ACCEPTANCE AND COMMITMENT GROUP THERAPY FOR TREATMENT OF INSOMNIA

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There are variety of populations and problems, including adults and children with common psychological problems where Acceptance and Commitment Therapy has been used. There are also promising pilot studies focusing principles of ACT for the treatment of insomnia. The aim of this study was to examine the effect of Acceptance and Commitment Group Therapy for sleep disorders.

The sample included a treatment group of 32 participants with chronic sleep disorder and a control group of 33 people. The treatment consisted of six group sessions from which the first one was held individually via phone. The remaining five group sessions were held weekly. Altogether there were 15 tests focusing on participants sleep, psychological flexibility and physical and psychological well-being. Outcomes were done by using repeated analyses of variance (ANOVA).

There were significant difference between the treatment and the control group in perceived severity of insomnia, sleep-related dysfunctional cognitions, psychological distress, severity of depressive, anxiety and stress symptoms, and dispositional and state hope over time. Additionally all used measures had significant improvements with scores in the treatment group over a time.

The study showed that ACT principles -based group intervention can be effective to treat insomnia. These findings, however, need to be interpreted cautiously, due to lack of long time follow-up. Further research and developing new measures for studying processes of insomnia are still needed.

Keywords: Acceptance and Commitment Therapy, insomnia, group therapy

JYVÄSKYLÄN YLIOPISTO

Psykologian laitos

PELKONEN, SONJA & PUHA, NIINA: Ryhmämuotoisen Hyväksymis- ja omistautumisterapian vaikutukset unettomuuden hoitoon.

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Hyväksymis- ja omistautumisterapiaa on käytetty laajasti erilaisten psyykkisten ongelmien hoidossa, niin aikuisilla kuin lapsilla. Viimeaikaisista tutkimuksista HOT:n periaatteiden soveltamisesta nukkumisongelmien ja unettomuuden hoitoon on saatu lupaavia tuloksia. Tämän tutkimuksen tarkoituksena oli selvittää ryhmämuotoisen Hyväksymis- ja omistautumisterapian vaikutuksia unettomuuden hoidossa.

Tutkimukseen osallistuneista 32 henkilöä kuului koeryhmään ja 33 tutkittavaa kontrolliryhmään. Hoito suoritettiin ryhmämuotoisena terapiana, joka sisälsi yhteensä kuusi kertaa, joista ensimmäinen tehtiin yksilöllisellä puhelinhaastattelulla. Loput viisi istuntoa pidettiin säännöllisesti viikoittain. Osallistujia tutkittiin yhteensä 15 eri testimenetelmällä, jotka keskittyivät uneen, psyykkiseen joustavuuteen sekä fyysiseen ja henkiseen hyvinvointiin. Tulokset analysoitiin käyttäen hyödyksi toistettujen mittausten varianssianalyysia (ANOVA).

Tutkimuksen tuloksena löydettiin merkitsevä ero hoito- ja kontrolliryhmän välillä kuudessa mittarissa. Tilastollisesti merkitsevä ero oli unettomuuden haitta-asteen arviossa, uneen liittyvissä haitallisissa kognitioissa, psykologisessa kärsimyksessä, masennus-, ahdistus-, ja stressioireissa, sekä toiveikkuudessa. Lisäksi koeryhmän sisäisessä tarkastelussa kaikissa mittareissa todettiin tilastollisesti merkitsevä ero ajan suhteen.

Tutkimus osoitti, että Hyväksymis- ja omistautumisterapiaan pohjautuva ryhmäinterventio voi olla tehokas keino unettomuuden hoidossa. Esitettyjä tuloksia tulee kuitenkin tulkita maltillisesti johtuen tutkimuksen pitkäaikaisen seurannan puutteesta. Tulevaisuudessa tarvitaankin yhä lisätutkimuksia ja parempien mittareiden kehittämistä unettomuuden prosessien tutkimiseen.

Avainsanat: Hyväksymis- ja Omistautumisterapia, unettomuus, ryhmäterapia

INTRODUCTION

The study is about using Acceptance and Commitment Therapy for sleeping problems. There are few but promising previous research focusing on principles of ACT for the treatment of insomnia (e.g. Dalrymple, Fiorentino, Politi, & Posner, 2010). It has been also presented that ACT techniques are related more accepting approach to spontaneously occurring physical and psychological processes, which may help to promote sleep (Lundh, 2005). There is also a promising study of cognitive behavioral group intervention model for chronic insomnia (Järnefelt et al., 2012a; Järnefelt et al., 2012b). Because of the prevalence of insomnia and the positive outcomes of ACT therapy for many other psychological disorders including also pilot studies of sleeping problems, we wanted to research this area further. The goal is to research whether the increasing of psychological flexibility is related to well- being and furthermore has positive effects on participant` s sleep and experienced quality of it.

Insomnia

Sleep disorders include many different sleep related disorders. Insomnia is the most prevalent sleep disorder in the general population and so a widespread problem (Schutte-Rodin, Broch, Buysse, Dorsey, & Sateia, 2008). A general consensus has developed from population-based studies in which about 30% of a variety of adult samples drawn from different countries report one or more of the symptoms of insomnia (Ancoli-Israel & Roth, 1999). In western European countries insomnia is a frequent symptom in the general population and approximately 10% to 35% of the population has insomnia symptoms of various degrees of severity (Ohayon & Partinen, 2002). In Finland prevalence of diagnoses of insomnia disorder is high. It is estimated that 11.7% of the general population have a DSM-IV insomnia disorder diagnosis and the overall prevalence of insomnia symptoms occurring at least three nights per week is 37.6%. However, it is good to remember that the actual prevalence of insomnia varies according to the stringency of the definition used and more importantly the population studied (e.g. Ohayon, 2002; Roth, 2007).

Insomnia can be defined as a diagnosed sleep disorder or less severe sleep-related symptoms, but it has also been defined by subtypes on frequency, duration (acute versus chronic) and etiology

(Järnefelt, 2011; Mai & Buysse, 2008). Universally insomnia is described as the subjective perception of difficulty with sleep initiation, duration, consolidation, or quality that occurs despite adequate opportunity for sleep, and that results in some form of daytime impairment (American Academy of Sleep Medicine, 2005). According to American Sleep Disorders Association (ASDA, 1997) insomnia can be classified as primary or secondary (Silber, 2000). According to American Psychiatric Association (1994) and ASDA (1990) primary insomnia has a psychological origin and secondary insomnia, that is more common than primary insomnia, is a sleep disturbance caused by a psychiatric or medical disorder (Lichstein, Wilson, & Johnson, 2000). As a diagnostic term, primary insomnia demands one or more of common sleep difficulties to last at least 1 month leading distress or impairment in important areas of functioning (American Psychiatric Association, 2000; Dalrymple et al. 2010).

Sleepless person suffers from daytime fatigue because of inadequate amount of sleep or poor quality of sleep. Insomnia can cause clinically significant difficulties in many important areas of functioning. Consequences include for example mood disturbances such as an increased risk of depression and anxiety disorders (e.g. Neckelmann, Mykletun, & Dahl, 2007; Riemann & Voderholzer, 2002), cognitive impairment, like memory impairment (e.g. Shekleton, Rogers, & Rajaratnam, 2010), daytime fatigue, sleepiness and greater daytime functioning impairment (e.g. Alapin, 2000; Ustinov et al., 2010), interpersonal difficulties (Healey et al., 1981; Schutte-Rodin et al., 2008), occupational difficulties and work disability risks (e.g. Sivertsen et al., 2009), increased healthcare utilization (Simon & VonKorff, 1997), chronic use of medication, medication tolerance and side effects when using drug treatment (Endeshaw, 2001; Morin & Wooten, 1996; Simon & Ludman, 2006), economic burden (e.g. Daley, Morin, LeBlanc, Grégoire, & Savard, 2009), lowered quality of life (e.g. LeBlanc et al., 2007), accidents (e.g. Connor et al., 2002; Powell et al., 2001; Powell & Chau, 2011), and mortality (e.g. Hublin, Partinen, Koskenvuo, & Kaprio, 2011). Managing to avoid these unfavorable consequences insomnia should be recognized and treated early and effectively (Järnefelt, 2012a). It is important to notice consistent risk factors such as increased age, female sex, comorbid (medical, psychiatric, sleep, and substance use) disorders, shift work, and possibly unemployment and lower socioeconomic status (Ancoli-Israel & Roth, 1999).

Acceptance and Commitment Therapy

Acceptance and Commitment Therapy gives the client a counterintuitive method of accepting, rather than changing or eliminating, troublesome thoughts and feelings (ACT: Kohlenberg, Hayes, & Tsai, 1993). A core assumption of ACT is that psychopathology often occurs when verbal functions dominate (Hayes & Wilson, 1994; Hayes, 1999). Thoughts and feelings are commonly pointed to as valid and sensible causes of behavior. The focus throughout the treatment is facilitating the client's movement towards a more valued and personally fulfilling life, in a context where previously obstructive unpleasant emotions no longer serve as obstructions. ACT is a part of the Cognitive Behavior Therapy (CBT) tradition, although it has still some major differences from CBT (Twohig, Pierson, & Hayes, 2007).

ACT is based on a basic experimental analysis of human language and cognition, Relational Frame Theory (RFT: Hayes, 2004). RFT allows fairly complex verbal events, such as metaphor and thoughts, to be approached behaviorally (Hayes, Barnes-Holmes & Roche, 2001). According to RFT the ability to form relational networks is a key component of language and cognition. The question is how language creates pain and useless methods of dealing with one's problems. The words must be avoided as much as the actual events when the distinction between words and their referents is lost, and they become functionally similar (Hayes & Wilson, 1995). Negative emotions must be avoided because the common locution literally suggests that the emotion itself is unacceptable and must change. The problem with avoidance is that in solving one problem, it creates others.

Normally there are six different stages or goals in ACT. Accordingly to Hayes and Wilson (1994) creative hopelessness is seen as a therapist attempts to establish a condition of creative hopelessness, in which the client begins to see former solutions as problems themselves. The first component of ACT is *cognitive fusion* meaning that emotional and cognitive control should be seen as the core obstacle preventing successful solution of the client's problems. Secondly, *being present* means that ACT helps the client being psychologically present: consciously connecting with whatever is happening right here, right now (Hayes, 1999). Thirdly, the *self as context* means that there are two different part of oneself - the thinking self and the observing self. The idea is that the observing self is able to be aware of whatever oneself is thinking or feeling or doing at the moment even though it would be the thoughts itself. Fourthly, emotional willingness in other words *acceptance* refers instead to the person`s openness to all emotional experience. It means openness to both positive and negative feelings. Fifthly, one of the ACT main goals is to help client to understand what *values* he or she has. The sixth goal of ACT is to aid the client in making *commitments to action* toward those important values (Hayes & Wilson, 1994).

There are variety of populations and problems, including adults and children with common psychological problems where ACT has been used (Cullen, 2008). These include for example problems such as anxiety (Twohig, Masuda, Varra & Hayes, 2005), depression (Hayes, Bach, & Boyd, 2010; Forman, Herbert, Moitra, Yeomans, & Geller, 2007), psychosis (Bach & Hayes, 2002), chronic pain (Wicksell, Olsson, & Hayes, 2011), phobias (Smout, Hayes, Atkins, Klausen, & Duguid, 2012), worry (LeJeune, 2007), social anxiety (Kocovski, Fleming & Rector, 2009) and difficulties of being a parent for children with autism (Busch, 2010; Blackledge, 2005).

ACT for insomnia as a new treatment

There is a great deal of evidence that insomnia is a risk factor for depression (Baglioni et al., 2011; Riemann et al., 2011). Compared to people with no sleep difficulties, non-depressed people with insomnia have a twofold risk of developing depression. Thus, it is possible that adequate and early treatment programs of insomnia might reduce the risk for developing depression. Overall disturbed sleep has a high impact on daily functioning and it has been correlated widely with psychopathology, for example anxiety disorders (van Mill, Hoogendijk, Vogelzangs, van Dyck, & Penninx, 2010). Knowing that ACT is an effective treatment for depression and anxiety and realizing the correlation between insomnia and these psychological disorders, we can assume that ACT could work as an effective treatment for insomnia too.

Knowing that ACT principles are focused on thoughts and feelings it is important to understand the connection between the cognitive aspect of thoughts and insomnia symptoms. Cognitive model of insomnia specifies five processes that function to maintain insomnia (Harvey, 2002; Harvey, 2005). According to the model, insomnia is maintained by a cascade of cognitive processes that operate at night and during the day. The five key perpetuating cognitive processes are worry, dysfunctional beliefs, selective attention and monitoring, counterproductive safety behaviors, and misperception of sleep and daytime deficits. Thus the purpose of the treatment is to reverse all five maintaining processes during both the day and the night. ACT has potential to work with these processes.

Insomnia has been treated by various methods, but often with hypnotic medication (Morin & Wooten, 1996). Concerns about medication treatments have fostered interest in behavioral interventions for insomnia (Bluestein, Healey, & Rutledge, 2011). Evidence-based techniques

include stimulus control, relaxation training, sleep restriction, paradoxical intent, sleep hygiene, and Cognitive Behavioral Therapy (Morgenthaler et al., 2006; Morin et al., 2006). It has been argued that the best validated treatment is still in 1972 introduced stimulus control procedure (Lundh, 2005). Cognitive Behavioral Therapy for treatment of insomnia (CBT-I) has been a topic of interest for researchers over dozens of years and has been shown to be effective (e.g. Edinger, Wohlgemuth, Radtke, Marsh, & Quillian, 2001; Espie, Inglis, Tessier, & Harvey, 2001; Morin 2004; Morin et al. 2006). CBT-I is a multicomponent treatment that involves techniques, like stimulus control, that have been proved to be effective and helpful and are presented above (Harvey, 2005). It has been studied that CBT-I is also as effective as hypnotic prescription medications in the short-term and have longer lasting benefits compared to medications (Dalrymple et al. 2010; National Institutes of Health, 2005). ACT does not exclude techniques that already have been proved to be effective but it can be easily added with these techniques, like stimulus control, which can optimize treatment's effectiveness. ACT can be considered being a new intervention within traditions of both cognitive and behavioral treatments including some similar aspects as CBT. Therefore it could be expected to work as effectively or even more effectively than CBT for insomnia.

There is also a promising study of cognitive behavioral group intervention model for chronic insomnia (e.g. Järnefelt et al., 2012a; Järnefelt et al., 2012b). Thus insomnia can be treated in group interventions and because ACT has been used effectively as a group treatment for other psychological disorders like for example social anxiety (Block & Wulfert, 2000), stress (e.g. Bond & Bunce, 2000; Brinkborg, Michanek, Hesser, & Berglund, 2011; Flaxman & Bond, 2010), depression (e.g. Bohlmeijer, Fledderus, Rokx, & Pieterse, 2011; Zettle & Raines, 1989), substance abuse (e.g. Luoma, Kohlenberg, Hayes, & Fletcher, 2012), and chronic pain (e.g. McCracken, Vowles, & Eccleston, 2005), we have a reason to study ACT's possibility to work as a group treatment for insomnia.

Nowadays many treatments include mindfulness and mindfulness-based programs have been developed for different problems (Ong & Sholtes, 2010). There is also preliminary work suggesting that mindfulness meditation can be successfully combined with CBT-I in one integrated treatment package (Ong, Shapiro, & Manber, 2008; Ong & Sholtes, 2010). The application of principles of mindfulness can develop adaptive ways of working with the nocturnal symptoms and waking consequences of chronic insomnia. ACT includes some principles of mindfulness which gives reason to study more ACT's possibility to be successful treatment for insomnia.

Still there are only few attempts in the literature to integrate ACT with behavioral strategies for the treatment of insomnia. According to one case sample integrating principles of ACT with

behavioral techniques in CBT-I may be useful for the treatment of insomnia, particularly by increasing willingness to experience the short-term discomfort associated with sleep restriction techniques and at the same time letting go of trying to control sleep (Dalrymple et al., 2010). It has been presented that acceptance and mindfulness techniques may help to foster a more accepting approach to spontaneously occurring physical and psychological processes, which again may help to promote sleep (Lundh, 2005). A pilot study from Åkerlund, Bolanowski and Lundh (2004) of an ACT-inspired group treatment has been carried out with promising results, but is still unpublished.

Based on the above -mentioned studies we hypothesized that the results of this study's treatment will show significant improvements in the symptoms of the chronic insomnia disorder as well as in the perceived severity of insomnia among participants. Insomnia is the most prevalent sleep disorder in the general population and so a widespread problem, but still there are only few studies where ACT has been used to treat insomnia symptoms. Because of insomnia can be seen a multidimensional symptom that have a cognitive fusion as a background, we could assume ACT to be workable treatment for it. Our hypothesis was that increasing psychological flexibility we can decrease sleep-related dysfunctional cognitions about sleep as well as the psychiatric and somatic symptoms among participants. We assumed that this will improve overall general well-being and have some positive effects on participant`s sleep and experienced quality of it.

METHODS

Subjects

The participants were recruited using two different methods. Firstly, by placing an add in a local newspaper and secondly, by offering the chance to participate in the present study during a lecture for diabetics. Altogether 102 people applied for the study. Originally, the intervention was planned for 6-8 participants as an individual therapy. Since there were more applicants than anticipated, it would have been unethical to leave most of the applicants without treatment. Therefore, the intervention was revised into a group therapy. Due to this, the applicants were contacted again to make sure they were willing to participate in a group therapy instead of an individually organized

intervention as originally planned. Overall 12 participants declined from group intervention from which 12 wanted to be placed on waiting list for individual therapy (see Figure 1).

Applications were received via phone calls, during which background information was also collected. Based on the background information, participants who had other on-going therapies overlapping with the intervention were excluded from the study. In addition, applicants with a diagnosed schizophrenia or a similar diagnosis of mental illness were excluded. However, depression or anxiety, were not excluding factors. Moreover, there was reason to believe that some applicants wanted to participate in the study for other reasons than sleep-related problems. Seven applicants found to be unsuitable for the study so other available interventions were recommended for them. After examining the background information and informing the applicants about the change in the intervention structure, there were 79 participants left.

Participants were randomly assigned into two groups. The first one was the treatment group and it consisted of 39 participants. Second group was the control group and had 40 participants in it. Furthermore, four intervention groups of 8-10 people were formed within the study group. This was achieved by determining the therapy dates of each group and assigning people to each group based on their own schedules. From those 79 participants seven people did not participate in pre-measurement (see Participant flow diagram). One participant discontinued after pre-measurement and one after first session. From 70 participants only three did not participate in 1-month Follow-Up. Furthermore, participants were given the chance of skipping one group session. Based on the one session rule, two participants were unsuitable for the study and were therefore excluded of the analysis.

Demographic and clinical information of the treatment and control group (n = 66) were collected and there were some missing data (Table 1). The participants were considerably heterogeneous group when considering background factors such as education, current work situation, age and gender. Furthermore, the heterogeneity persisted through randomization so that both the treatment and the control groups had high heterogeneity. Background analysis showed that women had slightly higher education than men (76, 9% versus 56%).

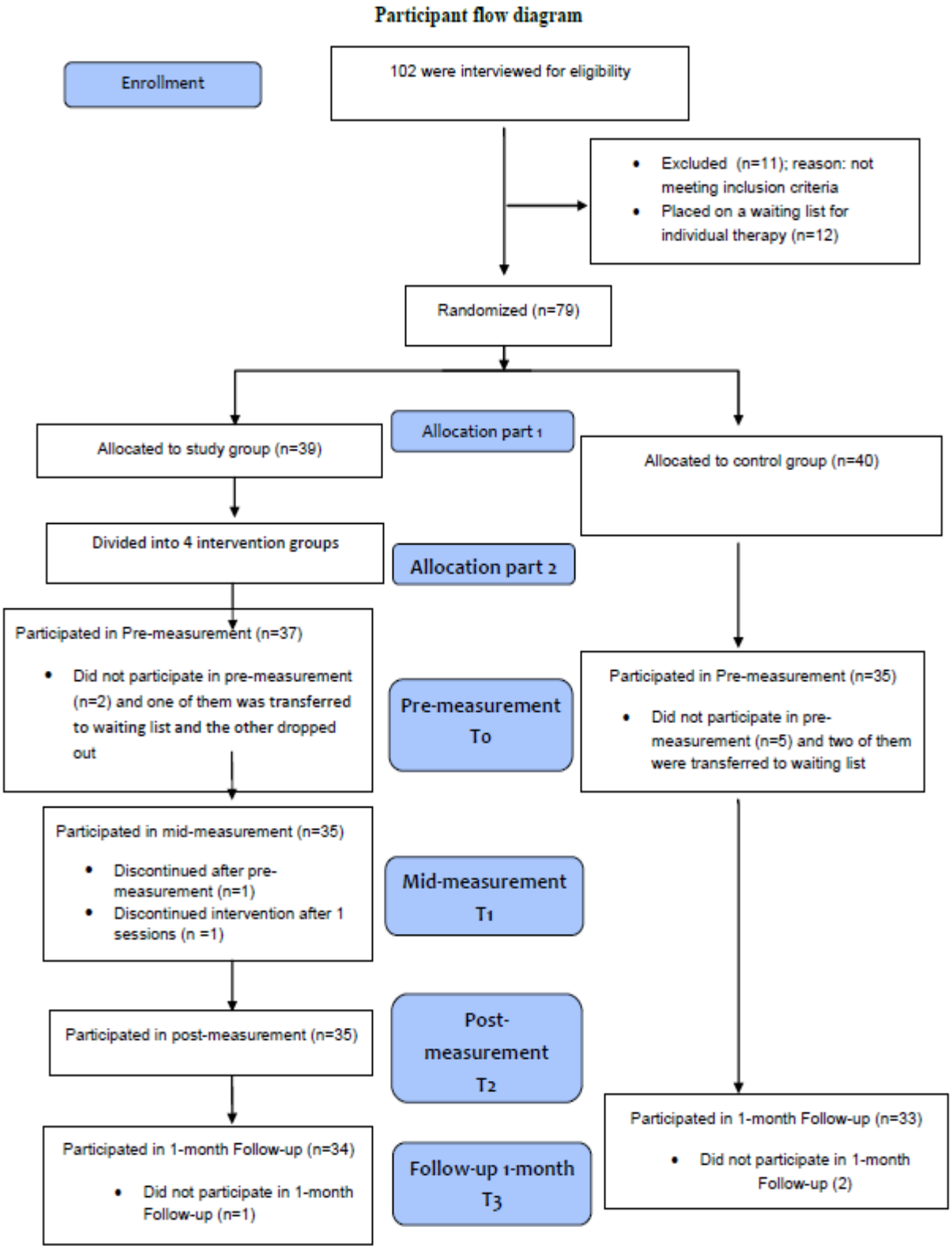

Figure 1. Participant flowchart

Table 1. Demographic and clinical information of the treatment and control group

Factor	Treatment group, n=33	Control group, n=33
Gender, n (%)		
Female	22 (66,7)	19 (57,6)
Male	11 (33,3)	14 (42,4)
Age (years), mean (SD)		
Mean	54,85 (13.203)	55,24 (12,557)
Range	28-78	26-77
Sleep medication, n (%)		
Yes	14 (42,4)	20 (60,6)
No	19 (57,6)	13 (39,4)
In a relationship, n (%)		
Yes	27 (90,0)	25 (75,8)
No	3 (10,0)	8 (24,2)
Current work situation, n (%)		
Not working at the moment	4 (12,1)	6 (18,2)
Working	18 (54,5)	12 (36,4)
Retired	11 (33,3)	15 (45,5)
Education, n (%)		
Vocational degree	7 (22,6)	6 (18,8)
University, polytechnic or college degree	24 (77,4)	20 (62,5)
No degree	0 (0)	6 (18,8)

The study design

The study design was a randomized group intervention. The measurements for the treatment group were conducted in four different questionnaire time points: Pre-measurement (T0), Middle-measurement (T1), Post-measurement (T2) and 1-month Follow-up (T3) measurement points (see Figure 1). Comparison between the treatment and the control group was accomplished comparing Pre-measurement and 1-month Follow-up measurement points. The time between Pre-measurement and 1-month Follow-up was four months and 1-month Follow-up was the end of the control group's waiting period.

Measures

15 different self-report measures were included in this study. Four measures (ISI, BNSQ, ESS, Sleep Diary) estimated the severity of insomnia and assess the symptoms of sleep difficulties. DBAS was included to assess dysfunctional beliefs and attitudes about sleep. CFQ-13 was used to estimate client's state of cognitive fusion that can maintenance insomnia. BDI and also DASS were included in this study because of the frequent co-occurrence of the psychological symptoms (e.g. depression, anxiety and stress) with insomnia. SCL-90 was used to estimate the overall psychological distress symptoms of clients´ lives. Client's list of problems and difficulties were used as an additional help for assessing how many different problems person estimates to have in his/her life and it was also used to help interviewing a client in first session kept via phone.

AAQ, Adult Hope Scales, VLQ and FFMQ were used to assess the process of used ACT-treatment and the hypothesized processes behind the problems (psychological inflexibility). SOC was an additional measure to assess client's coping with stressors.

In this study the function of these measures was reveal a good overall understanding of client's insomnia symptoms and the effect of ACT-treatment.

Assessment of sleep

Insomnia Severity Index (ISI)

Insomnia Severity Index is an instrument that was designed to assess the severity of insomnia examining both nighttime and daytime components of it (Morin, 1993; Bastien, Valliéres, & Morin, 2001; Morin, Belleville, Bélanger, & Ivers, 2011). It consists of seven self-report questionnaires assessing the nature, severity, and impact of insomnia. Several dimensions were evaluated recalling last two weeks. The dimensions evaluated are severity of sleep onset, sleep maintenance, early morning awakening problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning, noticeability of sleep problems by others, and distress caused by the sleep difficulties. These dimensions were estimated with a 5-point Likert scale yielding a total score ranging from 0 to

28. According to ISI the total score being lower than 8 interprets absence of insomnia. A total score from 8 to 14 interprets sub-threshold insomnia and between 15 to 21 moderate insomnia. Severe insomnia is about when the total score is over 21.

Basic Nordic Sleep Questionnaire (BNSQ)

The BNSQ has been used widely in a variety of studies performed in Nordic countries during the last years, and it has proved to be a valid tool (Partinen & Gislason, 1995.) The BNSQ is a 25-item self-report measure and it has been developed to assess the quality of sleep, nocturnal sleep duration, sleep and waking time, daytime drowsiness and snoring. Items are rated on a 5-point Likert scale (scale from 1 to 5) underlining on how many nights/days per week something happens. The basic scale is: 1 = Never or less than once per month; 2 = Less than once per week; 3 = On 1-2 nights per week; 4 = On 3-5 nights per week; and 5 = every night or almost every night. Higher scores indicate poorer quality of sleep, fatigue, or more severe snoring and breathing interruptions.

Epworth Sleepiness Scale (ESS)

ESS is a simple, self-administered questionnaire which is shown to provide a tool for measuring the client's general level of daytime sleepiness (Johns, 1991.) It consists of 8-item for the participants to describe or estimate how they doze off inadvertently when engaged in activities involving low levels of stimulation, relatively immobile and relaxed (Fong, Ho, & Wing, 2005). It does not require any instrumental evaluation so it is quick, inexpensive, flexible and able to measure chronic sleepiness.

Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS)

The brief version of Dysfunctional Beliefs and Attitudes about Sleep Scale is a 16-item self-report measure designed to evaluate a subset of sleep related cognitions (Morin, Vallières, & Ivers, 2007). DBAS-16 identifies specific sleep-related beliefs and attitudes that discriminate individuals with insomnia from normal sleepers. The 16-item measure is scored on a 0 to 10 Likert scale (0 = Strongly Disagree; 10 = Strongly Agree). All items are structured so that higher scores connote more dysfunctional beliefs. A total score equals the sum of the individual item scores with a maximum score of 160.

Sleep Diary

Participants insomnia symptoms were assessed through the sleep diary focusing on the previous sleep period. The sleep diary that was used in this study consists of 15 questions about the symptoms of insomnia, the quality of sleep, refreshingness after sleep and about the participants' use of medication or alcohol to help them fall asleep. Participants kept the sleep diary through the intervention starting it week before and ending it week after the intervention.

Assessment of psychological symptoms

Beck depression Inventory (BDI)

In this study an immensely popular and upgraded version of the original Beck Depression Inventory was used to assess the severity of depressive symptoms throughout the past two weeks (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; Beck, Steer, & Brown, 1996). The BDI-II is a 21-item questionnaire. Each item is a list of four statements arranged in increasing severity about a particular symptom of depression. A total score is measured on a 4-point Likert scale ranges from 0 to 63. A higher total score interprets more severe depressive symptoms. The total score is interpreted as follows: minimal depression (0-13), mild depression (14-19), moderate depression (20-28), and severe depression (29-63).

Depression Anxiety Stress Scales (DASS)

The Depression Anxiety Stress Scales- questionnaire (Lovibond & Lovibond, 1993; Lovibond & Lovibond, 1995) was used to measure person's psychological symptoms. It has been confirmed (Antony, Bieling, Cox, Enns, & Swinson, 1998) that DASS distinguishes well between features of depression, physical arousal, and psychological tension and agitation in clinical and nonclinical groups. This self-report questionnaire includes 42 questions about person's negative emotional symptoms like experienced feelings of depression, anxiety or stress over the past week. Questions are answered on a 4-point Likert scale ranging from 0 to 3 (0 = Not holding true at all; 3 = Holding true a lot). The higher total score indicates more severe symptoms.

Symptom checklist 90-R (SCL- 90-R)

The Symptom Checklist-90-R is one of the most widely used measures of multiple aspects of psychological distress in clinical practice and research (Derogatis, 1977.) SCL-90-R includes 90 items rated on a 5-point Likert scale, ranging from 0 to 4 (0 = Not at all; 4 = Extremely). SCL-90-R measures dimensions of primary distress such as somatization, obsessive compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation and psychoticism. In this study the SCL-90 was also a useful instrument for measuring the change in symptomatic distress (Holi, Sammallahti, & Aalberg, 1998.)

The client's list of problems and difficulties

An additional self-reported problem list was used to find out client's problematic areas (e.g. anxiety, sleeping problems and health problems). Problem list included 28 item and each item was rated on Likert scale from 0 to 10 (0 = No problems at all; 10 = Many problems/ Disturbing a lot) estimating how much asked problem was disturbing individual's life at that moment. The total score was summed and the higher score interpret the various problems that were also disturbing

individual's life more. The high total score could interpret various problems or only few problems that were experienced strongly disturbing. This list of problems was used as an additional help for assessing how many different problems person estimates to have in his/her life and it was used to help interviewing client at the first phone session.

Process measures

Acceptance & Action Questionnaire (AAQ)

Person's psychological inflexibility was measured with widely used Acceptance & Action Questionnaire (Hayes et al., 2004; Bond et al., 2011). In this study a new version of AAQ-II was used. The questionnaire estimates seven claims concerning acceptance and experiential avoidance on a 7-point Likert scale ranging from 1 to 7 (1 = Never true; 7 = always true). A total score ranges from 7 to 49 and a higher score equals greater levels of psychological inflexibility.

Cognition Fusion Questionnaire (CFQ-13)

The CFQ is a 13-item self-reported questionnaire that measures cognitive fusion (Gillanders et al., 2010). It is a brief, reliable self-report measure of cognitive fusion and defusion as a general process. The measure is more about generic thinking, rather than focusing on a specific type or content of thought. It contains items reflective of a broad definition of fusion. Rather than focusing solely on the believability of thoughts, the CFQ also has items about literality, engagement with thoughts, perspective taking on thoughts, entanglement, struggle, and taking action in contrast to thinking. The CFQ correlates highly and in theoretically predicted directions with measures of related constructs such as experiential avoidance, mindfulness, distress, rumination, thought control strategies and life satisfaction, quality of life and consistency of living important values.

Five Facet Mindfulness Questionnaire (FFMQ)

The FFMQ is a 39-item, self-report measure developed by Baer and colleagues (2006). Participants rate how often they have a given experience using a 5- point Likert scale ranging from 1 to 5 (1 = Never or very rarely true; 5 = Very often or always true). As the title of the measure implies, it measures five factors of mindfulness: observing sensations, perceptions, thoughts, and feelings; describing with words; acting with awareness; non-judging of experience; and nonreactivity to inner experience.

The Adult Hope Scales

The Adult Dispositional Hope Scale (Hope Scale D) is a self-report, 12-item inventory designed to tap an individual's dispositional hope or trait hope in adult state (Snyder et al., 1991). The scale tapping dispositional hope consists of 8 hope items (4 agency items and 4 pathways items) along with 4 filler items.

The Adult State Hope Scale (Hope Scale S) is used to measure participant`s hope at current level (Snyder et al., 1996.) The questionnaire consisted of 6 items including three agency- and three pathway-items in which participants describe themselves in terms of how well they can solve problems, achieve goals and how well they think they have succeeded in life.

Sense of Coherence scale (SOC scale)

A widely used instrument, The Sense of Coherence (SOC) scale is assumed to be a useful concept when assessing an individual's orientation and internal strengths (Antonovsky, 1987; Jacobson, 2011). The SOC scale was developed by means of a theoretical model that explains successful coping with stressors (Antonovsky, 1980). In this study a 13-item SOC (Antonovsky, 1993) scale was used. It consists of three components: comprehensibility (5 items), manageability (4 items), and meaningfulness (4 items) of one's life. Each item has graded on 7-point Likert scale. The grades of

items are summed up and the total score ranges from 13 to 91. A higher total score indicates greater level of SOC and a strong SOC can be associated for example with effective coping with life stressors, reduced stress and fewer health-damaging behaviors (Antonovsky, 1987; Jacobson, 2011) Person's with higher levels of coherence tended to have higher self-esteem, felt more in control of their lives and adopted a more positive and optimistic outlook (Pallant & Lae, 2002).

Valued Living Questionnaire (VLQ)

The Valued Living Questionnaire was developed as a tool for use during in Acceptance and Commitment Therapy (Wilson, Sandoz, Kitchens, & Roberts, 2010.) This 20-item questionnaire asks the individual to first rate the importance of values in 10 areas of life (e.g., family, work, education, relationships), and then the consistency of action towards those values taken during the last week. Each item is rated on Likert scale from 1 to 10. The Valued Living composite is calculated by multiplying the Importance and Consistency responses for each domain and then calculating the mean of those scores. The resulting Valued Living Composite scores ranges from 10 to 100.

Intervention

The intervention consisted of six sessions from which the first one was held individually via phone. The remaining five group sessions were held weekly. Group sessions were always held on the same day for schedule reasons, and clients were informed that they could skip one session and still be suitable for the study. The individually held session lasted from 45 minutes to 90 minutes depending on the participant. However, the group sessions took from 90 to 120 minutes. Durations of group sessions were dictated by measurements so that sessions with measurements lasted close to 120 minutes. If participant has more than one missed session results were not taken into account but they still had a right to participate in all the rest sessions. All of the sessions included videos and recorded exercises about the day's topic and dyad conversation about the completed exercises. All

the recorded instructions about the mindfulness exercises were given to participants after the intervention.

Each session included exercises concerning the six processes of ACT. At first sessions the emphasis was on values and the rest of the sessions emphasized more on acceptance and defusion. Session 1 included value map (important things of each participant) and how important these values are to participants in scale 1-10. After that participant were asked to evaluate how much they have done acts toward these values in the past few weeks. The idea was to integrate the value map and a behavior analysis about the participant's current life situation (see a case formulation in behavior therapy: e.g. Haynes & O'Brien, 2000; Person & Davidson, 2001) and then to discuss how participant`s values are connected to the symptoms of insomnia. After value working, session continued with video about observation and awareness of the present moment. Regarding exercise was about mindfulness skills focused on breath following. Sleep hygiene instructions including aspects of stimulus control were introduced. At the end of the session participants were given homework like in every session in the future.

Like all the next meetings, session 2 started with homework checking. After that participants were shown video about values. Mindfulness skills focused on mindful sitting and mindful breathing. Regarding exercise was about acceptance and defusion. There were measurements at the end of the session 2. Session 3 included two mindfulness exercises (mindful scanner, mindful breathing), two exercises concerning about acceptance and defusion and one metaphor about values. Values were topic in the both videos in sessions 3 and 4. Session 4 included also video about acceptance. Altogether there were two mindful exercises (mindful activity, mindful breathing), one metaphor (Tug of war with a monster) and exercise of thoughts about oneself included in the session 4. Last group session, session 5 involved five different exercises including value working (Six months time to live), two mindful exercises and acceptance (The mind monsters, The bird's nest). The summary contents of used Acceptance and Commitment Therapy for insomnia in group therapy are presented below including number of exercises and mean value of the used time for exercises (presented as 5 min accuracy including time of introduction and preparation).

Table 2 The Summary contents of Acceptance and Commitment Therapy for insomnia

Phone contact
Participants' histories individually (e.g. sleep, relationships)
Group session 1
Normal sleep processes (e.g. sleep physiology), insomnia and principles of the treatment

Participants' sleep histories: behavior analysis (case formulation)
Values and the acts of the values
Acceptance and commitments
Sleep hygiene instructions (e.g. regular wake-up routine, eliminating caffeine, and bed only for sleeping)
Mindfulness exercises
Homework
Videos: 2 (Observation and being aware of the present moment), 10 minutes
Exercises: 2 (Values, Mindful breathing), 15 minutes

Group session 2

Homework checking
Values
Mindfulness exercises
Acceptance and defusion: "You are not your thoughts and feelings"
Relaxation techniques
Sleep hygiene instructions
Homework
Videos: 1 (Values), 5 minutes
Exercises: 3 (Mindful breathing, Mindful sitting, Observing self), 20 minutes
Measurement

Group session 3

Homework checking
Values
Mindfulness exercises
Acceptance and defusion: Sleep-disturbing thoughts and developing alternative ways to handle them
Homework
Videos: 1 (Values), 5 minutes
Exercises: 5 (Passengers on the bus metaphor, Mindful scanner, Observing self, A thought floating on a leaf, Mindful breathing), 30 minutes

Groups sessions 4

Homework checking
Values
Mindfulness exercises
Acceptance and defusion: Sleep-disturbing thoughts and developing alternative ways to handle them
Homework
Videos: 1 (Values), 5 minutes
Exercises: 4 (Mindful activity, Mindful breathing, Tug of war with a monster metaphor, Thoughts about oneself), 15 minutes

Group session 5

Homework checking
Values

Mindfulness exercises
Acceptance and defusion
Integrating and checking advice from previous sessions
Homework: New assessment of own insomnia
Maintaining implementation at home
Feedback discussion
Measurement
Exercises: 5 (Six months time to live-exercise, Mindful breathing and other mindful exercise, The mind monsters, The Bird`s nest), 15 minutes

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Therapist

The group treatment was provided by seven psychology students. Students worked in pairs except one who was working alone receiving assistance from the other students if necessary. In teams of two, other partner was doing his/her master's degree and the other his/her bachelor's degree. Students participated in a short course of ACT principles and instructions of the ACT-program. The course comprised 17 hours split into four training sessions led by a clinical professor of psychology. Students were also mentored by an experienced neuropsychologist. The special treatment materials for insomnia were made by an experienced psychologist using commonly used ACT-model as the base of the treatment specializing it for sleep disorders. The materials comprised a well-structured intervention program, the videos about the ACT-principles, take-home sleep hygiene instruction and the mindfulness exercises for the participants. The intervention program included specific implementation guidelines for psychology students. Students used these guidelines and a clinical manual of ACT to support their work as group instructors. Additionally students were supervised by an experienced psychologist and maintained informal peer support meetings.

Statistical Methods

Repeated-measures of ANOVA were used to detect main effects of time and group x time interaction of each outcome measures. Main effect on the treatment group was assessed in each outcome variable over time (Pre, Middle, Post and 1-month Follow-up) with a general linear model

(ANOVA with repeated measurements). "Repeated" contrast methods were used to detect any differences between time points and reveal the serial trends. A p value of < .05 was considered statistically significant. We calculated the effect sizes of statistically significant results to estimate the impact of the treatment. Effect sizes are reported using Cohen's d. Between groups d-value 0.2 was considered as a small difference, 0.5 as medium and 0.8 as large. Within group d-values 0.5 was considered as a small difference, 0.8 as medium and 1.1 as large. Analyses were carried out using SPSS Statistics (Version 20).

RESULTS

Comparison between the treatment and the control groups

There were no statistical differences between the groups at the beginning of the study. Table 3 presents the summary results (mean ± SD) of the clinical outcomes at Pre-measurement (T0) and 1-month Follow-up measurement points (T3) between the control and the treatment group. The sample size (n) is also presented in table with each measure. Figures 2 and 3 visualize the statistically significant outcomes between groups in two main sleep measures (symptoms and processes). More information about significant outcomes is provided under.

Sleep Outcomes

There were significant interaction effect (group x time) in Insomnia Severity Index (ISI: $F_{1,61}$ = 7.80, p = .007, d = 0.50) and in Dysfunctional Belief and Attitudes about Sleep Scale (DBAS: $F_{1.61}$ = 9.32, p = .003, d = 0.79).

Participants kept sleep diary during the treatment and one week before and after the treatment. Unfortunately it was hard to specify the measurement points were outcomes would have been comparable between the treatment and the control group. Additionally the data of self-reported

sleep diary was not clear enough or understandable comparing to other clinical tests, so in this study it was decided to focus on generally known tests.

Psychological Outcomes

The statistical analysis revealed significant interaction effect in scores of The Depression Anxiety Stress Scales- questionnaire (DASS: $F_{1,62} = 7.21$, $p = .009$, $d = 0.66$). Statistical analysis on three DASS Scales revealed that particularly stress symptoms changed differently in the control and the treatment group over time ($F_{1,62} = 9.49$, $p = .003$). Both psychological distress measured by SCL-90 and severity of depressive symptoms changed differently in the control and the treatment group over time (SCL-90: $F_{1,63} = 6.78$, $p =. 011$, $d = 0.70$; BDI-II: $F_{1,63} = 7.22$, $p = .009$, $d = 0.75$).

Process Outcomes

There were also significant interaction effect in both Adult State Hope Scale and Adult Dispositional Hope Scale ($F_{1,63} = 6.00$, $p = .017$, $d = 0.50$; $F_{1,62} = 4.44$, $p = .039$, $d = 0.53$). Analysis revealed significant interaction effect more accurately in Agency scale for Adult State Hope ($F_{1,63} = 6.03$, $p = .017$) and in Pathway scale for Adult Dispositional Hope ($F_{1,62} = 4.45$, $p = .039$).

Table 3. Means and standard deviations of clinical outcomes at Pre-measurement (T0) and 1-month Follow-up (T3) measurement points

Clinical outcomes		**Means and standard deviations**		
		Pre-measurement (T0)	**1-month Follow- up (T3)**	
Sleep measures				
ISI	Treatment (32)	18.2 ± 3.2	12.5 ± 6.1	*
	Control (31)	17.4 ± 4.0	15.2 ± 4.5	
BNSQ	Treatment (32)	21.8 ± 4.3	19.7 ± 4.5	
	Control (32)	22.0 ± 4,5	21.2 ± 4.1	

ESS	Treatment (32)	7.1 ± 4.6	5.5 ± 3.6	
	Control (33)	6.7 ± 5. 0	6.0 ± 4.3	
DBAS	Treatment (32)	96.8 ± 19.6	80.3 ± 25.2	*
	Control (31)	103.9 ± 29.3	101.0 ± 27.0	
Psychological measures				
BDI	Treatment (32)	12.0 ± 6.9	6.8 ± 6.6	*
	Control (33)	13.7 ± 7.9	12.1 ± 7.5	
DASS	Treatment (32)	27.6 ± 15.6	14.3 ± 13.4	*
	Control (32)	30.7 ± 17.0	25.1 ± 18.8	
SCL-90	Treatment (32)	0.7 ± 0.3	0.4 ± 0.3	*
	Control (33)	0.8 ± 0.4	0.7 ± 0.4	
List of prob.	Treatment (32)	83.1 ± 48.0	74.5 ± 49.3	
	Control (33)	78.0 ± 33.5	57.4 ± 39.7	
Process measures				
AAQ	Treatment (32)	17.6 ± 8.3	15.2 ± 8.0	
	Control (33)	19.5 ± 8.5	17.4 ± 9.2	
CFQ-13	Treatment (32)	41.0 ± 12.7	36.0 ± 11.0	
	Control (32)	41.4 ± 10.6	38.3 ± 12.1	
FFMQ	Treatment (32)	127.0 ± 16.2	134.0 ± 18.4	
	Control (30)	126.3 ± 14.4	131. 0 ± 16.1	
HopeScaleS	Treatment (32)	34.4 ± 6.7	37.7 ± 7.7	*
	Control (33)	34.0 ± 7.7	33.6 ± 8.	
HopeScaleD	Treatment (32)	22.3 ± 3.0	24.8 ± 2.9	*
	Control (32)	22.9 ± 4.3	23.0 ± 4.0	
SOC -scale	Treatment (31)	62.4 ± 9.4	64.7 ± 10.2	
	Control (31)	61.4 ± 10.5	62.2 ± 10.0	
VLQ	Treatment (32)	84.2 ± 10.5	82.8 ± 11.6	
	Control (31)	82.8.1 ± 10.8	81.9 ± 12.1	

*= $p < .05$

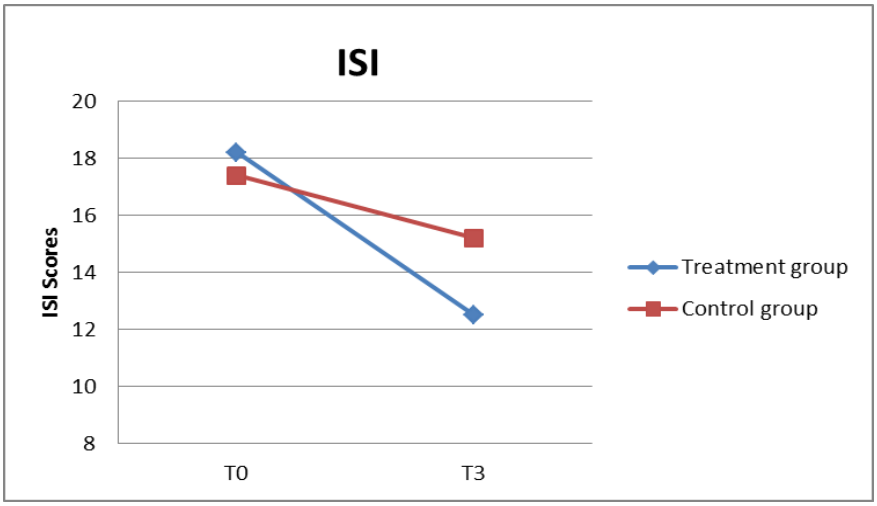

Figure 2. ISI scores at Pre - and 1-month Follow-up measurement points (T0, T3)

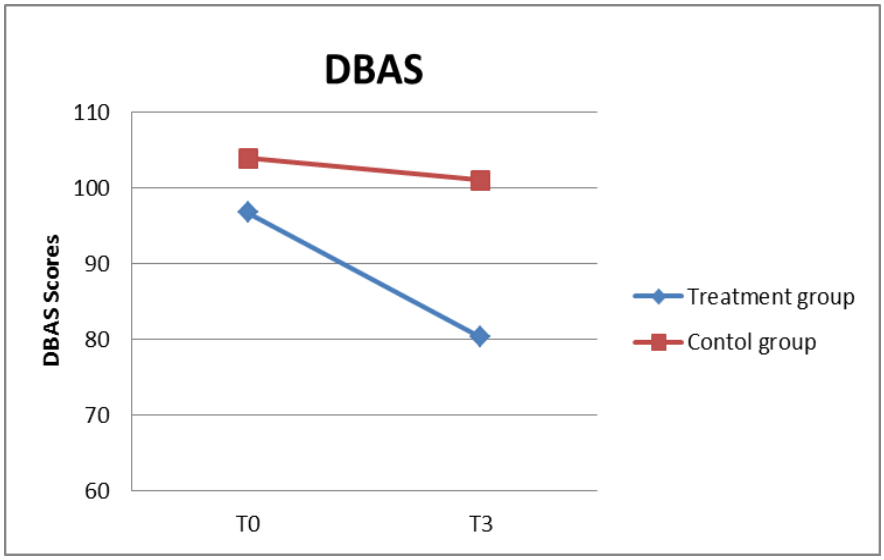

Figure 3. DBAS scores at Pre - and 1-month Follow-up measurement points (T0, T3)

Results in the treatment group

Sleep Outcomes

In Table 4 is presented the summary data (mean ± SD) of the sleep diary outcomes at Pre- and Post-measurement points (T0, T2) in the treatment group (n = 32). The analyses were done for one week

long sleep diaries at both measurements points. More information about sleep outcomes that have an effect size 0.50 or larger is provided under.

The self-reported sleep diary was used as an additional measure in the treatment group. From the total 15 questions about the symptoms of insomnia, this study focused on five different questions. Research has shown that quality of sleep, more than numbers, is better related to physical and emotional health (e.g. Pilcher & Walters, 1997). The timing of sleep period was elicited by the total sleep time (TST) but because knowing that the amount of sleep varies between people and the satisfaction with sleep differ among participants, we wanted to examine also the quality of sleep and the restedness. Participants estimated their own sleep quality (SQ) and restedness assessing how they felt during the last day. Additionally participants' evaluations about the experience about last night and wake up times were included in analysis because of the additional information they gave about the quality of sleep.

Total sleep time (8%) and sleep quality (SQ) (11%) measured with sleep diary increased over the measurement points ($F_{1,31} = 9.22$, p=.005; $F_{1,31} = 5.85$, p= .022, d = 0.54). Additionally there was a trend for significant change in experienced sleep ($F_{1,31} = 0.49$, p = 0.489).

The perceived severity of insomnia decreased (30%) significantly over the measurement points (ISI: $F_{3,28} = 9.42$, $p < .001$, d = 1.17). Sleep-related dysfunctional cognitions decreased (17%) significantly over the measurement points (DBAS: $F_{3,29} = 8.58$, $p < .001$, d = 0.73).

Table 4. Means and standard deviations of sleep diary at Pre-measurement (T0) and at Post-measurement (T2) points in treatment group (N= 32)

Sleep diary	**Means and standard deviations**		
	Pre-measurement (T0)	**Post-measurement (T2)**	
Total sleep time (h)	6.1 ± 1.0	6.5 ± 1.1	*
Sleep quality, 1 (bad) – 5 (good)	2.9 ± 0.5	3.2 ± 0.6	*
Restedness, 1 (very tired) – 5 (very energetic)	3.0 ± 0.6	3.1 ± 0.7	

Experienced sleep, 1 (very distressing) - 5 (very peaceful)	3.2 ± 0.6	3.4 ± 0.7
Wake ups during night (times)	2.8 ± 1.6	2.7 ± 2.3

Total sleep time: How many hours did you sleep last night?; Sleep quality: How was your sleep quality last night?; Restedness: How was your feeling during last day?; Experienced sleep: How was your experience about last night?; Wake ups during last night: How many times did you wake up last night?;

*= $p < .05$

Other Clinical Outcomes

In Table 5 is presented the summary data (mean ± SD, p-value) of the other clinical outcomes at Pre-, Middle-, Post-, and 1-month Follow-up (T0-T3) measurement points in the treatment group. The sample size (n) is also presented in table with each measure. More information about other clinical outcomes that have an effect size 0.50 or larger is provided under.

Psychological Outcomes

Client's problems and difficulties decreased (26%) significantly ($F_{2,30} = 7.76$, $p = 0.002$, $d = 0.56$). The symptoms of depression, anxiety and stress decreased (48%) significantly over the measurement points (DASS: $F_{3,29} = 13.48$, $p < .001$, $d = 0.91$). Additionally both psychological distress (42%) measured by SCL-90 and severity of depressive symptoms (44%) decreased significantly over the measurement points (SCL-90: $F_{2,30} = 22.01$, $p < .001$, $d = 1.00$; BDI-II: $F_{3,28} = 11.31$, $p < .001$, $d = 0.77$).

Process Outcomes

Additionally Dispositional hope scale increased (7%) significantly over the measurement points ($F_{3,29} = 6.17$, p = .002, d = 0.85).

Comparison changes between measurement points

Comparison changes between measurement points showed that many process measures had significant outcomes between Middle-measurement (T1) and Post-measurement (T2) points. These measures were AAQ (F_1= 13,18, p = .001), CFQ-13 (F_1 = 7.57, p = .010) and VLQ (F_1 = 8.39, p= .007). In few measures (SCL-90, ESS, DBAS, FFMQ) there were trends for significant changes (p-values between 0.78 and 0.05). Significant changes already between Pre-measurement (T0) and Middle -measurement (T1) were shown in DBAS (F_1 = 4.88, p = .035), SCL-90 (F_1 = 25.30, p < .001), and both Hope Scales, State (F_1 = 4.91, p = .034) and Dispositional (F_1 = 10.17 p = .003). Additionally there was a trend for significant change in ISI already between Pre-measurement and Middle-measurement points (p = 0.59).

Table 5. Means and standard deviations and p-values of clinical outcomes at Pre-measurement (T0), Middle-measurement (T1), Post-measurement (T2) and 1-month Follow-up (T3) measurement points

Clinical outcomes	**Means and standard deviations**				
	Pre-measurement (T0)	**Middle measurement (T1)**	**Post measurement (T2)**	**1-month Follow-up (T3)**	**p**
Sleep measures					
ISI (31)	18.2 ± 3.3	16.5 ± 5.0	13.7 ± 5.4	12.7 ± 6.1	<.001
BNSQ (32)	21.8 ± 4.3	21.3 ± 4.4	20.0 ± 4.3	19.8 ± 4.5	0.018
ESS (32)	7.1 ± 4.6	7.3 ± 4.3	6.3 ± 3.8	5.5 ± 3.6	0.010
DBAS (32)	96.8 ± 19.6	86.9 ± 24.4	78.2 ± 26.2	80.3 ± 25.2	<.001
Psychological measures					
BDI (31)	11.7 ± 6.9	10.0 ± 7.2	7.0 ± 6.1	6.5 ± 6.6	<.001
DASS (32)	27.6 ± 15.6	24.6 ± 15.9	16.5 ± 11.0	14.3 ± 13.4	<.001
DASS D	8.7 ± 7.2	7.4 ± 7.1	4.8 ± 4.8	4.7 ± 5.7	0.003

DASS A	5.3 ± 3.7	5.8 ± 5.2	3.5 ± 3.6	57.4 ± 39.8	<.001
DASS D	13.7 ± 8.5	11.4 ± 6.7	8.2 ± 5.4	7.1 ± 6.8	<.001
*SCL-90 (32)	0.7 ± 0.3	----	0.5 ± 0.3	0.4 ± 0.3	<.001
List of prob. (32)	23.3 ± 3.0	41.6 ± 12.6	66.7 ± 9.4	2.6 ± 2.8	0.003
Process measures					
AAQ (31)	17.3 ± 8.2	17.0 ± 8.2	13.7 ± 7.6	14.7 ± 7.6	0.004
CFQ-13 (32)	41.0 ± 12.7	37.2 ± 10.0	37.2 ± 10.0	36.0 ± 11.0	0.006
FFMQ (32)	127.0 ± 16.2	128.1 ± 17.8	131.2 ± 18.8	134.0 ± 18.4	0.009
FFMQ O	23.6 ± 5.7	25.5 ± 4.9	24.0 ± 5.9	24.1 ± 6.0	0.048
FFMQ D	28.2 ± 6.2	27.8 ± 6.7	27.8 ± 7.8	28.9 ± 7.1	0.609
FFMQ A	24.6 ± 6.3	23.8 ± 6.0	24.7 ± 6.7	26.2 ± 5.6	0.056
FFMQ NJ	30.8 ± 6.1	30.1 ± 7.4	32.8 ± 6.0	33.1 ± 5.8	<.001
FFMQ NR	19.8 ± 4.1	20.6 ± 4.3	32.8 ± 6.0	33.1 ± 5.8	<.001
Hope Scale S (32)	34.4 ± 6.7	36.0 ± 6.6	37.0 ± 6.6	37.7 ± 7.7	0.003
Hope Scale S/A	16.6 ± 4.7	17.6 ± 3.7	17.8 ± 3.5	18.4 ± 4.4	0.014
Hope Scale S/P	17.8 ± 3.2	18.4 ± 3.5	19.1 ± 3.5	19.3 ± 3.3	0.005
Hope Scale D (32)	78.0 ± 33.5	24.4 ± 2.8	24.0 ± 3.2	24.8 ± 2.9	0.002
Hope Scale D/A	11.8 ± 1.6	12.4 ± 1.4	12.3 ± 1.7	12.4 ± 1.5	0.036
Hope Scale D/P	11.5 ± 1.8	12.0 ± 1.7	11.8 ± 1.9	12.4 ± 1.7	0.014
*SOC -scale (30)	62.4 ± 9.5	----	67.8 ± 37. 2	62.6 ± 18.3	<.001
*VLQ (29)	62.4 ± 17.0	----	65.2 ± 15.2	62.3 ± 18.5	0.280

Sleep measures:
Insomnia Severity Index (ISI); Basic Nordic Sleep Questionnaire (BNSQ); Epworth Sleepiness Scale (EES); Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS);

Psychological measures:
Beck depression Inventory (BDI); Depression Anxiety Stress Scales (DASS); Symptom checklist 90 (SCL-90); The client's list of problems and difficulties;

Process measures:
Acceptance & Action Questionnaire (AAQ); Cognition Fusion Questionnaire (CFQ-13); Five Facet Mindfulness Questionnaire (FFMQ); Adult State Hope Scale; Adult State Hope Scale Agency; Adult State Hope Scale Pathway; Adult Dispositional Hope Scale; Adult Dispositional Hope Scale Agency; Adult Dispositional Hope Scale Pathway; Sence of Coherence scale (SOC); Valued Living Questionnaire (VLQ);

* Symptom checklist 90 (SLC-90), Sense of Coherence scale (SOC scale) and Valued Living Questionnaire (VLQ) were measured only three times, at Pre-, Post- and 1-month Follow-up measurement points (T0, T2, T3).

DISCUSSION

As was hypothesized the short-term Acceptance and Commitment Group Therapy conducted by the trained psychology students improved participants` sleep and other related symptoms. In this study the main results on sleep was the significant difference in perceived severity of insomnia in the treatment group comparing to the control group. Other main results were the significant changes in self-reported TST and SQ in the treatment group over time. Clinically significant improvements in outcomes of ISI showed that the insomnia decreased from moderate insomnia to sub-threshold insomnia within the Pre- and Post -measurement points. Significant outcomes in both self-reported TST and SQ, and a trend for significant change in experienced sleep in the treatment group supported these results. According to the results of sleep diary, participants slept about half an hour more after the treatment. The significant difference between groups in sleep-related dysfunctional beliefs and attitudes about sleep supported these results suggesting that there were improvements in both, cognitions as well as symptoms.

There were improvements in the treatment group comparing to the control group in both overall psychiatric and somatic symptoms measured by the SCL-90, DASS and BDI-II. These results may reflect participants` overall better skills to handle insomnia symptoms and decreased helplessness towards sleeping difficulties. Additionally the used methods of ACT may directly affect mood (e.g. worrying). These results are important because insomnia can be a risk factor for many other clinical disorders such as depression (e.g. Riemann & Voderholzer, 2003) and often coexists with other psychological disorders.

Surprisingly, there were no significant results between the treatment and the control group in the participant`s psychological flexibility measured by the AAQ. Traditionally, positive emotions and thoughts, strengths, and the satisfaction of basic psychological needs for belonging, competence, and autonomy have all been seen as the cornerstones of psychological health (Kashdan & Rottenberg, 2010). Psychological flexibility instead includes a wide range of human abilities, for example recognizing and adapting to various situational demands and maintaining balance among important life domains. Above all psychological flexibility means one's ability of being aware,

open, and committed to behaviors that are congruent with deeply held values. In spite of nonsignificant outcomes of AAQ, participants still reported that they felt more open and aware about their own values and life expectations during and after the treatment. They also made acts and small steps towards their values every week. Consequently, it seems like there is a discrepancy between the AAQ and participants` reports. It is interesting why assumed changes in psychological flexibility did not showed in outcomes of this study. However the scores of AAQ and e.g. FFMQ and BDI at Pre-measurement point suggest that participants were psychologically quite flexible, as well as their mindfulness skills was quite good and on the other hand severity of depression was low already at the beginning of the treatment. The beginning levels may have influenced that scores are not changed significantly.

Additionally it was interesting that there were no significant differences between the treatment and the control group in VLQ. In this study The Valued Living composite was used to evaluate participants' valued living. We found the outcomes of this questionnaire to be difficult to interpret and realized the need of a better measure. The participants fulfilled also self-report homework questionnaire that was used to motivate them to do actions towards their values. The homework questionnaire consisted of few questions about how participant has applied sleep hygiene and stimulus control techniques. We decided to leave this outside of the study due to lack of coding resources and lack of the questionnaire. For coming studies in future, a good homework questionnaire that includes questions about values and the consistency of actions towards one's values is needed. The homework questionnaire should be also easy for participant to fulfill and for researcher to code. That kind of homework questionnaire could be an opportunity for VLQ and, at the same time, it could work as an additional measure to evaluate the use of sleep hygiene and stimulus control techniques.

The comparison changes between measurement points in the treatment group showed that most of the measures had significant outcomes between Middle-measurement and Post-measurement. All the principles of ACT were included in every session but group sessions 1 and 2 focused more on values. Rest of the sessions emphasized more acceptance and defusion. At the beginning of the treatment participants had lot of worrying thoughts about sleep, but during the treatment those thoughts decreased. Especially during and after the sessions 3, 4 and 5 participants may have learned to handle sleep disturbing thoughts with increased acceptance and to develop alternative ways of coping. We suppose that the processes of acceptance during last three sessions influenced participants' acceptance increasing it, and furthermore improved sleep showing positive changes in measures ISI, BNSQ, AAQ and CFQ-13 precisely between Middle- and Post-measurement points.

Additionally participants' prejudices towards the used treatment may have decreased after firsts sessions due to the treatment routines and grouping which may have an influence that outcomes revealed overall after Middle-measurement point. A trend for improved mindfulness skills measured by FFMQ between Middle- and Post-measurement points may suggest that mindfulness exercises need time and repetition to be learned well.

Significant changes already between Pre-measurement and Middle-measurement in measures DBAS, SCL-90 and both Hope Scales may suggest that participants had positive expectations towards the treatment and firsts three sessions (one via phone, two in a group) had already a positive influence. Sleep hygiene instruction, stimulus control techniques and alternative aspects of sleep were introduced in the first group session. This may have produced rapid changes in DBAS and a trend for fast main effect in ISI.

Comparing to other pilot researches in this area the study included the control group which makes the results easier to be interpreted. There were no significant differences in any measures between the control and the treatment group at the first measurement point (T0) which was before the actual treatment. Thus we assume the outcomes of the study are due to the intervention. 1-month Follow-up shows that results maintained and scores improved in almost every measure after the treatment, so it seems like that the effect continues even though the treatment has been ended. Additionally, the positive outcomes already between Pre- and Middle-measurement points suggest that short-term lectures about principles of ACT, stimulus control and sleep hygiene could be used workable to prevent insomnia for example in occupational health services and student health care.

We wanted to compare the effectiveness of our ACT-based group treatment to other treatments that have been used effectively to treat insomnia. However, conclusive information about effect sizes has not been obtained. Because of CBT is the most used psychological treatment for insomnia and previous studies (e.g. Edinger et al., 2001; Espie et al., 2001 have shown the effectiveness of it we compared the effect sizes of this study to some other CBT-studies. The effect sizes from within-group comparison of CBT-I and comparison between CBT-I and the control groups are presented below.

Comparing to other earlier CBT-studies that do not have randomised controlled trial effect size in ISI was large (1.49) and in BDI small (0.78) when studied the effectiveness of the self-referral psycho-educational (Prytys, Whittinger, Coventry, Idusohan, & Brown, 2010). Effect sizes in DBAS was small (0.75) but in the study of Roane, Dolan, Bramoweth, Rosenthal & Taylor (2012) it was large (1.59). Järnefelt and colleagues (2012b) have studied the implementation and effectiveness of a Cognitive Behavioral Group Therapy for insomnia (CBT-I) among shift workers

with chronic insomnia. The study design was a non-randomized group intervention, including a waiting period prior to CBT-I as a control condition. Effect sizes in ISI were moderate to large (1.08-1.57) measured at post-, 3- and 6-month follow-up measurement points and in DBAS effect sizes were moderate (0.77-1.03).

In a within-group comparison of this study the effect size in ISI was large (1.17), in DBAS (0.73) small and in BDI (0.77) also small measured at pre- to 1-month Follow-up measurement point. Consequently these effect sizes fall within the range of above mentioned studies.

Morgan, Gregory, Tomeny, David, & Gascoigne (2012) have studied self-help treatment for insomnia symptoms associated with chronic conditions in older adults with a randomized controlled trial. Effect sizes in ISI were moderate (0.51–0.75) measured at post-, 3- and 6-month follow-up measurement points. Additionally Okajima, Komada, & Inoue (2011) have conducted a meta-analysis focusing on the effectiveness of Cognitive Behavioral Therapy for primary insomnia. A Meta-analysis identified 14 randomized controlled studies (9 individual and 5 group formats) published between 1990 and 2009. A comparison between the control group and the CBT-I group revealed the effect sizes in the CBT-I group in self-rated measures varied from medium to large measured at the end of the treatment (e.g. BDI: d = 1.30, and DBAS: d = 1.04) and in follow-up (e.g. DBAS: d = 0.83).

In a between-group comparison of this study the effect size in ISI was small (0.46), in DBAS almost large (0.79) and in BDI moderate (0.75) measured at 1-month Follow-up. These effect sizes remained to be little smaller than was reported above mentioned studies. Comparisons need to be interpreted cautiously because of the treatment format were not completely similar. Consequently with regarding to comparison presented above it seems that we can still assume that the ACT group therapy used in this study was effective compared to CBT treatments for insomnia.

Therapy was carried out in group sessions. According to Shipley (1977) group intervention promotes cohesion and fellowships. Walser and Pistorello (2004) have identified advantages of delivering ACT in a group format. They suggest that one useful event in group is listening to the experience of other participants following an exercise. A group gives clients an opportunity to receive support and validation as well as alternative viewpoints. At the beginning in this study participants were slightly concerned about the group sessions and they expressed uncertainty about how to deal with groups and what kind of things they could share and express in group therapy. Participants felt that the confidence increased during the therapy and they noticed that they were not alone with their insomnia and other symptoms. This study showed positive results through group

therapy. Recent reviews of the group psychotherapy literature also indicate that group is a beneficial and cost-effective treatment format (e.g. McRoberts, Burlingame, & Hoag, 1998).

However, because of the used group-form therapy there was no possibility to take into account all the individual needs of participants. Intervention was well structured and there were time limits in each practice so there was no possibility to modify sessions according to participants' wishes. Especially modifying the homeworks to be individual did not actualized as the common way in ACT. To future proposal we suggest that group therapy would include one individual session in the middle of intervention where to specify participant's homework. The effectiveness of the treatment could be increased by adding one personal session. However there were few people who refused to participate in the treatment because of the used group-form therapy. In future it would be useful to study the effect of individual ACT therapy for insomnia even though is clear that group interventions can be more cost-effective treatment format: it could be more useful to study the benefits of ACT group interventions for participants (e.g. peer support) and how to make group treatment easier for the client to participate in.

There were no significant outcomes between the control and the treatment group in ACT-process measures except both Hope Scales which can indicate that insomnia needs to have an own process measure. Significant changes between groups in DBAS support this assume referring to Harvey's (2002) cognitive model of insomnia. Lundh (2005) has suggested that Harvey's model of insomnia focuses on sleep-interpreting cognitive processes (perceptions of sleep, beliefs about sleep, sleep expectations etc.) but the approach of acceptance and mindfulness focuses on sleep-interfering cognitive processes which mean various kinds of arousal-producing processes (an excessive reliance on verbal regulation of behavior and controlled information processing etc.). Lundh and Broman (2000) have argued that insomnia is an interaction between these two processes, and therefore Lundh (2005) has suggested that Harvey's approach and the approach of acceptance and mindfulness focus on different parts of this interaction. That's why these approaches may represent two complementary approaches to the development of better methods for the treatment of insomnia. We believe that the modified ACT-treatment in this study succeeded to work with both these processes but the process measures just not were good enough showing the succeeding clearly. Insomnia can be complex and multidimensional disorder, so only ACT-processes may not reach all the aspects of it. For coming studies in future better measures for processes of insomnia should be developed.

One group of both, the control and the treatment group were assigned to wear Vivago WristCare (Lötjönen et al., 2003; Mattila et al., 2008) before and during the intervention. In this study the use

of WristCares turned out to be complex (e.g. lost data, problems of using) so we decided to exclude their data outside of the study. For coming studies in future the WristCare need to be validated for the purpose of using it as an objective sleep measure.

In conclusion, this study showed potential for the implementation of ACT for insomnia in group therapy. The results showed significant improvements in perceived severity of and generally in overall well-being among participants due to short-term ACT- intervention. According to feedbacks participants felt better wellness and most of them were also more satisfied with their sleep. Based on the feedbacks we can assume that the changes in measures appeared concretely in participants' lives. Some participants had long histories with insomnia which makes it unlikely that their insomnia would have been spontaneously improved. However, these findings need to be interpreted cautiously due to lack of long time follow-up and further research is still needed.

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