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Mind the gap: Acceptance and Commitment Therapy (ACT) for preventing stress-related ill-health among future nurses

A randomized controlled trial

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Sammanfattning

Stressrelaterad ohälsa är ett omfattande problem inom sjuksköterskeyrket med negativa konsekvenser för individer såväl som för samhället. Tidigare studier har visat att viss sådan ohälsa går att spåra tillbaka till stressutvecklingen redan under sjuksköterskeutbildningen. Denna randomiserade kontrollerade studie syftade till att undersöka effekten av en 6x2 timmars Acceptance and Commitment Therapy (ACT) gruppintervention med fokus på stress bland sjuksköterskestudenter ($n=113$). Efter interventionen rapporterade ACT-deltagarna signifikanta förbättringar i uppfattad stress, utbrändhet, arbetsengagemang, självskattad hälsa, psykologisk flexibilitet och medveten närvaro, jämfört med kontrollgruppen. Vid uppföljning efter tre månader kvarstod de uppnådda nivåerna, signifikanta för uppfattad stress, utbrändhet, arbetsengagemang och medveten närvaro. Dos-respons analyser visade att högre grad av deltagande resulterade i större effekter. Processanalyser visade att förbättringar i uppfattad stress, utbrändhet och självskattad hälsa var relaterade till grundläggande ACT-processer. Denna ACT-intervention visade sig vara verksamt för att förebygga utvecklingen av stress bland sjuksköterskestudenter. Implementering av denna intervention i större skala skulle kunna förväntas gagna den framtida sjuksköterskeprofessionen. Ytterligare analyser och förfining av aktiva komponenter skulle emellertid vara av värde.

Nyckelord: Acceptance and Commitment Therapy, prevention, randomiserad kontrollerad studie, sjuksköterskestudenter, stress.

Abstract

Stress-related ill-health is a major problem in the nursing profession with negative consequences for individuals and society alike. Previous studies have shown that part of this problem may be traced back to the development of stress occurring already during nursing training. This randomized controlled trial aimed to examine the effect of a 6x2 hours Acceptance and Commitment Therapy (ACT) group intervention targeting stress in nursing students ($n=113$). ACT participants reported significant improvements in perceived stress, burnout, work engagement, self-rated health, psychological flexibility, and mindful awareness, at post-intervention, as compared to controls receiving treatment as usual. At three months follow-up, achieved levels were sustained; significant for perceived stress, burnout, work engagement, and mindful awareness. Dose-response analyses showed that more participation resulted in greater effects. According to process analyses, improvements in perceived stress, burnout and self-rated health were related to core ACT processes. The

present ACT intervention showed effectiveness in preventing stress development among nursing students. If implemented on a larger scale, benefits of this intervention for the future nursing profession may be expected. However, additional analyses and refinement of active components would be valuable.

Keywords: Acceptance and Commitment Therapy, nursing students, prevention, randomized controlled trial, stress.

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Aleksandar Djordjevic & Elin Frögéli

Introduction

Nursing practice is known to contain many stressful situations (McVicar, 2003). The detrimental effects of work-related stress have been extensively studied within the field of occupational health psychology (e.g. Cherniss, 1980; Maslach, Schaufeli, & Leiter, 2001; Schaufeli, Leiter, & Maslach, 2009). This research centers round the conceptualization of stress-related ill-health as burnout. The core of burnout is exhaustion, a state which prompts individuals to cope with stressors experienced by distancing themselves emotionally and cognitively (i.e. avoidant coping) resulting in disengagement, ineffectiveness, lower professional efficacy, lower self-esteem, depression and absenteeism, and depleting coping resources (Maslach et al., 2001; Schaufeli & Enzmann, 1998; Schaufeli et al., 2009). In other words, avoidance of stressors, as a coping strategy, although intended to relieve stress seems to increase the experience of stress and its negative consequences, including eroded engagement (Biglan, Hayes, & Pistorello, 2008; Cherniss, 1980; Hayes, Strosahl, & Wilson, 2012; Ruiz, 2010; Schaufeli & Enzmann, 1998; Schaufeli et al., 2009). Eroded engagement and burnout are in turn related to poorer work performance and occupational turnover (Maslach et al., 2001). Recent research reveals that these problems in the nursing profession are related to a development of stress-related ill-health dating back to nursing training (Rudman & Gustavsson, 2012). The aim of the present study was to develop and evaluate an intervention targeting the development of stress in nursing students based on Acceptance and Commitment Therapy.

Development and consequences of nurse stress

The higher education for nursing training is one of the largest educational programs in Sweden, being available at 26 out of a total of 47 colleges and universities. One out of twenty university students in Sweden is attending an undergraduate nursing program with the goal of becoming a registered nurse with a bachelor's degree (Statistics Sweden, 2012). Some international studies conducted on nursing students have presented results that, taken together, indicates that stress-related ill-health increases during nursing training (Deary, Watson, & Hogston, 2003; Edwards, Burnard, Bennett, & Hebden, 2010; Nerdrum, Pustoen, & Ronnestad, 2009; Watson, Deary, Thompson, & Li, 2008) as opposed to what is seen for other health professionals where levels of stress are relatively stable, or decrease, during higher education (Nerdrum et al., 2009). The Swedish LANE (Longitudinal Analysis of Nursing Education) study (Rudman, Omne-Pontén, Wallin, & Gustavsson, 2010), where a total of 4316 Swedish nursing students are followed in the transition from higher education to working life, have confirmed an increase in stress symptoms throughout the nursing program (Rudman & Gustavsson, 2012).

The increase in experienced stress during nursing training seems to have far reaching consequences. Students experiencing high levels of the stress-related symptoms exhaustion and disengagement at the beginning of their studies, and those who experience an increase in these symptoms during the years of training, report higher levels of health-problems (i.e. somatic complaints and depressive mood), and lower levels of satisfaction with life, than their peers, at the last semester of education. In addition, they become less active in teaching

situations, and feel less prepared and competent to handle the upcoming profession. Still one year after graduation, a relation can be seen between an increase in exhaustion and disengagement during training and somatic complaints, depressive mood, dissatisfaction with life, lower levels of mastery of occupational tasks, less interest in quality issues in health care, and greater pre-occupation with thoughts about leaving the profession (Rudman & Gustavsson, 2012).

An association has also been seen between the development of exhaustion and disengagement during the first three years of the profession, and variables at the last year of training (Rudman & Gustavsson, 2011). Individuals experiencing increases in exhaustion and disengagement early in the profession were typically experiencing higher levels of negative affectivity, stress due to studies, and uncertainty about the occupational choice, during the last semester of nursing training (Rudman & Gustavsson, 2011). In addition, those who did not experience an increase in exhaustion and disengagement when entering the profession reported, at the last semester of training, low levels of negative affectivity, higher satisfaction with their choice of profession, and a feeling of being adequately prepared for the upcoming profession (Rudman & Gustavsson, 2011). This inverse relation echoes back to the development of exhaustion and disengagement during the years of nursing training: those who do not experience an increase in exhaustion and disengagement during the years of training are more active in teaching situations, and feel more prepared and competent to handle the upcoming profession at the last semester of training (Rudman & Gustavsson, 2012). In addition, they report less somatic complaints and depressive mood, higher levels of satisfaction with life, mastery of professional tasks and interest in quality issues, as well as lower intention to leave the profession, one year after graduation (Rudman & Gustavsson, 2012).

The nursing occupation contains many stressful situations, including heavy workloads, inadequate leadership, professional conflicts, emotional demands, shift work, and low salaries (Laschinger et al., 2009; McVicar, 2003). Nurses is one of the professional groups reporting the highest levels of work related stress (Smith, Brice, Collins, Matthews, & McNamara, 2000) and ill-health (Wall et al., 1997). Newly graduated nurses also have to deal with low confidence in their clinical skills as a further source of stress (McVicar, 2003). They frequently experience a distressing gap between their own competence, preparation, and expectations cultivated during nursing training, and the demands of the nursing profession (Cherniss, 1980; Djordjevic, Rudman, & Gustavsson, 2011; Duchscher, 2009). The transition from studies to working life has been emphasized as a context where individuals are at particular risk for developing stress-related ill-health (Cherniss, 1980; Duchscher, 2009; Kramer, 1974). Indeed, research indicates that stress-related ill-health and turnover are particularly common among newly graduated nurses (Bowles & Candela, 2005; Laschinger et al., 2009). In Sweden, dating back to over a decade, nurses stand out in the national statistics of long-term sick leave, as well as sick leave related to stress related ill-health (AFA Insurance, 2004, 2011; Swedish Work Environment, 2001). Even among newly graduated nurses the level of sick leave exceeds the level of the general working population (Lövgren, Gustavsson, & Rudman, 2011).

Stress-related ill-health among nurses is related to patients being less satisfied with their care (Aiken et al., 2012; Leiter et al., 1998; Vahey et al., 2004), lower safety and quality of care (Laschinger & Leiter, 2006; Poghossyan, Clarke, Finlayson, & Aiken, 2010), sickness absence (Davey, Cummings, Newburn-Cook, & Lo, 2009), as well as lower work ability and higher intention to leave the nursing profession (Hasselhorn, Tackenberg, & Müller, 2003). Nurse turnover, in turn, have vast impacts on care outcomes as well as care costs (Atencio, Cohen, & Gorenberg, 2003; Hayes et al., 2011) and is a contributing cause of nurse shortage, which is a serious problem for health care organizations worldwide (Buchan & Calman, 2004;

WHO, 2006). Considering the relation between stress-related ill-health, nurse turnover, and nurse shortage, the high prevalence of distress among newly graduated nurses is certainly alarming (Laschinger et al., 2009).

Previous research on interventions targeting nurse stress

Organizational measures (e.g. targeting workload, leadership, management and professional conflicts) to reduce stress seem to have limited short-term effects (McVicar, 2003). McVicar (2003) proposes that this is partly due to the fact that perceptions of stress and coping strategies differ between individuals, and emphasize that these individual factors must be addressed in preventative efforts to reduce stress in nursing. Mimura & Griffiths (2003) also propose that there is more evidence for the effectiveness of individual focused interventions to reduce nursing work-stress, than there is for environmental management.

Galbraith & Brown (2011) reviewed 16 intervention studies aiming at reducing stress-related ill-health in nursing students and concluded that effective interventions should include components that are typical of Cognitive Behavioral Therapy (CBT), such as work with dysfunctional thoughts and relaxation techniques. However, all studies originate in the United States or the United Kingdom, and the authors requested further studies for generalization of results, and studies of higher quality and with longer follow-up.

Systematic literature reviews of preventive stress management interventions for working nurses show that more comprehensive interventions (defined as over 6 hours plus subsequent booster session) are effective in reducing work-related stress (Marine, Ruotsalainen, Serra, & Verbeek, 2006; van Wyk & Pillay-van Wyk, 2010). The reviewers conclude, in line with the aforementioned, that interventions should include work with maladaptive cognitions and relaxation techniques according to CBT (Marine et al., 2006).

A CBT approach that has grown large in popularity in recent years is Acceptance and Commitment Therapy (ACT) (Hayes et al., 2012). ACT is part of what is called Contextual CBT (CCBT) (Hayes, Villatte, Levin, Hildebrandt, 2011), stressing the fact that it is a cognitive behavioral approach, but that focus is primarily on context and function of psychological events (i.e. thoughts, feelings, memories, behavioral dispositions), rather than content, validity, intensity, or frequency of the same, as is the target of traditional CBT. According to the theory of CBT and ACT, the basis for much human suffering is avoidance of troublesome thoughts and feelings (i.e. experiential avoidance), resulting in reduced contact with situations that provide positive experiences and well-being, as well as amplification of the stressful events themselves (Biglan et al., 2008; Hayes et al., 2012). Experiential avoidance is defined as trying to avoid or control unwanted psychological events by altering their form, frequency or situational sensitivity, even when doing so is not immediately necessary and/or cause additional behavioral difficulties (Hayes et al., 2012). Treatment aims at providing alternative skills for coping with troublesome thoughts and feelings so that they no longer cause severe problems in life.

In addition to traditional CBT, ACT has a fundamental focus on personal values and motivation, aiming at increasing commitment in life (i.e. values based living) in order to strengthen well-being. Also, ACT highlights mindful awareness as an approach and technique to more efficiently relate to unwanted thoughts and feelings (i.e. in a focused, voluntary, and flexible manner).

For work-related stress as well as a number of other problems, meta and review analyses of ACT studies, including randomized controlled trials (RCTs), have shown beneficial effects of relatively short interventions, both in group format and individually (Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Ruiz, 2010). In Sweden, randomized controlled ACT group interventions targeting stress has demonstrated positive results in a variety of groups such as social workers (Brinkborg, Michanek, Hesser, & Berglund, 2011), high school students

(Jakobsson & Wellin, 2006; Livheim, 2004), and teachers (Altbo & Nordin, 2007). Hayes et al. (2006), in their meta analysis of RCTs, present average effect sizes (Cohen's d) of 0.66 ($n=704$) post-treatment, and 0.66 ($n=580$) at follow-up (mean number of weeks 19.7). In addition, some studies suggest that the effect of ACT treatments does not stop or decrease after cessation of treatment, but rather continues to increase (Hayes et al., 2006; Jakobsson & Wellin, 2006). One possible explanation for the persistent and possible increasingly beneficial effects of ACT is that the method does not focus primarily on symptom reduction, but on long-term functionality and values based living (Hayes et al., 2012). Finally, as stated by Biglan et al. (2008), ACT is especially helpful in preventing future ill-health since the aim is to increase psychological flexibility rather than eliminating pathology.

The ACT framework

ACT is based on the philosophical framework of functional contextualism and the theoretical framework of relational frame theory (RFT) (Hayes et al., 2012). The goal of functional contextualism is prediction and influence of events (Hayes et al., 2012). It fosters a view of events as ongoing actions that cannot be influenced unless perceived in terms of their contextual variables (Hayes et al., 2012). The truth criterion of ACT is workability (Hayes et al., 2012): in a particular situation, does a particular act work in terms of getting closer to values based living? The central stance of RFT is that the core of normal human cognition is the ability to relate events arbitrarily, mutually and in combination, and to change the function of events accordingly, and that this ability contributes profoundly to human psychological suffering because of cognitive fusion and experiential avoidance (Hayes et al., 2012). Cognitive fusion may be explained as living in the verbally constructed world without noticing it (Biglan et al., 2008). When fusing with cognitions, one reacts to them as if they were equal to reality, regards their content as the absolute truth, let them dominate awareness, and rule choices of actions (Hayes et al., 2012). Accordingly, one may feel discomfort, pain, or stress, and operate in the present moment, because of troublesome thoughts of future situations, or memories of the past (Hayes et al., 2012). In line with what has previously been stated about the tendency to cope with distressing events by avoidance: “Thanks to cognitive fusion our thoughts about distress – not just the distress itself – becomes something to avoid” (Biglan et al., 2008, p.146), and by doing so, their distressing nature is augmented.

The goal of ACT: Psychological flexibility

The goal of ACT is to diminish experiential avoidance and increase psychological flexibility; accepting all personal experiences in contact with the present moment, enabling values based living instead of avoidance of troublesome psychological events. Psychological flexibility is a unified transdiagnostic model for alleviating suffering and fostering functionality and growth through six core processes: defusion, acceptance, flexible attention to the present moment, self-as-context, values, and committed action. These six processes are referred to as the hexaflex (i.e. the hexagon of psychological flexibility). In terms of relating to psychological events, these processes can be organized two and two in the three response styles of being open, centered, and engaged. Following is a presentation of these three styles, their core processes, and the techniques used to enhance psychological flexibility (Hayes et al., 2012).

Being open to direct experience, rather than being rigidly attached to thinking processes, or governed by rules and experiential avoidance, helps to increase the flexibility of one's actions. The open response style encompass the core processes defusion and acceptance. When defused one looks at thoughts as from a distance and sees them for what they really are, i.e. creations of the mind arbitrarily related to the present. When doing so, one does not need to react to troublesome thoughts about the future, or memories from the past, as if they were

actually present in the ongoing moment. A number of techniques are accessible to enhance defusion (i.e. reduce the literal quality of the thought, and weakening its tendency to affect behavior) and thereby increase psychological flexibility. Typically such techniques involve noticing thoughts as they come around, playing with their content to acknowledge that it is nothing more than constructions of one's mind (e.g. making it into a figure, saying it really slow or fast, saying it in the voice of a cartoon figure), and letting them pass on by. Acceptance means making room for and allowing all psychological experiences with an attitude of self-compassion and curiosity. The foundation of acceptance is recognizing the present feeling, exploring, and allowing it to come and go freely, using mindfulness and breathing techniques (Hayes et al., 2012).

The centered response style is about being flexibly attentive to the present moment, and aware of internal and external contexts (Hayes et al., 2012). By flexibly focusing one's attention to external and internal events, instead of exclusively attending to distressing psychological events, one may react and operate more flexibly and effectively (Hayes et al., 2012). The centered response style enables the open and engaged response style and detachment from identification with a conceptualized self (Hayes et al., 2012). Mindfulness, involving all present-moment processes, is the core technique (Hayes et al., 2012). Mindfulness may be defined as purposely paying attention to the present moment without judging (Kabat-Zinn, 1990). Typically, in training mindful awareness to increase psychological flexibility, one would purposefully shift one's attention to various targets in the present moment (e.g. external and internal sounds and sensations) noticing their actual qualities, without judgment (Hayes et al., 2012).

Finally, awareness of one's values, what is truly important for one self, and commitment to making contact with the rewarding events of the present, constitute the engaged response style. Values, once clarified, increase a sense of meaning in life and provide guidance for action and selection between behavioral alternatives. As such, values based living is a substitute of avoidance based living, and may contribute positively to personal development. Committed action driven by values does not only refer to overt physical acts, but also internal mental activities, i.e. not avoiding distressing thoughts, feelings or memories when doing so serves valued ends. In practice, any behavioral interventions can be used to enhance committed action, as long as they are in the favor of valued living (Hayes et al., 2012).

Willingness and capability to experience distress and still choose to act effectively towards desired ends, predicts success within a variety of aspects of human functioning (Biglan et al., 2008). Being a rather well researched psychological treatment method, suitable for group format preventive interventions, with proven effects on stress-related ill-health and a central focus on experiential avoidance and values based living, ACT was considered an appropriate method for targeting stress in nursing students.

The present intervention

The 6x2 hours group intervention under trial in this study incorporates all core aspects of the ACT model of psychological flexibility (Hayes et al., 2012). Its development was inspired by the ACT at work program (Bond & Bunce, 2000), as well as a Swedish adaptation (ACT – To cope with stress and promote health) targeting stress in youth (Livheim, 2004). Results from the LANE study (Rudman et al., 2010; Rudman & Gustavsson, 2011; Rudman & Gustavsson, 2012), concerning factors that are related to the development of stress-related ill-health among nurses, were also considered in the making of the program. The content of the intervention session by session is summarized and described briefly in Table 1a-f below. In the left column in Table 1a-f, the focus topics of the sessions are presented, with an elaboration of the topic content in the right-hand column. Throughout the intervention,

psycho-education, group discussions, exercises, mindfulness practice, metaphors, role-playing, work-sheets, and home work assignments were used extensively.

In session one, participants are presented to the working of the human stress reaction. In addition, it is concluded (using group discussions, metaphors and exercises) that experiential avoidance is a dead-end street to follow. In order to individualize the intervention, each participant is encouraged to identify personal struggles to target with the material presented in the following sessions. Acceptance is presented as an alternative to experiential avoidance, and mindful awareness is introduced by means of exercise.

Table 1a. Description of content session 1.

The human stress reaction	Education about the physical, emotional, and cognitive effects of the fight-or-flight response and how human cognition can keep the stress system constantly activated, leading to negative consequences in the long run.
Creative hopelessness	The hopelessness of attempting to eliminate internal events by ordinary problem solving is demonstrated interactively. The consequences of experiential avoidance are discussed. Participants are encouraged to identify for themselves the nature and contexts of their own struggles.
Acceptance as an alternative to struggle	Dropping the struggle is introduced as a more functional alternative to struggling against private events. Acceptance is explained and illustrated.
Mindfulness	Mindful awareness is introduced through an exercise and participants are encouraged to keep practicing at home through the whole course, using guidance through available digital recordings if wanted.
Homework	Mindfulness practice.

In session two, mindful awareness is further introduced, together with the core ACT processes defusion and acceptance. The truth criterion of ACT, i.e. workability, is presented. Finally, the concept of the human autopilot is discussed, and participants are encouraged to challenge a habit during the following week.

Table 1b. Description of content session 2.

Mindfulness	Illustration of mindfulness and education about the effects, benefits and evidence of mindfulness practice.
Defusion	Defusion is presented as a way of detaching from cognitions and different techniques are exercised.
Workability	Discussion about what cognitions to defuse from on the basis of whether they are helpful or not.
Acceptance	Education about emotions and their role in affecting behavior. Rational for acceptance is provided and exercises are carried through.
The autopilot	Demonstration of that it is possible to “turn off the autopilot” by choosing to behave differently than what our cognitions and impulses tell us. Suggestions for breaking old habits are presented.
Homework	Mindfulness practice, defusion and acceptance practice, challenge a habit.

In session three, the importance of sleep and exercise for physical and psychological well-being is presented. The core processes self-as-context and values based living are in focus. Using exercises, metaphors and writing-materials, participants are aided in reflecting on personal values.

Table 1c. Description of content session 3.

Exercise and sleep	Education about the impact of exercise and sleep on stress tolerance and general health.
Observing self	Through experiential exercise and illustration, the perspective of the observing self is introduced as a stable foundation from where one can explore thoughts and feelings for what they are, without involving the brain's problem solving mode.
Conceptualized self	The risk of creating self-fulfilling prophecies by holding on too tightly to conceptualizations of oneself is illustrated, as well as how old behaviors and self concepts amplify each other. The possibility to let go of hindering self-concepts by trying new behaviors is underlined.
Values based living	The benefit of clarifying one's values is explained as well as the difference between values and goals. Exercises to contacting one's values are carried through and participants are encouraged to continue to reflect on one's own values until next session.
Homework	Mindfulness practice, defusion and acceptance practice, reflect on personal values.

Building on the values work commenced in the previous session, in session four participants complete their personal life compass, and decide on actual steps to take towards values based living. Difficulties in changing habits are highlighted, and the importance of planning SMART (specific, meaningful, adaptive, realistic, time framed) (Harris, 2009) goals and behaviors is stressed. Use of ACT strategies to handle potential obstacles is encouraged.

Table 1d. Description of content session 4.

Life compass	The life compass is introduced as a tool to get an overview of personal values. Regular check-ins with the compass is encouraged as a way of supporting values based living. The importance of balance between different areas of life to prevent stress-related illness is discussed.
SMART goals	Formulation of SMART goals and target behaviors are presented and participants are encouraged to plan the execution of a target behavior using the compass as inspiration.
Handling obstacles encountered when changing behaviours	The habitual nature of humans is discussed as a preparation for obstacles in terms of troublesome thoughts and feelings expected when trying out new behaviors. Participants are encouraged to make use of acceptance and defusion strategies.
Homework	Mindfulness practice, defusion and acceptance practice, life compass, take a planned step for values based living.

In session five, looking back on the past weeks experiences, difficulties encountered are discussed, along with brainstorming about possible means of overcoming obstacles in order to take valued steps. Building on this, participants formulate an extended willingness and action plan. In addition, basic communication skills are modeled and practiced, as problems in interpersonal relations is a common source of stress in everyday life, and also a possible obstacle of values based living.

Table 1e. Description of content session 5.

Extension of techniques for handling obstacles encountered	Based on participants' experiences from the preceding assignment, hindering thoughts and feelings encountered, as well as strategies to deal with them, are discussed in group. An important distinction is emphasized between accepting the initial natural discomfort necessary to hold in order to take valued steps, and putting up with unpleasant feelings that are experienced in situations that do not serve the purpose of values based living. Mindful awareness is highlighted as a means of being consciously present in every step and thus being able to instantly recognize deviations from the path of personal values, and adjust the course.
Willingness and action plan	Building on previous knowledge of SMART goals and target behaviors, participants are encouraged to formulate an extended action plan, including strategies for dealing effectively with obstacles when encountered.
Communication skills	Communication skills effective for conflict management and setting boundaries are modeled and role-played.
Homework	Mindfulness practice, defusion and acceptance practice, life compass, take a planned step for values based living

In the sixth and final session, self-acceptance and compassion is highlighted together with discussions for relapse prevention. Conclusively, participants are encouraged to plan long-term values based actions, and break them down into short-term steps to guide their way.

Table 1f. Description of content session 6.

Self acceptance and compassion	The importance of accepting personal flaws, imperfections and mistakes, as well as being compassionate about one self and accepting the occasional uncomfortable feeling as a part of life, is addressed.
Relapse prevention	It is emphasized that learning new behaviors take time and that setbacks are to be expected. The difference between setbacks and relapse is discussed, as well as the natural cycle of ups and downs in life.
Future plans	Participants are encouraged to use their action planning skills to set a valued goal further away in time, and break this goal down in to smaller ones along the way. Literature for further reading is presented.

Aim

The aim of this study was to evaluate the effect of a 6x2 hours ACT intervention targeting stress in nursing students as compared to treatment as usual. We hypothesized that the intervention would prevent a development of stress and increase psychological flexibility during nursing training, as measured by self-reports at baseline, post-intervention, and follow-up three months later. In addition, we hypothesized that the effects would be related to core ACT processes, and that greater participation in the intervention would result in larger effects.

Method

Study design

This was a randomized controlled trial comparing the intervention (ACT) to treatment as usual (TAU). For the full sample, data were collected at baseline, post-intervention, and at three months follow-up (two and five months after baseline, respectively). For the ACT condition only, a mid-intervention measurement was performed half way into the intervention, i.e. one month after baseline. The purpose of the mid-intervention measurement was to perform analyses of intervention processes.

Study conditions

ACT

The intervention was a six-week group program based on theory and methods from ACT (Hayes et al., 2012). The content of the 6x2 hours sessions is presented in Table 1a-f above. The group leaders were psychology major students specialized in CBT and trained in ACT by an international peer reviewed and approved ACT trainer. Adherence to the manual was graded after all sessions and no deviations were noted. Participant attendance was registered at all sessions, coded, and integrated to data files.

TAU

Control subjects were invited to participate in 2x3 hours mentor led group seminars for personal and professional development, a standard part of the nursing program at Karolinska Institutet. Topics for discussion in seminars were day-to-day student-experiences, and personal, professional and academic development.

Participants and recruitment

Eligible participants were 140 nursing students registered at the first semester of the nursing program at the Karolinska Institutet the fall of 2011. Recruitment took place at an information meeting about mentoring activity. The current study was presented, framed as an evaluation of personal and professional development, and students were informed that they would be invited to participate in either mentoring sessions as usual, or a stress management course during six weeks, after which they would continue on with the usual mentoring activities the following semester. In all other aspects the two groups would be treated equally. After giving informed consent, participants completed a self-assessment measure for baseline data. Absent students were given the same information and questionnaire by mail. No compensation was given for participation. The study was approved by the Regional Ethical Review Board in Stockholm (File record 2011/1331-31/4).

Subjects were randomized by a person not involved in the study to 10 mentoring groups (with approximately 10-15 students in each group) out of which six groups were randomly chosen and combined in three groups of approximately 25 individuals for participation in the ACT intervention. At baseline, there were no significant differences between the ACT subjects ($n=69$) and controls ($n=44$) groups regarding demographic data such as age ($M=24.72$, $SD=6.9$), gender (79 % females), country of origin (83.2 % were Swedish born) and prior experience of higher education (28.3 %). Participants randomized to the control condition had significantly more experience of work in health-care ($\chi^2=4.2$, $df=1$; $p=.04$; 17.4% of ACT participants and 34.1 % of controls).

Outcome measures

Primary outcomes

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) is a self-report questionnaire with fourteen items with a 5-point response format for assessment of perceived stress during the past week. Scale scores are computed as a sum ranging between 0-56. Higher scores represent a higher level of perceived stress. The Swedish version of the instrument used in this study has been developed and validated in a Swedish population (Eskin & Parr, 1996). In this study, baseline data alpha coefficient was .89.

Scale of Work Engagement and Burnout (SWEBO; Hultell & Gustafsson, 2010) is a self-report questionnaire with 19 items for assessment of burnout and work engagement using a 6-point response format. Higher scores represent higher levels of burnout and work engagement respectively, and the scales are reported individually as burnout (BO) and work engagement (WE). Scores are computed as a mean ranging between 1-6. The instrument has

been developed and validated in a Swedish population (Hultell & Gustafsson, 2010). In this study, baseline data alpha coefficients were .83, and .84 for the subscales WE and BO, respectively.

Secondary outcome

Self Rated Health (SRH; Fayers & Sprangers, 2002) is a single item measure of over-all health. The item phrasing and scale used in this study is validated in a Swedish population (Brorsson, Ifver, & Hays, 1993). A higher score on the scale represents a poorer perceived health (range 1-5). Due to its limited score range, SRH was not included in the mid-intervention measurement.

Process measures

Avoidance & Fusion Questionnaire for Youth (AFQ-Y; Greco, Lambert, & Baer, 2008) is a self-report measurement with 17 items for assessment of how one relates to personal thoughts and feelings using a 5-point response format. Scores are computed as a sum ranging between 0-68. A higher score indicate more fusion and avoidance, i.e. less psychological flexibility. The instrument used in this study has been validated in a population of Swedish university students (Florin & Wennman, 2010). In this study, baseline data alpha coefficient was .90.

Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003) is a questionnaire with 15 items measuring mindful awareness of moment to moment experience using a 6-point response format. Scores are presented as a sum ranging between 15-90. A higher score represent a higher level of mindful awareness. The instrument is validated in a Swedish population (Hansen & Homman, 2007; Hansen, Lundh, Homman, & Wångby-Lundh, 2009). In this study, baseline data alpha coefficient was .86.

Data collection

Data was collected at a total of three times for the full sample, and at an additional occasion for the ACT sample. All data were self-reported through pen-and-paper surveys sent by post for the participants to receive at the dates given in Table 2. All surveys were followed by reminders every week consequently for a month's time. The mid-assessment served the purpose of evaluating ACT processes within the intervention and was thus sent to ACT participants only. Post- and follow-up assessments served the purpose of evaluating effects of the intervention immediately after its implementation, and three months later. Data was entered in data files by a third part and all entered data was double checked for typing errors. All subjects were assigned a number of identification to make longitudinal analyses possible while ensuring anonymity.

Table 2. Time points of data collection (surveys at recipients, including reminders)

Baseline administered at study location	October 3	2011
Baseline by mail ¹	October 3	2011
Reminder by mail ¹	October 12	2011
Mid-measurement by mail ²	November 3	2011
Reminder by web ²	November 9	2011
Post-measurement by mail	December 1	2011
Reminder by mail	December 9	2011
Reminder by web	December 11	2011
Reminder by mail	December 19	2011
Reminder by mail including extra survey	January 9	2012
3 month follow-up by mail	March 1	2012
Remainder by e-mail	March 7	2012
Remainder by mail	March 12	2012
Remainder by mail	March 20	2012
Remainder by mail including extra survey	March 28	2012

¹To those not present at administration; ²To intervention participants only

In Figure 1, the randomized controlled between-group design of the study is presented, with response rates and drop out rates at baseline-, mid-, post- and follow-up measurement for the ACT and TAU group respectively. Out of the 140 eligible nursing students, 113 chose to participate, out of which 69 were randomized to the ACT intervention, and the remaining 44 to TAU. Forty ACT participants completed the mid-intervention measurement. Two subjects assigned to the ACT group declined participation in the post-intervention measure; however 49 ACT subjects and 31 TAU subjects completed the assessment (response rate 71 %). At three months follow-up, attrition was higher, resulting in a response rate of 56 % (38 and 25 respondents from ACT and TAU, respectively). No subjects formally declined participation to the three months follow-up.

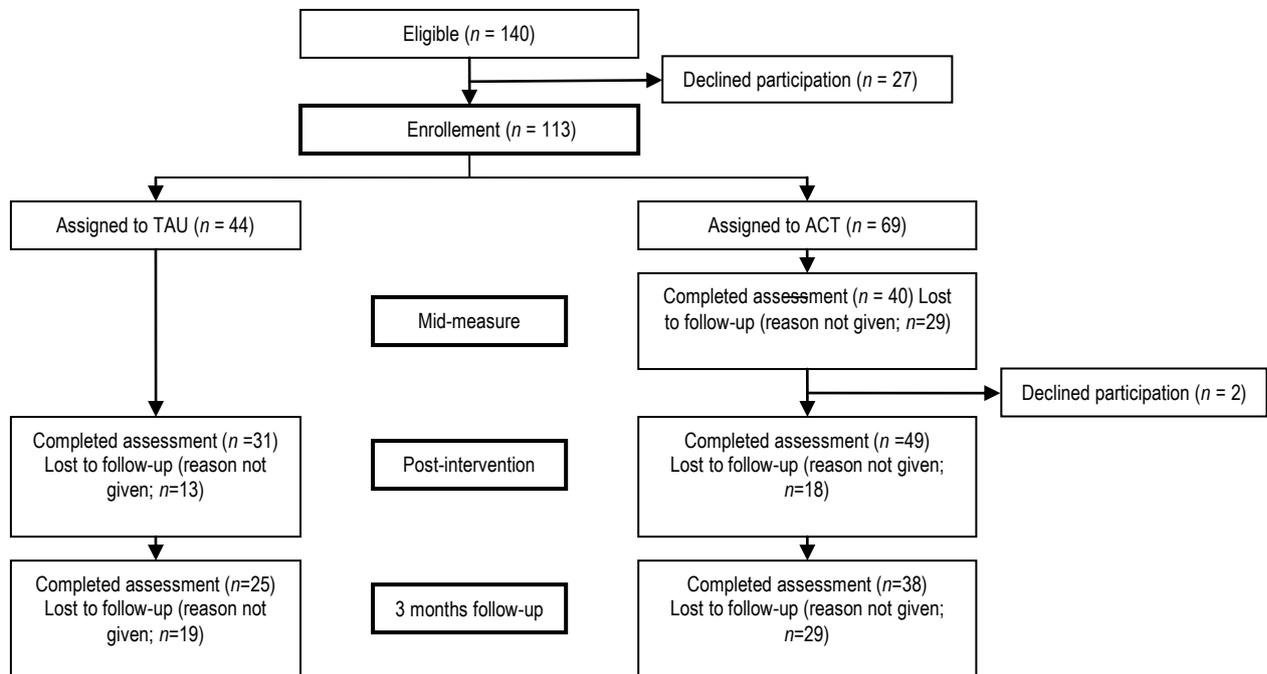


Figure 1. Description of the study design and flow of subjects.

Attrition analyses

Attrition analyses showed no differences between respondents and non respondents at post-intervention regarding the demographic variables age ($t = -0.81$, $df = 111$; $p = .42$), gender ($\chi^2 1.03$, $df = 1$; $p = .45$), country of origin ($\chi^2 1.84$, $df = 1$; $p = .18$), prior experience of higher

education (χ^2 1.16, $df=1$; $p=.36$), and experience of work in health-care (χ^2 0.29, $df=1$; $p=.63$), or primary outcome variables perceived stress ($t=0.24$, $df=109$; $p=.18$), work engagement ($t=1.41$, $df=107$; $p=.26$), and burnout ($t=-0.07$, $df=104$; $p=.94$).

Analyses of attrition at follow-up did not detect any differences between respondents and non respondents regarding the demographic variables age ($t=0.68$, $df=111$; $p=.49$), gender (χ^2 2.45, $df=1$; $p=.16$), country of origin (χ^2 3.31, $df=1$; $p=.08$), prior experience of higher education (χ^2 0.82, $df=1$; $p=.41$), and experience of work in health-care (χ^2 0.83, $df=1$; $p=.38$), or primary outcome variables perceived stress ($t=-1.06$, $df=109$; $p=.29$), work engagement ($t=1.35$, $df=107$; $p=.18$), and burnout ($t=-0.85$, $df=104$; $p=.40$).

Data analysis

The standard principle of analysis in RCTs is intention-to-treat (ITT), in which all subjects randomized are included in analyzes, regardless of them adhering to the treatment or not (Lachin, 2000). This is based on the idea that choosing not to participate, even though in need of aid, is informative of the treatment at trail (Montori & Guyatt, 2001). The ITT is thus considered to ensure the validity of the results by evaluating the treatment effect at the level of adherence observed in the study; i.e. the level of adherence expected in reality if the sampling was performed accurately (Montori & Guyatt, 2001). However, in preventive intervention RCTs, such as the present one, analyses based on the principles of ITT are not necessarily the most accurate report of results. Critics have claimed that low levels of adherence are an innate problem in preventive trials because subjects are not seeking treatment for an existing illness (Gross & Fogg, 2004). Using the ITT when adherence is low may lead to underestimations of effects, and increased risk of type II error (Gross & Fogg, 2004; Montori & Guyatt, 2001). A number of alternative principles for analyzing results of preventive interventions are available (e.g. Gross & Fogg, 2004). In this study, the following analyses were performed to evaluate the effect of the intervention:

1. Standard ITT analysis using multilevel modeling (MLM); pre- to post-intervention, and pre-intervention to three months follow-up, respectively.
2. Efficacy subset analysis including subjects who participated in at least three ACT sessions (i.e. half of the intervention) as compared to the full control sample using MLM; pre- to post-intervention, and pre-intervention to three months follow-up, respectively.
3. Analyses of intervention effects (based on pre-, mid-, and post-intervention data from the full ACT sample) in relation to core ACT processes using MLM.
4. Dose-response analysis of attendance on intervention effects (based on pre-, mid-, and post-intervention data from the full ACT sample) with session attendance as a continuous variable using MLM.
5. Analyses of clinically significant change in the primary outcome PSS (based on pre- to post-intervention data of the full randomized sample).

Multilevel modeling

The multilevel modeling (MLM) procedure was used to evaluate the intervention. This approach was chosen since mixed-effects regression models, such as MLM, has showed to have superior qualities when analyzing repeated measures data (compared to methods such as

repeated measures analyses of variance) regarding the handling of missing data and avoiding type I errors (which is done via the estimation method of full information maximum likelihood (FIML)) (Gueorguieva & Krystal, 2004). Analyses were performed using IBM SPSS Statistics 20.

MLM is an analysis of individual change over time (level 1), and the relation of that change to other variables, such as a treatment condition (level 2) (Singer & Willet, 2003). In this study, to address the primary research question, the predictability of participation in ACT or TAU (level 2) on change in the dependent variables PSS, WE, BO, SRH AFQ-Y and MAAS (level 1), was examined. In addition, to address the hypothesis of the relation of the effect of the intervention to ACT processes, change in AFQ-Y and MAAS throughout the intervention was used as continuous variables on level 2.

The level 1 model, also called the within-subject model, specifies the growth trajectory of each individual. The model is expressed as the function (usually linear) that best fits observed data. In the case of a linear function, the individual growth trajectory (Y) is defined as its baseline value (intercept; π_{0i}), its change (slope; π_{1i}) over time (X), and error (ε_{ij}), as indicated in equation 1. The parameters are estimated using FIML.

$$(1) Y_{ij} = \pi_{0i} + \pi_{1i}(X) + \varepsilon_{ij}$$

The level 1 model attempts to describe all individuals, and thus it is implicitly assumed that every true individual change trajectory have the same algebraic form. It is however not assumed that every individual have the exact same trajectory. This is acknowledged by letting intercepts and slopes vary (be random instead of fixed) between individuals. In this study, regarding the level 1 variable time, a model with fixed as well as random intercept and fixed slope was used.

The level 2 model, also known as the between-subject model, aims at predicting the values of individual intercepts and slopes. In particular, the goal is to investigate if individual differences in change (i.e. variance in slopes in the level 1 model) can be explained by a factor at a higher level ("group", i.e. participation in ACT or TAU). To this end, a conditional model is constructed using group membership coded as a dummy variable to predict intercept and slope, as indicated in equation 2 and 3. In this study, in all MLM analyses, fixed intercept and fixed slope on the level 2 model were used.

$$(2) \pi_{0i} = \beta_{00} + \beta_{01}(\text{group}) + \text{random deviation}$$

$$(3) \pi_{1i} = \beta_{10} + \beta_{11}(\text{group}) + \text{random deviation}$$

These equations state that individual intercept (π_{0i}) and slope (π_{1i}) are conditional on group membership. Due to the dummy coding of the group variable, the slope in equation 2 may be used to test if the two groups deviate significantly from each other at baseline. If β_{01} deviates significantly from zero, there is a significant difference in the two groups at baseline. In addition, due to dummy coding of "group", β_{11} in equation 3 describes the change in average slope per unit change in group, i.e. the difference in rate of change between the two groups. β_{11} may thus be interpreted as the effect of group participation on rate of change. In other words, the coefficient β_{11} is the difference in mean slopes between the two groups. If β_{11} deviates significantly from zero, there is a significant effect of group membership on variation in slope, i.e. the change trajectories of the two groups are unequal, and it is assumed that this is an effect of the intervention. Based on model coefficients, an estimated group means may be equated and consequently the problem of missing data is diminished.

In this study, between group effect sizes were calculated using Cohen's d with pooled standard deviations from baseline data. Given effect sizes reported in previous ACT interventions, 30 participants in each condition are required for a power estimate of .80, and the present sample size was thus adequate.

Clinically significant change

The calculations of clinically significant change were made based on the two conditions described by Jacobson and Truax (1991). The first condition concerns how much an individual has changed between the time points of measurements, assessed by the reliable change index (RC). RC is obtained by dividing the difference between a subjects pre- and posttest score by the standard error of difference (S_{diff}) between the test scores ($RC = ((x_2 - x_1) / S_{diff})$). The standard error of difference is, in turn, computed from the standard error of measurement (S_E) using the formula $S_{diff} = \sqrt{2(S_E)^2}$. S_E is obtained from the standard deviation of the measure at baseline and the reliability of the measure (r_{xx} : in the present study Cronbach's α) ($S_E = s_1 \sqrt{1 - r_{xx}}$). S_{diff} shows the expected spread of the distribution of change scores if no actual change took place. This means that an obtained RC larger than ± 1.96 (p -value of $p < .05$) indicates that an actual change has occurred. Subjects fulfilling this condition are thus defined as reliably improved, or reliably worsened if the change is in the opposite direction. The second condition for clinically significant change concerns whether a subject scoring within a dysfunctional range at baseline has crossed a specified cut-off point and moved to a functional level after the intervention. When normative data is available and when dysfunctional and functional populations in a sample overlap, Jacobson and Truax (1991) recommend using their c -criterion for obtaining this cut-off, where c can be regarded as a point half-way between the means of a dysfunctional and a functional population ($c = ((s_0 M_1 + s_1 M_0) / (s_0 + s_1))$). Clinically significant change was only computed for PSS as norm values for a functional population were not available for the other primary outcome variables. Mean and standard deviation on PSS from a functional Swedish population were obtained from Eskin and Parr (1996). Based on the data from Eskin and Parr (1996) a PSS-score of ≥ 25 was defined as high stress. Consequently, to compute the c -criterion, mean and standard deviation of the dysfunctional population (M_I, s_I) was derived using data of those subjects in this present study scoring above 25 on the PSS at baseline, resulting in a cut-off point of 29 on the PSS. Reliably improved subjects also crossing the cut-off point between dysfunctional and functional are regarded as reliably improved and recovered.

Analyses of opinions about the intervention and reasons for adherence

Finally, investigations of reasons for adhering and not adhering to the intervention, as well as general opinions about the intervention, were performed using a web delivered evaluation and focus group interviews. After intervention completion an anonymous web-evaluation was distributed to all subjects assigned to ACT. Questions examined whether participants found the intervention interesting, comprehensible, personally relevant and useful, appropriate in terms of time and contents, and whether or not the participants aimed at continuing using strategies and methods learned. It also contained open answer questions regarding the strongest and weakest parts of the intervention, as well as propositions for improvements. To conduct the focus group interviews, eight participants who attended at least four sessions were selected at random and invited to participate. Participation was compensated by a free lunch. One of the participants invited did not show up. In two groups of three and four participants respectively, led by the ACT group leaders, questions of similar kind as those in the course evaluation, with the addition of attendance at sessions, were discussed in more detail. The interviews were recorded and transcribed by the interviewers,

and a brief summary of the content, including highlighting quotes, are presented in the following results section.

Results

Means and standard deviations of measurements per group and measurement occasion, based on principles of ITT and efficacy subset analysis respectively, are presented in Table 3. At baseline, looking at the ITT sample as well as the efficacy subset sample, there were no differences between ACT and control subjects in any of the studied outcome variables (ITT: PSS $t=0.79$, $df=109$; $p=.43$; WE $t=-0.77$, $df=107$; $p=.45$; BO $t=0.83$, $df=104$; $p=.41$; SRH $t=1.41$, $df=109$; $p=.16$; AFQ-Y $t=0.83$, $df=110$; $p=.41$; MAAS $t=-0.25$, $df=110$; $p=.80$; Efficacy subset: PSS $t=-0.37$, $df=71$; $p=.71$; WE $t=0.62$, $df=70$; $p=.54$; BO $t=-0.39$, $df=67$; $p=.70$; SRH $t=0.10$, $df=71$; $p=.92$; AFQ-Y $t=-0.17$, $df=70$; $p=.87$; MAAS $t=0.62$, $df=70$; $p=.54$).

Effects of the intervention

Post-intervention

Results of the evaluation of the intervention effect to post-intervention based on MLM ITT and efficacy subset analyses are presented in Table 4 along with estimated marginal means, standard deviations and effect sizes. According to the ITT analyses, the ACT group experienced significant improvements in perceived stress ($\beta_{11}=-7.27$; $p=.000$), burnout symptoms ($\beta_{11}=-0.49$; $p=.015$), and psychological flexibility ($\beta_{11}=-3.67$; $p=.041$), as well as marginally significant improvement in mindful awareness ($\beta_{11}=0.23$; $p=.076$), as compared to the control group. Between group effect sizes post-intervention varied from small to moderate (0.23-0.62). The largest effect sizes were found for the primary outcome variables perceived stress (Cohen's $d=0.62$) and burnout symptoms (Cohen's $d=0.37$). Estimated marginal means indicated that controls as a group had experienced a worsening regarding perceived stress, work engagement and burnout symptoms from baseline to the post-intervention measurement. The efficacy subset analyses showed that those participating in at least three of the six intervention sessions were significantly, or marginally significantly, improved in all measured variables (β_{11} 's ranging from -9.88 to 0.42 $p=.000-.090$). Effect sizes varied between small to medium and large (0.39-1.16). The largest effect sizes were seen for perceived stress (Cohen's $d=1.16$) and psychological flexibility (Cohen's $d=1.00$). The results are graphically displayed in Figure 2, illustrating the change in outcome variables (estimated marginal means) from baseline, via post-intervention, to three months follow-up of the ITT, efficacy subset, and control sample, respectively.

Three months follow-up

Results of the evaluation of the intervention effect at three months follow-up based on MLM ITT and efficacy subset analyses are presented in Table 5 along with estimated marginal means, standard deviations and effect sizes. According to the ITT analyses, there was a significant improvement in mindful awareness ($\beta_{11}=0.41$; $p=.010$) from baseline to the three months follow-up. The effect size was moderate (Cohen's $d=0.53$). Estimated marginal means of the ACT group seemed to remain stable from post-intervention to follow-up. Looking at estimated marginal means of the controls, at three months follow-up, they seem to approach their baseline position on perceived stress and burnout symptoms. According to the efficacy subset analyses, there were significant improvements in burnout symptoms ($\beta_{11}=-0.49$; $p=.036$) and mindful awareness ($\beta_{11}=0.40$; $p=.022$), from baseline to the three months follow-up occasion in the ACT group as compared to controls, as well as marginally

significant improvements in perceived stress ($\beta_{11}=-4.54$; $p=.067$) and work engagement ($\beta_{11}=0.40$; $p=.074$). Effect sizes were moderate to large. The largest magnitudes were found for mindful awareness (Cohen's $d=0.83$) and work engagement (Cohen's $d=0.79$). The results are also graphically displayed in Figure 2 illustrating the change in outcome variables (estimated marginal means) from baseline via post-intervention to three months follow-up of the ITT, efficacy subset, and control sample, respectively.

Table 3. Descriptive data cross sectional.

Variable	Intention-to-treat						Efficacy subset					
	Baseline		Post intervention		3 month follow-up		Baseline		Post intervention		3 month follow-up	
	ACT	Control	ACT	Control	ACT	Control	ACT	Control	ACT	Control	ACT	Control
	(n)	(64-69)	(42-44)	(47-49)	(29-31)	(36-37)	(22-25)	(27-29)	(42-44)	(24-25)	(29-31)	(19-20)
	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>	<i>M</i>
	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)	(<i>SD</i>)
PSS	26.56 (10.66)	25.09 (7.50)	21.18 (9.59)	27.84 (10.16)	21.50 (10.14)	24.12 (7.82)	24.24 (12.05)	25.09 (7.50)	16.78 (9.21)	27.84 (10.16)	17.29 (9.74)	24.12 (7.82)
WE	4.14 (0.80)	4.25 (0.67)	4.02 (0.99)	3.85 (0.97)	4.04 (1.06)	3.89 (0.91)	4.36 (0.88)	4.25 (0.67)	4.44 (0.84)	3.85 (0.97)	4.47 (1.02)	3.89 (0.91)
BO	2.50 (0.92)	2.36 (0.84)	2.38 (0.93)	2.79 (1.08)	2.46 (1.00)	2.62 (1.12)	2.28 (0.84)	2.36 (0.84)	2.04 (0.80)	2.79 (1.08)	2.03 (0.77)	2.62 (1.12)
SRH	1.88 (1.01)	1.64 (0.69)	1.55 (0.86)	1.67 (0.80)	1.65 (0.79)	1.44 (0.77)	1.66 (0.94)	1.64 (0.69)	1.29 (0.47)	1.67 (0.80)	1.30 (0.47)	1.44 (0.77)
AFQ-Y	22.30 (13.04)	20.21 (13.04)	17.55 (10.66)	21.23 (14.08)	17.83 (10.74)	19.40 (15.22)	19.69 (12.69)	20.21 (13.04)	13.71 (8.77)	21.23 (14.08)	16.38 (10.98)	19.40 (15.23)
MAAS	4.10 (0.79)	4.14 (0.73)	4.46 (0.80)	4.17 (0.81)	4.37 (0.84)	3.97 (0.72)	4.25 (0.83)	4.14 (0.73)	4.67 (0.84)	4.17 (0.81)	4.60 (0.90)	3.97 (0.72)

Note: *M*=mean; *SD* = standard deviation; *n* = number of subjects

Table 4. Estimated marginal means, MLM results, and effect sizes of ACT participants and controls according to intention-to-treat and efficacy subset analyses baseline to post-intervention

(n)	Intention-to-treat								Efficacy subset							
	Baseline		Post intervention		Group by time				Baseline		Post intervention		Group by time			
	ACT (69)	Control (44)	ACT (69)	Control (44)	β_{11}	t	p	Effect size d	ACT (29)	Control (44)	ACT (29)	Control (44)	β_{11}	t	p	Effect size d
	M (SE)	M (SE)	M (SE)	M (SE)					M (SE)	M (SE)	M (SE)	M (SE)				
PSS	26.60 (1.12)	25.09 (1.43)	21.97 (1.29)	27.72 (1.62)	-7.27	-3.75	.000*	0.62	24.24 (1.75)	25.09 (1.42)	17.01 (1.85)	27.74 (1.62)	-9.88	-4.08	.000*	1.16
WE	4.14 (0.10)	4.25 (0.13)	3.95 (0.12)	3.84 (0.15)	0.22	1.21	.228	-	4.37 (0.15)	4.25 (0.12)	4.37 (0.16)	3.84 (0.15)	0.42	1.94	.057 [†]	0.72
BO	2.51 (0.11)	2.35 (0.14)	2.43 (0.13)	2.76 (0.16)	-0.49	-2.49	.015*	0.37	2.30 (0.17)	2.35 (0.14)	2.12 (0.17)	2.76 (0.16)	-0.60	-2.51	.015*	0.73
SRH	1.89 (0.11)	1.64 (0.13)	1.62 (0.12)	1.62 (0.15)	-0.25	-1.21	.228	-	1.66 (0.14)	1.64 (0.11)	1.29 (0.15)	1.63 (0.13)	-0.36	-1.72	.090 [†]	0.39
AFQ-Y	22.30 (1.52)	20.15 (1.91)	18.47 (1.62)	20.00 (2.03)	-3.67	-2.08	.041*	0.23	19.69 (2.27)	20.15 (1.85)	13.49 (2.33)	19.98 (1.97)	-6.02	-3.10	.003*	1.00
MAAS	4.10 (0.09)	4.15 (0.12)	4.40 (0.10)	4.22 (0.13)	0.23	1.80	.076 [†]	0.24	4.25 (0.14)	4.15 (0.12)	4.61 (0.15)	4.22 (0.13)	0.29	2.01	.049*	0.51

Note: M = mean; SE = standard error; β_{11} = slope estimate of time x group in MLM; t = t-value, p = significance value ($^* p \leq 0.05$; $^{\dagger} p \leq 0.10$); d = Cohen's d derived from estimated marginal means between groups at post-intervention and the pooled standard deviation from baseline.

Table 5. Estimated marginal means, MLM results, and effect sizes of ACT participants and controls according to intention-to-treat and efficacy subset analyses baseline to three month follow-up

Variable	Intention-to-treat								Efficacy subset							
	Baseline		3 month follow-up		Group by time			Effect size	Baseline		3 month follow-up		Group by time			Effect size
	ACT (69)	Control (44)	ACT (69)	Control (44)	β_{11}	t	p		ACT (29)	Control (44)	ACT (29)	Control (44)	β_{11}	t	p	
	M (SE)	M (SE)	M (SE)	M (SE)				M (SE)	M (SE)	M (SE)	M (SE)					
PSS	26.56 (1.15)	25.09 (1.42)	21.50 (1.55)	24.12 (1.89)	-3.15	-1.54	.128	-	24.24 (1.72)	25.09 (1.39)	17.29 (2.12)	24.12 (1.85)	-4.54	-1.87	.067 [†]	-0.74
WE	4.14 (0.11)	4.25 (0.13)	4.04 (0.14)	3.89 (0.18)	0.20	0.96	.338	-	4.37 (0.16)	4.25 (0.13)	4.47 (0.19)	3.89 (0.18)	0.40	1.83	.074 [†]	0.79
BO	2.50 (0.13)	2.36 (0.16)	2.46 (0.17)	2.62 (0.20)	-0.28	-1.24	.218	-	2.28 (0.18)	2.36 (0.15)	2.03 (0.22)	2.62 (0.19)	-0.49	-2.15	.036 [*]	-0.67
SRH	1.88 (0.11)	1.64 (0.13)	1.65 (0.14)	1.44 (0.17)	0.00	0.02	.983	-	1.66 (0.14)	1.64 (0.11)	1.30 (0.17)	1.44 (0.15)	-0.11	-0.53	.601	-
AFQ-Y	22.30 (1.71)	20.21 (2.10)	17.83 (2.24)	19.40 (2.68)	-0.55	-0.31	.760	-	19.69 (2.44)	20.21 (2.01)	16.38 (3.02)	19.40 (2.63)	-0.20	-0.10	.919	-
MAAS	4.10 (0.09)	4.14 (0.12)	4.37 (0.13)	3.97 (0.15)	0.41	2.64	.010 [*]	0.53	4.25 (0.15)	4.14 (0.12)	4.60 (0.18)	3.97 (0.16)	0.40	2.37	.022 [*]	0.83

Note: M = mean; SE = standard error; β_{11} = slope estimate of time x group in MLM; t = t-value, p = significance value ($^* p \leq 0.05$; $^{\dagger} p \leq 0.10$); d = Cohen's d derived from estimated marginal means between groups at follow-up and the pooled standard deviation from baseline.

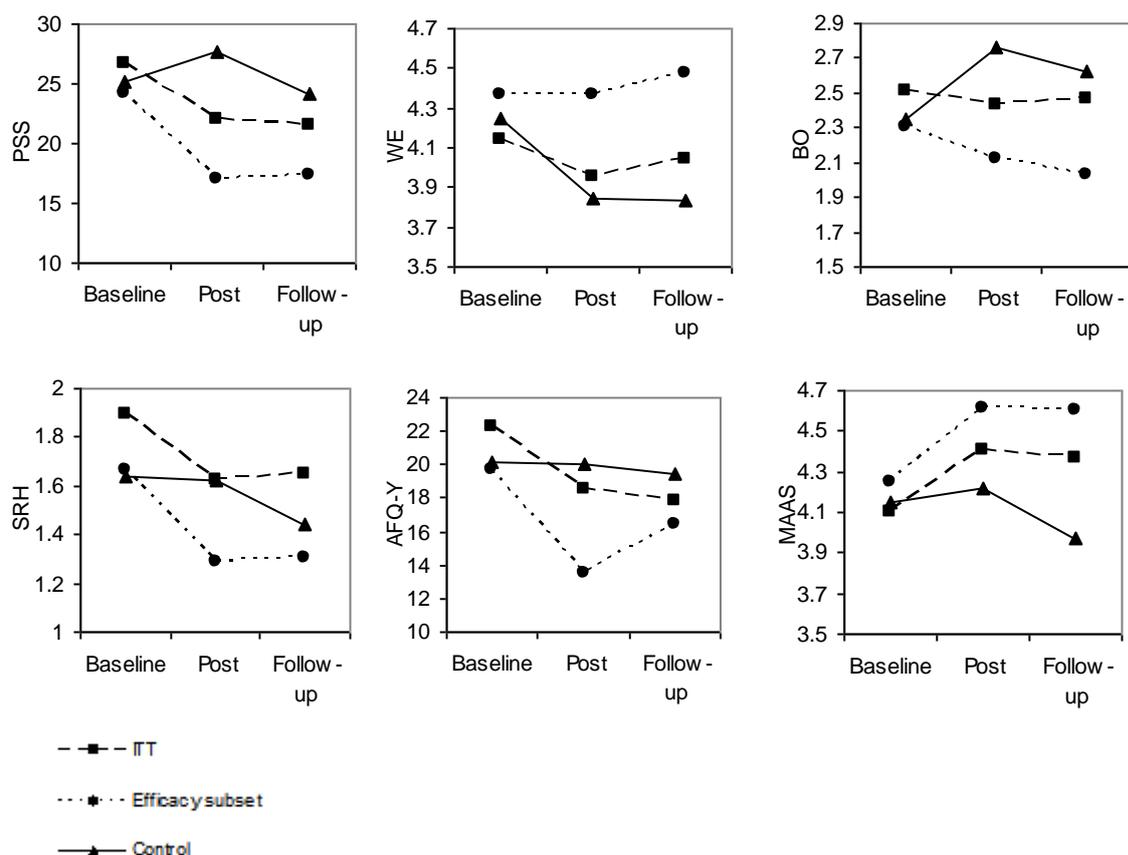


Figure 2. Estimated marginal means of outcome variables at baseline, post-intervention and three months follow-up for the ITT, efficacy subset and control sample, respectively.

Analyses of intervention effects in relation to core ACT processes

Results of analyses relating the effects of the intervention to changes in the core ACT processes psychological flexibility and mindful awareness are presented in Table 6. Changes in perceived stress, burnout symptoms and psychological flexibility from baseline to post-intervention were related to change in mindful awareness. In addition, change in psychological flexibility from baseline to post-intervention was related to change in perceived stress, burnout symptoms, self-rated health and mindful awareness.

Table 6. Results of process analyses ($n=61$)

Variable	Process measure			Process measure		
	MAAS			AFQ-Y		
	β_{11}	t	p	β_{11}	t	p
PSS	-1.79	-1.89	.062 [†]	0.24	3.74	.000 [*]
WE	0.08	0.97	.337	-0.01	-1.51	.135
BO	-0.39	-4.95	.000 [*]	0.01	2.04	.045 [*]
SRH	-0.34	-1.44	.156	0.03	2.36	.021 [*]
AFQ-Y	-2.54	-3.05	.003 [*]	-	-	-
MAAS	-	-	-	-0.01	-3.05	.003 [*]

Note: β_{11} =regression coefficient; t =t-value; p =significance value (^{*} $p \leq 0.05$; [†] $p \leq 0.10$)

Dose-response analyses of attendance on intervention effects

Attendance is presented in Table 7. The highest level of attendance was registered at session one, after which a decrease was seen with each following session. Dose-response analyses revealed significant effects of attendance on change in PSS ($\beta_{11} = -.58, p = .045$); WE ($\beta_{11} = .05, p = .040$); BO ($\beta_{11} = -.06, p = .026$); and AFQ-Y ($\beta_{11} = -.76, p = .004$), but not on SRH ($\beta_{11} = -1.71, p = 1.00$) and MAAS ($\beta_{11} = .03, p = .126$).

Table 7. Number of participants attending each session.

Session	1	2	3	4	5	6
Participants	51	41	29	24	20	13

Analyses of clinically significant change

In Table 8, clinically significant change in perceived stress from baseline to post-intervention in the two study conditions is presented. As indicated, the ratio of reliably improved subjects in the ACT group as compared to the control group was 5:1, and 6:0 for reliably improved and recovered. Twice as many subjects in the control group as compared to the ACT group were reliably worsened in perceived stress from baseline to post-intervention.

Table 8. Number of participants in the ACT and control condition who made a clinically significant change on the PSS from baseline to post-intervention

Group	Reliably improved	Reliably improved and recovered	Reliably worsened
ACT	5	6	2
Control	1	0	4

Analyses of opinions about the intervention and reasons for adherence

According to the web delivered course evaluation and the focus group interviews, the majority found the content interesting, understandable, personally relevant and appropriate in size. Participants expressed an increased awareness of thoughts and feelings, and strengthened focus of attention, contributing to more effortless decision making and problem solving. Clarification of personal values and the life compass contributed to keeping a balance between different life areas. The intervention was perceived as targeting an important topic in a valuable manner, as expressed by one of the participants:

“Stress is a subject one has heard a lot about, and that one talks about a lot, but what you (ACT group leaders) did was giving us tools to handle it, not just talking about it as a problem, but something you can handle.”

Increased ability to handle stress, whether working as a nurse or not, and an ability to handle new challenges, were expected future benefits of attending:

“...when standing in front of a patient and thinking “I can’t do this” ...To be able to take one thing at a time in that moment, letting stressful thoughts and feelings come and go...”

For some, participation was compromised because of unfortunate scheduling (intervention sessions taking place after a free period, or as the single item during a lecture free day), stress due to upcoming exams, and not being susceptible of, or interested in, the content of the intervention.

“At the moment I find the content of the course very difficult, such as mindfulness practice. I get way to fidgety and can’t see that it gives me anything...”

Drawbacks and ideas of improvement involved requests for a more explicit explanation of the purpose and methods at the first session, earlier presentation of the life compass, and more practical exercises. Others requested more sessions, over a longer period of time. Most respondents had the ambition to continue working with mindfulness practice, values and committed action after the intervention, and found the intervention to be of great value in the present moment, as well as in the future, as expressed in the following statements:

“To learn that one can have a thought without it necessarily being true. That has made me able to let difficult thoughts pass on by”.

“In the future (at least sometimes) one can put ones energy into actually doing what one should be doing, instead of ruminating over everything one does wrong”.

Discussion

This study evaluated the effect of a 6x2 hours ACT intervention aimed at preventing the development of stress-related ill-health in nursing students. To evaluate the effect of the intervention, standard ITT analyses, efficacy subset analyses, dose-response analyses, and analyses of opinions about the intervention and reasons for adherence, were performed according to recommendations of Gross & Fogg (2004). In addition, analyses of clinically significant change were performed, as well as process analyses evaluating the results in relation to core ACT processes. According to the standard ITT analyses, the intervention resulted in significant, or marginally significant, improvements in perceived stress, burnout symptoms, psychological flexibility, and mindful awareness, of ACT subjects as compared to their peers. Looking at those subjects attending at least half of the sessions, there were additional marginally significant improvements in work engagement and self-rated health, indicating that these variables need more effort to affect. Students in the ACT condition were, following the intervention, more willing to experience negatively evaluated thoughts, feelings and physiological sensations without avoiding them or letting them determine their course of action (Hayes et al., 2012). These improvements in psychological flexibility and mindful awareness could in turn be concluded to be related to improvements in perceived stress, burnout and self-rated health. Thus, this study demonstrates that, by implementing the present intervention, the previously documented increases in stress levels during nursing education (Edwards et al., 2010; Rudman & Gustavsson, 2012; Watson et al., 2008) may be prevented.

Over all, the effects of the intervention were larger for those participating in at least three sessions. As seen, a dose-response relationship between participation in the intervention (i.e. number of attended sessions) and improvements in perceived stress, burnout and work engagement could be confirmed. In other words, the more one participated, the better the effect. However, even though missing out on a few occasions, improvement in stress-related ill-health can be expected. Given the nature of educational settings, as the one where this study was performed, this is a valuable attribute of the intervention. Future studies may further evaluate the effect of adhering to the intervention operationalized as amount of homework performed.

Analyses of clinically significant change in perceived stress revealed that more subjects in the ACT condition were reliably improved and/or recovered, and that more subjects in the control condition were reliably worsened, following the intervention. In this study, floor-effects of change rather than clinically significant change were expected as participants were not drawn from a clinical setting or actively seeking treatment. The result indicates that, even

for those within a normal population experiencing clinical levels of stress, the intervention have the potential to bring about a recovery.

At the three months follow-up, significant or marginally significant positive effects of the intervention were maintained regarding mindful awareness, looking at the full randomized sample, and perceived stress, work engagement, burnout symptoms, and mindful awareness, looking at the efficacy subset. The non-significant result of psychological flexibility for the efficacy subset at follow-up was unexpected, given the large effect seen at post-intervention. The reason for this result is unclear. Some ACT studies have detected sustained and/or increased effects of interventions following one to two years (Hayes et al., 2006; Jakobsson & Wellin, 2006). This present study evaluated the effect of the intervention following three months and no additional improvements from post-intervention could be concluded. Possibly, the development of such effects requires a longer time span.

For all variables, except for mindful awareness, larger between-group effect sizes were seen at post-intervention than at follow-up. A possible explanation for this is that the full sample was exposed to a stressor at the post-intervention collection time point, and that the intervention worked to protect the ACT subjects from the detrimental effects of that stressor. This theory is strengthened by the fact that the students started a new course (anatomy, known to be stressful due to a large amount of material to learn in a limited time) two weeks before the post-intervention data collection, which was terminated before the follow-up data collection. Accordingly, the trend of the control group was a worsening in primary outcome variables perceived stress and burnout from baseline to the time point of post-intervention data collection, and then a return to healthier levels at follow-up. Regarding self-rated health, the missing effects of the intervention at follow-up may be due to improvements in the control group at follow-up while the ACT group remained stable at achieved levels. Indeed, Edwards et al. (2010) conclude in their study investigating levels of stress during three years of nursing studies that a single data collection time point is inadequate to measure stress in nursing students as there is natural variation in students' psychological status across the academic year, partly due to stressful assessments, deadlines and exams occurring at distinct times.

Finally, the main result of the focus group interviews and the evaluation of the study was that students found it difficult to prioritize the intervention above ordinary studies, as it did not result in study credits. In other words, some type of external reward, or obligation to attend, might enhance adherence. Possibly, such external incentives could interfere with the nature of the intervention (i.e. focusing on personal values and internal motivation). However, given the magnitude of the problem with stress in nursing students, the benefits might override the possible drawbacks of the conflict.

Methodological considerations

Using the principles of the strict ITT analysis in MLM ensures that the results are not biased in the direction of positive results. Contrary, the results may be considered under-estimations of the real effect of the ACT intervention, as a number of non-participating subjects are included. Gross and Fogg (2004) state that the lowest levels of adherence found in clinical practice arise in prevention studies that include life style changes and that are not intended to cure existing illness. Because of this, a number of complementary methods of analysis are suggested, such as the efficacy subset analysis that was performed in this study. A concern that has been voiced regarding efficacy subset analysis is that it, having criteria being identified post randomization, may be flawed with selection bias and inflated risk of type I error (Gross & Fogg, 2004). To address this concern, in this study, the chosen efficacy subset included those subjects participating in half of the intervention or more, which should be considered a rather inclusive set. This analysis, similarly to the dose-response analysis, provides insight about the beneficial effects of actually attending the intervention at a

reasonable level. Gross and Fogg (2004) states that, when predicting intervention effectiveness the role of adherence can be understood by comparing ITT and efficacy subset analyses in the same trial.

Limitations

Attrition from the intervention, as well as from post-intervention and follow-up measurements, was the main study weakness resulting in lower power. Future studies involving students should plan the intervention in careful relation to their ordinary schedule, as the scheduling of this intervention possibly contributed to the low participation in the intervention. In addition, rewards for participation (e.g. study credits) should be considered.

The ACT condition constituted a total of 12 hours, and was compared to 6 hours of TAU. In addition, attrition seems to have been higher in controls, however TAU participation was not registered and could thus not be included in analyses. This unbalance raises the question if the intervention in reality was compared to an active or passive control condition.

As TAU was used as control, it is possible that assigned participants sought optional treatment affecting assessments, which could not be controlled for in analyses. However, the same is true for the ACT group. It was clearly stated that the intervention was not a psychological treatment. It should therefore have been no difference in the tendency of participants in the ACT- and control group to seek additional counseling or treatment.

Therapist effect could not be accounted for in this study. It is possible that some of the effects presented are due to factors related to the therapist delivering the intervention, rather than the intervention itself. To further evaluate the effect of the intervention future studies should consider a design where therapist effects may be accounted for.

Strengths

The main strength of this study was the randomized controlled design in which the effect of the intervention was evaluated in comparison to TAU post-intervention and three months later. Being implemented in an educational setting, without giving subjects incentives for participation, and adhering to the original randomization, the ecological validity ought to be high. Bias in evaluating the effects should thus be considered minimal (Montori & Guyatt, 2001).

Future studies

Ethical approval is granted for yearly follow-ups of the sample until 2015.

As stated by the Medical Research Council (Craig et al., 2008), an evaluation of complex interventions, such as the one presented in this study, should answer the questions (1) are they effective in everyday practice, and (2) how do they work (i.e. what are the active components and how are they exerting their effects). Based on these answers, complex interventions may be improved in terms of effectiveness and appropriateness of application across groups and settings (Craig et al., 2008). The evaluation of this present intervention showed that it was effective in this sample, and that psychological flexibility and mindful awareness were processes involved in this effect. Additional evaluation of effects and active components in larger samples, at various settings, and with longer follow-up, would be valuable to further improve the intervention. In addition, it would be interesting to evaluate the effect of the intervention as compared to other interventions with confirmed effect for targeting stress in nursing students.

Ethical concerns

This ACT intervention aimed to help students develop an approach to life that is characterized by long-term functionality and to live according to personal values, despite any

obstacles that may arise. Nursing students who would not normally become subjects of such interventions were so through this ACT intervention. However, as longitudinal comparisons between the ACT- and control groups are planned to further investigate the long-term effects of the intervention, the control group cannot be offered to participate in an ACT intervention within this research project.

Significance of the results

A number of Swedish studies have demonstrated beneficial effects of ACT interventions for groups of social workers (Brinkborg et al., 2011), teachers (Altbo & Nordin, 2007) and high school students (Jakobsson & Wellin, 2006; Livheim, 2004). To our knowledge, no previous study has proven ACT to be effective for preventing or reducing stress among nursing students, as shown in this study. Considering the study design, with high ecological validity, there is reason to believe that these results could be generalized to nurses in training nationwide, possibly also in other countries. Likely rather cost effective and feasible to implement, this intervention could thus benefit future nurses on a larger scale, and in turn affect various aspects of care quality. Since analogous problems of stress during education and in the transition to working life have been documented among other human service professionals, e.g. teachers (Cherniss, 1980), it is not unreasonable to believe that the present intervention could benefit these groups as well.

Although this study shows that interventions on the individual level can have positive effects on nurse stress, one must not overlook the pivotal role of the working environment and organizational factors as contributors to this ubiquitous problem (Aiken et al., 2012; Duchscher, 2009; Lashinger et al. 2009; Maslach et al., 2001). We believe that efforts focused on individual factors should be regarded as important complements to organizational measures (e.g. targeting workload, lack of reward, leadership, management and professional conflicts) to reduce stress in nursing, possibly with better short-term effects (McVicar, 2003). As such a complement, the present intervention seems promising.

Conclusion

ACT interventions aimed at reducing experiential avoidance are valuable for dealing with a variety of human life problems because they may serve as vaccines against unnecessary suffering caused by dysfunctional coping with normal life adversities (Biglan et al., 2008). The results of this study show that, if implementing the present 6x2 hours ACT intervention during nursing education, one could expect to see that (1) some individuals will choose to attend; (2) some individuals will choose not to; (3) on a group level, there will be significant improvements in health, and the greatest effect will be seen in those participating in many sessions. Given the consequences of stress-related ill-health throughout the nursing career, if used on a larger scale, this intervention may benefit future nurses and health care.

Founding

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