Hopeful struggling for health - Experiences of participating in computerized cognitive training and aerobic training for persons with stress-related exhaustion disorder

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This is the author manuscript accepted for publication and has undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/sjop.12623

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Article type : Empirical Paper
Section : Cognition and Neurosciences

Number of words excluding abstract: 5728

INTRODUCTION

Stress-related ill-health has increased dramatically in recent years in Sweden, and among these, exhaustion disorder (ED) is a common cause of sick leave (Swedish Social Insurance Agency, 2017). ED (F43.8A, ICD-10-SE) (National Board of Health and Welfare, 2003) is a criteria-based diagnosis and used in Swedish clinical practice as a clinical manifestation of burnout (Grossi, Perski, Osika, & Savic, 2015; Wallensten, Asberg, Wiklander, & Nager, 2019). ED is characterized by psychological and physical exhaustion as a consequence of identified stressors (work- or non-work-related), present for at least six months (National Board of Health and Welfare, 2003). Different symptoms are also included in the diagnostic criteria, and one of the most prominent symptoms is cognitive impairments (Grossi et al., 2015).

Rehabilitation for persons with ED and clinical burnout has usually included cognitive behavioural interventions or multimodal interventions, but with no effect on symptoms or return to work compared with control groups (Grossi et al., 2015; Wallensten et al., 2019). The recovery time may be long with remaining symptoms and reduced work ability (Malmberg Gavelin et al., 2018; Stenlund, Nordin, & Slunga Järvholm, 2012) and symptoms of exhaustion are persistent (Glise, Ahlborg Jr, & Jonsdottir, 2012). Cognitive impairments have also been shown to be long-lasting despite treatment with cognitive behavioural therapy (CBT) (Eskildsen, Andersen, Pedersen, & Andersen, 2016; Jonsdottir et al., 2017) and work related activities (Oosterholt, Maes, Van der Linden, Verbraak, & Kompier, 2016; Österberg, Skogsliden, & Karlsson, 2014). The most common cognitive impairments

are reported in executive functions, attention, episodic and working memory (Grossi et al., 2015; Malmberg Gavelin, Boraxbekk, Stenlund, Slunga Järvholm, & Stigsdotter Neely, 2015). In addition, people with stress-related exhaustion experience that their cognitive abilities in everyday life are impaired for a long period of time (Eskildsen et al., 2016; Oosterholt et al., 2016).

We have recently evaluated two different interventions specifically directed to improving cognitive functioning in addition to a multimodal rehabilitation programme (MMR) for persons with ED. A 12-week intervention with computerized cognitive training improved performance on the executive function updating and episodic memory (Malmberg Gavelin et al., 2015) whereas aerobic training at a moderate-vigorous intensity during 12 weeks improved performance in episodic memory (Eskilsson, Slunga Järvholm, Malmberg Gavelin, Stigsdotter Neely, & Boraxbekk, 2017). The computerized cognitive training also demonstrated cognitive improvements at long-term follow-up (Malmberg Gavelin et al., 2018).

However, in order to implement cognitive and aerobic training in rehabilitation, it is important to understand how people with ED perceive these interventions. Thus, the overall aim of this study was to explore experiences from persons with ED after participating in a 12-week intervention of either computerized cognitive training or aerobic training. . Specific aims were to investigate what was perceived to be advantages/disadvantages of the intervention and if there were any facilitators/barriers to achieve the goal of the training.

METHODS

Participants and study design

The current study is part of the Rehabilitation for Improved Cognition (RECO) - study, which was a randomized controlled trial, conducted at the Stress Rehabilitation Clinic at the University Hospital in Umeå, Sweden. The overall aim of the RECO-study was to investigate whether the addition of a 12-week period of computerized cognitive training or aerobic training could further enhance cognitive function in patients with ED participating in an MMR program. The RECO-study has previously been described in detail (Eskilsson et al., 2017; Malmberg Gavelin et al., 2015). Inclusion criteria in the study were: confirmed ED according to criteria established by the Swedish National Board of Health and Welfare, 18-60 years of

age, currently employed, considered by physician and psychologist as suitable for MMR in group, no need of other treatment or rehabilitation, no known abuse of alcohol or drugs and no participation in other intervention studies. Twenty-three eligible patients with ED that most recently completed the RCT study and the interventions were asked to participate in individual interviews. We used purposive sampling to provide a variation in age, education, occupation, and representing participants from the computerized cognitive training and aerobic training interventions as well as dropouts. Ten persons declined to participate where the most common cause was lack of time due to work rehabilitation. In total 13 remaining persons (11 women and two men) accepted, gave informed consent and were interviewed. The characteristics of the participants were; 30-56 years of age; 11 with university education; 10 married or cohabiting, and 10 worked with people (for example nurse, teacher) and three with data (for example secretary, computer operator) (Kohn & Schooler, 1983). Moreover, five participants were on full-time sick leave, and eight were on part-time sick leave before the intervention. After the intervention four participants were on full-time sick leave including vocational training, five were on part-time sick leave and four participants reported no sick-leave.

The individual interviews were analyzed with Qualitative Content Analysis (QCA) (Graneheim, Lindgren, & Lundman, 2017; Graneheim & Lundman, 2004). QCA is a useful systematic method of analyzing written or verbal communication, often used in analyses of experiences and reflections of people (Downe-Wamboldt, 1992; Hsieh & Shannon, 2005). QCA focuses on differences between and similarities within codes and categories. The method allows both manifest and latent interpretations of the content, but the interpretations vary in depth and level of abstraction (Graneheim et al., 2017; Graneheim & Lundman, 2004).

Context

The participants took part in a 24-week MMR programme, consisting of group-based CBT, individual physical activity on prescription, and vocational measures. Each CBT group consisted of eight participants who met once a week in 22 three-hour sessions. The purpose of the group sessions was to change the participants' behaviour patterns in order to promote better health, function and work capacity.

Therefore, two individual meetings were performed to set individual targets for behavioural change. Each CBT group-session started with relaxation, followed by specific themes: stress and recovery; sleep; and coping with emotions.

Intervention

After 12 weeks of MMR, a randomization by CBT group was conducted to either continue MMR with an addition of computerized cognitive training or continued MMR with an addition of aerobic training. The additional training was performed three times per week for 12 weeks. The computerized cognitive training was performed at home by a web-based program and lasted approximately 15-20 minutes per session. The aerobic training was performed as group indoor cycling ("spinning"), at a training center conveniently located for the participant. Each training session was 40 minutes long, and the participants' exercised at a moderate to vigorous intensity. These additional training programs have previously been described in detail (Eskilsson et al., 2017; Malmberg Gavelin et al., 2015).

Data collection

The interviews were conducted after completion of the MMR programme and the additional training programmes. Interview data were collected from five participants from the computerized cognitive training programme, and five participants from the aerobic training programme. Moreover, three drop outs; one from the cognitive training and two from the aerobic training were interviewed (Figure 1).

[Insert Figure 1 about here]

Written and verbal information about the study were given to all participants, along with a written informed consent. The study was approved by the Regional Ethical Review Board in Umeå, Sweden (Approval No. 2012-357-32, 2010-53-31). All interviews were performed at the Stress Rehabilitation Clinic at the University Hospital in Umeå, Sweden, where the MMR programme was conducted. A physiotherapist (TE) and a social scientist interviewed the participants. The interviewers had never met the participants before the interviews. The interviews were performed with the help of an interview guide with semi-structured questions regarding participating in respective intervention; computerized cognitive training or

aerobic training. Example of questions for this paper was: Please tell me about barriers/facilitators to achieve the goal of the training, What have you done in order to overcome the barriers? Did you experience advantages/disadvantages with the training? If yes, which? What made you succeed/not succeed in your training? Minor adjustments were made to the questions between interviews so that information provided in one interview could be taken into consideration in a subsequent interview. The interviews lasted between 20-60 minutes and were audio-recorded and transcribed verbatim by a professional transcriber.

Data analysis

The interviews were analyzed using QCA according to Graneheim & Lundman (Graneheim et al., 2017; Graneheim & Lundman, 2004). Each transcript was read repeatedly as a whole and in parts during the data analysis. The text was divided into meaning units and sentences, and phrases relevant to the qualitative aim of the study were identified and sorted into condensed meaning units and labelled with codes. To find similarities and differences, the codes were compared and interpreted repeatedly. Codes, sub-categories and categories were analyzed on a manifest level (close to the text), while the overarching theme included interpretations that corresponded to the meaning of the material.

Each interview was read and coded by four researchers in the research group (AFW, EEM, MN, TE). Three were not involved in the RCT study (AFW, EEM, MN) and one was the project coordinator (TE). AFW, EEM and TE are physiotherapists and MN is a behavioural scientist. AFW, MN and TE have experience from research in stress-related health, qualitative studies, occupational health and rehabilitation and teaching in stress-related health.

During all steps of the analysis each of the researchers mentioned above, independently made the coding, followed by a mutual comparison of the result and a final negotiated outcome. The results were also presented and discussed, in a peer debriefing (Lincoln & Guba, 1985), with staff at the Stress Rehabilitation Clinic. The staff recognised the results as consistent with what they perceived that the participants expressed. The results are presented with quotes from the interviews, sub-categories, categories and a theme.

RESULTS

Hopeful struggling for health – the theme

The theme hopeful struggling for health reflects the participants' struggle with changing from who they were to who they wanted to become and as a participant mentioned *"it was an interesting before and after experience".* Despite the struggle, the participants express hope and wishes for a healthy and sound future. Recovery from ED requires hard work, but *"the longer they worked* in the programme the *better they became"*. The theme constitutes three categories, support, motivation and sensations since the participants reported these to be the most important parts for keeping on struggling and for success.

Despite being asked to reflect on participating in computerized cognitive training or aerobic training, the participants' interviews entail to a large extent, experiences from recovering from ED and participating in the MMR programme. However, the results indicate that experiences of participating in computerized cognitive training or aerobic training contributed to a hopeful struggle for health.

[Insert Table 1 about here]

Support

Support served as a basis for the whole recovery process and the category support contained three sub-categories: assistance from others, technological support, and planning and routine.

Assistance from others

To be loved and accepted, despite not functioning as before was essential for the recovery process.

> *"*My sister came with me to the aerobic training, it was good that she could position the saddle and be there as a support when everything was new*"* (Participant 11)

> *"*My family has been very involved in this (process) and they have taken part in my computer *exercises and we have discussed it"* (Participant 5)

Family and close relatives were a concrete support for the participants during the training.The meetings in the MMR programme were highly appreciated. In fact, these meetings were what encouraged the participants the most and gave them hope that their persistence would lead them to recovery one day.

> *"/…/ to meet the group, to meet* peers in the same situation and get tips and *ideas and even support… That's what's made me stronger"* (Participant 5)

The recognition from others with the same diagnosis contributed to larger insights about ED, which was reported as a relief, and the feeling of not being alone was accentuated.

The participants reported that they had wished that the computerized cognitive training and aerobic training had been better adapted to their situation, and for instance being performed together with the MMR group.

> "What if we had gone (aerobic training*) the whole group … and had classes together ….* A *little bit more adapted /…/ a little calmer … a bit lower music … and with the support of the others"* (Participant 11)

> *"*It would have been better if the cognitive training had been part of the MMR group. Since it triggered my performance anxiety and took energy, I would have needed support in this*" (Participant* 6)

In summary, to be able to conduct the exercises included in the computerized cognitive training or aerobic training, support from the family and from others in the same situation was crucial.

Technological support

Technological support was an important factor to manage the exercises. In the aerobic training, some participants had previously over-trained.

> *"The pulse watch was great, then I knew that, aha* – this is enough! And also, it was so much fun! (Participant 11)

The pulse watch was an appreciated tool to keep them from overdoing the exercises and to help them listen and learn bodily signals. The pulse watch was also a support in limiting themselves not being enticed to increase the workout by other stimuli such as music or pepping from the session leader. At the same time, it felt unfamiliar to adapt the training to a lower intensity. Some described that they had continued to use the pulse watch in their training after the intervention had ended.

The technology was essential for the computerized memory training. When it failed, the training could not be completed with frustration as a consequent reaction. In one case, failing of the participant's own Internet connection, was the reason for drop-out.

> *"... also, my Internet connection failed and I was thrown out all the time. /.../ That was an additional stressor and sometimes I had to do the tasks three* times before they got registered. This became very hard and in the end, I *didn't manage. / ... / I fell behind and it became a burden, so I decided to* drop out*"* (Participant 1)

For other participants in the computerized cognitive training, the technology was perceived as smooth and without problem.

Planning and routine

Planning and development of routines in the training were important sources of support. Permission to exercise during working hours, distributing the training over several days, or dividing it into smaller parts, facilitated the computerized cognitive training.

> *"*So I have to divide it (the cognitive training) up in chunks and take micro pauses all the time. Even if I think it feels okey, I have to take these micro pauses as a preventive measure*"* (Participant 5)

Some participants showed awareness of their own needs and stopped the training, even if it felt they could go on, to save energy for the rest of the day or week.

> "It (cognitive training) took a lot of energy from the day, about a fourth of my energy. When I got a routine for the practice, it took much less energy" (Participant 6)

For some participants it was difficult to get started with aerobic training, but when it became mandatory by participating in the project with a clear framework, the participants enjoyed it. However, lack of exercise groups that suited the participant's schedule, or living in areas far from training centres, were obstacles to creating lasting routines of aerobic training.

> "... *and* every other week, when I have had the kids, I thought I can exercise during lunch hour*, but there (at the gym) weren't that many lunch* training sessions *and then it became difficult to make it happen" (Participant* 12)

To conclude, it was important to plan and create routines for the cognitive training so that it did not consume too much of the available energy. Clear routines provided support also for conducting the aerobic training, however, they became more difficult to uphold if the accessibility to training was limited.

Motivation

Motivation was an important part for conducting both the computerized cognitive training and the aerobic training. The category motivation comprised of three sub-categories: balance and timing, feedback and pleasure.

Balance and timing

Balancing and timing of activity, i.e. matching the extra activities to the rehabilitation process and work- and family life, were discussed among all participants. The participants expressed it to be hard to make ends meet combining the MMR programme, the extra exercises that the aerobic and cognitive conditions required, work, family and life itself. Both the computerized cognitive training and

aerobic training were thus put aside to prioritize children, family or work during the intervention.

> *"/.../ twice a week would have been enough for me. /.../ It can feel like a failure when you don't succeed in working out three times a week as* proposed*"* (Participant 10)

> *"...there* must also be time for it (the computer training). You have more working hours and there is no time to sit down and (do the training) no energy ... you consume so much energy at work*" (Participant* 5)

However, it was possible to prioritize both training and the family when work was in balance. The participants also prioritized themselves more after having gone through the MMR programme and the additional interventions.

The motivation was declining when the participants had to struggle with managing their own performance anxiety.

> *"... it was a performance thing ... it was hard to do it (the cognitive training)* because you wanted to perform better than last time and at the same time it was harder since you levelled up*"* (Participant 6)

This was especially true for the computerized cognitive training, where the exercises increased in difficulty when the participants passed a certain level.

Feedback

Objective feedback from heart rate curves in the aerobic training and measures of physical fitness level from professionals was appreciated. This, in combination with getting support from the physiotherapist in customizing the aerobic training provided a sense of security.

> *"... I exercised too much ... so the exercise became less frequent* (when entering the intervention)*, but controlled ... and that was valuable. I needed* someone who steered me in all aspects of reality*"* (Participant 2)

Customized training consisted of both graded activity and learning to set boundaries.

Participants in the computerized cognitive training wished for feedback on measures of cognitive function.

> *"... then when I walked out of there (the cognitive testing) ... I was ...* personally I was really sad */.../ Because it was like a proof that ... how far it* had gone /.../ I mean, how shall I be able to function ...to do a job?*"* (Participant 9)

Not receiving feedback on measures of cognitive function meant that participants were left with concerns about not being restored again. They also wished for feedback on results from the cognitive training.

> *...these computer exercises...well*, ok there is no feed-back from the (computer) programme*" (Participant* 4)

Because the cognitive training was adaptive and always challenging, there was a great need to get feedback on the training results.

Pleasure

Joy was an important factor. The participants reported it to be difficult to get started with the aerobic training, but those who went on perceived the exercise to be enjoyable as confidence increased to cope with it. Training in a group, to music at their own pace worked well.

> *"...* The group leader was positive and the music was pepping. I thought it was great fun /.../ You feel good... you become happier... you become calmer somehow*" (Participant 9)*

However, some participants could feel that the music was too loud and would have preferred to exercise in a calmer environment.

On the contrary, the computerized cognitive training was initially very fun and inspirational but turned out to become more stressful and therefore difficult to prompt at the end of the intervention. In fact, the cognitive training ended up as

being perceived as boring and the participants expressed a wish to renew the training program to make it more fun.

> Honestly, I was bored with the practices at the end. I have tested other types of memory exercises on the Internet and they are much more varied and more fun. Almost like playing a game even though you practice memory. (Participant 4)

Thus, pleasure was an important part of motivating oneself to training, where environment, group leaders and music were some important motivators. Cognitive training could be improved and made more fun with more game-like elements.

Sensations

Participants from both the computerized cognitive training and aerobic training reported various sensations. These were mostly positive, at least in retrospect, and included a sense of improved and sustained memory, clearer head, energy, better self-efficacy, increased self-esteem and better understanding of themselves. These were sub-categorised into memory, strength and faith.

Memory

The participants experienced that their memory gradually improved.

> *"*It (the computer training) gave some effect. I had more acuity, I got better structure at work, I could structure the job a little better… better structure of things,…it did not get messy when I was to perform certain tasks, easier to keep up with and be able to hold discussions in conversation, find words a little better*"* (Participant 4)

The improved memory increased the participants' ability to work and facilitated conversations.

For some it was difficult to single out what had been the most active ingredient in the rehabilitation in improvement of memory.

> *"*If it (cognitive improvement) was due to only memory training or if it was *due to giving it time to heal, I don't know"* (Participant 5)

Time itself could be part of the improvement but also the specific training. It was also clear to some of the participants that the improved memory was noticeable in daily life.

> *"And that's* (the aerobic training) what makes this spring so fantastic. When *I wake up and feel fresh and don't have to go back to sleep and can* remember six nu*mbers in a row!"* (Participant 2)

The memory gradually improved during the rehabilitation, which facilitated work and everyday life. Strength

Participants in the aerobic training expressed that they became stronger mentally and physically which was felt in different situations in everyday life. Aerobic training was exhausting but gave a lot of vigour afterwards.

> *"…*of course I was tired from the exercise, but it was a refreshing tiredness *… that gave en*ergy and power" *(Participant 10*)

The participants expressed that the aerobic training gave them a possibility to relax the thoughts since these stopped for a while. It was described *as "if the oxygen went to the head"* and as "*a pause for the brain and exertion for the body instead".* This in turn contributed to a better ability to concentrate and remember.

Participants who were working, reported that the cognitive training led to fatigue as it consumed all their energy on the training days.

> *"… my brain hurt for a couple of days (after training) …* I was completely *beaten. That's why it was so hard to find that strength … to get the thoughts to land … really tricky" (Participant 2)*

Obviously, the participants in the computerized cognitive training needed to have enough energy to perform the cognitive training. However, they were strengthened when they succeeded in the exercises.

> *"It is mostly my memory I notice…of course your self*-confidence is better when you succeed in certain exercises, you feel strengthened*."* (Participant 5)

In summary, aerobic training provided energy after the training sessions, while cognitive training gave some of the participants a feeling of fatigue. The cognitive training was facilitated if there was a balance between activity and recovery in daily life.

Faith

Faith was strengthened when participants felt they were able to complete the training. In the computer training group participants were hopeful through the computer exercises, despite ups and downs.

> "Of course I think I got help from this (computer training), I do not doubt it for a second. In the beginning, then the curve pointed upwards very quickly. But then ...there was like a deep dip and then after that it became heavier but of course I think I was helped by it" (Participant 4)

One participant in the aerobic training felt that the most valuable part was to complete the intervention, which she had not thought possible.

> *"I didn't think that I would succeed with the training ... and that it would feel* so positive. Now I have discovered that I can do aerobic exercise if I do it the right way*" (Participant 8*)

The belief in being physically active meant that some dared to resume previous activities that they had stopped doing since they became ill in ED.

To sum, faith was strengthened in both groups and gave them hope for a healty future in work and private life.

DISCUSSION

The aim of this study was to explore experiences from persons with ED when participating in a 12-week intervention of either computerized cognitive training or aerobic training that was included in an MMR programme. The main findings

showed that it was hard work recovering from ED and the participants struggled with the exercises from the intervention. However, they gradually experienced that the interventions gave confidence and hope for a healthier future. Support – both emotional and instrumental – was described as an important facilitator of the recovery process, including assistance from others, as well as support from technological aids and through finding an appropriate training routine. Motivation was also expressed as a key factor for conducting the training; specifically, the importance of adequate timing, feedback on training progression and training enjoyment were highlighted by the participants as drivers of training motivation.. In addition, both cognitive and aerobic training were perceived as beneficial for improving memory and feeling stronger mentally and physically, leading to increased self-confidence.

To recover and regain energy, basic needs may have to be replenished. Relatedness, competence, and autonomy are basic psychological needs emphasized in the self-determination theory (SDT) (Ryan & Deci, 2000). SDT speaks about how external and internal motivation impact for instance self-regulation. In the present study, it became evident that the pulse watch served as an external motivator for some individuals to start regulating their behaviours. Further, the pulse watch became a tangible tool to learn how to listen to bodily signals and set boundaries for themselves in order to promote health in the recovery process. Setting boundaries to keep balance is key in maintaining a good health (Beckie, 2012). When learning how different pulse levels, i.e. how different activity levels, were perceived bodily the participants could gear themselves towards a healthier activity level. For some, aerobic training was also an intrinsic motivation with feelings of enjoyment.

In this study, feedback from the pulse watch and from professionals were important for motivation. Professional competence and support to work with goal-setting and action plans are examples of tools used to facilitate behavioural change (Abraham & Michie, 2008) which have also been found to be important for persons with long-lasting pain (Andersen, Kohberg, Herborg, Sogaard, & Roessler, 2014). Additionally, a recent study on home-based cognitive training in long-lasting pain described weekly contact between trial personnel and participants as vital for maintaining training engagement (Baker et al., 2018). In our study, participants in the

computerized cognitive training reported that the training sometimes was boring and that the lack of feedback made the participants' motivation to easily fade. Thus, making training more engaging, e.g., though including game-like elements (Anguera & Gazzaley, 2015), as well as incorporating more clinician contact could be of value for motivation.

According to SDT, fulfilling relatedness, competence and autonomy needs, such external motivation can convert into internal motivation that reflects conducting behaviours due to conviction rather than external pressure. It can be assumed that the need for relatedness can be satisfied by the confirmation of meeting others with the same experiences. In line with this, there was a strong wish from the participants that the computerized cognitive training and aerobic training had been performed together with the MMR group. Research has shown that persons with ED (Eriksson, Karlström, Jonsson, & Tham, 2010; Fjellman-Wiklund, Stenlund, Steinholtz, & Ahlgren, 2010) and sick-listed with long-lasting pain (Andersen et al., 2014) who participate in a group-based rehabilitation programme tell about the importance of good encounters with people who understand what they are going through, of being confirmed and of cohesion in the group. This was confirmed by the participants in the present study, but in referral to the MMR group meetings. Cognitive and aerobic training also increased the participants' experience of competence in coping with their situation. However, in our previous study (Malmberg Gavelin et al., 2018), we observed that participants from aerobic training did not maintain their maximal oxygen uptake at one-year follow-up, which indicate that they may have stopped training, suggesting that the concept of autonomy was not reached. Potentially, there may be a need for enhanced intrinsic motivation practice to achieve autonomy for sustained exercise behaviours over time (Teixeira, Carraça, Markland, Silva, & Ryan, 2012).

Support from different sources played an important role in the recovery process. Family support was a basis for successful participation in the intervention. The family is considered to be a universal buffer against stress (Cutrona & Russel, 1990). It can provide support by emotional and confirmatory support, that can ease stress regardless of stressor (Cutrona & Russel, 1990). Support from the family may thus

be something to reflect carefully on and work with when developing interventions for persons with ED.

After having completed the intervention, the participants perceived that their cognitive functioning had improved which corroborates the results of the cognitive test battery in our previous studies (Eskilsson et al., 2017; Malmberg Gavelin et al., 2015). It was, however, difficult for the participants to specify whether the perceived improvement in memory was due to training or the time for healing. Notably, the participants expressed that the computerized cognitive training and the aerobic training had been beneficial for memory in everyday situations.

The recovery process of cognitive function may further be aggravated by fatigue which is a major symptom in ED. Even if the persons are able to perform complicated tasks, more resources and energy are allocated for the process (Krabbe, Ellbin, Nilsson, Jonsdottir, & Samuelsson, 2017; Malmberg Gavelin et al., 2017; Oosterholt, Maes, Van der Linden, Verbraak, & Kompier, 2014; van Dam, Keijsers, Eling, & Beckers, 2011) than in healthy persons (Krabbe et al., 2017; Oosterholt et al., 2014; van Dam et al., 2011). This excess in energy expenditure may tax on everyday functioning. Participants in the computerized cognitive training described that they needed to have enough energy to perform the cognitive training. Carrying out the aerobic training also took energy, three training sessions per week were difficult to maintain for most of the participants. If interventions such as these are included in treatment, it is important to consider a balance between activity and recovery, and those who are working may require extra attention in balancing the resources and demands. This could be facilitated if planning and clear routines existed for how the training should be organized. The participants also needed appropriate technological support, which for some was a problem during the computerized cognitive training. This is especially important to take into account as persons with ED have impaired cognitive functioning , specifically in domains of relevance for efficient planning and problem solving (Ellbin, Engen, Jonsdottir, & Nordlund, 2017; Eskildsen, Andersen, Pedersen, Vandborg, & Andersen, 2015; Jonsdottir et al., 2013; Öhman, Nordin, Bergdahl, Slunga Birgander, & Stigsdotter Neely, 2007).

Contrary to the computerized cognitive training, participants from the aerobic training perceived that they gained energy following the physical activity training sessions. They experienced, that the brain and the mind rested and that the body worked instead. This is in line with our earlier results (Eskilsson et al., 2017) where there was a tendency for a larger improvement in heart rate recovery for participants who improved most in episodic memory. This indicates that aerobic exercise is related to regulation of the autonomic nervous system and an increased parasympathetic reactivation after exercise.

Methodological considerations

In order to increase trustworthiness triangulation between researchers (Lincoln & Guba, 1985) was used. Different research fields such as physiotherapy, cognitive-, social- and health psychology as well as stress rehabilitation were represented when conducting the study.

For the interviews, we aimed for a variety of participants from both intervention groups (computerized cognitive training and aerobic training) along with dropouts from both groups. The perceptions from the dropouts were regarded as important information to understand how future interventions should be developed. This study was part of a randomized controlled study evaluating both cognitive training and aerobic training which may have made the analyses more demanding. However, the strength of this design is that our results may be applicable in a clinical setting in treatment of ED. More women participated in both this qualitative study as well as in the MMR-programme. For future qualitative studies, more men need to be included as informants to explore if men and women benefit from the same type of treatment of ED.

The participants in this study represent the group of persons diagnosed with ED well since they were middle-aged, well-educated, have families, work with people and most of them are women. Thus, the transferability of our results may be made to similar settings.

The strengths of our study are the rich and varied interviews and that researchers from different research fields participated in the analyses and interpretations. This

ensured that several interpretations were discussed and negotiated before reaching a final result which helps guarding against over-interpretation of the results and improving trustworthiness. Thus, trustworthiness was ensured through accuracy in the research design, data collection and analysis. The researchers responsible for the intervention study did not participate in the analysis and interpretation of the interviews. However, they were included in discussions of the results and the model, and a negotiated outcome in the research group was reached after minor adjustments.

CONCLUSIONS

It seems to be advantageous in rehabilitation and recovery from ED to include support from various sources such as group support from others who are in the same situation and from family members. Both aerobic and cognitive training were perceived as beneficial for improving memory and feeling stronger both mentally and physically. However, it is important to adjust the aerobic training to fit the patient group by adjusting frequency and, in cases of patients who over-train, to modify intensity. Moreover, the use of a pulse watch may strengthen the practice of setting boundaries. The computerized cognitive training may be ameliorated by including regular feedback and making the exercises more motivating. In addition, the timing and amount of activities in the rehabilitation for persons with ED should be considered.

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687 # FIGURE LEGENDS

688 **Figure 1.** Study design and description of the 12-week intervention of computerized
689 cognitive training and aerobic training.

Theme	Hopeful struggling for health		
Categories	Support	Motivation	Sensations
Sub-categories	Assistance from others Technological support Planning and routine	Balance and timing Feedback Pleasure	Memory Strength Faith

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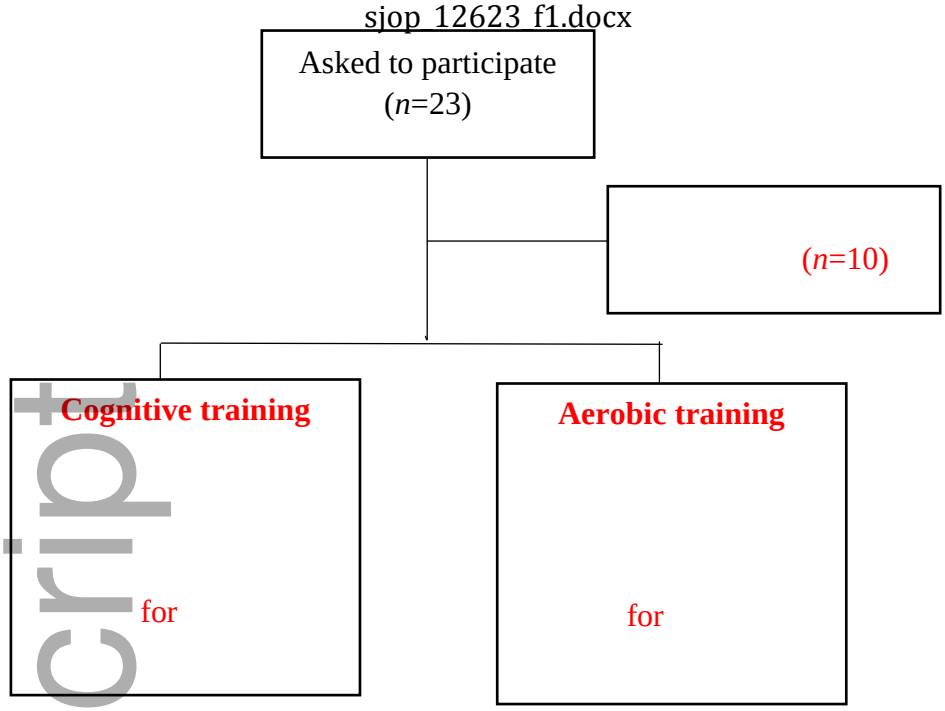

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Title:
Hopeful struggling for health: Experiences of participating in computerized cognitive training and aerobic training for persons with stress-related exhaustion disorder

Date:
2020-06

Citation:
Eskilsson, T., Fjellman-Wiklund, A., Ek Malmer, E., Stigsdotter Neely, A., Malmberg Gavelin, H., Slunga Jarvholm, L., Boraxbekk, C. -J. & Nordin, M. (2020). Hopeful struggling for health: Experiences of participating in computerized cognitive training and aerobic training for persons with stress-related exhaustion disorder. SCANDINAVIAN JOURNAL OF PSYCHOLOGY, 61 (3), pp.361-368. https://doi.org/10.1111/sjop.12623.