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The use of physical activity, sport and outdoor life as tools of psychosocial intervention: the Nordic perspective

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ABSTRACT
The core values in the Nordic welfare model are health equality and social inclusion. Individuals with mental disorders and/or a history of substance use disorder are often excluded from the core value of equality. Psychosocial interventions such as physical activity and outdoor life can have several benefits for those suffering from mental disorders. Firstly, such interventions can have therapeutic effects. Secondly, they show benefits for somatic health and the risk of lifestyle-related diseases. Finally, they can provide an environment for experiencing self-efficacy, lead to improved quality of life, and promote the development and building of social relationships. This paper provides a critical review of current evidence for physical activity and outdoor life as psychosocial interventions in psychiatric and substance misuse treatment, with specific examples from Norway, Sweden and Denmark.

Introduction
Mental disorders, such as depression, are the leading causes of reduced lifetime expectancy based on disability (Ferrari et al. 2013). The use of antidepressant medications among adolescents in the Nordic countries is increasing, despite there being no evidence for the effectiveness of such treatments in this age group (Hartz et al. 2016; Steinhausen and Bisgaard 2014). The side effects of such medications are also under-evaluated (Mihanovic et al. 2010). One can therefore argue that treatments that centre on medication may serve as a ‘quick fix’, but are not sustainable solutions. In the Nordic welfare model, social inclusion is a core value (Wahlbeck et al. 2011). Individuals with mental and/or substance use disorder are often excluded from the mainstream society (Wahlbeck et al. 2011). It is therefore important to offer these individuals other interventions in addition to medication. Psychosocial interventions are therefore viewed as important in dealing with such issues. Physical activity, exercise, sport and outdoor life are examples of such intervention approaches.
Psychosocial interventions with physical activity, exercise, sport and outdoor life have additional potential benefits when compared or added to pharmacological interventions. In this paper, we will use the term ‘physical activity’ to cover all aspects of physical activity including structured exercise and sport participation. The meeting between nature and psychology expresses the relationship between humans and their surroundings, especially regarding perceptions, emotions and behaviour (Kaplan and Kaplan 1989; Roessler 2012). In addition, many psychological processes are dependent on an impression of the environment. It is therefore important to explore such processes in physical activity and outdoor interventions with children, adolescents and adults with mental disorders.

Individuals with mental disorders can experience reductions in lifetime expectancy of up to 30 years compared to the wider population (Cunningham, Peters, and Mannix 2013). This reduction can be attributed, amongst other things, to the metabolic side effects of medication, physical inactivity, unhealthy nutrition and smoking (Cunningham, Peters, and Mannix 2013). Physical activity has, however, been shown to be effective in the treatment of various non-communicable diseases and mental disorders (Rosenbaum et al. 2014).

In this paper, we will present the acute biochemical and psychological responses to physical activity and discuss the importance of these responses for the treatment of mental disorders. We will also provide an overview of the potential for using physical activity and outdoor life in the treatment of depression, anxiety, eating disorders, schizophrenia, post-traumatic stress disorder (PTSD) and substance use disorder. Lastly, we will present examples of how physical activity and/or outdoor life have been integrated as psychosocial interventions in Norway, Sweden and Denmark.

Biochemical and psychological responses to physical activity

The onset of physical activity initiates several acute biochemical and physiological responses such as increased ventilation rate, increased heart rate, increased systolic blood pressure, altered insulin secretion, altered pattern of blood distribution and changes in hormone secretion and neurotransmitter release (Bouchard, Blair, and Haskell 2007). Some of these responses can be confused with the symptoms of anxiety, and experienced as scary for individuals with anxiety disorder, despite being normal bodily reactions to increased muscular work.

Several of the responses to physical activity have been reported as having potential benefits to mental health and will be presented here. It is important to acknowledge that, for the moment, we do not fully understand the mechanisms behind how mental health can benefit from physical activity (Schiller 2016). Therefore, the responses presented should be seen as hypotheses rather than evidence.

Biochemical responses

The biochemical responses include increased substrate availability in the brain (Deslandes et al. 2009; Dienel 2012), and secretion and uptake of neurotransmitters, hormones and proteins such as endorphins, dopamine, serotonin, epinephrine, norepinephrine, glutamate, gamma-aminobutyric acid and brain-derived neurotrophic factor (Boecker et al. 2008; Deslandes et al. 2009; Knaepen et al. 2010; Schiller 2016). These responses are comprehensively described elsewhere in the literature (e.g. Deslandes et al. 2009).
The inflammation hypothesis states that depression and anxiety are associated with low-grade inflammation, and that physical activity can counteract these neuro-immunological consequences by reducing the inflammation (Eyre and Baune 2012). Gut microbiota can physically induce depression-like behaviour in mice (Zheng et al. 2016), and it is possible that physical activity can benefit the gut microbiota status (Monda et al. 2017).

**Affective responses**

Affects can be defined as acute reactions to life events that motivate and guide behaviour (Tomkins 1995). Several studies have found acute responses to physical activity for both positive and negative affects (Bodin and Martinsen 2004; Reed et al. 1998). Affective responses to physical activity are stronger than affective responses to e.g. reading books (Reed et al. 1998). Several factors have been suggested to influence these responses to physical activity, such as pre-activity affective state, physical fitness, attitudes towards and experiences with physical activity, and personality (Ekkekakis and Petruzzello 1999; Reed et al. 1998). The insula, a cerebral cortex structure, is both the communication centre for emotions and bodily experiences, and plays an important role in the regulation of cardiovascular responses to physical activity (Williamson et al. 1999). Activation of the insula and brain blood flow was shown to increase with low-to-moderate intensity, but then to decrease with very vigorous and exhausting intensity levels (Rooks et al. 2010). The dual-mode theory states that moderate intensity physical activity will amplify positive affects, whereas vigorous intensity increases negative affects (Ekkekakis and Petruzzello 1999), and the increased insula activity during physical activity may contribute to the affective responses to physical activity at different intensities (Lind, Ekkekakis, and Vazou 2008). This theory has been criticized for not taking into account whether the intensity is self-selected or imposed (Lind, Ekkekakis, and Vazou 2008). In addition, there might be an adaptation of the affective responses after several high-intensity sessions (Szabo 2013). Among individuals with eating disorders, excessive and compulsive exercise is often used to reduce negative affects (Bratland-Sanda et al. 2010). However, it is not known whether this is the case among individuals with other types of mental disorder.

**Theories of psychological response to physical activity**

There are four theories that may explain the positive psychological response to physical activity: response style theory, flow theory, self-efficacy theory and cognitive restructuring.

Response style theory (Nolen-Hoeksema, Wisco, and Lyubomirsky 2008) suggests that physical activity functions as a distraction device from negative thoughts, in contrast to rumination which is a passive and repeated focus on negative thoughts. The response style to negative thoughts can be crucial for the development, duration and severity of depression, with physical activity possibly having a protective function.

According to flow theory (Csikszentmihalyi 1990), flow is defined as a state where one gets so involved in a task or an activity that difficult thoughts and feelings are forgotten. Flow is experienced in situations where there is a proper balance between the challenges of the task and the skills of the person performing the task (Csikszentmihalyi 1990). Physical activity at the correct skill level and intensity provides opportunities for experiences of flow.
Self-efficacy theory is the third theoretical approach on psychological responses to physical activity. Self-efficacy refers to the belief that one has the skills necessary for completion of a task or a behaviour (Bandura 1977). It is suggested that physical activity can be used as a strategy to enhance self-efficacy. Low self-efficacy is associated with mental illness (Andersson et al. 2014), and the experienced empowerment in physical activity can therefore be valuable in the recovery of such illnesses.

A final possible mechanism is cognitive restructuring. As discussed earlier, physical activity produces some of the same bodily reactions as those experienced with anxiety. Cognitive restructuring enables individuals to interpret these bodily symptoms in a less catastrophic manner, and as a result, the fear of these bodily reactions is reduced (Clark 2013).

**Physical activity and outdoor life in psychiatric and substance use disorder treatment**

A significant number of papers have examined the use of physical activity and structured exercise in treatment of various psychiatric diagnoses, although there are large variations between these interventions in the designs used and the results obtained. Several of the studies have used physical activity in an outdoor environment, but nature has often only been used as an arena for physical activity with experience of the natural environment and outdoor life not being integrated in the physical activity programme.

Outdoor life as a treatment strategy is less studied, and is most typically used therapeutically for adolescents (Russell 2006). Such programmes seek to incorporate psychotherapeutic approaches within nature and wilderness contexts. Little is reported regarding the effects of these programmes on somatic health, lifestyle-related diseases and psychopathology (Russell 2006). A few studies have reported potential positive effects on schizophrenia psychopathology and substance use disorder (Annerstedt and Währborg 2011), but the large variation in the quality of the study design makes it difficult to reach a consensus at this point.

Existing knowledge about the effects of various physical activity programmes in the treatment of depression, anxiety, PTSD, eating disorders, schizophrenia and substance use disorder are presented in Table 1. In the following paragraphs, a summary of the findings of these studies will be given:

**Depression**

Of the mental disorders presented in this summary, depression has been the most extensively researched. Several systematic reviews and meta-analyses have examined the evidence for the effect of exercise on depression across a range of age levels. The results of these analyses show a moderate effect of physical activity on the reduction of depressive symptoms among adolescents (Carter et al. 2016), adults (Kvam et al. 2016; Schuch et al. 2016) and the elderly (Catalan-Matamoros et al. 2016). The best effect is found when exercise is compared to control conditions and no interventions (Kvam et al. 2016). Exercise has similar effects to antidepressants and cognitive behaviour therapy (CBT) (Kvam et al. 2016), whereas there is a moderate but non-significant effect of exercise in combination with antidepressants compared to medication only (Kvam et al. 2016). Previous studies have also studied the effect of publication-biased research involving physical activity and mental health. Schuch
Table 1. Evidence for effects of physical activity and/or outdoor life in treatment of various mental disorders.

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Symptoms</th>
<th>Recommended treatment/ gold standard treatment</th>
<th>Effects on psychopathology</th>
<th>Effects on quality of life</th>
<th>Effects on somatic health</th>
<th>Comparison to other therapeutic interventions</th>
<th>Adverse events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>Persistent feelings of sadness, worthlessness and lack of desire to engage in activities one used to enjoy</td>
<td>Antidepressants, CBT and exercise</td>
<td>Improves mild to moderate depressive symptoms</td>
<td>Improves quality of life</td>
<td>Improves CRF</td>
<td>Better than controls</td>
<td>None reported</td>
</tr>
<tr>
<td>Anxiety</td>
<td>Apprehensive expectation or fear</td>
<td>Medication, psychotherapy, behaviour therapy such as exposure therapy and exercise</td>
<td>Reduce anxiety symptoms</td>
<td>Improves quality of life</td>
<td>Improves CRF</td>
<td>Similar or less effect compared to CBT or medication</td>
<td>Temporary increase in level of anxiety at start of exercise intervention</td>
</tr>
<tr>
<td>PTSD</td>
<td>Stress symptoms after exposure to events such as war, torture, assault, or natural disasters</td>
<td>Specialized CBT and medication</td>
<td>Small reduction in PTSD symptoms</td>
<td>Improves quality of life</td>
<td>Improves CRF</td>
<td>Better than control</td>
<td>None reported</td>
</tr>
<tr>
<td>Eating disorders</td>
<td>Preoccupation with food, body weight and shape</td>
<td>CBT, family therapy</td>
<td>Reduce body dissatisfaction</td>
<td>Improves quality of life</td>
<td>Improves CRF and muscle strength</td>
<td>Better than control</td>
<td>None reported</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>Psychosis manifested as e.g. hallucinations, delusions, and confused thinking.</td>
<td>Medication, sometimes in combination with psychotherapy</td>
<td>Small reduction in schizophrenia symptoms</td>
<td>Improves quality of life</td>
<td>Improve CRF Reduce blood cholesterol Reduce blood pressure</td>
<td>None reported</td>
<td>None reported</td>
</tr>
<tr>
<td>Substance use disorder</td>
<td>Use of psychoactive substances in amounts or ways that are harmful to oneself or others</td>
<td>CBT, family therapy, motivational interview, medication</td>
<td>Acute effects on cravings Reduce nicotine dependence Possible effect on alcohol drinking Possible effects on withdrawal symptoms</td>
<td>Improves quality of life</td>
<td>Improve CRF and muscle strength Reduce risk of NCS</td>
<td>None reported</td>
<td>None reported</td>
</tr>
</tbody>
</table>

Notes: PTSD: post-traumatic stress syndrome. CBT: cognitive behavioural therapy. CRF: cardio-respiratory fitness. NCS: non-communicable diseases (e.g. type 2 diabetes, cancer, cardiovascular disease, morbid obesity).
References: 1Carter et al. (2016), Kvaam et al. (2016), Schuch et al. (2016) and Catalan-Matamoros et al. (2016); 2Muotri, Nunes, and Bernik (2007) and Stonerock et al. (2015); 3Rosenbaum et al. (2015); 4Cook et al. (2016); 5Stanton and Happell (2014), Firth et al. (2015) and Soundy et al. (2015); 6Zschucke, Heinz, and Strohle (2012), Lynch et al. (2013) and Giesen, Deimel, and Bloch (2015).
et al. (2016) reported that previous studies most likely underestimated the effects of exercise due to such publication bias, and suggested that moderate to vigorous aerobic exercise should be recommended especially in treatment of mild to moderate depression. Exercise is included in the treatment recommendations for mild to moderate depression in Norway, Denmark and Sweden (Bahr 2009; Klarlund Pedersen, Andersen, and Sundhedsstyrelsen 2011; Martinsen et al. 2015), although the guidelines have been criticized for late implementation (Hallgren, Stubbs, et al. 2017).

**Anxiety**

Exercise is suggested as a therapeutic strategy for anxiety according to the handbooks of physical activity provided for health care professionals in Norway, Sweden and Denmark (Bahr 2009; Hovland et al. 2015; Klarlund Pedersen, Andersen, and Sundhedsstyrelsen 2011). This inclusion is, at least in part, based on research showing that exercise can reduce the symptom of anxiety when compared to placebo or control conditions (Herring, O’Connor, and Dishman 2010), and can be equally effective as more established treatments (Stonerock et al. 2015). Exercise can be integrated into exposure therapy, for example for panic disorders (Muotri, Nunes, and Bernik 2007), although the evidence for its effectiveness remains inadequate. Current guidelines suggest the evidence for physical activity as the only treatment strategy for anxiety is inadequate (Hovland et al. 2015). These guidelines therefore suggest that physical activity in the treatment of anxiety should be only used in conjunction with other established treatments (Hovland et al. 2015).

**Post-traumatic stress disorder**

Very few studies exist on the effects of exercise in the treatment of PTSD, and hence there are currently no government recommendations for such treatment approach. Rosenbaum et al. (2015) conducted a meta-analysis that found a small to moderate effect of exercise on the reduction of PTSD symptoms, compared to waiting-list control conditions. To our knowledge, no studies have examined the effects of exercise compared to, or in combination with, other therapeutic strategies for PTSD.

**Eating disorders**

Excessive and compulsive exercise are commonly observed among individuals with various eating disorders, therefore these are the only mental disorders where exercise previously has been restricted (Michielli, Dunbar, and Kalinski 1994). Nevertheless, adapted and supervised exercise has also been found beneficial in treatment of anorexia, bulimia and binge eating disorders (Cook et al. 2016). Sundgot-Borgen et al. (2002) found physical activity to be more effective than CBT and nutrition counselling in reducing symptoms of bulimia. To our knowledge, the effects of physical activity have not been compared to other treatment interventions with eating disorders. No consensus or guidelines exist for use of exercise in the treatment of eating disorders, although suggested guidelines have been provided (Cook et al. 2016). These suggested guidelines have several recommendations for the use of exercise in eating disorders treatment:
• Need for a team approach including qualified personnel with competence in exercise physiology, exercise prescription, nutrition and eating disorders psychopathology
• Appropriate screening for medical contraindications and exercise-related psychopathology
• Inclusion of a psycho-educational component
• Proper nutrition
• Debriefing during and after each exercise session

Schizophrenia

Individuals with schizophrenia have a life expectancy of approximately 15–20 years less than the general population, mainly due to medication side effects and high prevalence of non-communicable diseases (Ringen et al. 2014). There are some studies addressing the therapeutic potentials of exercise intervention for individuals with schizophrenia, but the studies, in general, have methodological limitations and small sample sizes (Firth et al. 2015). The general findings are that exercise may be useful in reducing general psychiatric symptoms, and provide physiological benefits of improved physical fitness (Firth et al. 2015; Soundy et al. 2015; Stanton and Happell 2014).

Substance use disorder

Use of physical activity is believed to be useful in the treatment of substance use disorder because the biochemical and psychological responses of physical activity are similar to the responses seen with use of substances (Lynch et al. 2013). Unfortunately, the studies that have examined the effects of physical activity in substance use disorder are affected by poor study design (Giesen, Deimel, and Bloch 2015; Zschucke, Heinz, and Strohle 2012).

In the treatment of nicotine dependence, physical activity has been shown to be effective when combined with CBT and/or nicotine replacement therapy (Zschucke, Heinz, and Strohle 2012). Roberts et al. (2012) concluded that the acute responses of physical activity on cigarette cravings and withdrawal symptoms lasted up to 30 min post-exercise. Hallgren, Vancampfort, et al. (2017) found no effects of exercise on alcohol consumption; however, they did note improvements on other health outcomes. As previously mentioned, the positive effects of physical activity on non-communicable diseases are in itself a justification for recommending exercise in treatment of mental and substance use disorder (Hallgren, Vancampfort, et al. 2017).

Methodological issues

As mentioned earlier, several of the studies examining the evidence for the use of physical activity and outdoor life in psychiatric and substance misuse treatment, are affected by poor study design. Randomized controlled trials are viewed as the gold standard for research on the effect of physical activity on various outcome variables (Brighton et al. 2003). However, such strict research conditions have been criticized for selection bias, which reduces external validity and creates distance and irrelevance to the everyday clinical setting (Leichsenring 2004). The majority of the studies recruit participants through advertisement, and it is
likely that those who volunteer for such studies are positive about physical activity prior to participation. Such preferences may differ from the preferences seen in any given patient population, and would limit the external validity of the study. Another challenge with conducting randomized controlled trials is the possibility of a control group response being affected by the type of treatment imposed on treatment group. In treatment studies of adults with depression, the control group response in exercise trials was found to be double that achieved in the antidepressant trials (Stubbs et al. 2016). It is possible that the Avis effect (i.e. participants in the control group try harder just because they are in the control group) is greater in exercise trials compared to medication trials. Other possible explanations are: (a) contact between participants in the physical activity intervention and control groups influence the behaviour of the control group; and (b) attention, empathy and therapeutic alliance regardless of exercise (Stubbs et al. 2016). It is unknown whether such control group responses might be present in physical activity intervention studies among other psychiatric populations as well.

As with other therapeutic interventions, there are issues with the motivation and dropout rate of individuals in the studies. Many patients undergoing psychiatric and substance misuse treatment exercise actively, but struggle to continue the activities when back at home (Martinsen, Hoffart, and Solberg 1989). These individuals tend to be withdrawn, have a poorly developed social network and exhibit a lack of initiative, which contribute to them being passive, isolated and finding it hard to motivate themselves to exercise on their own (Cunningham, Peters, and Mannix 2013). To counteract high dropout rates, physical activity interventions studies should include aspects of motivational work to the participants. Studies should also examine strategies for how physical activity behaviour can be sustained among the participants, and carry out follow-up studies with such aims.

Linke and Ussher (2015) have presented important research themes for future studies on the effects of physical activity in treatment of substance misuse and mental disorders:

- Importance of intensities, modalities and frequencies of physical activity in treatment
- Supervised vs. self-guided physical activity
- Effects of tailoring physical activity to different treatment stages and sub-groups in the patient population
- Ensuring adherence to the physical activity intervention

**Examples of physical activity and outdoor life as psychosocial interventions**

From Norway, we will present two examples of psychosocial interventions involving physical activity and outdoor life. The first involves local exercise contacts, which is an intervention based on a social support contact model. The second is called ‘Active Daytime’, and is a collaboration between the health care services, municipalities and local communities, Norwegian Sports Federation, and the Norwegian Labour and Welfare Administration.

Examples from Sweden of using outdoor life and physical activity for different mental disorders will also be presented, followed by a Danish project using nature and environmental psychology as an intervention among distressed men suffering from burnout.
Local exercise contacts

In Sogn og Fjordane county, Norway, the problem with lack of motivation and high dropout rates from physical activity has been addressed by creating an education programme for exercise contacts (Skrede et al. 2006). These are people who in addition to having a socially supportive role also have a role in encouraging the service users to become more physically active. The exercise contact therefore functions as a motivator, planner and active participant. The exercise contacts receive a nominal salary, and must complete a 40-h course prior to beginning work. Through the course, the exercise contacts learn how they can perform their role as motivator and planner for people with mental illness and/or substance use disorder who want to be physically active. Through this arrangement, the people seeking help meet motivated individuals with whom they can exercise, and develop their social network, whilst establishing good habits for leading a physically active lifestyle, based on their own wishes and needs.

The exercise contact model has not been scientifically evaluated as of yet, however reported personal experiences among users and exercise contacts have been positive (Skrede et al. 2006). The pairing of individuals with exercise contacts aims to allow users to gradually take responsibility for their physical activity with the initial help given by exercise contacts being important for establishing sustainable physical activity behaviours.

Active daytime

‘Active daytime’ (in Norwegian: ‘Aktiv på Dagtid Jæren’) is a concept that has been established in several parts of Norway. Active daytime is a physical activity programme for the unemployed, offering regular training sessions for individuals with little or no previous experience of training at very low cost. The programme was created in an attempt to counteract the negative effect on mental health of extended periods of unemployment, as well being an aid to recovery for individuals with mental disorders. The programme was started in 2008 by Jæren Psychiatric Centre in south-west Norway at the behest of the regional authority, and was open to any individual receiving benefits from the four local authorities (Time, Klepp, Gjesdal and Hå municipalities) served by the Psychiatric Centre. By stressing benefit status as criteria for inclusion, it was hoped to avoid labelling the programme as only being suitable for those with mental illness. In this way, it would also be possible to recruit individuals who are not full-time workers for reasons other than issues with their mental health (e.g. those who had been made redundant or were recovering from a physical injury).

The programme aims to increase physical fitness, improve body composition, reduce stress, increase body awareness, and increase feelings of self-efficacy and mastery, whilst expanding the social network of participants. Focus on the social aspect of the programme is weighted equally with the other goals, as it was noted that many of the individuals in the desired population are, or become, isolated because of being out of work. In addition, by having a focus on the social aspect of the programme, members eligible for inclusion are less likely to dropout.

In 2013, exercise referral centres were established in the four local authorities in the Jæren area, as a result of a government initiative to promote a healthy lifestyle for the Norwegian population via increased physical activity, better nutrition and reduction in smoking (Helsedirektoratet 2011). In 2016, Active Daytime Jæren was fully integrated into
Outdoor life and nature as tools for increased health – Swedish experiences

Nature-assisted rehabilitation has been shown to reduce health care needs among 118 patients on sick leave with severe stress and/or depression (Wahrborg, Petersson, and Grahn 2014). However, the number of people on sick leave was not affected. Other research utilizing a combination of horticultural activities and regular rehabilitation also appeared effective in the treatment of individuals suffering from schizophrenia and substance use disorder (Annerstedt and Wahrborg 2011). This result led the authors to highlight the importance of considering nature as a significant resource in mental health care services and public health care.

Two prospective studies without control groups have been conducted on the benefits of nature-based treatments in individuals with mental disorders. Individuals with stress-related mental disorders (fatigue, depression, anxiety) and a sick leave lasting for more than three months, received nature-based rehabilitation for several months (Sahlin et al. 2015). Comparison of the scores before and after the treatment period showed reductions in burnout, depression and anxiety, as well as increases in well-being scores. Furthermore, the level of health care utilization decreased after the intervention. A second study also demonstrated decreased burn-out scores and frequency of long-term sick leave, and increased work ability after a nature-based stress management course of two sessions per week lasting a period of 3 months (Sahlin et al. 2014). Among the various rehabilitation strategies implemented in the course, the garden and nature content played an integral role in stress relief. We must however be cautious with interpretations of these results because time and the natural course of the disorder are possible confounding factors. Studies with control groups are therefore needed to counteract this bias.

Among patients with exhaustion disorder, the exposure to forest environments (twice a week for 12 weeks) was associated with more favourable mental states and physiological responses, as well as an increased attention capacity when compared to individuals exposed to an urban environment (Sonntag-Öström 2014; Sonntag-Öström et al. 2015). However, exposure to forest environments as the only treatment option is not sufficient for rehabilitation in severe and long-term cases of exhaustion disorder. The authors suggested that exposure to forest environments should be combined with CBT to further improve recovery for these types of patients.

When considering physical activity for mental health, active commuting is one strategy to increase physical activity levels in the general population. Pleasant environments may
affect people’s active commuting positively and thus contribute to increased health. In a study by Wahlgren and Schantz (2012), metropolitan bicycle commuters \( n = 827 \) reported that green, beautiful and safe environments are stimulating factors in deciding to commute actively. In contrast, traffic congestion, exhaust fumes and the low ‘directness’ of the route were considered as hindering factors (Wahlgren and Schantz 2012). In addition to greenery settings and safety, other important aspects for active transports are destination distance and available of suitable infrastructure (sidewalks, bicycle paths) (Hartig et al. 2014). These results may be considered by urban planners as important public health aspects to promote active commuting.

**Nature as therapeutic space – a Danish input**

Project ‘Wildman’ is a programme that uses nature as a therapeutic environment for individuals who do not appear to benefit from other treatment programmes. The programme targeted men in crisis suffering from various non-communicable diseases and mental disorders, and built on previous research using therapy gardens (Grahn and Stigsdotter 2010). Started 2015, the research project was a collaboration between the municipality of Svendborg and the Naturama Museum. It consisted of three courses involving four hours of therapy per week, lasting for a period of eight weeks each. In total 33 men participated in the courses, and on completion the participants were invited to join the Wildman association, consisting of former course participants.

The project was based on two significant theories: Aesthetic Affective Theory (Ulrich 1983) and Attentive Restoration Theory (Kaplan and Kaplan 1989). This research explains how the healing and restorative effects of nature are connected to the ways in which human beings mainly have two different kinds of attention: focused and spontaneous. The research postulates that it is spontaneous attention that gives the human body the opportunity to recover and can be developed by utilizing natural surroundings.

With these theories in mind, the project’s main focus was on movement in nature and nature guidance, which were combined with meditation and attention training (Kabat-Zinn 2003), body sensation and balance (Büssing et al. 2012), and community spirit and story-telling (Bruner and Kalmar 1998). On the last day of the course, the participants met representatives from the Wildman Association.

An evaluation of the project concluded that the participants experienced an improvement in the quality of their everyday lives. The participants also displayed an increase in the level of self-care, and they reported experiencing a higher level of meaning in their daily lives. Finally, the participants became more energetic and were able to establish positive social relations. In 2016, the project was integrated into the local rehabilitation programmes offered by the municipality.

There are several possible mechanisms for the reported changes. The diversity of landscapes and the seasonal variations in nature seem to have different impacts on people (Bischoff 2012), and this was taken into consideration during the course of the programme. In the interviews, participants often characterized the seasonal changes as peace giving. When standing by the waterside, time would stop, as if one travelled back in time. Meditation and attention training supported this sense of peacefulness. The experience of peace is not just objective, a product of looking at the landscape, but it has a psychological and cultural dimension, being related to stress in the daily life of the participants (Kaplan and Kaplan 1989).
In addition, the participants described their relationship to the group and to their course leader as important.

The experienced benefits described by the individuals participating in this project suggest a need for research in the field of health and environmental psychology. Such research should aim to establish how nature could contribute to improving health in individuals suffering from mental illness and lifestyle-related disease.

**Concluding remarks**

Physical activity and outdoor life are promising interventions for use in the treatment of mental disorders. Such psychosocial interventions can have effects on psychopathology, somatic health and quality of life. Also, they provide an environment for experiencing self-efficacy, and promote the development and building of social relationships. Structured physical exercise programmes have received the most attention with more than 40 years of research focusing on this area. Various forms of physical activity have been studied, and there does not seem to be any specific modality or intensity that is superior to the others. The use of nature has been less focused in scientific studies, although increasing evidence points to the beneficial potentials of nature experiences for mental well-being. Future studies should therefore investigate whether there are safety and/or feasibility issues with such outdoor life programmes. It is also important to examine the role of the physical activity component in such programmes, and the extent to which the effects can be attributed to the physical activity component rather than the nature aspect. Furthermore, investigation of how structured physical activity programmes can integrate with outdoor life, as opposed to just using the nature as a stage for the physical activity, is also warranted. Finally, future studies using outdoor life should examine to what extent such interventions influence the somatic and physical health of individuals with mental disorders.

In this paper, we both presented the current state of knowledge in this field, and gave practical examples of interventions and programmes from the Scandinavian countries. Our hope is that this article will stimulate both research in this field, and the use of physical activity and outdoor life as psychosocial interventions, thus providing the means for individuals to be more effective in coping with mental illness.

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