, pointing to the possible benefit of acceptance. The same result was found in a replication study published in a doctoral thesis by Moreland (2007).

These results were all based on correlational studies, but one coping strategy commonly used by tinnitus patients has also been tested experimentally. Many tinnitus sufferers use background sounds to mask and distract themselves from tinnitus. In an between-group experiment (Hesser, Pereswetoff-Morath & Andersson, 2009) a series of trials were performed in either of two experimental conditions using the Digit-Symbol subtest included in the Wechsler Adult Intelligence Scale–Revised test battery (Wechsler, 1981). The subjects were randomly assigned to control of background sounds or no control of background sounds. Individuals in the condition with control showed faster growth rates on tinnitus interference (increased interference) and slower rates of improvement on cognitive performance over trials, compared to individuals assigned to the condition with no control.

To conclude, these findings indicate that some coping strategies tinnitus patients tend to use are harmful, whereas others are merely unhelpful and that the more coping used, the more distressed is the patient. Thus, adjustment to tinnitus may be promoted by disengaging from ineffective coping strategies. So far CBT for tinnitus has not focused on evaluating the workability of the patients coping strategies while letting go of those that are unhelpful, or even have detrimental effects. This is one
core component of the acceptance-based approaches recently presented within the CBT-spectra.

The role of avoidance
Avoidance has a central role in behavioural and CBT models in the initiation and maintenance of disability resulting from diverse conditions such as chronic pain (Vlaeyen & Linton, 2000), irritable bowel syndrome (Ljótsson, 2011), and depression (Ottenbreit & Dobson, 2004). Avoidance of activity has for a long time been recognised as a contributing factor to chronic pain (e.g., Fordyce, 1982) and has achieved a prime position in current research and clinical practise regarding this condition (McCracken & Samuel, 2007). There is now convincing evidence that a conceptualisation including fear, avoidance of activity, disuse and disability is useful for understanding chronic disabling pain (Vlaeyen & Linton, 2000; Leeuw et al., 2007). McCracken and Samuel (2007) have investigated different activity patterns in a clinical sample of chronic pain sufferers and found that patients who reported high activity levels, paired with little avoidance, demonstrated better physical and emotional functioning than those displaying other patterns of activity, such as activity cycling or avoidance.

Regarding tinnitus, the role of behavioural avoidance in explaining distress and disability has been explored in an epidemiological sample (Hesser & Andersson, 2009). In this study a measure of anxiety sensitivity (AS) was also included, which is a psychological factor that had earlier shown a relationship to tinnitus distress (Andersson & Vretblad, 2000). AS is a set of dysfunctional beliefs about harmful consequences of internal (arousal-related) sensations, believed to augment the experience of fear (Berman, Wheaton, McGrath & Abramowitz, 2009). The results showed that the relationship between AS and functioning (not being able to live a normal life because of tinnitus) was fully mediated by behavioural avoidance (not exposing oneself to tinnitus-associated situations). The relationship between AS and tinnitus interference was partially mediated by behavioural avoidance.

To a person for which tinnitus is perceived as an aversive stimulus the natural response would be to escape, avoid or attempt to alter this experience and other experiences connected to it. Most of the earlier listed unhelpful or harmful coping strategies can on a theoretical level be understood as serving precisely this function. This connects well to the concept of experiential avoidance, suggested to be a generic pathological process involved in a number of health problems, where disability is not primarily related to the health problem itself but rather to the individuals malfunctioning solutions to the problem (Hayes, Wilson, Gifford, Folette, & Strosahl, 1996). Experiential avoidance is defined as an unwillingness to remain in contact with certain private experiences such as bodily sensations, emotions and thoughts, manifested in action taken to alter these experiences and the context that occasion them (Hayes et al., 1996). The founders of the concept argue that the basis for experiential avoidance is built into the human language, as well as being socially
encouraged and modelled in the cultural context. When a human interacts symbolically with an event, the functions of the referent are partially present in the symbol, and vice versa (Törneke, 2009). As a consequence it will be hurtful to symbolically contact a hurtful event, as when thinking about it or reporting about it (Hayes et al., 1996). Further, as a result of language, the cognitions and emotions that emerge from aversive events themselves become aversive. The aversive function can further spread to other symbols or external events, via actual or verbally established relations (Hayes, Strosahl & Wilson, 1999). This means that the potential for contact with emotional pain is limitless for a human being. In addition to this, the founders of the concept reason that we are raised in a culture that views negative thoughts and emotions as something a) pathological and unwanted, b) causally related to behaviour and c) governed by the same rules of control that apply to external events (Hayes et al., 1996). In sum this explains why human beings are so prone to avoid not only aversive events per se, but also their own experiences and the related symbolic representations of these events and experiences.

The idea that human beings are motivated to avoid unwanted private experiences has grown out of findings in basic experimental work (e.g. Wegner, Schneider, Carter & White, 1991; Cioffi & Holloway, 1993) the coping styles literature (e.g. DeGenova, Patton, Jurich, & MacDermid, 1994) psychotherapy process research (e.g., Orlinsky & Howard, 1986) and the literature on clinical syndromes (e.g. Barlow, 1988).

The problem of experiential avoidance is twofold. Not only does it paradoxically make the avoided stimulus more salient and distressing (Hayes, Wilson, Gifford, Folette & Strosahl, 1996). It also motivates the individual to engage in fruitless attempts to regulate what is less controllable by will (tinnitus, thoughts and feelings), instead of putting their time and energy on behaviours leading to the life they want for themselves. Someone who is highly unwilling to remain in contact with tinnitus and thereby associated thoughts and feelings, is also motivated to find strategies of escaping and avoiding this experience. This promotes activities that give a short-term relief from symptoms but are less enjoyable and meaningful, putting more, rather than less emphasis on tinnitus. Over time the patient’s behaviour repertoire becomes less flexible as tinnitus will increase its functional importance in determining what activities and situations should be approached or avoided. As a result the patient becomes disabled by their condition. This points to the key theoretical construct in Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) called psychological inflexibility, defined as the inability to persist or change behaviour in the service of long-term valued ends, in the presence of negative private experiences.

Acceptance as an alternative

Acceptance is the alternative response to avoiding, escaping or attempting to control an experience. Acceptance refers to a process by which a private event (such
as tinnitus, and thereby associated thoughts and feelings) loses its functional influence on overt behaviour. It comes from the Latin “accipere”, meaning to receive or take what is offered (Hayes et al., 1999). Acceptance in its fullest expression means actively contacting an experience, for what it is - fully and without needless defence - while behaving effectively in the pursuit of valued goals (Hayes et al., 1996; Blackledge & Hayes, 2001). Acceptance by this definition is not an end in itself but a means to accomplish valued outcomes. An acceptance approach is not inconsistent with change strategies (Blackledge & Hayes, 2001). Rather it opens up a wide variety of response options and directs change strategies towards what can be changed at will, namely overt behaviour and life situation. It enables the individual to discriminate between the experienced need for emotional regulation and the true need for behavioural regulation.

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). Laboratory (Hayes, Bissett, et al., 1999; Masedoa, & Esteve, 2006) studies show that acceptance-based strategies have a positive impact on pain tolerance and the psychological problems associated with chronic pain.

Acceptance as a concept has also received some attention within the field of tinnitus research so far. Schutte, Noble, Malouff and Bhullar (2009) tested a theoretical model of tinnitus interference and of general distress that incorporated emotional intelligence and acceptance of tinnitus symptoms (n=162). The results showed that tinnitus interference was significantly related to both acceptance ($\beta=-.28$, $p<.001$) and general psychological distress ($\beta=.55$, $p<.001$). No significant relations were found to emotional intelligence or tinnitus symptom severity (loudness/maskability). In this study acceptance of tinnitus was measured using a seven-item scale assessing acceptance drawn from the Tinnitus Experience Questionnaire (TEQ; Croft, 2008). In an unpublished study by Croft this acceptance sub-scale was negatively related to measures of tinnitus severity, tinnitus interference, depression, anxiety and stress (Croft, 2008). However, when competing with the other two sub-scales of TEQ, defeat made such a strong unique contribution to the variance in tinnitus interference, depression, anxiety and stress, that no further variance was explained by acceptance. On tinnitus severity, acceptance continued to contribute with unique variance. In another study by Sirois, Davis and Morgan (2008) data from 315 tinnitus sufferers were collected via the Internet. A secondary finding in this study was that acceptance of tinnitus was related to fewer symptoms of depression and increased well-being. Lastly, in a doctoral thesis by Moreland (2007) acceptance coping, as measured by a single item on the Tinnitus Coping Strategies Questionnaire contributed with unique variance in a regression model predicting tinnitus interference and depression, controlling for tinnitus characteristics, other
coping variables and illness representation constructs. In addition, a full acceptance questionnaire entered as the sole predictor, accounted for 50.8% of the variance in tinnitus severity, 24.6% in anxiety, and 46.2% in depression. When entering acceptance as a last step in a regression model, it contributed with unique variance over and beyond that of tinnitus characteristics, other coping variables and illness representation constructs in predicting tinnitus severity and depression.

**Acceptance and Commitment Therapy (ACT)**

Acceptance and Commitment Therapy is one of several new cognitive and behavioural therapies aiming to reduce experiential avoidance and increase behavioural flexibility. Most of the theoretical framework behind ACT (i.e. respondent and operant learning) is shared with all behaviour therapies, such as behaviour therapy and CBT. In addition to learning theory ACT is also based on principles outlined in Relational Frame Theory (RFT) - a basic theory aiming to expand behaviour analysis to include an account of human language and cognition. ACT encompasses a philosophy of science, a basic theory of language and cognition, and a model of psychopathology and psychological change (Hayes et. al, 2006).

The proponents of ACT sometimes accuse CBT of having weakened its link to basic behavioural principles and the philosophical assumptions behind behaviour analysis, a link they instead wish to reaffirm (Hayes et al., 2006). In their criticism they point to a philosophical mismatch between the assumptions underlying cognitive information processing models used in CBT, and the assumptions of behaviourism. The philosophy of science behind ACT is radical behaviourism, somewhat refined and clarified in functional contextualism (Hayes, Barnes-Holmes & Roche, 2001). Drawing on earlier work on rule-governed behaviour and stimulus equivalence, the ideas behind relational frame theory were slowly developed and researched from the late 1970's and onwards by Steven Hayes and colleagues.
(Hayes et al., 2001). According to Hayes et al. (2006) the basic experimental work conducted on relational frame theory guided the development of ACT.

Relational frame theory (RFT)
Although respondent and operant learning work differently they share the basic assumption that a direct learning experience changes stimulus functions through a conditioning process where different stimuli have stood in an actual relationship to one another. This actual relationship is based on the proximity in time between two events and the fact that one event is contingent upon the other. According to RFT the process of changing stimulus functions through contextual control is also the core mechanism behind how thinking and language influence our behaviour (Törneke, 2009). The first major distinguishing quality of language/thinking is that an event can be arbitrarily related to any other event, without direct learning experiences, shared physical properties or actual relationships. The second major distinguishing quality is that as one relationship is being directly learned, derived (non-learned) relationships will simultaneously be established. If you teach a human being that A “is the same as” B, and that B “is the same as” C this human being will derive that B is the same as A and that C is the same as B. These kinds of derived relationships are called mutual entailment and have been seen in human beings as early as 17 months (Lipkens, Hayes & Hayes, 1993) but not in other language knowledgeable primates (Sidman et al., 1982; Dugdale & Lowe, 2000). A human being however, will also derive that A is the same as C, possibly as early as at an age of 23 months, although these two stimuli have never been presented together (Lipkens, Hayes & Hayes, 1993). This is called combinatorial entailment. It may seem like an overly simplistic example but it clearly illustrates the basic principles that according to RFT are characteristic of human language. Further, not even this very basic example of how human language works can be fully accounted for by operant or respondent learning (Törneke, 2009).

There is experimental evidence to show that relational framing is a learned ability (Lipkens, Hayes & Hayes, 1993; Luciano, Gomez & Rodriguez, 2007). It has also been established that relational framing is an operant behaviour, as it is flexible (Gomez, Barnes-Holmes & Luiciano, 2001) and contextually controlled, meaning it is controlled by antecedents (Wulfert & Hayes, 1988) and is influenced by consequences (Healy, Barnes-Holmes & Smeets, 2000). Further, it has been shown that stimulus functions can be transferred and transformed through relational framing (Dougher, Hamilton, Fink & Harrington, 2007). Evidence exists that relational framing and language are closely linked, as derived relational responding is strongly correlated with verbal ability (Devany, Hayes & Nelson, 1986) even in deviant verbal development such as for hearing impaired children (Barnes, McCullagh & Keenan, 1990). Derived relations also produce fMRI activation patterns that resemble those involved in semantic processing (Dickins, 2005) and directly trained, equivalent and non-equivalent stimuli show differential ERPs (Barnes-Holmes et al., 2005). Experimental research has established different kinds
of relational frames such as frames of coordination (same), opposition (opposite),
distinction (different), comparison (e.g. more than-less than), temporal (before-after)
and deictic (perspective-taking) (Törneke, 2009). Other kind of frames are suggested
theoretically such as frames of hierarchy, temporality (before-after) and causation
(cause-effect). Relational framing has been used to model semantic priming, implicit
association, analogy/metaphor, rule governed behaviour, motivation, perspective
taking and implicit cognition.

As a human being learns to relate stimuli through framing (verbal behaviour) and
react/act on stimuli according to the established relations (rule-governed behaviour)
with time this become two dominant processes involved in human behaviour
(Törneke, 2009). Verbal behaviour refers to both overt (i.e. talking, reading) and
covert (i.e. interpreting speech or text, thinking) relational framing. Over time large
relational networks of verbal stimuli are created by direct experience and derived
learning (Wicksell, 2009). In some contexts verbally established stimulus functions
are so effectively transferred or transformed from the referent to the symbol that
these two almost fuse together, as when the thought “What if tinnitus gets worse”
elicits a similar response of anxiety and escape as the experience of an actual
worsening of tinnitus would (Hayes et al., 1999). This is called cognitive fusion.

With RFT behaviourism can now, on a theoretical level, explain how antecedents
through verbal behaviour (relational framing in thought or language) acquire
stimulus functions from events that the individual has never been in contact with
(such as a presumed future) and how a verbal description of delayed consequences
can influence behaviour. This is a major breakthrough for behaviour analysis
(Törneke, 2009).

The relevance of RFT for understanding tinnitus interference and tinnitus disability
has yet to be empirically established. In a theoretical understanding however it can
be suggested that for a person who is not particularly bothered by their
condition “tinnitus” stands in a frame of coordination with “the perception of
sound(s)”. A person who is severely distressed however is likely to have related
aspects of “tinnitus” to a large network of aversive stimuli and consequences. For
instance “tinnitus”, for this person, can stand in a frame of coordination with “I will
never hear silence again”, which in turn stands in a frame of coordination with “My
life will never be the same again”, which in turn stands in a frame of coordination
with “My life is destroyed”. In this example it is most likely that tinnitus will elicit
different responses and promote different behaviour repertoires for these two
people. This is another example of how cognitive fusion can be hypothesised to
contribute to tinnitus interference, as when the thought “My life is destroyed” is
responded to as a truly destroyed life.
The ACT-model applied to tinnitus
According to the ACT model disability is not primarily an aggregated result of symptom burden, distress and limitations in the environment, but heavily relies on the individuals course of action in relation to symptoms, distress and the life they want for themselves. In this model the capacity to live a rich and rewarding life is not dependent on the absence or reduction of tinnitus symptoms or distress (Wicksell, 2009). The model suggests that a primary source of human suffering is the way verbal and rule-governed behaviour interact with direct contingencies to produce psychological inflexibility (Hayes et al., 2006). This is the case when behaviour is guided by derived verbal rules (cognitive fusion) such as "In order to be happy I must get rid of my tinnitus" narrowing down the behavioural repertoire by promoting behaviours devoted to control, diminish or abolish tinnitus (experiential avoidance). Further, as "getting rid of tinnitus" for most people is not possible today, following the logic of the verbal rule, this means that "being happy" is not possible. Through cognitive fusion and experiential avoidance controlling tinnitus can become a superior goal to living a valued life. As a result people may become so caught up with their tinnitus that they are no longer as committed to moving towards valued ends. In the ACT-model the individual’s level of functioning refers to their ability to act effectively despite the presence of tinnitus and negative thoughts and emotions (Wicksell, 2009). This ability is asserted in ACT through practicing acceptance of tinnitus and related reactions, finding ways of undermining fusion with hindering tinnitus related thoughts (defusion), identifying and stating important personal values and life goals, and having the patient commit to taking steps in the outlined direction. The treatment outcome in ACT is thought to be achieved through the processes of acceptance, defusion and values based action.

Empirical studies on ACT and chronic health conditions
The overall empirical status of ACT has been under some debate (Hayes, 2006; Öst, 2008). Proponents of ACT advertise that more than 50 trials and case series have been conducted to evaluate ACT, of which 30 are randomised controlled trials (Hayes, Villatte, Levin & Hildebrandt, 2011). Reviews and meta-analysis have revealed medium to large between group effect sizes in comparison to other structured interventions, placebo, treatment as usual and wait lists (Hayes et al., 2006, Powers et al. 2009, Ruiz, 2010). Further, components such as acceptance, defusion, values and mindfulness have been tested in over 30 experimental and 70 correlational studies (Hayes, Villatte, Levin & Hildebrandt, 2011). Results from experimental studies using instructions, metaphors or exercises have shown significant effect sizes on outcome such as pain tolerance (e.g. Hayes, Bissett, et al., 1999), perceptual-motoric performance (Zettle, Petersen, Hocker, & Provin, 2007) cardiovascular recovery (Low, Stanton, & Bower, 2008) behavioural avoidance (e.g. Levitt, Brown, Orsillo & Barlow, 2004), levels of anxiety (e.g. Feldner, Zvolensky, Eifert, & Spira, 2003) and discomfort (Marcks & Woods, 2005), in comparison to
techniques such as thought suppression, distraction or coping instructions. Results from correlational studies have shown that ACT components (mainly experiential avoidance) are on average moderately related to various quality of life outcomes, disability, mental health status, psychopathology and behavioural effectiveness such as job performance and chronic pain management (Hayes et al., 2006; Ruiz, 2010).

A more critical review of the empirical status of ACT and other contextual behaviour therapies included 13 randomised controlled trials (RCTs) on ACT, with a total of 677 participants (Öst, 2008). The author concluded that randomised controlled trials conducted in this field were methodologically significantly less stringent than CBT studies, that the mean effect size was moderate for ACT, and that none of the contextual behaviour therapies fulfilled the criteria for empirically supported treatments. In a more recent meta-analysis (Powers, Zum Vorde Sive Vording, & Emmelkamp, 2009) additionally five RCTs were included (n=917). Results showed that there was a clear overall advantage of ACT compared to control conditions. The average ACT-treated participant was more improved than 66% of the participants in the control conditions. Analysed separately ACT was superior to waiting lists and psychological placebos (Hedges’s g = 0.68) and treatment as usual (Hedges’s g = 0.42). However, ACT was not found to be significantly more effective than established treatments. Furthermore, regarding psychological distress such as anxiety/depression, ACT was not found to be superior to control conditions.

In the following outcome and treatment process studies on ACT for chronic health conditions will be reviewed. For an overview of the outcome studies see Table 1.

**Chronic Pain**

Chronic pain is the condition in which ACT has been most thoroughly investigated. So far three small randomised controlled trials, four larger open trials and four smaller pilot studies have been conducted. In the first randomised controlled trial (Dahl, Wilson & Nilson, 2004) workers at risk of developing disability related to pain and stress were randomised to continuing treatment as usual (TAU) or TAU + ACT. Results showed that the ACT group had less days of sick leave and used fewer medical treatment resources at post treatment and follow-up. There were no differences between the group regarding stress symptoms, pain symptoms, pain intensity or beliefs that symptoms were caused by work. The results support some of the assumptions behind the ACT model as they reveal a treatment-induced discrepancy between symptom burden and behaviour.

Another study included and randomised participants suffering from whiplash-associated disorders (WAD) to receive TAU or ACT+TAU (Wicksell, Ahlqvist, Bring, Melin & Olsson, 2008). The ACT group had a significant better outcome on pain disability, life satisfaction, fear of movements, depression, and psychological
flexibility a result that was maintained at follow-up. No differences or changes were found regarding pain intensity. Mediational analyses indicated that psychological flexibility significantly mediated the outcome on pain-related disability and life satisfaction (Wicksell, Olsson & Hayes, 2010). This whereas pain intensity, anxiety, depression, kinesiophobia, and self-efficacy did not show significant mediating effects.

A second study by the same group included children and adolescents who were randomised to ACT or a multidisciplinary treatment and amitriptyline (MDT) (Wicksell, Melin, Lekander & Olsson, 2009). The MDT treatment was on average twice as extensive as the ACT treatment and continued throughout the follow-up phase. Using all assessment points a difference in results favouring ACT could be found on perceived functional ability in relation to pain, pain intensity and pain related discomfort. At post treatment differences were also found regarding fear of re/injury, kinesiophobia, pain interference and quality of life.

Four large-scale open trials have been published using different samples of patients from the same residential pain rehabilitation unit (Ruiz, 2010). The treatment program was based on ACT principles adapted to an interdisciplinary setting, was delivered in a group format and lasted three or four weeks (6.5h per day, 5 days a week). Outcome was measured on depression, pain-related anxiety, pain intensity, physical disability, psychosocial disability, walking distance, performance on a sit-to-stand task, medication classes and medical visits. All studies included a three month follow-up. Results from three of the trials showed significant improvements on all outcome measures which were maintained at follow-up. In one of the studies significant change in work status was also found and 75.4% of the subjects demonstrated reliable improvements in at least one key domain (Vowles & McCracken, 2008). Similar results were found in the fourth trial, including a group of highly disabled chronic pain patients (McCracken, MacKichan & Eccleston, 2007). Three of these studies analysed the relationship between changes in process and changes in outcome using regression analyses on residualised change scores. Results showed that changes in acceptance (McCracken et al., 2005) and valued based action (Vowles & McCracken, 2008) were associated with improvements in outcome. In a comparison between different potential processes of change it was found that changes in acceptance and catastrophizing accounted for significant variance independent of, and larger than changes in pain intensity.

**Type II diabetes**
The effect of ACT has also been evaluated in a RCT on type II diabetes. Patients (n=81) in a low-income community health centre were randomised to education alone or a combination of education and ACT, each condition consisting of a 7 h long one - day workshop (Gregg, Callaghan, Hayes & Glenn-Lawson, 2007). After 3 months the patients in the ACT condition reported better diabetes self-care and were more likely to have glycated hemoglobin (HbA1C) values corresponding to
diabetic control. Mediational analyses indicated that changes in acceptance coping and self-management behaviour mediated the impact of treatment on changes in HbA1C both individually (controlling for the other mediator) and in total.

**Epilepsy**
Acceptance and Commitment Therapy has been tried in two randomised controlled trials with drug-refractory epilepsy in South Africa and in India. Treatment consisted of two individual sessions, one group session and two booster sessions at 6 and 12 months post treatment. The therapy included the behaviour therapy technique “seizure control”. In comparison to supportive therapy (n=27) ACT showed significant and large differential effects regarding seizure frequency, seizure index and quality of life (Lundgren, Dahl, Melin & Kies, 2006). Results were maintained or even more pronounced in the follow-ups at 6 and 12 months. A series of mediational analyses showed that changes in outcome at the 1 year follow up were mediated by ACT processes (Lundgren, Dahl & Hayes, 2008). In comparison to yoga (n=18) both treatments reduced seizure frequency, seizure index and improved quality of life (Lundgren, Dahl, Yardi & Melin, 2008). Because of large pre treatment differences between groups a found significant difference on seizure index reduction is hard to interpret.

**Weight loss**
Three preliminary trials have been published regarding weight loss and the related reduction in stigma (Ruiz, 2010). Forman, Butryn, Hoffman & Herbert (2009) conducted a preliminary open trial on 29 overweight and obese women. The intervention consisted of 12 weekly one-hour group sessions containing both behaviour recommendations based on the LEARN-program (Brownell, 2000) and Acceptance and Commitment based components. Among completers (n=19) the participants had lost 6.6% of their body weight post-treatment and 9.6% at the 6 months follow-up. Intention-to-treat weight losses were 4.5% at post treatment and 6.6% at 6 months. Regressed change scores of several of the process variables were associated with weight loss at post treatment. In another weight loss study Tapper, Shaw, Islev, Hill, Bond and Moore (2009) randomised 62 obese women actively attempting to loose weight to receive a series of ACT workshops or to act as a control condition. Results revealed a small (d=0.31) significant difference between the groups regarding their amount of physical activity. No differences were found regarding BMI or mental health difficulties. In a small study (n=19) by Alberts, Mulkens, Smeets and Thewissen (2010) participants were randomised to receive or not receive a 7 week mindfulness training in addition to their dietary group treatment. The results showed participants in the mindfulness group reported significantly lower cravings for food. No results were found on weight loss.

**Tinnitus**
So far no studies have been conducted evaluating the effects of Acceptance and Commitment Therapy on tinnitus interference. Two studies have however studied
mindfulness, which is an acceptance promoting intervention used as one treatment component in ACT.

In a small \(n=25\) non-randomised treatment study Sadlier, Stephens & Kennedy (2007) compared a four session mindfulness meditation cognitive behavioural therapy approach to a wait list control. Results regarding tinnitus interference were in favour of the mindfulness therapy and results were maintained at a four to six month follow-up.

In a randomised controlled trial the effects of Mindfulness Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002) was compared to that of progressive relaxation training (Jacobson, 1957) in 30 participants recruited through local newspapers (Philippot, Nef, Clauw, Romrée, & Segal, in press). All participants were given a single session of psycho-education about tinnitus, and two months later they were randomised to one of the two interventions. Both treatments were manualised and consisted of six group sessions following the same structure, each lasting 2 hours and 15 minutes. Outcome was assessed at baseline, pre-training, post-training, and at a 3-month follow-up. Results revealed a clear positive effect of psycho-education on reduction of negative affect, irritability, rumination, social difficulties and self-efficacy. For most variables, mindfulness and relaxation trainings did not have an immediate effect. However at the follow-up significant differences in favour of MBCT were found on negative affectivity and rumination. Another differential impact between the interventions was that the mindfulness group had a continued significant decrease on negative affect and rumination at follow-up compared to pre-training and a maintained effect on irritability and self-efficacy. This whereas the relaxation group only maintained the effects of psycho-education regarding rumination. Also, the relaxation group used more distraction coping following treatment, whereas the mindfulness group used more acceptance coping.

Treatment outcome and process studies have also been conducted in the field of cancer, postsurgical recovery, prevention of HIV and in systemis lupus erythematosus (Ruiz, 2010). These studies have however not been published in peer reviewed journals. Besides health psychology ACT-interventions have also been evaluated in clinical psychology, school settings, work settings, in reducing prejudice and stigma, and increasing sport performance.
### Table 1. ACT and chronic health conditions. Treatment outcome studies.

<table>
<thead>
<tr>
<th>Study</th>
<th>Diagnosis</th>
<th>Comparison</th>
<th>N at start</th>
<th>Design</th>
<th>Treatment</th>
<th>Follow-up</th>
<th>Summary of results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dahl et al 2004</td>
<td>Chronic pain and stress</td>
<td>TAU</td>
<td>19</td>
<td>RCT</td>
<td>Individual 4 sessions à 60 min 4 weeks</td>
<td>6m</td>
<td>ACT + TAU reduced days on sick leave and use of medical resources. Results maintained at follow-up.</td>
</tr>
<tr>
<td>Wicksell et al 2008</td>
<td>Chronic pain (WAD)</td>
<td>TAU</td>
<td>22</td>
<td>RCT</td>
<td>Individual 10 sessions à 60 min 10 weeks</td>
<td>3.5m 7m</td>
<td>ACT + TAU significantly better results on e.g. disability and life satisfaction. Results maintained at follow-up.</td>
</tr>
<tr>
<td>Wicksell et al 2009</td>
<td>Chronic pain (pediatric)</td>
<td>MDT*</td>
<td>32</td>
<td>RCT</td>
<td>Individual 10 sessions à 60 min 10 weeks Parent support 1-2 sessions à 90 min 10 weeks</td>
<td>3.5m 7m</td>
<td>Significantly better than MDT at post and follow-up on e.g. perceived functional ability, pain and distress.</td>
</tr>
<tr>
<td>McCracken et al 2005</td>
<td>Chronic pain</td>
<td>Waiting phase</td>
<td>142</td>
<td>Within-group</td>
<td>Group Multidisciplinary residential 97.5-130h 3-4 weeks</td>
<td>3m</td>
<td>Significant improvements following treatment in emotional, social and physical functioning and health care use. Mostly maintained at follow-up.</td>
</tr>
<tr>
<td>Vowles et al 2007</td>
<td>Chronic pain</td>
<td>-</td>
<td>252</td>
<td>Within-group</td>
<td>Group Multidisciplinary residential 97.5-130h 3-4 weeks</td>
<td>3m</td>
<td>Significant improvements at post and follow-up on depression, anxiety, disability, catastrophizing and pain.</td>
</tr>
<tr>
<td>McCracken et al 2007</td>
<td>Chronic pain, highly disabled</td>
<td>Less disabled sample</td>
<td>53 + 234</td>
<td>Within-and Between-group</td>
<td>Group Multidisciplinary residential 80h 3-4 weeks</td>
<td>3m</td>
<td>Significant improvements in eight of nine outcome variables, comparable to or mostly larger than the sample of less distressed patients. Average effect size (d): .75. Results maintained at follow-up.</td>
</tr>
<tr>
<td>Vowles &amp; McCracken 2008</td>
<td>Chronic pain</td>
<td>-</td>
<td>187</td>
<td>Within-group</td>
<td>Group Multidisciplinary residential 97.5-130h 3-4 weeks</td>
<td>3m</td>
<td>Significant improvements following treatment in pain, depression, anxiety, disability, medical visits, work status and physical performance. Maintained at follow-up.</td>
</tr>
<tr>
<td>Gregg et al 2007</td>
<td>Type-II diabetes</td>
<td>Education</td>
<td>81</td>
<td>RCT</td>
<td>Group 1 day - 7h workshop</td>
<td>3m</td>
<td>ACT+education had significantly better diabetes self-care and diabetic control (HbA1C) at 3m.</td>
</tr>
<tr>
<td>Lundgren et al 2006</td>
<td>Epilepsy</td>
<td>Supportive therapy</td>
<td>27</td>
<td>RCT</td>
<td>Individual 2 sessions à 90 min Group 1 session à 3 h + 2 individual booster sessions (at 6m and 12m)</td>
<td>6m 12m</td>
<td>ACT had significantly better results on seizure index and quality of life at 6m and 12m.</td>
</tr>
</tbody>
</table>

*Note: MDT stands for multidisciplinary treatment and amitriptyline.*
<table>
<thead>
<tr>
<th>Study</th>
<th>Diagnosis</th>
<th>Comparison</th>
<th>N at start</th>
<th>Design</th>
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<th>Follow-up</th>
<th>Summary of results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lundgren et al 2008</td>
<td>Epilepsy</td>
<td>Yoga</td>
<td>18</td>
<td>RCT</td>
<td>Individual 2 sessions à 90 min Group 1 session à 3 h + 2 individual booster sessions (at 6m and 12m)</td>
<td>6m 12m</td>
<td>Improvements were seen in both groups. A difference favouring ACT on seizure index is hard to interpret because of very big pretreatment differences.</td>
</tr>
<tr>
<td>Forman et al 2009</td>
<td>Overweight and obesity</td>
<td>-</td>
<td>29</td>
<td>Within-group</td>
<td>Group (ACT+LEARN) 12 sessions à 60 min 12 weeks</td>
<td>6m</td>
<td>Among completers (n=19) a 6.6% weight loss, on average and 9.6% at 6m follow-up</td>
</tr>
<tr>
<td>Tapper et al 2009</td>
<td>Overweight</td>
<td>WLC</td>
<td>62</td>
<td>RCT</td>
<td>Group 3 sessions à 2h 5 weeks + 1 booster à 2h (at 3m)</td>
<td>3m</td>
<td>A small significant effect on physical activity favouring ACT. No differences regarding BMI or mental health</td>
</tr>
<tr>
<td>Alberts et al 2010</td>
<td>Overweight</td>
<td>Dietary group</td>
<td>22</td>
<td>RCT</td>
<td>Individual mindfulness 7 sessions à 60 min + Dietary group 7 weeks</td>
<td></td>
<td>Significantly lower cravings for food. No differences regarding weight loss.</td>
</tr>
<tr>
<td>Sadlier et al 2007</td>
<td>Tinnitus</td>
<td>WLC</td>
<td>25</td>
<td>Controlled, non-randomised</td>
<td>Individual mindfulness + CBT 4 sessions à 40 min</td>
<td>4-6m</td>
<td>Significantly better than WLC regarding tinnitus impact. Results were maintained in follow-up.</td>
</tr>
<tr>
<td>Philippot et al in press</td>
<td>Tinnitus</td>
<td>Progressive relaxation (PMR)</td>
<td>30</td>
<td>RCT</td>
<td>Education 1 session à 2h15 min Group (PMR/mindfulness) 5 sessions à 2h15 min</td>
<td>3m</td>
<td>Clear effect of education on outcome. At follow-up the mindfulness group maintain and show continued improvement to a larger extent than the relaxation group.</td>
</tr>
</tbody>
</table>
THE EMPIRICAL STUDIES

Overall aims

The aims of this thesis were 1) to explore the role of acceptance and psychological flexibility in understanding tinnitus interference both experimentally and with a longitudinal design 2) to evaluate the immediate and long-term outcomes of an acceptance based behaviour therapy (ACT) in the treatment of people with tinnitus and, 3) to investigate the relationship between treatment outcome and processes assumed to be the active ingredients of treatment (acceptance and cognitive defusion). Specific and secondary aims are presented together with the separate studies below.

Measures

Main outcome measure

In study I the main outcome was amount of time paying attention to a mental image and the number of times the participants lost attention focus towards the mental image. Participants were asked to indicate by pressing or releasing a button whether they attended to the image or not. Their performance was recorded on a software called ‘Button timer’ specifically developed for the study.

In studies II, III and IV the Tinnitus Handicap Inventory (THI; Newman, Jacobson, & Spitzer, 1996) was used as main outcome measure. THI is a 25-item self-report measure, which assesses tinnitus interference globally by examining emotional reactions (e.g., frustration, irritability, anxiety and depression), daily functioning (e.g., interference with work, household duties and social activities), and catastrophizing (e.g., perception of having a terrible disease, inability to escape and cope). It has high internal consistency (Baguley & Andersson, 2003), high convergent validity with other measures of tinnitus interference (Baguley, Humphris, & Hodgson, 2000), and good test-retest reliability (Newman et al., 1996). The THI items are scored 0, 2, or 4 and summarised into a total score (0-100). There are guidelines for classification of tinnitus interference using the THI, with cut-offs for no handicap (0-16), mild handicap (18-36), moderate handicap (38-56), and severe handicap (58-100) (Newman et al., 1998).

Measures of secondary outcome

In studies I, II and IV results on secondary outcome were reported on Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). This is a commonly used instrument when screening for anxiety and depression among somatic patients. The HADS consists of 14 items divided into two subscales; HADS-anxiety, and HADS-depression. Each item is scored from 0 to 3 with a total score of
In a review Herrmann (1997) concluded that the scale had good reliability and acceptable sensitivity and specificity. HADS internal consistency ranges from $\alpha=0.80$ to $0.93$ regarding the anxiety scale and between $\alpha=0.81$ and $0.90$ for the depression scale. The scales two-dimensional structure has been confirmed in a number of factor analyses. With regards to tinnitus patients test-retest reliabilities of $r=0.84$ for the anxiety scale and $r=0.71$ for the depression scale have been found (Andersson, Kaldo-Sandström, Ström, & Strömgren, 2003) and the depression scale has shown greater sensitivity and specificity than the anxiety scale (Svedlund, Zöger, & Holgers, 2003).

In study I ratings of tinnitus loudness and annoyance were measured on a 1 to 10 point scale immediately before and after the imagery task. In the post-experiment ratings the patients were asked to report the loudness and annoyance they had experienced during the task.

In study II and IV results on Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992) were reported. QOLI measures life quality in 16 domains such as health, work, education and love. These domains are scored on two different scales; the first is importance with a score ranging from 0 to 3, the second is satisfaction with a score ranging from -3 to 3 (with the zero removed). The score of each domain is the product of the importance score times the satisfaction score. The sum of the scores from the 16 domains is divided by the number of domains receiving at least a score of one regarding importance. 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 a $\alpha=0.84$ and $0.80$ for the PTSD patients and non clinical sample respectively.

In study IV results on the Insomnia Severity Index (ISI; Bastien, Vallières, & Morin, 2001) and the Clinical Global Impression-Improvement (CGI-I; Guy, 1976) were reported as secondary outcome. The ISI is a seven-item questionnaire assessing insomnia, perceived sleep quality, and negative impact of sleep loss on daily functioning (Bastien, Vallières, & Morin, 2001). Each item is scored from 0 to 4 and summed together. The measure has been shown to have an acceptable internal consistency ($\alpha=0.74$) and a test-retest reliability of $0.76-0.78$.

The Clinical Global Impression is a structured interview measuring the patients experienced change in response to treatment (Guy, 1976). It has been found to have acceptable inter-rater reliability ($k = 0.68$) in audiological rehabilitation (Öberg, Wänström, Hjertman, Lunner & Andersson, 2009). In study IV only the Improvement subscale (CGI-I) was used, measured on a 7-point scale ranging from “very much improved” (1) to “very much worse” (7), with a mid-point score of “no change” (4). To increase power results were reported in a fashion categorising
participants as *improved, no change or deterioration*. Participants rated as much improved or very much improved (i.e. score of 1 or 2) where categorised as *improved*, whereas those having scores of 3 (minimally improved) or 4 (no change) were categorised as *no change*. Ratings of 5 (minimally worse) or more were considered as *deterioration*. The interview was performed by independent clinicians blinded to the participants’ group assignment.

**Process measures**

In study II and IV the Tinnitus Acceptance Questionnaire (TAQ; Westin, Hayes et al., 2008) was included as a process measure and suggested mediator. The TAQ is a measure of experiential avoidance/acceptance in relation to tinnitus (Westin, Hayes et al., 2008). The measure consists of 12 items divided into two factors: *activity engagement* and *tinnitus suppression* and has been developed and adapted from the Chronic Pain Acceptance Questionnaire (CPAQ; Geiser, 1992) and the Action and Acceptance Questionnaire (AAQ-32; Hayes et al., 2004). The internal consistency of the TAQ subscales is $\alpha = .91$ and $\alpha = .70$ respectively.

In study III the observer scale Acceptance and Defusion Process Measure (ADPM; Hesser, Westin, Hayes, & Andersson, 2009) was developed to investigate clients’ in-session acceptance and defusion behaviour. The observer reported the frequency of acceptance and defusion behaviour during the sessions, and rated the extensiveness of each behaviour on a 5-point scale. For intercategory assignment the interrater agreement was $\kappa = .77$, and for intracategory extensiveness rating the interrater agreement was reported as a ICC single measure coefficient with the value of .78 for acceptance, and .81 for defusion.

**Audiometric measures**

A part from the additional sample ($n=30$) in study II, all participants underwent audiometric evaluation of hearing and tinnitus. These evaluations were performed mainly at the audiological clinic at Linköping University Hospital, but for study III and IV evaluations were also performed at Vrinnevisjukhuset in Norrköping and Länsjukhuset Ryhov in Jönköping. The evaluation consisted of measurement of pure tone averages in decibel hearing level (dB HL) and minimal masking levels (MML) of tinnitus using broad band white noise. In study IV loudness discomfort levels were measured for pure tones at 0.25, 0.5, 1, 2, 3 and 4 kHz.

**Study I. The effects of acceptance versus thought suppression for dealing with the intrusiveness of tinnitus**

**Aims**

The aim of this study was to investigate the impact of thought suppression versus an acceptance strategy on the ability to maintain attention on an imagery task, in a group of help-seeking tinnitus patients.
Methods
Participants with chronic tinnitus were recruited from the waiting list at the local audiology department. Patients were excluded if they had neurological disabilities, were younger than 18 years old or had such severe hearing impairment or insufficient knowledge of Swedish that understanding of the oral instructions was not possible. Forty-seven patients were included and randomised to one of the three conditions: acceptance, thought suppression or a neutral control.

For each condition there was a general and a specific oral instruction lasting approximately five minutes in total (see Appendix I). The experimental task consisted of attending to a positive mental image, eyes closed. Participants were asked to indicate by pressing or releasing a button timer whether they attended to the image or not. A test trial of the task was completed to further ensure that the subjects had understood the task. The specific instructions for acceptance were drawn from acceptance and commitment therapy (ACT; Hayes et al., 1999) and focused on willingness to experience the tinnitus sensation and thereby associated feelings, and thoughts during the task. The thought suppression instruction involved not letting any thought, emotion, or sensation disrupt the participant during the task (i.e. if you think about your tinnitus try to suppress it). The neutral control instruction just contained a reminder of the general instruction.

The main dependent variables of the experiment were amount of time paying attention to the mental image and the number of times the participants lost attention focus towards the mental image. Secondary dependent variables were tinnitus minimal masking levels (dB HL) measured before and after the experimental manipulation and subjective self-report ratings of tinnitus loudness and annoyance on a 1 to 10 point scale. Ratings were collected immediately before the imagery task and, in retrospect, immediately after the task (where the participant was asked about perceived loudness and annoyance during the task). A brief interview on how well the subject had followed the instructions, and what had happened during the task was used as a manipulation check. After having completed the experimental task, baseline questionnaire data for study II was collected from the sample.

Results
As the two main outcome variables were negatively correlated ($r=-.48$, $p<.05$), a MANOVA was used when analysing the between group effect on time with image. This resulted in a significant between group effect $F(4,88)=3.5$, Wilks’ Lambda=.74, $p<.01$. Post-hoc comparisons with pair-wise MANOVAs, using adjusted $p$-values (Bonferroni), showed a difference between acceptance and control, but not between suppression and control. The difference between acceptance and suppression was not statistically significant.
There were no significant differences between the groups on minimal masking levels or subjective ratings of loudness and annoyance pre- or post the experimental manipulation. However, on HADS-anxiety a significant difference \( F(2,44)=4.12, p=.023 \) was found between groups. Post hoc testing with Bonferroni corrected t-tests showed that this difference was between acceptance and control \( (p=.017) \). By entering HADS-anxiety as a covariate, the difference in levels of anxiety was controlled for. Results showed that the between group effect on time with image remained significant \( F(4,88)=3.1, \) Wilks’ Lambda=.76, \( p=.02 \). No significant correlations were found between the dependent variables and the questionnaires.

**Methodological considerations**

The strength of this study is its experimental design, rendering the possibility of knowing the direction of the results. The largest methodological issues to consider regarding this study have to do its reliability and external validity. The question of reliability is dependent on whether or not the participants followed the instructions and kept the button pressed down only while attending to the mental image. This is assumed, as all subjects answered the questions in the manipulation check in a way suggesting that they had followed the instructions. The question of external validity concerns whether the task of attending to a mental image has any bearing on the subjective experience of not being able to concentrate, often reported by distressed tinnitus patient.

Length of time with imagery can be viewed as a direct behavioural measure of how tolerant the participants were towards their tinnitus and the intrusiveness of tinnitus. Tolerance towards tinnitus can be compared with the pain tolerance effect found in studies such as that by Hayes et al. (1999). Results from earlier experiments on tinnitus served as contraindication for choosing a too simple cognitive tasks such as letter cancellation tasks (Andersson & McKenna, 2006), or a too complex tasks such as silently counting backwards in steps of seven (Andersson, Jüris, Classon, Fredrikson & Furmark, 2006) when measuring tinnitus interference with cognitive performance. Therefore we chose a task on an intermediate level that was likely to be sensitive to tinnitus intrusion. In the present study we did not include any cognitive screening tests, which could have given information about the participants general ability to sustain attention. Overall, the standard deviations on outcome were large. However, in the MANOVA, the data fulfilled the assumption of equality of variance.

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

**Aims**

This study aimed to develop a self-report measure of tinnitus specific acceptance and to evaluate its psychometric properties by examining its internal consistency,
factor structure and construct validity. A further aim was to investigate the role of tinnitus acceptance in predicting the impact of tinnitus on psychological functioning.

Methods
The sample consisted primarily of the forty-seven patients in study I. However, in the psychometric evaluation of the developed self-report measure an additional sample of thirty patients was recruited from the waiting list at the local audiology department, excluding participants younger than 18 years old.

Tinnitus Acceptance Questionnaire (TAQ) was developed using seven items from the Chronic Pain Acceptance Questionnaire-Revised (McCracken, Vowles, & Eccleston, 2004), and two items from the Action and Acceptance Questionnaire-32 (AAQ: Hayes et al., 2004), adapting them for tinnitus. Three additional items were created 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 eight reversed items in the scoring. The draft TAQ was piloted on a group of eight 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 administered in the total sample of 77 participants. There was no overlap between TAQ and AAQ-9 in terms of item content.

To investigate the role of tinnitus acceptance in predicting the impact of tinnitus on psychological functioning the original sample of forty-seven patients were given additional measures of tinnitus interference (THI; Newman, Jacobson, & Spitzer, 1996), quality of life (Quality of Life Inventory; Frisch, Cornell, Villanueva, & Retzlaff, 1992), anxiety and depression (Hospital Anxiety and Depression Scale, Zigmond & Snaith, 1983). All measures (including TAQ and AAQ-9) were collected at baseline and at follow-up after seven months.

In the development of TAQ 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 the longitudinal study linear regression models were used to test mediation following the definition provided by Baron and Kenny (1986), where variable M is considered a mediator if (1) X significantly predicts Y, (2) X significantly predicts M, and (3) M significantly predicts Y, controlling for X. To establish mediation, a previously significant relation between the independent and dependent variables should no longer be significant, when paths 2 and 3 are controlled for. The strongest demonstration of this, defined as full mediation, occurs when path 1 becomes zero. The statistical significance of the mediation effect was further tested by considering the statistical significance of the cross product of the X/M path and the M/Y path using the multivariate delta logic of the Sobel test (Preacher & Hayes, 2004).
Results
For each item on the TAQ, the full range of the scale was used 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, 9, 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 gender or age. The internal consistency for TAQ was Cronbach’s alpha $\alpha=.89$ and that of AAQ was $\alpha=.56$.

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 had an eigenvalue of 1.76. The number of factors was confirmed by checking a scree-plot. 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). For the factor tinnitus suppression a low score should be interpreted as more suppression, as items were reversed in the scoring. 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. The 7-month test–retest reliability of the TAQ was $r(45)=.77$, $p=.000$.

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.

Using the longitudinal data set, results from the linear regression showed that tinnitus interference at baseline significantly predicted anxiety, depression, quality of life and tinnitus interference at follow-up. Further, tinnitus interference at baseline predicted tinnitus acceptance, measured both at baseline and at follow-up. In a last step the regression analyses assessed whether there was a relationship between the mediator, tinnitus acceptance, and the outcome at seven months, while controlling for tinnitus interference at baseline. Results showed that the factor activity engagement as assessed by the TAQ at follow-up was a significant predictor of life quality ($\beta=.54$, $p=.00$), depression ($\beta=.55$, $p=.00$) and tinnitus interference ($\beta=.38$, $p=.01$) while controlling for tinnitus interference at baseline. Regarding life quality and depression the results showed full mediation. No significant relation was found with anxiety. Similar results were found using the full scale of TAQ. This whereas tinnitus suppression was neither related to the predictor variable at baseline, nor to
the outcome at follow-up. The results were confirmed in the cross products of coefficients (Sobel) tests. To further test our theoretical assumption 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-depression, was the only measure with significant results, partially mediating the relation between tinnitus interference and tinnitus acceptance. The results were however not as strong as those with acceptance as the mediator.

Methodological considerations
While there are limitations to this study one of its strengths is its longitudinal design which justifies drawing conclusions regarding the direction of some of the relations found. However, the sample size was small and the chosen design is not optimal for testing mediation. In that case more measurement points would have been necessary in order to follow development over time and see if change in the mediator preceded changes in outcome. Also, as tinnitus acceptance is not conceptualised as a stable, trait like construct it would have been preferable to have measured test-retest using two assessment points closer in time. One methodological consideration regarding this study is whether the TAQ can be said to measure a construct different from that measured by the THI, an issue further elaborated in the discussion section. Another methodological consideration concerns the appropriateness of using THI as the predictor variable in this trial. It perhaps would have been more suitable to have chosen a measure of tinnitus severity, in the sense of loudness of the perceived sound or how easily it can be masked by other sounds.

Study III. Clients’ in-session acceptance and cognitive defusion behaviours in acceptance-based treatment of tinnitus distress

Aims
The aims of this study were to investigate whether client acceptance and defusion behaviour 1) could be observed and reliably measured from video recorded sessions of Acceptance and Commitment Therapy (ACT), 2) increased over the course of therapy and, 3) could predict the long-term outcome following therapy. A fourth aim was to investigate the temporal relations between process and outcome.

Methods
The sample consisted of twenty participants from the two first inclusions in study IV and four additional patients. The additional patients were drawn from a sample of eight patients excluded from intake two in study IV, who fulfilled all inclusion criteria except having hearing thresholds which would allow the use of wearable sound generators. These eight patients were randomised to receive ACT or to join a waiting list. The wait list group started their treatment after 10 w. The purpose of adding this sample was to increase the power in study III. There were in total 24
clients randomly assigned to ACT in study III. Inclusion criteria were the same as in study IV, except for criterion h in the additional sample. For inclusion in the present study clients’ Session 2, Session 4 and Session 6 videotapes also needed to be available, viewable and audible. We did not have access to five of the 24 clients required videotapes, leaving 19 clients available for analysis (of which two belonged to the hearing impaired sub-sample).

The therapy, therapists, training and supervision is described in study IV. To investigate clients’ acceptance and defusion in-session behaviour the Acceptance and Defusion Process Measure (ADPM) was developed, inspired by the Functional Acceptance and Commitment Therapy Scale (FACTS), which has been used to measure therapist adherence to ACT (Forman et al., 2007). Videotapes from a sample of sessions (not included in the further analyses) were analysed in the development of the measure. The developers were blind to the outcome of the treatment at the time when the measure was created. Raters used videotapes to identify verbal behaviour as a defusion or an acceptance statement. Codable verbal behaviour was considered to be a complete thought or intent expressed by the client either in an unsolicited manner or in response to therapist behaviour (e.g., inquiries, comments, interventions). A defusion behaviour was defined as a verbal statement that included the client noticing, labelling and separating self from a private experience (e.g., a thought, feeling), whereas an acceptance statement was defined as a statement where a client expressed emotional willingness, an active approach of making room for difficult feelings, memories, and physical sensations in order to be able to pursue valued goals. Raters were instructed never to infer an acceptance or a defusion behaviour, but instead only to rate the statement explicitly reported by the client. Once a statement was identified and classified, the verbal behaviour was given an “extensiveness rating”. The behaviour’s extensiveness was rated on a 5-point scale for both acceptance and defusion (1 = highly diminished statement, 2 = a moderate, somewhat qualified statement, 3 = a straightforward statement, 4 = a statement with some in-depth amplification, 5 = an absolute in-depth statement). The highest extensiveness score given to a behaviour during a session was used as a peak level for the current session. The frequency and peak level for both defusion and acceptance were used in the analyses.

All study sessions in the ACT condition were videotaped with digital video recorders. The camera was positioned in the room so as to capture both the therapist and the client. Four raters were involved in the study. Two primary raters were licensed psychologists who had experience of conducting ACT and two secondary raters were undergraduate master program students in clinical psychology, who had theoretical knowledge about ACT. All the raters received training (approximately 16 h) with the manual before making the study ratings. Additional meetings after the completion of the training were held to minimize rater drift. The middle 30 min of each of the sessions were coded since it typically
represented the “working part” of the session. The sessions were randomly assigned to the raters who were blind to identity of patient, time of the assessment, and to outcome. Three sessions of ACT were rated for each patient: Session 2 in the beginning, Session 4 in the middle, and Session 6 in the late part of treatment. A total of 57 sessions (1710 min) were coded in the study.

Thirteen randomly selected sessions (23%) of all the rated sessions \((n = 57)\) were used to establish interrater reliability in the study. Reliability of the ADPM was calculated after completed rater training. The four raters formed two pairs. The pairs were composed of a primary and a secondary rater. Raters were compared by protocol (time and comment) for the identified verbal behaviour rated. Two forms of interrater agreement were then computed: one for intercategory assignments and one for intracategory extensiveness ratings. Interrater reliability for intercategory assignments of defusion and acceptance behaviour was calculated using, Cohens’s kappa \((\kappa)\). The combined interrater agreement for the two pairs of raters was \(\kappa = .77, p < .001\) (Pair 1=.69; Pair 2=.88). The two-way random model of intraclass correlation (ICC) was computed to assess interrater reliability for intracategory extensiveness ratings (ranging from 1 to 5). The combined ICC single measure coefficient for the two pairs of raters was .78 for acceptance (Pair 1=.70; Pair 2=.84), and .81 for defusion (Pair 1=.62; Pair 2=.90).

Results
Repeted measure ANOVAs showed that the frequency \(F(2,18)=5.44, p=.009\) and peak \(F(2,18)=3.35, p=.047\) levels of acceptance observed at middle and late in therapy were higher than those early in therapy. Dependent t-tests revealed that these effects reflected a significant change between Session 2 and Session 4 in therapy. Regarding defusion the differences in mean scores between early, at middle and late in therapy were not significant.

The difference in means between pre treatment and 6 month follow-up for the primary outcome measure THI was found to be statistically significant, with a within group effect size of Cohen’s \(d=.91\). One case did not complete the 6 month follow-up. The reductions of tinnitus interference appeared to occur rapidly. By Session 4 more than half of the total mean change in THI score had occurred and by Session 6 the mean THI score had dropped 12.0 points (74%) of the 16.2 total decrease. The mean decrease from pre treatment to Session 2 was not statistically significant, but there was a statistically significant difference in means between pre treatment and Session 3.

Given the rapid response in the present therapy and an a priori concern that the early improvement could contaminate the potential relationships between later rated process variables and outcome, early processes rated in Session 2 were analysed as predictors of final outcome (decreases in tinnitus interference between pre treatment and 6 month post treatment). In all cases, correlations are positive
when higher ratings on a process measure are associated with greater reduction of interference. Both frequency \( r = .62, p = .006 \) and peak level \( r = .50, p = .03 \) of defusion rated in Session 2 had a positive significant relationship with long term outcome. In addition, a significant positive relationship between peak level of acceptance in Session 2 and outcome was found \( r = .51, p = .03 \). The relationship between frequency of acceptance behaviour and outcome was not statistically significant.

The next step was to investigate the effect of process on outcome while controlling for clients’ prior improvement in treatment. A series of hierarchical regression analyses were conducted in which the Session 2 THI score was entered as a first step as predictor of pre to follow-up outcome changes. In the second step, the process variable rated in Session 2 was added to the model. Thus, the effect of the process predictor was examined only after controlling for prior improvement, as measured by the Session 2 THI score. This analysis was repeated separately for all process variables. Results showed that frequency of defusion behaviour remained a significant predictor of long-term outcome independently contributing with 40% of the variance, over and above the contribution by Session 2 THI score. Peak level of cognitive defusion also remained a significant predictor, contributing independently with 23% of the variance above the contribution by Session 2 THI score. Similarly, peak level of acceptance remained a significant predictor of long-term outcome, contributing with 20% of unique variance over and above Session 2 THI score. All of these prediction models were significant. Consistent with the previous correlation analyses, frequency of acceptance behaviour did not yield a significant positive effect.

To control for the possible confound that early rated process variables were functions of clients’ initial levels of tinnitus interference, we also computed zero-order correlations between process variables rated in Session 2 and clients’ pre treatment scores on THI. None of the correlations were significant. Given that more than half of the mean change in THI score had occurred by Session 4, we explored whether prior symptom change could predict process variables rated later in therapy. All correlations between prior symptom change and process variables rated in Session 4 and Session 6 were small or negative, and none were statistically significant, except that between frequency of acceptance behaviour rated in Session 6 and symptom change that had occurred prior to the rated session. This correlation was however negative \( r = -.48, p = .04 \), indicating that clients who reported greater gains before the rated session, less frequently expressed acceptance behaviours in Session 6.

**Methodological considerations**

This study has several methodological strengths. The development, training and psychometric evaluation of ADPM was thoroughly conducted and reported. The design of the study is well suited for the purpose of following the development of process and outcome over time. Using behavioural and/or observer measures to tap
therapeutic processes is advisable. A notion particularly true given the theoretic assumptions underlying ACT. This is the first published study that measures the processes of acceptance and cognitive defusion with in-session verbal behaviours.

However, some limitations need to be acknowledged. The study does not establish whether or not it is the actions of the therapist and the specific treatment content that leads to client acceptance and cognitive defusion behaviour. Given that these behaviours are already found in Session 2, and that defusion behaviour does not significantly change during treatment, they could be conceptualised as pre-treatment patient characteristics, rather than behaviours induced by therapy. A pre-treatment recording of the patients during the tinnitus interview could have acted as a baseline for the results achieved during therapy and the interplay between therapist behaviour and client behaviour could have been more explicitly targeted. Further limitation concerns representativity of the sample and the generalizability of the results as the sample is normal hearing and the participants are rather homogeneous in terms of ethnicity. Also, with choosing to rate only the middle 30 min of each session comes the risk that important acceptance and defusion behaviours can have been missed.

Study IV. Acceptance and Commitment Therapy versus Tinnitus Retraining Therapy in the treatment of tinnitus: a randomized controlled trial

Aims
The aims of this study were to evaluate the immediate effects of Acceptance and Commitment Therapy (ACT) in comparison with a wait list (WLC) and to compare the long-term effects of ACT with those of Tinnitus Retraining Therapy (TRT) across a period of 18 months among participants who experienced tinnitus as interfering. The study also investigated whether changes in acceptance of tinnitus mediated outcome.

Methods
Participants were recruited from three different audiology departments and via advertisements and articles in newspapers over the course of 17 months. For inclusion in the study, participants needed (a) to have tinnitus as their primary problem (b) to be ≥18 years old, (c) to have a score of ≥30 on the THI (Newman, Jacobson & Spitzer, 1996), (d) a duration of tinnitus of ≥ 6 months, (e) not to suffer from a severe psychiatric disorder, (f) not to have previously received a psychological or sound-generator treatment for tinnitus (g) not be in need of immediate medical consultation and (h) to have hearing thresholds which would allow for the use of wearable sound generators (i.e., in severe hearing loss the sound stimulation may not be heard or need to be so loud that the person would have
problems hearing conversations). A total of 64 patients were included and randomised to one of three groups: ACT, TRT or WLC.

Main outcome was measured using the Tinnitus Handicap Inventory (THI: Newman, Jacobson & Spitzer, 1996). Secondary outcome was measured on Insomnia Severity Index (ISI: Bastien, Vallières & Morin, 2001), Quality of Life Inventory (QOLI; Frisch, Cornell, Villanueva, & Retzlaff, 1992) and Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983) Treatment process was measured using the TAQ (Westin, Hayes & Andersson, 2008). All questionnaires were distributed at pre treatment, at 10 weeks (i.e. at post treatment in the ACT group), at 6 months and at 18 months (i.e. at post treatment in the TRT group). In addition, the TAQ was distributed to the WLC group and the ACT group at 5 weeks to assess possible mediation. For ethical reasons the wait list control groups started their treatment after 10 weeks. At 6 months an additional assessment was performed in the two treatment conditions consisting of a short structured telephone interview with a global rating (Clinical Global Impression, subscale Global Improvement, Guy, 1976). Independent clinicians blinded to the participants’ group assignment performed the interview.

The ACT treatment was delivered in an individual format using a treatment manual developed according to Acceptance and Commitment Therapy (ACT) treatment principles as outlined by Hayes et al. (1999). All participants in the ACT condition received weekly sessions. A maximum of 10 sessions were offered and the average number of treatment sessions was $m=8.38$ ($SD = 1.56$, range = 5-10). The sessions were set to be 60 minutes, with exception for session two, which was set to 75 minutes. The first sessions contained evaluating the patients’ current coping strategies in relation to tinnitus, examining costs and benefits and an introduction to mindfulness. The treatment further consisted of mindfulness and acceptance training to promote goal-directed behaviours in valued life-domains. The mindfulness exercises involved approaching the tinnitus sound and related reactions in a non-judgemental way. Other treatment components included working with values and life goals, changing tinnitus related behavioural patterns, and psycho education regarding tinnitus. Experiential exercises and metaphors were frequently used. In addition, in the later phase treatment addressed other problems related to tinnitus interference (e.g., insomnia or hypersensitivity to sound). Each session ended with a homework assignment such as ACT- daily ratings (Eifert & Forsyth, 2005, revised for tinnitus). Of the eight therapists delivering the ACT treatment six were master program students in clinical psychology who were receiving their clinical training, and two were clinical psychologists. Therapists were monitored through videotapes for treatment adherence and received weekly supervision by two licensed psychologists and psychotherapists who had extensive experience in ACT and supervision.
The TRT treatment was delivered individually following the principles outlined by Jastreboff and Hazell (2004). The patients in the TRT condition received a single 2 ½ hour consultation. At the same appointment wearable sound generators (Starkey, GN Resound) were fitted bilaterally with an open fitting. The consultation started with a medical evaluation, taking the history of tinnitus, decreased sound tolerance and hearing loss, and assessing the category for treatment using the criteria presented by Jastreboff and Hazell (2004) in order to adjust treatment accordingly. The consultation included retraining counselling with education about the neurophysiological model of tinnitus. Patients were also given an introduction to sound therapy and instructions on how to wear and monitor their wearable sound generators. The instruction was to wear the devices throughout the waking hours. If this for any reason was impossible a minimum of 8 hours should be attempted, which may be divided into several shorter blocks of time. The intensity of the sound enrichment was set to the “mixing point”, at which level partial suppression of the tinnitus sound begins to occur. Patients were given a 30 min follow-up session over telephone during which compliance with the treatment was also assessed. The treatment went on for 18 months in total. The consultation was provided by an Ear-Nose-Throat physician who was also a specialist in audiology and had extensive clinical experience of assessing and treating tinnitus patients. The physician also had previous experience of TRT from in total seven full days of lectures and workshops led by P. Jastreboff. Prior to the study the physician had delivered Sound Therapy and Retraining Counselling in the clinical setting. The fitting of the sound generators was performed by an audiologist.

Outcome was analysed using a linear effects model fitted with full maximum likelihood estimation (FIML; Verbeke & Molenberghs, 2000). Further analyses were made to establish to what extent change on main outcome was statistically reliable and clinically relevant applying Jacobson and Truax’s (1991) concept of Reliable Change Index (RCI) to calculate reliable change scores based on the test–retest reliability of the measure. For those with a reliable improvement, we calculated to what extent the interventions placed these patients below the cut-off value for “no tinnitus handicap” (Newman, Sandridge & Jacobson, 1998), using this as a measure of high end-state functioning indicating a shift to normal functioning. Mediational analyses were conducted using a bootstrapped multivariate extension of the Sobel test (1982) as suggested by Preacher and Hayes (2004).

Results
The total attrition was 6.3% (4/64) at 10 weeks, 9.5% (4/42) at 6 months and 21.4% at 18 months (9/42). At 10 weeks, results showed a significant superior effect of ACT in comparison with the wait list condition regarding tinnitus interference (Cohen’s $d=1.04$), problems with sleep and anxiety. The results were mediated by tinnitus acceptance. A comparison between the active treatments, including all assessment points, revealed significant differences in favour of ACT regarding tinnitus interference (Cohen’s $d=0.75$) and problems with sleep. At 6 months, reliable
improvement on the main outcome measure was found for 54.5% (12/22), in the ACT condition and 20% (4/20), in the TRT condition. Chi-square tests were calculated showing that this difference was significant \(\chi^2(1, 38)=4.35, p=.037, d=0.72\). Further, the percentage of patients who had gotten a reliable improvement and ended up below the cut-off for “no handicap” was 36% (8/22) in the ACT group and 10% (2/20) in the TRT group. The Reliable Change Index calculations further showed reliable deterioration for 4.5% (1/22) of the participants in the ACT group and 10% (2/20) in the TRT Group.

Results on the CGI-I showed that 27% (6/22) of the participants in the ACT group were categorised as improved by the treatment, 65% (13/22) had no change and 5% (1/22) deteriorated. In the TRT group 10% (2/20) were categorised as improved by the treatment, 72% (13/20) had no change and 17% (3/20) deteriorated. Fisher’s exact test was calculated using the net gain of treatment (the number of improved patients minus the number classified as having deteriorated) with results showing a significant difference between ACT and TRT (\(p=.049\)).

To further examine the temporal trends across the assessment points (pre-treatment, 10 weeks, 6 months, and 18 month assessment) we conducted separate linear mixed effects models for each treatment condition. Linear mixed effects analysis of the TRT treatment showed a significant linear decrease in tinnitus impact \(\beta(51)=-0.09, p=.046\), better explained as a significant decrease up till the 6 month assessment \(\beta(51)=-0.40, p=.031\). None of the secondary outcome measures showed significant linear improvements over time, but anxiety showed a significant decrease up till the 6 months assessment \(\beta(52)=-0.14, p=0.005\), followed by a significant increase from 6 to 18 months \(\beta(52)=0.002, p=.009\). In the ACT treatment linear mixed effect models, using the 10w assessment point as baseline, indicated that treatment gains were maintained for all outcomes at 6 and 18 months (i.e., nonsignificant coefficients of time).

Methodological considerations
This study has a number of methodological strengths: Random assignment to conditions, blind assessment, attention to clinical significance and high end-state functioning, the consideration of those who dropped out of treatment as non responders, and some reports of patient compliance. The levels of participant attrition were small up till 6 months and acceptable at 18 months. Also, the design of the study makes it suited for mediational analyses.

The most obvious limitation of this study is that a larger sample size would have been preferable to find smaller differences between the active treatments and potential effects on the secondary outcome measures. A second limitation concerns the representativity of the selected sample since it consists mainly of normal hearing individuals, while many of those suffering from tinnitus have a significant hearing loss. The sample is also rather homogeneous in terms of ethnicity. A third limitation
of this study concerns the fact that TRT counselling was not monitored for adherence or therapist competence and that no potential specific TRT mediator was targeted in the design of this study. Moreover, the treatment was delivered in one single comprehensive appointment instead of being spread out in time with a number of follow-up appointments, as suggested by the treatment manual (Jastreboff and Hazell, 2004). The limitation regarding assessments of adherence and competence is to a certain extent true also for the ACT condition. This is particularly relevant as the ACT therapists were clinically inexperienced, in particular with tinnitus patients. Treatment integrity was however tested to some extent as the recordings of the ACT sessions were analysed with regard to clients’ acceptance and defusion behaviours in relation to outcome (see Study III). Comparing treatments of different lengths and with different amounts of therapy contact complicates the interpretation of the results. Also, the different amount of attrition in the two treatment conditions at the 18-month follow-up is problematic. Lastly, the baseline values on the secondary outcome measures were low, leaving little room for improvement.
GENERAL DISCUSSION

Main findings and conclusions

In relation to the first aim of this thesis results from study I indicated that patients with tinnitus could benefit from an acceptance strategy to handle tinnitus intrusion when performing an attention task. The main finding in this study was a significant difference between the acceptance and the neutral control group regarding length of time with imagery combined with the number of interruptions. The expected negative effect of the suppression task was not clearly found, in that acceptance and suppression instructions did not result in any differences. Thus, the results do not rule out possible beneficial short-term effects of suppressing thoughts about tinnitus. Study II investigated the mediating role of acceptance on the relationship between tinnitus interefere at baseline and tinnitus interference, anxiety, life quality, and depression at a 7-month follow-up. Results showed that tinnitus acceptance, and more specifically, the acceptance factor activity engagement, showed full mediation for depression and life quality at follow-up, and partial mediation for tinnitus interference. These results underscore the importance of acceptance for the well-being of patients suffering from tinnitus interference. To conclude, some support was found for the notion that acceptance and psychological flexibility may contribute to the understanding of tinnitus interference. The pursuit of aim number one is also implicitly inherent in studies III and IV.

In relation to the second aim of this thesis results from study IV showed that Acceptance and Commitment Therapy had large immediate effects on tinnitus interference in comparison to wait list, and medium to large long-term effects in comparison to Tinnitus Retraining Therapy. Results were also seen on secondary outcome. Immediate effects in comparison to wait list were seen on anxiety ($d=0.80$) and sleep problems ($d=0.22$). Medium long-term effects on sleep problems were found favouring ACT over TRT. At six months, reliable improvement on the main outcome measure was found for 54.5% in the ACT condition and 20% in the TRT condition. One patient in the ACT treatment experienced deterioration. To conclude the results suggest that ACT can reduce tinnitus interference in a group of tinnitus patients with normal hearing.

In relation to the third aim of this thesis the relationship between treatment outcome and the processes assumed to be the active ingredients of treatment was investigated both in study III and study IV. Results from study III showed that clients in-session acceptance and defusion behaviours rated early in therapy were predictors of sustained positive treatment effects of ACT. These associations continued to be substantial even when controlling for the improvement in outcome that had occurred prior to the measurement point of the process variables. This
whereas prior symptom change could not predict process variables rated late in therapy, when most of the improvement had occurred. The first conclusion of these results is that clients’ acceptance and defusion behaviours are present in ACT therapy and can be measured in a reliable way. Further, our findings provide preliminary evidence that such behaviours precede and predict changes in outcome, rather than emerge in response to symptom reduction. Results from study IV showed that tinnitus acceptance, assessed by the TAQ, significantly mediated the immediate outcome of ACT. Before treatment no differences were found between the three groups concerning tinnitus acceptance. In the ACT group there was a significant change in TAQ from baseline to the 10 weeks assessment sustained at 6 and 18 months. In the WLC group and the TRT group no significant changes on tinnitus acceptance were found. In sum these findings implicate that acceptance and cognitive defusion are important processes in ACT, related to treatment outcome.

Discussion of the results

Acceptance – trait, process or outcome?
In this thesis acceptance is regarded as a process through which a decrease of the interference tinnitus may cause on a person’s life is possible. But in a common sense understanding acceptance could also be seen as a stable trait like construct, a predisposition to act and react in certain ways, or as an outcome, such that when a person is no longer distressed by tinnitus they take on an accepting stance towards it. Another possibility would be to view acceptance as just being the inversed concept of distress/annoyance with no explicatory value of its own. Results from the different studies in the thesis support the assumption of acceptance as a process in its own right. In study II we explored our data by reversing 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-depression scale, was the only measure with significant results, partially mediating the relation between tinnitus interference and tinnitus acceptance. The results were however not as strong as those with acceptance as the mediator. In study II tinnitus acceptance and tinnitus interference were quite highly correlated at baseline suggesting that our measure could just be an inversed concept of interference. However in study IV the correlation between TAQ and THI at baseline was moderate $r(64)=-0.50$, $p<0.001$ and in the TRT condition significant changes were seen on THI but not on TAQ, results indicating that the constructs are distinguishable from each other. Also, results from an unpublished trial comparing internet-delivered CBT and ACT for tinnitus (Hesser, Gustafsson et al., unpublished data) show comparable outcome for the two treatments whereas mediation analysis indicated that improvements in the ACT condition, unlike in the CBT condition, were mediated by changes in acceptance, as measured by the TAQ. The difference in mediated pathways between conditions was driven primarily by a stronger
treatment effect on the mediator in ACT than in CBT. This indicates that acceptance can be seen as an entity separate from interference. Further, the fact that it can be changed by a relatively short (eight to ten week) intervention implies that it is not a stable trait.

The strongest support for our assumption regarding the nature of acceptance comes from study III, in which acceptance was measured in another response domain than the outcome. Here the possibility that acceptance could be an outcome produced by the level of interference was explicitly controlled for by two different procedures. Results showed that early rated process variables were not associated with clients’ initial levels of tinnitus interference and furthermore that prior change in outcome could not predict process variables rated later in therapy. However as the process variables related to outcome were measured already at session two the results do not preclude the interpretation of acceptance and defusion as trait like variables rather than treatment induced processes. Here the result that observed frequency and peak levels of acceptance significantly changed over the course of ACT therapy is informative. The same was not true for defusion behaviour. Taken together, our assumption that acceptance is a process separate from, but related to, decreased tinnitus interference is underbuilt by the results of the studies in the thesis.

Control as the problem?
In the ACT model deliberate control of private events is conceptualised as “the problem, not the solution” (p.115, Hayes, Strosahl & Wilson, 1999). Although only tested in a narrow sense in this thesis, by the concept tinnitus suppression, the findings from study I and II are not in line with a “control is the problem”-conceptualisation of how tinnitus becomes interfering and disabling. In fact, suppression was almost as effective as acceptance compared with the control condition in study I. In study II the factor tinnitus suppression on TAQ was not related to tinnitus interference and was therefore dropped from further analysis. Actually this is in line with previous research on tinnitus and suppression (Andersson, Jüris et al., 2006), showing that suppression is ambiguously related to tinnitus interference and can even be beneficial for tinnitus sufferers, at least in the short run. A considerable limitation of these experimental studies is that the effect of thought suppression was evaluated immediately after the experimental manipulation, where previous findings from other research domains suggest that the adverse effects of thought suppression are not found in very time limited conditions but with longer suppression periods. Moreover, when the effort to suppress a thought is being relaxed the participants experience a resurgence of the thought, called the rebound effect (Abramowitz, Tolin, & Street, 2001).

There is evidence to suggest that perceived controllability is an important predictor of discomfort from and adaptation to tinnitus (Scott et al., 1990). The construct of perceived control has been subdivided into general control over health, symptom control and retrospective control in a study investigating the impact of tinnitus on
depressive symptoms and wellbeing (Sirois et al., 2006). Results showed that general control over health and symptom control were associated with better psychological adjustment, whereas retrospective control (i.e., rumination) was associated with worse psychological adjustment. Further, symptom control significantly moderated the tinnitus severity (loudness/maskability)–adjustment relationship, so that stronger belief in one’s ability to control symptoms was a better predictor of adjustment in patients with more severe tinnitus symptoms. Findings are however somewhat mixed as one study by Sullivan et al. (1994) did not find a significant relationship between ‘control over stressor’ and self-ratings on three Likert scales relating to role perceived disability in work, social and home/family domains.

Earlier psychological models attempting to explain the annoyance arising from tinnitus have emphasised that the perceived uncontrollability of tinnitus may be crucial to the interpretation of tinnitus as an aversive stimulus (Hallam et al., 1984). According to Jakes et al. (1986) perceived uncontrollability may be responsible for generating the emotional distress in relation to tinnitus. However “control of itself, is not intrinsically rewarding, rather, it is when control is valued, that lack of it is aversive” (p.506, Jakes et al., 1986). The authors argue that control beliefs regarding tinnitus, paired with the value of control, constitute a cognitive variable that affect tinnitus interference. Further they point to the fact that some control beliefs related to tinnitus imply a loss of control over important life satisfactions rather than lack of control over the tinnitus per se.

Believing in and acting in accordance with the relational frame “because you have tinnitus, you no longer have control over important life satisfactions” can theoretically be regarded as the essence of how psychological inflexibility leads to decreased wellbeing and disability for people with tinnitus. The findings in study I and study II together with the literature on perceived control suggest that giving up the attempts of controlling tinnitus is perhaps not as essential for a positive outcome as regaining control over life, in the sense continue moving towards personally valued ends despite tinnitus. In study II the acceptance factor activity engagement (pursuit of life activities regardless of tinnitus) alone accounted for the acquired mediation on depression, quality of life and tinnitus interference. Activity engagement can be said to show some similarity to the ICF construct participation (involvement in a life situation), with one important difference being that the construct participation does not contain the aspect of what the individuals wants to do and values in life (Nordenfelt, 2006).

In the ACT literature “control (of private events) is the problem” has almost become an axiom, a pre-analytic assumption. This can be seen as a violation of the pragmatic truth criteria. From a pragmatic stance, whether deliberate control of private events is a problem or not in a specific situation depends on the
accomplishment of the goals of the behaving organism at one level and at another level the goals of the person doing the analysis. As we know from empirical data that both acceptance and perceived control can be beneficial for tinnitus sufferers further research should be more specific about the how and when.

**Problems with tinnitus, but not with life?**

On secondary outcomes it seems like our samples were quite well off. In study I/II the sample had a mean result within .5 of a standard deviation of values found in a nonclinical group of Americans on the AAQ-9 (Hayes, Strosahl et al., 2004), and 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, usually score much lower compared to non-clinical groups (Paunovic & Öst, 2004). Further, on half of the items on the TAQ the participants had high mean ratings. Reviewing the content of these items in relation to these responses suggests that tinnitus might not entail a substantial change in the patient’s way of life and life quality after all. Maybe this can be interpreted as an example of how life quality sometimes can be independent of somatic symptoms and distress. On the HADS-depression scale means were also within .5 of a standard deviation of values found in a group of average Swedes, whereas the anxiety scores were somewhat elevated but still below cut-off for mild anxiety (Lisspers, Nygren & Söderman, 1997).

Results were similar in study IV. Regarding quality of life the mean score in our sample was slightly reduced, but still within one standard deviation from that of a normal group (Paunovic & Öst, 2004). On the HADS, mean scores of our sample were somewhat elevated on both scales, but still within one standard deviation from a normal group and below the cut-offs for mild distress (Lisspers, Nygren & Söderman, 1997). Finally, regarding sleep difficulties our group mean corresponded to a level of certain problems, but was below the level of a clinically significant sleep disorder (Bastien, et al., 2001). This was expected as far from all persons with tinnitus experience insomnia (Andersson, Baguley et al., 2005).

Reviewing results from other tinnitus studies using the same measures reveals that the mean scores on the THI found in this thesis were within 0.5 of a standard deviation of that found in previous studies with tinnitus patients (e.g. Baguley & Andersson, 2003; Kaldo et al., 2008). Means on the HADS-anxiety were within 0.5 of a standard deviation of what is normally found in clinical (Andersson et al., 2003; Kaldo-Sandström et al., 2004) and community samples (Kaldo et al., 2008). Means on the HADS-depression scale were within 0.5 of a standard deviation from the mean of another clinical sample (Andersson et al., 2003) and that of a community samples (Kaldo et al., 2008) but slightly reduced in comparison in comparison to a second clinical sample (Kaldo-Sandström et al., 2004).
These results imply that a substantial group of people who are disturbed by their tinnitus continue to have quite normal levels of life quality, and sub-clinical levels of psychological distress and insomnia. Review articles and meta analysis on CBT for tinnitus interference have drawn conclusions that no or small effects on secondary outcome is customary (e.g. Martinez Devesa, et al., 2010). This should come as no surprise given that the low levels on secondary outcome pre treatment leave little room for improvement. This desynchrony between problems with tinnitus and problems with life parallels a finding from a comprehensive study on acceptance with chronic pain. Three clusters of patients were identified on the Chronic Pain Acceptance Questionnaire: one with high scores on both subscales, one with low scores on both subscales, and one with discrepant scores that were high on the activity engagement subscale and low on the pain willingness subscale (Vowles, McCracken, McLeod, & Eccleston, 2008). The authors conclude that these results imply that it may be possible to engage in activity without full willingness to have pain, although this pattern was associated with intermediately elevated levels of depression, pain related anxiety, psychosocial disability, and daily rest due to pain.

**Methodological discussion**

**How to measure acceptance**

Accurate measurement of the key concepts is always a central and demanding aspect of research. Every kind of design or measurement has flaws. In the measurement of ACT-processes the fact that these are by definition functionally and not topographically defined significantly adds to this complexity. This means that embedded in a concept such as acceptance lies a specific kind of interplay between behaviour and context in a functional entity. The research conducted so far on acceptance and other ACT-relevant processes can be divided into experimental component studies, correlational studies, and studies of process of change during treatment outcome studies.

**Experimental design**

Most of the experimental components studies have manipulated acceptance and other ACT-relevant processes such as values or defusion, through instructions, exercises/metaphors or brief protocols (Ruiz, 2010). Effect sizes on dependent variables have shown a tendency to grow as metaphors and exercises were added to the manipulation (Hayes, Villatte, Levin, & Hildebrandt, 2011). In some cases psychological flexibility has not been manipulated but measured by self-report. The experimental design has clear scientific advantages as it gives the researcher full control of the included variables and render the possibility of drawing some conclusions about causality. With regards to measuring acceptance the experimental design enables a direct test of whether acceptance shows substantial within-subject variability and can be directly influenced, potentially providing evidence conflicting
with a conceptualisation of acceptance as a trait. In an experiment it is also possible to assign acceptance the role as the dependent variable, and see what kind of outcomes it generates. The drawbacks of controlled experiments in the measurement of acceptance consist primarily of concerns regarding the external validity of the findings as acceptance in ACT is always in the service of values based action and the experimental setting usually does not contain any valued contextual features for the participant. Therefore it can be hard to find a relevant, yet delimited outcome to measure.

In experimental tests of psychological flexibility, use of exercises and metaphors is preferred over instructions as they are more similar to the way in which acceptance is taught in treatment. Furthermore, the theoretical framework in ACT problemizes the domination of rule-governed behaviour such as pliance (as in following instructions for the sake of following instructions) over contingency shaped behaviour. The addition of such metaphors and exercises would have improved the manipulation in study II. Moreover, further consideration could preferably have been given to the choice of outcome. There is a lack of structured theoretical knowledge of the role of cognition in tinnitus intrusion. A handful of studies have been published using cognitive tests with no obvious theoretically driven hypothesis regarding what cognitive functions are likely to be involved, nor with the explicit attempt to in a systemised way explore and establish this fact. If tinnitus intrusion on cognitive abilities is the object of study then it is important to work out what cognitive function can theoretically be presumed as relevant and how this function is best measured. Further it would be advisable to use the results on another test of the same function as a reference value and design the study so that the rebound effect of tinnitus suppression is captured. Another alternative would be to appoint a totally different tinnitus relevant behaviour as outcome, such as perseverance in listening to annoying/unpleasant sounds. It would also be interesting to have used experimental paradigms from RFT-research as outcome or process variables in the treatment study.

**Self-report**

A large body of studies have used self-reported correlational data to investigate the relationship between experiential avoidance and measures of quality of life outcomes, disability, mental health status, psychopathology and behavioural effectiveness. These correlational studies have almost exclusively used different versions of the Acceptance and Action Questionnaire (AAQ) or problem specific versions of this measure to assess experiential avoidance or the diametrical opposite acceptance/psychological flexibility (Hayes et al., 2006; Ruiz, 2010). The validity of all of these empiric findings relies on the psychometric properties of process self-report measures, such as the different versions of the AAQ, and furthermore on the assumption that ACT-processes can be targeted by such measures in a meaningful way. In study II, 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. Problems with the comprehension and reliability of AAQ have repeatedly been reported, and as a result a second version of the questionnaire (AAQ-II) has been developed (Bond et al., in press). Also a number of versions of the AAQ have been developed that are tailored to particular applied areas or specific populations, such as pain (McCracken, Vowles, & Eccleston, 2004), smoking (Gifford, Kohlenberg, Hayes, Antonuccio, Piasecki, Rasmussen-Hall, & Palm, 2004), diabetes management (Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), weight (Lillis & Hayes, 2008) and coping with epilepsy (Lundgren, Dahl, & Hayes, 2008).

The preliminary evaluation of our tinnitus specific acceptance measure TAQ indicates that it has adequate psychometric properties. However some problems with the measure exist and need to be addressed. There is unfortunately an uneven distribution of items between the two subscales of the TAQ, where factor two only consists of three items and this is part of the reason why factor two only explains 14.7% of the variance in TAQ. Factor two was first called tinnitus willingness, but because of the narrow content of the items in this factor it was renamed.

The development of the TAQ coincided in time with the development of three other acceptance measures aimed to be used in tinnitus research. One of these measures is a seven-item sub-scale to the Tinnitus Experience Questionnaire (TEQ; Croft, 2008). In an unpublished study by Croft this acceptance sub-scale received an internal consistency alpha of .81. In creating this scale all items containing reference to specific behaviour patterns (such as noise-avoidant behaviours) were deliberately removed as they were intended to be used in a separate behaviour questionnaire. Reviewing the theoretical background of the thesis where it is presented, it is clear that the underlying conceptualisation of this instrument is that acceptance and habituation are “inseparable constructs” (p.122, Croft, 2008). Also the item content of the TEQ sub-scale, such as “I am so used to hearing the tinnitus noise I hardly notice it” and “When I become aware of the tinnitus noise my awareness soon passes” can perhaps rather be conceptualised as habituation towards tinnitus. The second acceptance measure was developed specifically for the earlier presented study by Sirois et al. (2008). The measure consisted of eight items, each with four response options and received an internal consistency alpha of .76. The authors define acceptance of tinnitus as “a tendency to perceive tinnitus as a non devaluing aspect of one’s identity (as opposed to viewing it as an invasive entity that has “taken over” one’s body or head)” (p.131, Davis & Morgan, 2008). A number of the sample items they present do not specify any operant behaviour or valued outcomes, suggesting a different conceptualisation of what acceptance is. Examples of this are: “Have you accepted that your tinnitus will never be cured?” or “Have you accepted that your tinnitus is part of who you are?”. One of the sample items they describe “Are you hopeful that a cure for tinnitus will be found soon?” could
in a generous interpretation be taken for a covert operant behaviour although it is unclear whether this hopefulness has a role in maintaining a context where tinnitus works as a discriminative stimulus for avoidance. The fourth presented sample item “Do you think about or imagine what life without tinnitus would be like?” is actually overlapping in content with item 12 on the TAQ. The third acceptance questionnaire was developed by Moreland and presented in her doctoral thesis (2007). This measure was an adaption of the Chronic Pain Acceptance Questionnaire for use with tinnitus patients by replacing the word “pain” with the word “tinnitus”. The measure was called Chronic Tinnitus Acceptance Questionnaire, consisted of 20 items and a principal components analysis supported the original two-factor structure of the questionnaire, with the exception of two items: item 3 ‘it is ok to experience tinnitus’ and item 8 ‘there are many activities I do when I experience tinnitus’. Neither of these two items loaded heavily onto either factor. Evidently this scale is to a large extent overlapping with the Tinnitus Acceptance Questionnaire as they share seven items. In reality the overlap is even bigger as the other items in TAQ and CTAQ, although not stated in the same wording, share content such as the item 2 in TAQ “My chronic tinnitus has led me to decrease my engagement in former activities” and item 19 in the CTAQ “It’s a relief to realise that I don’t have to change my tinnitus to get on with my life”. Other items in both scales are very focused on the experienced need of controlling tinnitus and tinnitus related thoughts and emotions. These two overlapping scales were developed by two research groups in parallel, unknowingly of one another. The data collection for study II in this thesis was finalised in October 2005 and the results were first published on-line in a masters thesis in February 2006 (Westin, 2006). The data collection in Morelands doctoral thesis was commenced in September 2006 as specified in the methods section, and the results were published in June 2007.

In terms of design more than half of the correlational studies on different versions of the AAQ have used cross-sectional data (Hayes et al., 2006; Ruiz, 2010), rendering an interpretation of the direction of the results impossible, thus making the interpretation of acceptance as the outcome equally plausible. Slightly less than half have been conducted with a longitudinal design, some of which have tested mediation. Most studies testing mediation however have not used a design suited for examination of the temporal relation of mediator variables and changes in outcome as to few measurement points were included (Hesser, Westin, Hayes, & Andersson, 2009). This is true also for most process studies conducted in conjunction with treatment outcome studies, using acceptance (e.g. Gregg et al., 2007), values (e.g. Vowles & McCracken, 2008) and believability of thoughts (Zettle & Hayes, 1986, recalculated in Hayes et al., 2006) as process variables, all of which assessed these variables by self-report at the end-point of treatment. With respect to this aspect of design study II with its longitudinal data, and III and IV with repeated measurement points during the course of treatment, have methodological strengths compared to the field as a whole.
**Behavioural observation**

The perhaps most relevant method to use for measuring acceptance and psychological flexibility is through behavioural observations. So far study III is the only published study using this approach. The most important kind of acceptance behaviours to observe would of course be situated in real-life events, however this kind of data collection is highly demanding and would almost call for video diaries or naturalistic experiments. Short of that, video recorded in-session behaviour is highly useful data for a behaviouristic study of acceptance as a process in treatment. This approach can also be used to make observations of behaviour during a standardised tinnitus interview. As the findings in study III suggest it can be important to single out aspects of the target behaviours such as frequency and depth.

In sum, this discussion asserts the need to investigate acceptance with different research designs and in more than one response domain. It would also be helpful to investigate if acceptance as measured in one response domain is related to acceptance measured in another domain. Future research should continue investigating acceptance and cognitive defusion with behavioural or observer measures and use a larger number of measurement points when trying to tap these processes.

**Representativity of the samples**

The participants recruited to the studies included in this thesis were mainly taken from the waiting list at the local audiology department and thus represent a clinical tinnitus population. The main concern regarding the representativity of the samples has to do with the fact that both the sample in study I/II (n=47) and the samples in study III/IV are on the average normal hearing, this while the majority of those suffering from tinnitus have hearing difficulties. In study I/II pure tone average thresholds were obtained from 45 participant of the original sample 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 hearing loss. The range of obtained values was between 0dB HL and 47dB HL, with 40 (85%) participants having no hearing loss (0-25 dB HL), four having mild hearing loss (26-40 dB HL) and one participant having moderate hearing loss (41-55 dB HL). No audiograms were obtained from the additional (n=30) sample in study II. The sample in study III and IV had an average hearing threshold of 12.8 dB HL with standard deviations being 5.6 and 7.1 respectively, results ranging between 0.0 dB and 28.8 dB. Fifty nine participants had no hearing loss and two had mild hearing loss, audiograms were missing for three patients. Of course in study III/IV the fact that the sample was normal hearing should come as no surprise given the exclusion criteria h) to have hearing thresholds which would allow for the use of wearable sound generators. As a point of reference the 14 articles (other than study IV) included in the meta-analysis by Hesser et al. (2011) on CBT for tinnitus were reviewed to see what kind of hearing data they reported. Only one of the included trials reported results from pure tone audiograms and this study only included
subjects older than 65 years of age and reported an average hearing thresholds of 28.3 dB HL (SD=13.3) (Andersson, Porsæus, Wiklund, Kaldo & Larsen, 2005). Six of the trials described the number of patients with hearing deficits established by self-report, with results ranging between 43-100% of the participants (on average 56%). Interestingly, another trial of CBT for tinnitus, not included in the meta-analysis, had included both pure tone audiograms and self-report data on hearing (Kaldo et al., 2008). The results showed that the average pure tone hearing thresholds were 13.0 dB HL (SD=9.19) indicating normal hearing, whereas 36% of the sample reported that they were rather, much, much or very much distressed by their hearing deficit.

In study III and IV, while the basis for intake of participants mainly consisted of the waiting list at three different audiology departments, some participants were also recruited through advertisements and articles in newspapers. Therefore the findings may not be fully generalizable to regular tinnitus clinic patients. However, there are no indications in the literature that tinnitus patients in a clinical sample (e.g., Kaldo-Sandström et al., 2004) or patients with more severe hearing loss (e.g., Andersson, Porseus et al., 2005) benefit less from CBT or from TRT (Henry et al., 2006).

Since a majority of people with tinnitus in the general public are only moderately disturbed by their tinnitus and manage to live with their symptom without any intervention (Andersson, Baguley et al., 2005) clinical samples can not be said to be representative of all those with tinnitus. As 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 interference scores in our samples. It would therefore be recommended to also study the interplay between these variables in epidemiological samples.

Further, the study samples were rather homogeneous in terms of ethnicity and the participants in study I/II 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 higher than usually observed (Andersson, 2000).

**Future directions**

This thesis has only just started investigating the link between tinnitus and tinnitus interference focusing on specific factors on the psychological level, mainly acceptance. We are not the first to be interested in this topic. To further explore this link two main approaches are suggested – breadth and depth. Breadth in this context means finding factors on the biological, psychological and social level that can account for variance in tinnitus disability, with openness to the fact that suggested relations may not be linear. Depth refers to the continued and refined investigation of the role of avoidance and experiential avoidance in the
development and maintenance of tinnitus disability. One way forward would be to examine persons who have not sought help for their tinnitus, to see how they have managed to come to terms with their symptom. I suspect that acceptance is a common process, but this assumption should be investigated in epidemiological studies. A non help-seeking group could also be compared to a help-seeking group on a number of relevant variables, one being acceptance. Another way would be to include tinnitus patients with a more recent onset of tinnitus, since this group would be more likely to show a more substantial change in tinnitus interference and quality of life depending on what strategy they chose for dealing with their new predicament. As suggested by the results in studies I and II, the possible benefit of control strategies should be further investigated and done so in a manner consistent with how tinnitus patients normally attempt to control their tinnitus. In doing so it is important to distinguish between short and long term effects. In large, the study of tinnitus interference would benefit from an increased clarity regarding what factors are proposed as predictors, process variables or outcome. In the existing literature it is not unusual to conceptualise a variable, such as depression, as being a predictor of tinnitus interference, the process through which tinnitus becomes interfering and as “tinnitus related interference on mood”. The development of a more cohesive and specific cognitive-behavioural model of tinnitus disability, is likely to be of value both for the theoretical understanding and for the further development of the treatment. Avoidance (as in avoidance and experiential avoidance) is suggested to play a key role in such a model. This would be an extension of the current habituation model focusing almost exclusively on respondent psychology.

The further refinement of an experimental paradigm to measure tinnitus interference would be desirable and is indeed underway (Hesser, Molander, Jungermann, & Andersson, unpublished data). The tinnitus specific acceptance measure developed in study II could also be further refined. For instance the second factor *tinnitus suppression* could be excluded as it consists of so few items and lack an association with tinnitus interference. Instead it could be replaced with new items loading into factor one. From a theoretical perspective one can argue for the benefit of viewing acceptance as one unified concept. Another alternative would be to abandon TAQ and instead use the CTAQ, as this measure is more balanced in terms of factor structure. The criterion validity of the TAQ/CTAQ should be further investigated. One suggestion on how to do this would be to compare results on the TAQ/CTAQ with observer ratings on the ADPM.

The results of the ACT intervention were comparable to those reported for CBT for tinnitus (Hesser et al., 2011; Martinez-Devesa et al., 2010). However, to make a correct comparison both treatments would need to be included in the same trial with sufficient power to discover small differences in outcome. Such a comparison is underway in a guided self-help format provided via the Internet (Hesser,
Gustafsson et al., unpublished data). It will be relevant for future research to address whether or not patients potentially benefiting from ACT are in any way different from those benefiting from CBT, finding predictors of treatment gain in the two treatments and potential mediators of the processes driving treatment changes. Moreover it would be of value to find out the relative importance of different treatment components in ACT vs. CBT.

As the results of the ACT-intervention were only comparable to, and not better than, CBT for tinnitus, it is relevant to ask what could add to the treatment effect. A suggested way forward would be further elaborating the understanding of how tinnitus becomes disabling. Another solution suggested by Kaldo (2008) could be to directly target the tinnitus patient’s major secondary problem. This means that distressed tinnitus patients would be sub-divided and receive a treatment targeting for instance insomnia in some cases, and depression in other cases. Given the large overlap between tinnitus interference and depression is somewhat surprising that the current CBT-treatment does not include behavioural activation. Another possibility would be to follow a recent trend within the field of CBT for chronic health conditions, to firmly emphasize the role of exposure (e.g. Wicksell, 2009; Ljótsson, 2011). However, in our clinical experience, only a small sub-group of those with tinnitus interference react with fear or anxiety to their tinnitus or tinnitus related stimuli. Although results could improve further, different forms of CBT have long been acknowledged as being among the most empirically supported treatments for tinnitus. Despite this fact very few of those who could be helped by the treatment receives it, pointing to the need of increased dissemination within the public health care system.

Put broader, the existing categorisations of tinnitus are not helpful in discriminating between patients in terms of pathological mechanisms and response to different treatments. A more useful system of categorisation could be of value in the development of tinnitus treatments, so that treatments that are potentially beneficial for a sub-group are not rejected as ineffective because they have been tested on the group as a whole.

The results in study III encourage continued investigation of therapy process variables using ratings of observable behaviour from video recordings. The design of the study and the observer rating measure ADPM could be used in ACT and CBT process research applied to other problem areas. Future research should investigate whether these processes are unique for ACT or relevant also in other treatments. It would also be interesting to find ways of establishing the connection between therapist behaviour on one hand and client behaviour or outcome in treatment on the other hand. Here process research on motivational interviewing could work as a source of inspiration (for a review see Apodaca & Longabaugh, 2009). Given the rapid response to treatment in ACT for tinnitus it is suggested that clients’
acceptance and defusion behaviours should be measured already at baseline, to have a point of reference. This would also shed light on the issue of whether these processes are indeed influenced by treatment, or act as more stable trait-like constructs.

Any study following the course of development of tinnitus disability or the relation between treatment process and outcome would require a large number of measurement points to keep track of when change occurs in process and outcome.

In sum, we need to improve our theoretical understanding of the development and maintenance of tinnitus disability, refine our ways of measuring tinnitus interference experimentally and tinnitus acceptance through self-report, find ways of further enhancing our treatment results and our understanding what processes are responsible for treatment change.
ACKNOWLEDGEMENTS IN SWEDISH/
TACKORD PÅ SVENSKA


Mina varmaste tack vill jag också rikta till...

Patienterna som valt att delta i forskningsprojekten och givit av sin tid och sitt engagemang. Min stora förhoppning är att vi i framtiden ska hitta sätt att förebygga tinnitus och hörselskador i den utsträckning det är möjligt, förbättra våra hörhjälpmedel än mer särskilt avseende tal i brus, hitta sätt att tysta eller reducera tinnitus och i väntan på det hjälpa fler människor att leva ett bra liv trots tinnitus.

Per Carlbring och Mary Rudner. Två mycket skickliga, noggranna, inspirerande forskare som fungerat som mina biträde handledare. Per med den insats du gjort och gör för KBT i Sverige och psykologiprogrammet i Linköping och nu i Umeå. Mary med ditt förtjänstfulla ledarskap av forskarskolan för hörsel och dövhet (HEAD).

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the founders of RFT and ACT, a brilliant researcher who seek to deepen and renew our understanding of human behaviour, you are also a very skilled, intuitive therapist and a warm and generous human being, committed to the old behaviouristic mission of “saving the world with behaviour analysis”.


 Jerker Rönnberg. Föreståndare för Institutet för handicappvetenskap och Linnécenrum HEAD. Stort tack för att jag blev antagen som doktorand och har fått tillhöra en så välfungerande och framstående forskningsmiljö!


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Rikard Wicksell och Tobias Lundgren som på ett mycket generöst sätt tog sig tid att läsa igenom och diskutera ACT-manualen till behandlingsstudien och som på åren som gått sedan dess blivit mina vänner.

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Cynthia och Erland. För stöd och avlastning!


Alla mina underbara vänner som fyller mitt liv med glädje, innehåll och mening.
REFERENCES


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APPENDICES

APPENDIX I. Instructions for the imagery task in study I

APPENDIX II. Tinnitus Acceptance Questionnaire – items and scoring in English

APPENDIX III. Tinnitus Acceptance Questionnaire – in Swedish

Instruction for the imagery task

General introduction to the task
You will now be asked to do a task in which you imagine a mental image. As long as you can see the image in front of you I want you to keep this button pressed down. We will measure the time by this device. When you lose track of the image, you should release the button and keep it that way until the image is back again. When it comes back you press the button down again. Five minutes might seem long, but just try to follow the instruction. I will tell you when the time is out. First I will provide you with an example...

Can you see that loudspeaker in front of you? … Now close your eyes and imagine that you see the loudspeaker. Keep the button pressed down as long as you can see the loudspeaker in front of you. If you lose the image and think about something else then release the button. Once you return to the image, press the button down again.

Now it is time for the task. I will ask you to imagine a specific place. It can be a place where you have been or it could be somewhere else. It should be a place you associate with calmness and serenity, for example it could be standing by the sea, or in a forest. The important thing is that you can see the image in front of you.

-SPECIFIC INSTRUCTION-

Take a deep breath and hold your breath … then gently release the air. Breathe with your stomach… When you are ready we can start the trial. Remember to keep the button pressed down only while your focus is on the mental image.

Specific instruction depending on experimental condition

Acceptance instruction: While you focus on your mental image, thoughts, feelings, and physical sensations are bound to turn up. By trying to suppress thoughts about your tinnitus sound, you might end up being more occupied by the sound, which can make the sensation even stronger. Instead of trying to suppress these thoughts, welcome them and let them take the place they need. Only notice the thoughts as they are, and continue to focus on your inner image. If you notice that you are caught up in thoughts other than the image, just take notice of that and return to the image. Each time these thoughts occur, make room for them and continue to focus on your image.

Suppression instruction: While you focus on your mental image, thoughts, feelings, and physical sensations are bound to turn up. You should not let yourself be disturbed by those sensations. Thoughts about your tinnitus sound can interrupt your concentration on the image. You should suppress the thoughts if they occur. Your task is to prevent the thoughts from attracting your attention. If you notice that your mind is focusing on something else, other than the image, you should drop that thought and concentrate on the image. You should attempt to keep the thoughts about tinnitus away, so that you can focus on the image.

Control instruction: What you should to now is to sit and focus on your mental image.
TAQ-items

Instruction: 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>Rating</th>
<th>Description</th>
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<tr>
<td>0</td>
<td>Never true</td>
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<tr>
<td>1</td>
<td>Very rarely true</td>
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<tr>
<td>2</td>
<td>Seldom true</td>
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<td>4</td>
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For instance, if you believe a statement is “Often true”, you would circle number 6 on the row following the statement.

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 about how things would be for me, without chronic tinnitus…

Scoring: Reverse score items: 4, 7, 8, 9, 10, 11, 12.
Tinnitus Acceptance Questionnaire

Namn: _______________________________
Kön: M   K          Ålder:               Datum:
_______________________________________________________________________

Nedan finner du ett antal påståenden. Skatta i vilken utsträckning vart och ett av påståendena stämmer in på dig. Använd följande skattningsskala:

1 2 3 4 5 6 7
Stämmer Stämmer Stämmer Stämmer Stämmer Stämmer  Stämmer
aldrig mycket  sällan ibland ofta mycket  alltid
sällan    ofta

Om du exempelvis anser att ett påstående ”stämmer ibland” ringar du in 4:an på den rad som följer efter påståendet.

_______________________________________________________________________

1. Mitt liv fungerar bra trots att jag har tinnitus.

1 2 3 4 5 6 7
Stämmer Stämmer Stämmer Stämmer Stämmer Stämmer  Stämmer
aldrig mycket  sällan ibland ofta mycket  alltid
sällan    ofta

2. Min tinnitus har lett till att jag i mindre utsträckning gör saker jag tidigare ägnade mig åt.

1 2 3 4 5 6 7
Stämmer Stämmer Stämmer Stämmer Stämmer Stämmer  Stämmer
aldrig mycket  sällan ibland ofta mycket  alltid


1 2 3 4 5 6 7
Stämmer Stämmer Stämmer Stämmer Stämmer Stämmer  Stämmer
aldrig mycket  sällan ibland ofta mycket  alltid

4. Det är nödvändigt för mig att kunna kontrollera mina negativa tankar och känslor omkring min tinnitus.

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5. Trots min tinnitus känner jag att jag kan staka ut en kurs i mitt liv och hålla mig till den.

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6. När min tinnitus tilltar kan jag fortfarande sköta mina åtaganden.

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7. Jag kommer att ha bättre kontroll över mitt liv om jag kan kontrollera mina negativa tankar rörande tinnitus.

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8. Min tinnitus gör att jag undviker vissa situationer.

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9. Mina tinnitusbesvär förändrar mig som person.

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10. Jag måste anstränga mig för att få saker gjorda när jag har tinnitusbesvär.

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Acceptance and Defusion Process Measure
Client Behavior In-Session

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Linköping University
Sweden

This scale has been adapted from the Functional Acceptance and Commitment Therapy-Revised Scale (FACTS-R scale) and inspired by the Acceptance Process Measure (Khorakiwala, Hayes & Wilson, 2004).

The history of FACTS scale, and original citations, are below.

Functional Acceptance and Commitment Therapy Scale (Revised Scale)
Blackledge, J., Ciarrochi, J., and Billich, L. 2006

Functional Acceptance and Commitment Therapy Scale (VERSION 3/15/05)
Pierson, H., Gifford, E.V., Smith, A.A, Bunting, K., & Hayes, S.C. 2004


**Adapted from: H.M. Behr, R.M. Bisighini, K.M. Carroll, R. MacLean, & K.F. Nuro: Rater’s Manual for Project Match Tape Rating Scale***


*Adapted from: C. R. Parker, M. Bolling, & R. J. Kohlenberg: Therapist In-Session Strategy Manual

*Adapted from: S. D. Hollon, M. D. Evans, A. Auerbach, R. J. DeRubeis, I. Elkin, A. Lwery, M. Kriss, W. Grove, V. B. Tuason, & J. Piasecki: The Collaborative Study Psychotherapy Rating Scale**

**Adapted from: Adapted from: C. R. Parker, M. Bolling, & R. J. Kohlenberg: Therapist In-Session Strategy Manual
INTRODUCTION TO ADPM VERSION 1.0

The Acceptance and Defusion Process Measure (ADPM) was developed as a method for evaluating specific client behavior relevant for Acceptance and Commitment Therapy (ACT); specifically coding for acceptance and defusion behaviors from audiotapes and videotapes of individual therapy sessions. The possible uses of ADPM include:

- Conducting psychotherapy process research to examine client responses
- Predicting treatment outcome from psychotherapy process measures
- Generating new knowledge about ACT and its underlying processes of efficacy

GENERAL GUIDELINES

1. RATE OBSERVABLE CLIENT BEHAVIORS:

Items refer to the client’s behavior, not the therapist’s behavior or the therapist’s responses. Variables must have explicitly occurred. Do not rate a variable as having occurred if this occurrence was not explicit but only implied.

- Rate verbal behavior
- Explicit, not implied

2. WHAT IS CLIENT BEHAVIOR:

For clients, a verbal behavior is considered to be a complete thought or intent. A behavior ends either when one thought it completed and a new thought begins with the same speaker, or when the other speaker takes over. It is common, however, for utterances representing different items to follow one another within the same speaker's speech. If a client’s turn includes two statements, each of which can be assigned a different code, then both are rated as separate client behaviors. Keep in mind that only client behaviors that reflect an item (defusion or acceptance) should be rated (see below).

3. RATE EVEN IF IT IS LIMITED CLIENT BEHAVIOR:

Although the rater’s task is to rate the client’s behavior, the therapists may initiate a behavior, which is being measured with only limited client involvement. An item should not necessarily receive a lower rating in this case. Ratings should reflect the degree to which the client is verbally expressing the specific activity (e.g. answering a question), rather than merely acting as a passive recipient of the therapist’s behavior.
4. RATE FOR FREQUENCY AND EXTENSIVENESS:

Each time the client speaks, the rater should consider if the particular utterance reflect an item. What you are listening for in particular are two forms of speech that represent either defusion or acceptance. If the rater considers the statement to reflect either defusion or acceptance, it should be coded as D and A, respectively. This coding may be based on listening to audio or videotaped conversation, or coding a transcript of a conversation. The coder can stop the tape at times, and rewind and replay as necessary to determine proper codes.

**Rating the Extensiveness of Behavior**

One more element is needed to have a complete code for a client utterance. In addition to the type and valence of behavior (if any), every relevant statement (defusion or acceptance behavior) is also given an extensiveness score, ranging from +5 to +1. The starting point for a straightforward statement of acceptance or defusion is a three (+3). The intensity of inclination can be increased or decreased by signals in the content, vocal tone, or context of an utterance. See Sessions Occurrence for scales of extensiveness ratings for acceptance and defusion behavior.

- Frequency = how often
- Extensiveness = how in-depth

We recommend a sequential recoding of behaviors, in that all codes must be entered in the order they occurred in session, clearly indicating time point and verbal phrase coded. This will allow a detailed examination of each item. Inter-coder reliability can then be evaluated by directly comparing coder responses for each specific behavior, across the entire session or for identified portions of the session.

5. AVOID HALOED RATINGS:

The rating scale is designed for the purpose of describing the client’s behavior in the session. In order to use the rating scale correctly, it is essential that the rater rate what actually occurred, and not what ought to have occurred. Therefore, the rater must be sure to apply the same standards for rating an item regardless of:

1. the type of therapy the rater thinks he/she is rating;
2. other behaviors the client engaged in during the session;
3. ratings given to other items;
4. how skilled the rater believes the therapist and/or client to be;
5. how much the rater likes the client and/or therapist.
6. RATE BEHAVIOR FOR HEAD ITEMS, NOT SUB-ITEMS:

Each item has sub-items, which are indicated by a letter. Only rate the items designated by a number. The sub-items are not rated separately, but instead factor into the rating given to the item they are listed under. The client’s behavior does NOT need to be differentiated among sub-items. If the client’s behavior falls under any one of the sub-items, it counts as an example of the heading item.

7. USE THE MANUAL DURING EACH RATING:

In order to prevent rater drift, we strongly recommend that all raters read the manual’s description of each item each time a session is rated. Because of the complexity of the scale items, it is essential that the rater be completely familiar with the definitions of variables before rating them. We recommend that raters have theoretical knowledge about the proposed processes in ACT before using the scale. Because raters are asked to make fine distinctions, it is essential that the rater watch the session carefully and without distraction.

*Use the Manual for Specific Examples.*

Examples are provided in the manual to be used as guidelines for rating client behavior. The examples are guidelines for rating an item. The rater is expected to exercise his/her judgment when using the examples to guide his/her rating.

*Use the Manual to Clarify Subtle Differences between Items.*

Because the items may overlap in terms of breadth of coverage, the same client behavior, which are appropriately rated in one item, may also apply to another item. The rater should be careful to rate each item distinctly (i.e., the rater should consider the extent to which the behavior specified in that item occurred and should not consider other similar items when doing so). The rater should use the manual as a guide to clarify subtle differences between items.

8. CONFIDENTIALITY:

All videotapes and rating scores are confidential material. While watching tapes and rating sessions, please ensure that you do so in a place where family members and friends cannot see or hear the sessions. The tapes are to be handled like private psychiatric charts. Do not leave tapes or rating material unattended. Do not discuss the content of sessions with anyone other than project staff. This is done to ensure the confidentiality of all clients and therapists.
SESSION OCCURRENCES: RATING ITEMS

1. DEFUSION

A. Reduced Behavioral Reactivity to Cognitions: To what extent did the client express that thoughts and feelings are just thoughts and feelings and not necessarily reality (i.e., “I am having the thought/feeling/evaluation that…,” and/or “I will thank my mind for that,” and/or “I m really being stubborn; well that’s a thought” etc.)?

Client observes, notices, catches thoughts, words as they are happening in the here and now during the session and appears to see thoughts, feelings, attitudes, beliefs, evaluations, and memories as something one has, as opposed to believing the content of these private experiences. It is clear that the client does not buy and literally believe the thought.

This question is intended to evaluate whether client identified thoughts as thoughts without judgment or evaluation. This may include discussions about the limitations of language in general as well as the extent the client expressed to see particular thoughts and feelings as just thoughts and feelings, distinct from established facts. The client might discuss cognitions as “mind chatter” or separating private experiences from reality and actual behavior.

Examples:

Th: So how is, "Gosh, I'm never going to be able to do this!" different from, "I'm really able to do this!?"

Cl: They're just thoughts, both of them.

Cl: I notice that I'm having the feeling…

Cl: That's just a thought, anyway..

Cl: I feel sad right now

Th: What does that look like?

Cl: It looks like a black box
B. **Feeling/Thoughts DO NOT Lead to Actions:** To what extent did client’s feeling/thought not lead the client to behave in certain ways?

The client is not in need of acting as a way of getting rid of thoughts and/or feelings. (e.g., “Whenever I feel anxious I have to stop doing what makes me anxious”), instead the client is identifying that the particular thought/feeling does not lead to action.

Thoughts are just words, even long-held beliefs. If thoughts are seen for what they are (just thoughts), choices can be made as to whether they should actually be acted upon. The client’s behavior is not the result of thoughts/feelings but rather that the client has the ability to observe private experiences and urges and not act on them.

**Examples:**

**Th:** Have you ever been angry enough with your child to strike him?

**Cl:** Yes, but I never would!

**Th:** Exactly! You can have the thought or urge to do it, but the thought itself doesn’t cause you to actually hit your kid. In those moments you act in accordance with your values, not with your thoughts.

**Cl:** Yes, I see your point, I don’t have to act on my thoughts, I can do what I choose, no matter what a feel…

**Cl:** Before….whenever I had that thought… I became overwhelmed….and I felt forced to get rid of it

**Th:** And now?

**Cl:** Well…it’s just a thought…and when I think about…it’s kind of strange that I acted the way I did…

**Th:** So what do you do now whenever you have that thought?

**Cl:** Nothing really…I don’t have to do anything.
C. **Mindfulness Of Self As Separate From Language:** To what extent did the client express a sense of *self-awareness* or identification as the *context* in which all his/her thoughts, feelings or evaluations occur (e.g., talk about the “observer self”)?

This question is intended to evaluate the extent the client relate to him/herself from a more complete and profound perspective rather than basing a sense of self on the fluctuating status of momentary feelings and thoughts.

To what extent did the client focus on feeling in his or her body and noticing physical sensations, thoughts, and feelings that are occurring in the moment as something the client has, as opposed to being literally one with his/her private experience.

**Examples:**

*Cl:* I am noticing I’m having a reaction to something you just said…

*Cl:* I noticed that it was my mind chattering away and I was able to see it just as that…chatter

*Cl:* It seems like I don’t have to get caught in the thought, I can just let it go

*Cl:* My mind is giving me all these crazy thoughts, just now, while we’re taking…
### 1.2 SCALE OF EXTENSIVENESS FOR DEFUSION BEHAVIOR

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
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<tbody>
<tr>
<td>+5</td>
<td>An absolute in-depth expression of defusion. It is clear that the individual does not believe the content of the private experience and is able to separate him-/herself from the experience. “At that moment, I thanked my mind for whatever it gave me”</td>
</tr>
<tr>
<td>+4</td>
<td>A statement of defusion with some in-depth amplification. This can be judged from definitive vocal tone of expression or from emphasis modifiers (just, only). The statement should express that the client is able to separate him/herself from the experience (“It gave me another thought”) or that the client does not believe the content of the private experience (“that’s just a thought”).</td>
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<tr>
<td>+3</td>
<td>A straightforward statement of defusion, such as “I’m experiencing an anxious feeling, I’m having a thought…”</td>
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<tr>
<td>+2</td>
<td>A moderated, somewhat qualified statement of defusion. Code most short answers here (e.g., answering a defusion question) – “Is that a thought you are having? Yeah, it often shows up…”</td>
</tr>
<tr>
<td>+1</td>
<td>A highly diminished statement of defusion – talk about the limitations of language or about the difference between having an emotion/thought and feeling/thinking in general terms.</td>
</tr>
</tbody>
</table>
2. ACCEPTANCE

A. Experiential Acceptance - In Session: To what extent is the client willing to contact and accept difficult feelings, thoughts, memories and/or bodily sensations in session?

This question is intended to evaluate whether the client is willing to have what he/she has in the moment. Presence of client emotion is not enough. The client feeling his/her emotion must be accepting of it without trying to get rid of or controlling the feeling or thought. This includes situations where the client initiates expression of difficult feelings and express an attitude of acceptance of his/her private experience. But it also reflects the extent to which the client is willing to have an difficult private experience (e.g. emotion) when the therapist help the client to explore his/her feelings or physical sensations related to current symptoms or clarify affect states as related to target problems.

Examples:

Th: See if you can just show up to what is there to be experienced right now in this moment.

Cl: I feel really anxious right now.

Th: Can you just sit with that experience for a moment?

Cl: Yeah, okay, I think so.

Cl: I feel a little anxious right now, and I am having a thought: “What if I am doing this wrong”. It is strange, it actually feels like a can have this, and it makes the situation better...

Th: Are you willing to experience it right now (a bad feeling or thought), even if you don’t like it?

Cl: I’m willing.
B. Experiential Acceptance - Out of Session: To what extent is the client willing to contact and accept experience difficult urges, thoughts, feelings, memories and/or bodily sensations in their daily life outside of session?

This differs from experiential acceptance-in session, in that the client may talk about acceptance experiencing that refers to a time other than in the current session. It also reflects the extent to which the client is willing to have an difficult private experience (e.g. emotion) when the therapist help the client to explore his/her feelings, thoughts or physical sensations, that the client might experience outside of session.

Examples:

Th: What feelings and sensations show up with your wife when you try to talk about the problem you’ve been having?

Cl: I start to feel anxious—my heart starts racing and I, you know, start worrying that if she finds out I made one more mistake like this, that’ll be it.

Th: What do you do in response to those anxious feelings and thoughts?

Cl: I typically don’t even let myself get that far—I don’t even talk to her about this stuff in the first place.

Th: Would you be willing to try showing up to those feelings that come up with your wife like we’ve practiced in here?

Cl: I guess I need to, it is really important to me that she understands what I am going through.

Th: What I’m hearing is that you were able to have difficult thoughts and emotions and yet still act in accordance with your values

Cl: Yeah!.

Cl: Yesterday I felt very sad and thought “What’s the point?”, but instead of feeling like I had to get rid of that experience, I just kind of ‘sat with it’.

Cl: Yes, I feel awful and I have thoughts about not wanting to do it, yet, I know that doing this is more important to me then not doing anything
C. Acceptance of Personal History: To what extent is the client willing to contact and accept his/her personal history?

This item refers to the extent to which clients talk about their own history in an acceptance context (not with resignation) and reflects the extent that the client is willing to contact the psychological reality of his/her own history. This includes situations that the clients are making statements of their own history without expressing a wish to change the past and/or want to return to a previous point in time in order to remove/change specific incidents in their own history.

Examples:

Cl: I want to change, it’s hard…..
Th: What would be between you and your goals?
Cl: I guess… all those memories…
Th: Can you bring all of those up to the front and drive?
Cl: I guess they can be allowed on the bus.

Cl: My parents always told me that I was suppose to sit still….do nothing
Th: And how has that worked in relation to your children today?
Cl: It’s not working at all!
Th: Can you make a commitment to do something that will bring you closer to your values?
Cl: That is all in the past….it can’t control my life anymore… I need to move on….to tell my kids that I love them…and not sit still anymore.
## 2.2 Scale of Extensiveness for Acceptance Behavior

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5</td>
<td>An absolute in-depth expression of acceptance. The client expresses emotional willingness, an active approach of making room for difficult feelings, memories, and bodily sensations in order to pursue valued goals. The difficult private experience seems to play a different function often through the process of defusion. “I didn’t let my ‘monster’ decide for me” “I was able to take it all in!”</td>
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<tr>
<td>+4</td>
<td>A statement of acceptance with some in-depth amplification. Amplification of acceptance can be judged from the verb that is used (“I will” “I can sit with it” with vocal emphasis) as well as from emphasis modifiers (definitely, surely, absolutely) and/or from definitive vocal tone of expression. “I’m willing!”</td>
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<tr>
<td>+3</td>
<td>A straightforward statement of acceptance without a change/control agenda. Code most short answers here on acceptance questions, such as “Are you willing”: Yes” although a short answer like “Certainly” may merit a 4.</td>
<td></td>
</tr>
<tr>
<td>+2</td>
<td>A moderated, somewhat qualified statement of acceptance. The client expresses an ambiguity of accepting private experiences. “I believe I can sit with it”</td>
<td></td>
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<tr>
<td>+1</td>
<td>A highly diminished statement of acceptance (toleration). The client expresses that she has given up a change or control agenda with regards to difficult private events. “It’s something I’ve come to terms with”</td>
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<tr>
<td>TIME</td>
<td>BEHAVIOR</td>
<td>COMMENT</td>
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<td>(After behavior)</td>
<td>(A or D)</td>
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<th>FREQUENCY</th>
<th>PEAK LEVEL</th>
<th>MODAL LEVEL</th>
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<tr>
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<td></td>
<td></td>
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<tr>
<td>Defusion</td>
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