

## Forord

Interessen for trening og funksjon hos mennesker med schizofreni har vært stor siden jeg startet som fysioterapeut ved Østmarka, St. Olavs Hospital. Jeg har vært så heldig å få tilgang til datamaterialet fra et treningsprosjekt som ble påbegynt i 2016 ved Treningsklinikken på Østmarka, LEXUS-prosjektet. Jeg har med denne studien fått et innblikk i fysisk og funksjonell kapasitet, og hva dette har å si for mennesker med schizofreni og deres hverdag.

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Innholdet i denne oppgaven står for forfatterens regning.

## Sammendrag

**Bakgrunn:** Pasienter med schizofreni har redusert fysisk arbeidskapasitet og svekket funksjon, men hvordan fysisk kapasitet og funksjon korrelerer er ukjent. Hensikten med denne studien var å beskrive og kartlegge fysisk arbeidskapasitet og funksjonell kapasitet, og undersøke sammenhenger mellom fysisk arbeidskapasitet og funksjonell kapasitet og hverdagsfunksjon hos mennesker med schizofreni, både i hele utvalget og ved kjønn.

**Metode:** 25 deltakere, 16 menn og 9 kvinner,  $35,5 \pm 9,4$  år deltok i studien. Fysisk arbeidskapasitet ble definert som peak oksygen opptak ( $VO_{2peak}$ ) og 1 repetisjon maksimum relativ til kroppsmasse (1RM/KM). Funksjonsutfallene var 6-minutt gangtest (6MGT), trappetest, sette og reise seg (30sSTS), University of California San Diego Performance-based Skills Assessment (UPSA-B), Specific Level of Functioning (SLOF) og SF-36® Health Survey (SF-36).

**Resultater:** Menn hadde bedre  $VO_{2peak}$  ( $p=0,013$ ), 1RM/KM ( $p=0,009$ ) og presterte bedre i 6MGT ( $p=0,006$ ) enn kvinner.  $VO_{2peak}$  korrelerte sterkt med 6MGT ( $r=0,82$ ,  $p=0,000$ ), trappetest ( $r=-0,64$ ,  $p=0,001$ ) og moderat med 30sSTS ( $r=0,48$ ,  $p=0,017$ ). 1RM/KM korrelerte moderat med 6MGT ( $r=0,48$ ,  $p=0,017$ ), trappetest ( $r=-0,48$ ,  $p=0,015$ ) og sterkt med 30sSTS ( $r=0,54$ ,  $p=0,005$ ).  $VO_{2peak}$  korrelerte sterkt med UPSA-B totalscore ( $r=0,71$ ,  $p=0,003$ ) og SLOF totalscore ( $r=0,59$ ,  $p=0,022$ ) hos menn, men ikke hos kvinner.

**Diskusjon og konklusjon:** Bedre fysisk arbeidskapasitet er assosiert med bedre prestasjon i 6MGT, trappetest og 30sSTS hos mennesker med schizofreni. Redusert  $VO_{2peak}$  er assosiert med redusert funksjonell kapasitet og hverdagsfunksjon hos menn. Videre forskning bør gjøre intervensjonsstudier som undersøker om fysisk arbeidskapasitet kan øke den funksjonelle kapasiteten hos mennesker med schizofreni. Fysisk trening bør vektlegges i recovery-orienterte helsetjenester for denne gruppen.

**Nøkkelord:** schizofreni, 1RM,  $VO_{2peak}$ , recovery, livskvalitet

## Summary

**Background:** Patients with schizophrenia have reduced physical work capacity and impaired performance in functional outcomes, but the degree to which these characteristics are related is unknown. The purpose was to describe physical work capacity and functional capacity, and investigate associations between physical work capacity and functional capacity and everyday functioning in schizophrenia, both in the overall sample and by gender.

**Methods:** 25 outpatients (16 men, 9 women),  $35.5 \pm 9.4$  years participated. Physical work capacity was peak oxygen uptake ( $VO_{2peak}$ ) and One Repetition Maximum relative to body mass (1RM/BM). Functional outcomes were 6-minute walk test (6MWT), stair test, 30-second sit-to-stand test (30sSTS), University of California San Diego Performance-based Skills Assessment (UPSA-B), Specific Level of Functioning (SLOF) and the SF-36<sup>®</sup> Health Survey (SF-36).

**Results:** Men had higher  $VO_{2peak}$  ( $p=0.013$ ), 1RM/BM ( $p=0.009$ ) and 6MWT performance ( $p=0.006$ ) than women.  $VO_{2peak}$  correlated strongly with 6MWT ( $r=0.82$ ,  $p=0.000$ ), stair test ( $r=-0.64$ ,  $p=0.001$ ) and moderately with 30sSTS ( $r=0.48$ ,  $p=0.017$ ). 1RM/BM correlated moderately with the 6MWT ( $r=0.48$ ,  $p=0.017$ ), stair test ( $r=-0.48$ ,  $p=0.015$ ) and strongly with 30sSTS ( $r=0.54$ ,  $p=0.005$ ).  $VO_{2peak}$  revealed a strong correlation with UPSA-B total score ( $r=0.71$ ,  $p=0.003$ ) and SLOF total score ( $r=0.59$ ,  $p=0.022$ ) in men, but not women.

**Discussion and conclusion:** Better physical work capacity is associated with better performance in 6MWT, stair test and 30sSTS in individuals with schizophrenia. Reduced  $VO_{2peak}$  is associated with reduced functional capacity and everyday functioning in men. Future intervention studies should investigate whether physical work capacity could improve functional capacity. Physical training should be emphasized in recovery-oriented mental health services.

**Keywords:** schizophrenia, 1RM,  $VO_{2peak}$ , recovery, quality of life

## Abbreviations

QoL	Quality of Life
SD	Standard Deviation
SF-36	The SF-36 <sup>®</sup> Health Survey
SLOF	Specific Level of Functioning Scale
UPSA-B	University of California San Diego Performance-based Skills Assessment
VO <sub>2peak</sub>	peak oxygen uptake
1RM	One Repetition Maximum
1 RM/BM	One Repetition Maximum/Body Mass
6 MWT	6-minute walk test
30sSTS	30-second Sit-To-Stand test

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# **PREFACE CHAPTER**

## **1. Background**

### **1.1 Introduction**

Individuals with schizophrenia have great disabilities and reduced physical work capacity that threatens their health (Harvey et al., 2012). Physical work capacity includes peak oxygen uptake and maximal strength. Functional capacity includes abilities to perform activities in everyday life. Functional and physical work capacity is important to carry out activities and work in this patient group (Bowie et al., 2008). Therefore, I wanted to investigate potential associations between physical and functional capacity, and discuss how this associations can influence everyday life in individuals with this illness. Function is important for all of us, but in this study we are looking at individuals with schizophrenia and their need for better function to cope with their lives. This may contribute to help individuals with severe and chronic illnesses to get a better life.

### **1.2 Illness of psychosis**

Psychosis is not one specific illness, but rather a term used when we have the impression that a person has lost contact with reality (The Norwegian Directorate of Health, 2013). A person suffering from psychosis will most often describe a reality, which the normal population experience as very different from theirs. A psychosis may represent a feeling of having “lost oneself”, often accompanied by consequential agitation and anxiety (The Norwegian Directorate of Health, 2013).

### **1.3 Schizophrenia**

Schizophrenia is one of the most disabling and chronic mental illnesses and is characterised by symptoms like personality disorganisation and distortion of reality (World Health Organization, 2010). Schizophrenia often begins at an early age and influences the person much of his life. This illness is often associated with positive symptoms like delusions, hallucinations and thought disorders (World Health Organization, 2010). Positive symptoms can be an act of diversion and complicate the focus on everyday functioning for individuals

with schizophrenia (M. Strassnig, Signorile, Gonzalez, & Harvey, 2014). The negative symptoms are affective flattening, apathy, social withdrawal, lack of drive and cognitive impairments. They cause social isolation, and will gradually reduce their functioning (The Norwegian Directorate of Health, 2013). Inability and impaired everyday functioning are reasons for the large indirect costs of schizophrenia. These indirect costs on the community may be up to three times larger than the direct treatment for psychotic symptoms (Harvey & Strassing, 2012).

#### **1.4 Recovery**

How do individuals with schizophrenia or other severe mental illnesses live with their illness? How do they recover and what is recovery? Recovery has been known and used in treatments of severe mental illnesses for a long time, but the degree of recovery varied (Cavelti, Kvrjic, Beck, Kossowsky, & Vauth, 2012). To understand recovery as a return to symptom-free situation has been challenging in mental health services. Mental health services have earlier focused on symptom reduction (Williams, McKinney, Martinez, & Benson, 2016). This biomedical model regarded recovery as an outcome, mainly implying reduced psychotic symptoms and improved functional capacity (Andresen, Oades, & Caputi, 2003). Recovery has been defined as “a deeply personal, unique process, of changing one`s attitudes, values, feelings, goals, skills, and/or roles” and “a way of living satisfying, hopeful, and contributing life even within the limitations caused by illness” (Anthony, 1993).

Recovery is now more oriented as a dynamic interplay between the individuals with schizophrenia and its environment (Cavelti et al., 2012). Patients today are more involved in their treatments. Recovery in mental health work is now focusing on environmental empowering and that the patients must master their own lives, being self-empowered and preserve hope (Frese, Knight, & Saks, 2009; Myers, 2010; Samuelsen, Moljord, & Eriksen, 2016). This new perspective promotes autonomy, empowerment and hope for restoration of a meaningful life for the patients with schizophrenia (Myers, 2010).

This model of improvement and coping is important for both patients with schizophrenia and for those who work with this group in mental health work; thus, the interaction between patients and helpers are often challenging (Samuelsen et al., 2016). This patient group have great disabilities and their lives are largely affected by this severe, chronic illness (Harvey & Strassing, 2012). It is challenging to handle living with a severe illness and



sustain a good life despite of fewer afflictions. Recovery may contribute to increase improvement of social and physical function.

### **1.5 Quality of life**

Quality of life (QoL) is defined as “individual’s perception of their position in life in the context of the culture - and value systems in which they live and in relation to their goals, expectations, standards and concerns” (World Health Organization, 1993). Reducing the negative impact of symptoms on QoL is an important part of treatment (Kukla, Lysaker, & Roe, 2014). Greater self-perceived recovery, a good service provision or active involvement in the community improves QoL in schizophrenia (Kukla et al., 2014).

QoL is a multidimensional construct that includes different domains of life, categorized from physical and mental health to social functioning in a person (World Health Organization, 1995). There are different measurements of QoL; health related QoL, and generic preference-based QoL measurements. The generic QoL is common practice when evaluating health interventions (Connell, O’Cathain, & Brazier, 2014).

Several aspects of schizophrenia may affect patients` QoL. However, patients with schizophrenia may not report QoL contrary to ratings given by experienced staff (Linaker & Moe, 2005). High levels of cardio respiratory fitness are associated with high QoL in healthy young adults (Sloan, Sawada, Martin, Church, & Blair, 2009). The level of physical activity of patients with schizophrenia is a significant predictor of health related QoL (Davy Vancampfort et al., 2011). The lower physical work capacity in individuals with schizophrenia may contribute to a reduction of QoL, normalization and achievement of psychiatric treatment (Davy Vancampfort et al., 2011).

### **1.6 Treatments**

To identify treatments that have an effect on mental health recovery in individuals with schizophrenia, it is necessary to have a mental health care system that promotes autonomy and empowerment (Williams et al., 2016). Many treatments attend this model of recovery. Individuals with schizophrenia are in need of much assistance and use of services in both psychiatric centres and in municipal service. Clinical reports of functionality are very important for the municipal services to plan and organize good services in the community.

A recent study found that individuals with schizophrenia who engaged in activities, school or work, had better functioning and cognition and less severe psychotic symptoms than

those who did not participate (Humensky, Essock, & Dixon, 2017). To prevent frequent and long hospital stays the focus in rehabilitation of persons with schizophrenia should emphasize more recovery and coping (Williams et al., 2016).

Both psychiatric centres and municipal services have groups and activities for in and out patients with schizophrenia and other severe chronic illnesses. Ambulant teams in the hospital assist the patient in everyday activities like shopping, housework, self-care and management of medication. Some patients get follow-ups several times a week; others get follow-ups once a week. Other patients with schizophrenia need an organized house (council houses) to live in in the community, often with staff and support. The staff will guide or help the consumers in living by themselves.

It exists a varied supply for patients with schizophrenia. Voluntary organizations as Red Cross Door Opener and FIRE offer both physical trainings and social happenings for individuals with mental illnesses (FIRE, 2009; Røde Kors, 2017). Meeting-points for individuals with mental disorders and the organization of interest Mental Health are other places which offer creative activities, physical activities, art, music, cooking and hiking (Mental Helse, 2017; Trondheim Kommune, 2016). These offers are low-threshold services with user involvement.

### **1.7 Everyday functioning**

Everyday functioning refers to carry out activities of daily living (ADL). ADLs include activities such as self-care, functional mobility, financial and medication management, housework, cooking, job skills and transportation within the community (M. Strassnig et al., 2014). Everyday functioning embraces domains of social functioning, vocational performance, and carrying out everyday activities (Harvey, Velligan, & Bellack, 2007). Functional capacity is a wide term and the literature defines this concept as performance of skills that underlie functional success. It means the ability to perform social activities, finances, communication, work, and social skills (Bowie et al., 2008; Harvey & Strassing, 2012). There are methods to divide functional capacity in different assessments, and the most common is; a) performance-based measure of functional capacity (i.e. finance and communication) and b) everyday functioning (i.e. physical functioning like sight, hearing and speech, personal care skills, interpersonal relationships, social acceptability, activities and work skills). Some of the instruments to assess functional capacity are utilized by self-report, others use informant report, clinician ratings, performance-based measures or direct

observations of performance (Harvey et al., 2007; Patterson, Goldman, McKibbin, Hughs, & Jeste, 2001). However, there are challenges associated with measurement of functional outcome among severely ill individuals (Harvey et al., 2007). Some studies highlight the importance of separating content domains of outcome and potential disability, which contain social, vocational, self-care, and independent living, from the assessment methods employed (Harvey et al., 2007).

For individuals with schizophrenia adequate functioning in the community will depend on physical work capacity and physical activity behaviour in everyday functioning (M. Strassnig et al., 2014). Several previous studies have a limited time frame, too short for an expected change in social function in individuals with schizophrenia to appear. In addition to this, everyday functioning will be influenced by the person's economy or the opportunity to get municipal or other follow-ups (M. Strassnig et al., 2014). Reduction in motivation, challenges in everyday and physical functioning are common in individuals with schizophrenia, and because of this this group do not seek or sustain employment (Harvey et al., 2012). The challenges with everyday functioning and the cognitive impairment will hamper them, because cognitive impairments are the most consistent conclusive deficits in everyday functioning in schizophrenia (Harvey et al., 2012).

### **1.8 Physical work capacity**

Schizophrenia symptoms, memory, and QoL are supposed to improve with regular exercise (Gorczyński & Faulkner, 2010). Since we know that physical work capacity is beneficial for these patients (Jørn Heggelund, Kleppe, Morken, & Vedul-Kjelsås, 2014), today's treatments of schizophrenia emphasize exercise therapy more. Physical work capacity includes peak oxygen uptake and maximal strength. The  $VO_{2peak}$  is defined as "the highest rate at which oxygen can be taken up and utilized by the body during severe exercise" (Basset, 2000). Maximal strength is defined as the maximal force (in Newton) a muscle or muscle group can generate at a specified or determined velocity (Komi, 2003). 6-minute walk test (6MWT), stair test and 30-second Sit-To-Stand test (30sSTS) are physical tests we use to measure performance-based physical function. This physical function is a capacity individuals with severe mental illnesses is in need of to perform ADLs (Martin Strassnig, Brar, & Ganguli, 2011).

This population has lower peak oxygen uptake, compared with the general population (J. Heggelund, Nilsberg, Hoff, Morken, & Helgerud, 2011). Their functioning of walking and

muscle strength are also impaired (Martin Strassnig et al., 2011). This could be an immediate limitation for their functionality and their capability to work. Individuals with schizophrenia are more likely to be inactive and less involved in sport and physical activities (Davy Vancampfort et al., 2011).

We know that physical activity has an important role in the lives of patients with schizophrenia, and that physical activity interventions are, and have been for a long time, a component in recovery-oriented mental health services (Williams et al., 2016). We also know that patients with schizophrenia have disability and impaired functional capacity, and this influences their health (Harvey & Strassing, 2012).

Previous research has suggested that physical activity may alleviate negative symptoms such as depression, low self-esteem and social withdrawal in schizophrenia. Physical activity can also be used as a coping strategy to control positive symptoms such as auditory hallucinations (Faulkner, 2005). Physical activity would, regarding previous studies lead to less psychotic symptoms and better physical work capacity (D. Vancampfort et al., 2015). There are different determinants of performance of everyday functioning (Bowie et al., 2008). Reduced muscle strength and low aerobic endurance may result in impaired functional capacity and problems for individuals with schizophrenia to carry out everyday activities and social activities, and work (Harvey & Strassing, 2012). It is a relationship between physical work capacity and functional capacity in individuals with schizophrenia. We assume that better muscle strength and aerobic endurance correlates positively with performance-based physical function; walking performance, stair climbing, and sit to stand quickly; and performance-based functional capacity measured by UPSA-B (finance and communication), everyday functioning (ADLs), and subjective functioning (QoL).

## **2. Aims of the Master`s Thesis**

The aims of this study were: 1) to describe physical work capacity and functional capacity in individuals with schizophrenia, both in overall sample and gender, and 2) to investigate possible associations between physical work capacity and performance-based functional capacity and everyday functioning.

## **3. Methods**

### **3.1 Study design**

This study used baseline data collected from a randomised controlled trial (RCT) investigating the effect of long-term exercise training therapy in patients with schizophrenia (ClinicalTrials.gov Identifier: NCT02743143) conducted at the Exercise Training Clinic at St. Olav University Hospital. My study investigated the correlations between physical work capacity and the performance-based functional capacity, everyday functioning and subjective functioning in persons with schizophrenia. A correlational study determines whether two variables are correlated. This means to study whether an increase or decrease in one variable corresponds to an increase or decrease in the other variable (Altman, 1999).

### **3.2 Participants**

The inclusion criteria were individuals with ICD-10 schizophrenia; schizotypal or delusional disorders (F20 to F29), between 18-65 years old, and they should be able to carry out the tests in the survey. The participants had to be capable of giving informed consent.

Participants were excluded if they had contra-indication for exercise training and testing according to the American College of Sports Medicine specifications (In, 2006); life threatening or terminal medical conditions; not able to carry out test procedures; current pregnancy; mothers less than 6 months post-partum.

### **3.3 Procedure of recruitment**

During 2016, eligible women and men, aged 20-56 years with ICD-10 schizophrenia, schizotypal or delusional disorders (F20 to F29) were recruited. The participants had the criteria of inclusion and were receivers of public care. All participants were provided a consent form, describing the trial and providing sufficient information for patients to make an informed decision about their participation.

### **3.4 Outcome measures**

#### **3.4.1 Physical work capacity**

Muscle strength of the lower extremities was measured as 1RM in the Plate-Loaded Linear Leg press machine (Hammer Strength, United States of America) (Astrand, Rodahl, Hans, &

Sigmund, 2003). This test is frequently used as a measure of maximal strength in both healthy and un-healthy persons. The test is easy to carry out, require little equipment and is easy to get familiar with for the participants (Astrand et al., 2003). The lift was performed from extension to 90 degrees angle in the knee joint and back to extension. The load was increased successively by 5 -10 kgs until the participant was not able to lift the weight. The highest weight was set at 1RM. Rest periods were 2-3 minutes between each trial (American College of Sports Medicine, 2010). The test is standardized and well established, which increase the reliability of the assessment (Friis, 2002). Due to a very heterogeneous group, 1RM was expressed both as an absolute value and relative to body mass (Astrand et al., 2003).

$VO_{2peak}$  was measured by an incremental treadmill-test, where the participants walked or ran to exhaustion. The  $VO_{2peak}$  was measured by a Cortex Metamax II portable metabolic system (Cortex Biophysik GmbH, Leipzig, Germany), and the  $HR_{peak}$  was measured by Polar S 610i heart rate monitor (Polar Electro, Finland), respectively. This test is “gold standard” and is earlier used in individuals with schizophrenia and healthy people (Jørn Heggelund, Hoff, Helgerud, Nilsberg, & Morken, 2011). The patients warm up with ten minute walking or running on the treadmill at an intensity corresponding to 60-70 % of predicted  $HR_{peak}$ . The test started from warm-up speed with 5 % inclination. The speed or inclination was increased every 2-3 minutes ( $1-2 \text{ km}\cdot\text{h}^{-1}$  or 1-3 % inclination, respectively) until the participants could no longer continue. The highest oxygen uptake was decided as  $VO_{2peak}$ . The Metamax was calibrated every test day using procedures recommended by the manufacturer.

### 3.4.2 Performance-based measures of physical function

The 6-minute walk test (6MWT) was used as a performance-based measures of physical function (Burr, 2011). This test is a sub-maximal exercise test. The participants were instructed to walk as fast as possible, back and forth between 2 cones on a flat, hard surface for 6 minutes, without running. The distance between the cones was 15 meters (American Thoracic Society, 2002). We measured the result of 6MWT in meters.

6WMT is practical, inexpensive and simple to manage with minimal equipment (Enright, 2003). The American Thoracic Society has published guidelines for adults carrying out the 6MWT in clinical settings (American Thoracic Society, 2002). The test has high reliability and is suitable for measuring cardiorespiratory endurance in individuals with schizophrenia (Bernard et al., 2015). This test corresponds more to the needs of everyday

activities than the  $VO_{2peak}$  does, because most ADLs are performed at submaximal levels of effort (American Thoracic Society, 2002; Kervio, Carre, & Ville, 2003).

The stair test measures performance-based physical function like 6MWT, and has previously been used in individuals with schizophrenia (Cataneo, 2007; Tveter, Dagfinrud, Moseng, & Holm, 2014). Researcher-staff instructed the participants to ascend and descend 18 average-sized steps ( $17\pm 1$ cm) 3 consecutive times. The stairs include a platform in-between the steps. The participants had to use all steps, they were allowed to run, and they could use the bannister if they needed (Tveter et al., 2014). The result was measured in seconds. The better you run the stair, the better oxygen uptake you have (Cataneo, 2007).

The 30-second sit to stand test (30sSTS) measures strength and power in the lower extremity (Bennell, Dobson, & Hinman, 2011). The test has good test-retest reliability and provides a valid indicator of lower body strength in adults (Jones, Rikli, & Beam, 1999). Participants started from a seated position with arms folded across the chest. They should complete as many full stands as possible in 30 seconds. If the test person was more than half-way to standing up, this would count like one repetition (Jones et al., 1999). The numbers of full stands were recorded.

#### 3.4.3 Performance-based measurement of functional capacity

University of California San Diego Performance-based Skills Assessment (UPSA-B) (Patterson et al., 2001) measures functional capacity in which patients are asked to perform everyday tasks related to communication and finances (Mausbach, Harvey, Goldman, Jeste, & Patterson, 2007). During the Communication subtest, participants role-play exercises using an unplugged telephone, showing the tester what number they would dial if they had an emergency. They should also call directory enquiries to get a specific telephone number, and dial this number from memory. For the Finance subtest, participants count change, make change from 10 dollars, read a utility bill and write and record a check for the bill. The UPSA-B requires approximately 10 minutes, and raw score is converted into a total score ranging from 0 to 100 %, with higher scores indicating better functional capacity (Mausbach et al., 2007).

#### 3.4.4 Everyday functioning

We used Specific Level of Functioning (SLOF) (Schneider & Struening, 1983) to assess functioning in ADL, regularly defined as everyday functioning. SLOF includes 43 items, and

is an informant rated report of a patient's behaviour and functioning in six domains. Each item is rated on a 5-point Likert scale with anchors describing the frequency of the behaviour and/or the patient's level of independence. The SLOF domains include interpersonal relationships (7 items), activities of community living (11 items), work skills (6 items), physical functioning (5 items), personal care skills (7 items) and social acceptability (7 items). Scores range from 43 to 215 (Cardenas et al., 2013; Mucci et al., 2014). The higher the total score, the better the overall functioning of the patient. This measurement has excellent reliability and validity and is commonly used to assess functioning in patients with schizophrenia (Cardenas et al., 2013; Mausbach et al., 2007; Mucci et al., 2014).

#### 3.4.5 Subjective functioning

SF-36<sup>®</sup> Health Survey (SF-36) (Ware, Kosinski, & Gandek, 2000) was used to assess the aspects of health related QoL, regularly defined as subject functioning. The test assesses eight domains; Physical Function, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health (Leese et al., 2008). The SF-36 is a 36-item self-report. Su et al. (2014) found that the SF-36 showed good reliability and validity among people with schizophrenia. Scores for the SF-36 range from 0 to 100. A higher SF-36 score suggests a better health related QoL (Su, Ng, Yang, & Lin, 2014).

### 3.5 Procedures

The participants carried out the tests at the hospital's Exercise Training Clinic. The research group in the RCT had collaboration with the municipal services in Trondheim, who coordinated adherence initiatives. Contact persons in the municipal services offered wake-up calls, reminders of the testing and transportation to the Exercise Training Clinic.

### 3.6 Statistical analysis

We used the Statistical Package for the Social Sciences version 24.0 (IBM, Corp., Armonk, 2016). Data are reported as mean and standard deviation (SD). Data were tested for normality using the Kolmogorov-Smirnov test and found to be normally distributed (Pallant, 2013). The independent t-test was used to compare differences between men and women. The Pearson's  $r$  was used to analyse correlations between 1RMBW ( $\text{kg}\cdot\text{m}_b^{-1}$ ),  $\text{VO}_{2\text{peak}}$  ( $\text{ml}\cdot\text{kg}^{-1}\cdot\text{min}^{-1}$ ) and the 6MWT (m), stair test (s), 30sSTS (stands), each domain of UPSA-B, SLOF, and SF-36. The



significance level was set at  $p < 0.05$  (2-tailed). The following correlations were used: 0-29 = small; 30-49 = medium; and 50-100 = large classifications (Field, 2009).

### **3.7 Ethical considerations**

The study was approved by the Regional Committee for Medical and Health Research Ethics, Central Norway, and conducted according to Norwegian and international standards of Good Clinical Practice (The World Medical Association Declaration of Helsinki) (Carter, 2011; World Medical Association, 2001). Participants got both oral and written information about the study's background and purpose, how information collected about them would be handled and that they could withdraw at any time.

## **4. Results**

Eligible persons, 16 men and 9 women, aged from 20 and 56 years, mean age was  $35.5 \pm 9.4$ , diagnosed with ICD-10 schizophrenia; schizotypal or delusional disorders (F20 to F29) were included. Height was  $1.76 \pm 0.09$  m, and weight was  $95.6 \pm 23.6$  kg for the sample.

### **The main results were:**

- Men have similar functional capacity and everyday functioning to women, despite having better physical work capacity.
- Higher peak oxygen uptake and maximal muscle strength relative to body mass was associated with better walking performance and stair climbing in men and women with schizophrenia.
- Reduced peak oxygen uptake was associated with reduced functional capacity and everyday functioning in men, but not in women.
- Reduced peak oxygen uptake was associated with poor experience of subjective physical functioning in women, but not in men.

For additional details, see Table 2, 3 and 4 in the article.

## **5. Discussion**

In this section, methodological considerations regarding study design, attrition, validity, and measurements and data collection will be discussed in detail, followed by reflection on and discussion of the results for further research and clinical practice.

### **5.1 Methodological considerations.**

#### 5.1.1 Study design

Correlation is the method of analysis to use when studying the possible association between two continuous variables (Altman, 1999). A correlational study is a powerful way to study correlations between different outcomes at a determined time (Aalen, 2006). The study cannot say something about cause-effect relation between physical and functional capacity with this study design. We tested several correlations in this study, and this increases the risk of chance findings.

#### 5.1.2 Attrition

Individuals with schizophrenia usually do have problems with attending research experiments (Abbott, Arthur, Walker, & Doody, 2005). This group of patients has difficulties with attending and follow up appointments, testing and exercises (Harvey & Strassing, 2012). A larger part of this patient group lacks drive and motivation to participate in exercise studies (M. T. Strassnig et al., 2015). Many of the participants had problems being present for testing, despite that contact persons in the municipal services phone called them and were able to transport them.

#### 5.1.3 Validity

The sample size in this correlation study is small (N=25), which jeopardize a generalization of the results to the population with schizophrenia (Aalen, 2006). This could be a threat to the external validity. While a larger sample would have been preferable, the significant associations provided support to our conclusions. In addition there was an imbalance in gender; few women participated compared to men (women=9, men=16).

Persons who are willing to serve as research participants may also differ from the general population (Carter, 2011). Therefore, the results may be applicable only to a subgroup of the total schizophrenia population, and the results must be interpreted with caution. The participants' scores on everyday functioning were better than expected. These participants are in need of extensive care in the municipality. Most of them live in council houses with staff,

and almost all receive disability pension. This means that it might be difficult to assess the functional capacity based on plain functional questions, and to generalise the results to the wider population of schizophrenia (Corell, 2011). Alternatively, SLOF may not cover the functional domains in which patients have most problems.

#### 5.1.4 Measurements and data collection

The choice of well-known and standardized tests for measuring physical and functional outcomes represents a strength in this particularly study. A person familiar to the test executed all performance-based tests in neutral environments. A weakness with self-reports is that individuals with schizophrenia may have lack of insight and they do not see their presence of psychotic symptoms. This might causes bias in answering the questionnaire (Harvey et al., 2007).

Performance-based measures, like the UPSA-B reduce the risk of response bias and can be adjusted to capture highly specific characteristics of functional skills. But there are also weaknesses with this test, such as other influences on functional performance that can considerably reduce the relationships between competence and performance (Harvey et al., 2007). Our values of UPSA-B showed that men performed better than women, especially in the sub score Finance. However, the women had higher value in sub score Communication, compared to men. This suggests that this test elicits gender differences in performance-measured functional capacity.

We used SLOF in our study, where a contact person in municipal service and familiar to the participant, gave information about the participant. A weakness with this test is that some individuals with schizophrenia lack familiar contact persons.

Individuals with schizophrenia could be a challenging group to test; especially the physical tests can be difficult to complete. Some participants were suspicious and paranoid when they had to use a mask for measuring oxygen uptake. Because of poor motivation, uncooperativeness and fear to get exhausted in persons with schizophrenia, testing performance-based measures could lead to low scores (Harvey et al., 2007).

## 5.2 Result discussion

As expected, men had higher  $VO_{2peak}$  and 1RM/BM, and performed better on the 6MWT than women. However, the men`s functional capacity and everyday functioning were similar to women`s functioning. This might imply that other factors than physical work capacity influence the functional capacity more in women. The physical work capacity and

performance-based physical functioning found can be characterised as low for both men and women. Previous research has investigated these characteristics and the associations between aerobic fitness and everyday functioning, but not in gender differences (Kimhy et al., 2014). Previous correlational studies including physical activity and functioning have primarily involved men, and may not apply to women with schizophrenia (D. Vancampfort et al., 2012). Future studies should investigate gender differences in physical and functional capacity, in order to inform varied and designed activities for both genders, both in psychiatric centres and in the municipal service.

The difference between men and women in physical capacity should be considered when working with recovery for this group. The clinic should offer women with schizophrenia structured exercise program designed to meet their needs and interests, so that their experience of coping and satisfaction will increase the possibility of continued exercise. The patient's involvement in treatment and motivation is essential (Samuelsen et al., 2016), and different physical initiatives for genders would be favourable.

Higher physical work capacity was associated with better walking performance and stair climbing. Our findings support that physical activity ought to be a part of the treatments for individuals with schizophrenia in mental health work (The Norwegian Directorate of Health, 2013). Previous studies have concluded that aerobic exercise training is feasible and acceptable to individuals with schizophrenia and that aerobic exercise training can increase the physical capacity in this population (Gorzynski & Faulkner, 2010). It would be important to maintain or improve physical work capacity to attend good everyday functioning in recovery and coping.

For the men in this study, reduced peak oxygen uptake was associated with reduced functional capacity and everyday functioning, and there were strong correlations between  $VO_{2peak}$  and functional capacity measured in UPSA-B. However, there were no significant correlations between 1RM/BM and UPSA-B. Our results showed a tendency towards stronger associations between  $VO_{2peak}$  and functional capacity, compared to 1RM/BM and functional capacity. Aerobic endurance might thus be more important for the ability to perform functional skills than muscle strength. Randomised controlled trials should investigate whether improved muscle strength and aerobic endurance could improve functional capacity. One might enhance the focus in health work system for activities that require both physical and functional capacity, empowerment and handle everyday life, for persons with schizophrenia. Clinicians in mental health work may be able to offer more information to clients about the importance of exercise as a support treatment for schizophrenia.

We also found that reduced oxygen uptake was associated with poor experience of subjective physical functioning in women. This could mean that women notice their physical health more than men, and this might hamper them. This would be important knowledge for clinicians in conversations about training and physical exercises to persons with schizophrenia.

## **6. Conclusion**

Our results showed that men and women with schizophrenia had similar functional capacity and everyday functioning, despite that men had better physical work capacity. Higher physical work capacity was associated with better walking performance and stair climbing for both genders. There were associations between physical work and everyday functioning for men, but not for women. Clinicians should offer men and women different initiatives to improve or maintain physical and functional capacity. Physical training should be emphasized in recovery-oriented mental health services. Interventions studies should investigate whether improved muscle strength and aerobic endurance could improve functional capacity.

## 7. References.

- Abbott, M., Arthur, A., Walker, L., & Doody, G. (2005). The challenge of recruiting people with schizophrenia to a health promotion trial. *British Journal of General Practice*, 55.
- Altman, D. G. (1999). *Practical statistics for medical research* London: Chapman & Hall/CRC.
- American College of Sports Medicine. (2010). *ACSM's guidelines for exercise testing and prescription*. (W. Thompson, Gordon, N., Pescatello, L., Ed. 8 ed.). Baltimore: Lippincott Williams & Wilkins.
- American Thoracic Society. (2002). ATS statement: guidelines for the six- minute walk test. . *American Journal of Respiratory and Critical Care Medicine*(166), 111-117.
- Andresen, R., Oades, L., & Caputi, P. (2003). The experience of recovery from schizophrenia: towards an empirically validated stage model. *Australian and New Zealand Journal of Psychiatry*, 37(5), 586-594. doi:10.1046/j.1440-1614.2003.01234.x
- Anthony, W. A. (1993). Recovery from mental illness: The guiding vision of the mental health service system in the 1990s. *Psychosocial Rehabilitation Journal*, 16(4), 11-23. doi:10.1037/h0095655
- Basset, D. R. J., Howley E. T., (2000). Limiting factors for maximum oxygen uptake and determinants of endurance performance. *Medicine and Science in Sports and Exercise*, 32(1), 70-84.
- Bennell, K., Dobson, F., & Hinman, R. (2011). Measures of physical performance assessments: Self-Paced Walk Test (SPWT), Stair Climb Test (SCT), Six-Minute Walk Test (6MWT), Chair Stand Test (CST), Timed Up & Go (TUG), Sock Test, Lift and Carry Test (LCT), and Car Task. *Arthritis Care & Research*, 63(S11), S350-S370. doi:10.1002/acr.20538
- Bernard, P., Romain, A. J., Vancampfort, D., Baillot, A., Esseul, E., & Ninot, G. (2015). Six minutes walk test for individuals with schizophrenia. *Disability and Rehabilitation*, 37(11), 921-927. doi:10.3109/09638288.2014.948136
- Bowie, C. R., Leung, W. W., Reichenberg, A., McClure, M. M., Patterson, T. L., Heaton, R. K., & Harvey, P. D. (2008). Predicting Schizophrenia Patients' Real-World Behavior with Specific Neuropsychological and Functional Capacity Measures. *Biological Psychiatry*, 63(5), 505-511. doi:http://dx.doi.org/10.1016/j.biopsych.2007.05.022
- Burr, J. F., Bredin, S. S., Faktor, M. D., Warburton, D. E., (2011). The 6-minute walk test as a predictor of objectively measured aerobic fitness in healthy working-aged adults. *Phys Sportsmed*.(2), 133-139.
- Cardenas, V., Abel, S., Bowie, C. R., Tiznado, D., Depp, C. A., Patterson, T. L., . . . Mausbach, B. T. (2013). When Functional Capacity and Real-World Functioning Converge: The Role of Self-Efficacy. *Schizophrenia Bulletin*, 39(4), 908-916. doi:10.1093/schbul/sbs004
- Carter, R. E., Lubinsky, J., Domholdt, E., (2011). *Rehabilitation research: principles and applications*. (Vol. 4). St. Louis: Elsevier Saunders.
- Cataneo, D. C., Cataneo, A. J., (2007). Accuracy of the stair climbing test using maximal oxygen uptake as the gold standard. . *Jornal Brasileiro de Pneumologia : Publicacao Oficial da Sociedade Brasileira de Pneumologia e Tisiologia*(33), 128-133.

- Cavelti, M., Kvrjic, S., Beck, E. M., Kossowsky, J., & Vauth, R. (2012). Assessing recovery from schizophrenia as an individual process. A review of self-report instruments. *European Psychiatry, 27*(1), 19-32. doi:http://doi.org/10.1016/j.eurpsy.2011.01.007
- Connell, J., O'Cathain, A., & Brazier, J. (2014). Measuring quality of life in mental health: Are we asking the right questions? *Social Science and Medicine, 120*, 12-20. doi:http://doi.org/10.1016/j.socscimed.2014.08.026
- Corell, C. U., Kishimoto, T., Kane, J. M., . (2011). Randomized controlled trials in schizophrenia: opportunities, limitations, and trial design alternatives. *Dialogues in Clinical Neuroscience, 13*(2), 155-172.
- Enright, P. L. (2003). The Six-Minute Walk Test. *Respiratory Care, 48*(8), 783-785.
- Faulkner, G. E. J. (2005). Exercise as an adjunct treatment for schizophrenia. In G. E. J. Faulkner, Taylor, A. H., (Ed.), *Exercise, health and mental health: emerging relationships*. (pp. 27-47). New York: Routledge.
- Field, A. (2009). *Discovering statistics using SPSS*: Sage publications.
- FIRE. (2009). FIRE Stiftelsen ett skritt videre/aktiviteter. Retrieved from <https://www.etskrittvidere.no/aktiviteter>
- Frese, I. I. F. J., Knight, E. L., & Saks, E. (2009). Recovery From Schizophrenia: With Views of Psychiatrists, Psychologists, and Others Diagnosed With This Disorder. *Schizophrenia Bulletin, 35*(2), 370-380. doi:10.1093/schbul/sbn175
- Friis, S., Vaglum, P.,. (2002). *Fra idé til prosjekt - en innføring i klinisk forskning*. Oslo: Tano Aschehoug.
- Gorczynski, P., & Faulkner, G. (2010). Exercise therapy for schizophrenia. *The Cochrane database of systematic reviews*(5), CD004412-CD004412. doi:10.1002/14651858.CD004412.pub2
- Harvey, P. D., Heaton, R. K., Carpenter Jr, W. T., Green, M. F., Gold, J. M., & Schoenbaum, M. (2012). Functional impairment in people with schizophrenia: Focus on employability and eligibility for disability compensation. *Schizophrenia Research, 140*(1-3), 1-8. doi:http://dx.doi.org/10.1016/j.schres.2012.03.025
- Harvey, P. D., & Strassing, M. (2012). Predicting the severity of everyday functional disability in people with schizophrenia: cognitive deficits, functional capacity, symptoms, and health status. *World Psychiatry, 11*(2), 73-79.
- Harvey, P. D., Velligan, D. I., & Bellack, A. S. (2007). Performance-Based Measures of Functional Skills: Usefulness in Clinical Treatment Studies. *Schizophrenia Bulletin, 33*(5), 1138-1148. doi:10.1093/schbul/sbm040
- Heggelund, J., Hoff, J., Helgerud, J., Nilsberg, G. E., & Morken, G. (2011). Reduced peak oxygen uptake and implications for cardiovascular health and quality of life in patients with schizophrenia. *BMC Psychiatry, 11*, 188-188. doi:10.1186/1471-244X-11-188
- Heggelund, J., Kleppe, K. D., Morken, G., & Vedul-Kjelsås, E. (2014). High Aerobic Intensity Training and Psychological States in Patients with Depression or Schizophrenia. *Frontiers in Psychiatry, 5*(148). doi:10.3389/fpsy.2014.00148
- Heggelund, J., Nilsberg, G. E., Hoff, J., Morken, G., & Helgerud, J. (2011). Effects of high aerobic intensity training in patients with schizophrenia-a controlled trial. *Nord J Psychiatry, 65*. doi:10.3109/08039488.2011.560278
- Humensky, J. L., Essock, S. M., & Dixon, L. B. (2017). Characteristics associated with the pursuit of work and school among participants in a treatment program for first episode of psychosis. *Psychiatric Rehabilitation Journal, 40*(1), 108-112. doi:10.1037/prj0000256

- In, M. H., Whaley, P. H., Brubaker, R. M., Otto, L. E., Armstrong, E.D.S., (2006). *American College of Sports Medicine*. Baltimore: Lippincott Williams & Wilkins.
- Jones, C. J., Rikli, R. E., & Beam, W. C. (1999). A 30-s Chair-Stand Test as a Measure of Lower Body Strength in Community-Residing Older Adults. *Research Quarterly for Exercise and Sport*, 70(2), 113-119. doi:10.1080/02701367.1999.10608028
- Kervio, G., Carre, F., & Ville, N. S. (2003). Reliability and intensity of the six-minute walk test in healthy elderly subjects. *Medicine and Science in Sports and Exercise*, 35(1), 169-174. doi:10.1249/01.mss.0000043545.02712.a7
- Kimhy, D., Vakhrusheva, J., Bartels, M. N., Armstrong, H. F., Ballon, J. S., Khan, S., . . . Sloan, R. P. (2014). Aerobic fitness and body mass index in individuals with schizophrenia: Implications for neurocognition and daily functioning. *Psychiatry Research*, 220(3), 784-791.  
doi:http://dx.doi.org/10.1016/j.psychres.2014.08.052
- Komi, P. V. (2003). *Strength and power in sport*. (2nd ed.). Oxford: Blackwell Science.
- Kukla, M., Lysaker, P. H., & Roe, D. (2014). Strong subjective recovery as a protective factor against the effects of positive symptoms on quality of life outcomes in schizophrenia. *Comprehensive Psychiatry*, 55(6), 1363-1368.  
doi:http://doi.org/10.1016/j.comppsy.2014.04.022
- Leese, M., Schene, A., Koeter, M., Meijer, K., Bindman, J., Mazzi, M., . . . Thonicroft, G. (2008). SF-36 scales, and simple sums of scales, were reliable quality-of-life summaries for patients with schizophrenia. *Journal of Clinical Epidemiology*, 61. doi:10.1016/j.jclinepi.2007.08.004
- Linaker, O. M., & Moe, A. (2005). The COOP/WONCA charts in an acute psychiatric ward. Validity and reliability of patients' self-report of functioning. *Nordic Journal of Psychiatry*, 59(2), 121-126. doi:10.1080/08039480510022918
- Mausbach, B. T., Harvey, P. D., Goldman, S. R., Jeste, D. V., & Patterson, T. L. (2007). Development of a Brief Scale of Everyday Functioning in Persons with Serious Mental Illness. *Schizophrenia Bulletin*, 33(6), 1364-1372.  
doi:10.1093/schbul/sbm014
- Mental Helse. (2017). Mental Helse Trondheim. Retrieved from <http://www.mentalhelse.no/fylkes-og-lokallag/soer-troendelag/lokallag/trondheim>
- Mucci, A., Rucci, P., Rocca, P., Bucci, P., Gibertoni, D., Merlotti, E., . . . Maj, M. (2014). The Specific Level of Functioning Scale: Construct validity, internal consistency and factor structure in a large Italian sample of people with schizophrenia living in the community. *Schizophrenia Research*, 159(1), 144-150.  
doi:http://dx.doi.org/10.1016/j.schres.2014.07.044
- Myers, N. L. (2010). Culture, Stress and Recovery from Schizophrenia: Lessons from the Field for Global Mental Health. *Culture, Medicine, and Psychiatry*, 34(3), 500-528. doi:10.1007/s11013-010-9186-7
- Pallant, J. (2013). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS*. (5th ed.). Berkshire, England: Open University Press.
- Patterson, T. L., Goldman, S., McKibbin, C. L., Hughs, T., & Jeste, D. V. (2001). UCSD Performance-Based Skills Assessment: Development of a New Measure of Everyday Functioning for Severely Mentally Ill Adults. *Schizophrenia Bulletin*, 27(2), 235-245. doi:10.1093/oxfordjournals.schbul.a006870
- Røde Kors. (2017). Om Røde Kors Døråpner. Retrieved from <https://www.rodekors.no/om-rode-kors/lokalforeninger-og-distrikter/sor-troendelag/trondheim/>



- Samuelsen, S. S., Moljord, I. E. O., & Eriksen, L. (2016). Re-establishing and preserving hope of recovery through user participation in patients with a severe mental disorder: the self-referral-to-inpatient-treatment project. *Nursing Open*, 3(4), 222-226. doi:10.1002/nop2.59
- Schneider, L. C., & Struening, E. L. (1983). SLOF: a behavioral rating scale for assessing the mentally ill. *Social Work Research and Abstracts*, 19(3), 9-21. doi:10.1093/swra/19.3.9
- Sloan, R. A., Sawada, S. S., Martin, C. K., Church, T., & Blair, S. N. (2009). Associations between cardiorespiratory fitness and health-related quality of life. *Health Qual Life Outcomes*, 7(47), 1186/1477 - 7525 - 1187 - 1147. doi:10
- Strassnig, M., Brar, J. S., & Ganguli, R. (2011). Low cardiorespiratory fitness and physical functional capacity in obese patients with schizophrenia. *Schizophrenia Research*, 126(1-3), 103-109. doi:http://dx.doi.org/10.1016/j.schres.2010.10.025
- Strassnig, M., Signorile, J., Gonzalez, C., & Harvey, P. D. (2014). Physical performance and disability in schizophrenia. *Schizophrenia Research: Cognition*, 1(2), 112-121. doi:http://dx.doi.org/10.1016/j.scog.2014.06.002
- Strassnig, M. T., Raykov, T., O'Gorman, C., Bowie, C. R., Sabbag, S., Durand, D., . . . Harvey, P. D. (2015). Determinants of different aspects of everyday outcome in schizophrenia: The roles of negative symptoms, cognition, and functional capacity. *Schizophrenia Research*, 165(1), 76-82. doi:http://dx.doi.org/10.1016/j.schres.2015.03.033
- Su, C.-T., Ng, H.-S., Yang, A.-L., & Lin, C.-Y. (2014). Psychometric evaluation of the Short Form 36 Health Survey (SF-36) and the World Health Organization Quality of Life Scale Brief Version (WHOQOL-BREF) for patients with schizophrenia. *Psychological Assessment*, 26(3), 980-989. doi:10.1037/a0036764
- The Norwegian Directorate of Health. (2013). *Nasjonalt faglig retningslinje for utredning, behandling og oppfølging av personer med psykoselidelser (National clinical guideline for the management of psychotic disorder.)*. Oslo: Helsedirektoratet v/Trykksakekspedisjonen.
- Trondheim Kommune. (2016). Treffsteder. Retrieved from <https://www.trondheim.kommune.no/content/1117734979/Treffsteder>
- Tveter, A. T., Dagfinrud, H., Moseng, T., & Holm, I. (2014). Health-Related Physical Fitness Measures: Reference Values and Reference Equations for Use in Clinical Practice. *Archives of Physical Medicine and Rehabilitation*, 95(7), 1366-1373. doi:http://dx.doi.org/10.1016/j.apmr.2014.02.016
- Vancampfort, D., Knapen, J., Probst, M., Scheewe, T., Remans, S., & De Hert, M. (2012). A systematic review of correlates of physical activity in patients with schizophrenia. *Acta Psychiatrica Scandinavica*, 125(5), 352-362. doi:10.1111/j.1600-0447.2011.01814.x
- Vancampfort, D., Probst, M., Scheewe, T., Maurissen, K., Sweers, K., Knapen, J., & De Hert, M. (2011). Lack of physical activity during leisure time contributes to an impaired health related quality of life in patients with schizophrenia. *Schizophrenia Research*, 129(2-3), 122-127. doi:http://dx.doi.org/10.1016/j.schres.2011.03.018
- Vancampfort, D., Rosenbaum, S., Probst, M., Soundy, A., Mitchell, A. J., De Hert, M., & Stubbs, B. (2015). Promotion of cardiorespiratory fitness in schizophrenia: a clinical overview and meta-analysis. *Acta Psychiatrica Scandinavica*, 132(2), 131-143. doi:10.1111/acps.12407

- Ware, J. E., Kosinski, M., & Gandek, B. (2000). *SF-36 health survey: manual & interpretation guide*. Lincoln, RI: QualityMetric Inc.
- Williams, W., McKinney, C., Martinez, L., & Benson, C. (2016). Recovery outcomes of schizophrenia patients treated with paliperidone palmitate in a community setting: patient and provider perspectives on recovery. *Journal of Medical Economics*, 19(5), 469-476. doi:10.3111/13696998.2015.1131989
- World Health Organization. (1993). *The ICD-10 classification of mental and behavioural disorders: diagnostic criteria for research*. Geneva: World Health Organization.
- World Health Organization. (1995). The World Health Organization Quality of Life assessment (WHOQOL). *Social Science and Medicine*, 41(10), 1403-1409.
- World Health Organization. (2010). International Statistical Classification of Diseases and Related Health Problems. Retrieved from <http://apps.who.int/classifications/icd10/browse/2010/en#F20-F29>
- World Medical Association. (2001). World Medical Association Declaration of Helsinki. Ethical principles for medical research involving human subjects. *Bulletin of the World Health Organization*, 79(4), 373.
- Aalen, O. O., Frigessi, A., Moger, T. A., Scheel, I., Skovlund, I., Veierød, M. B.,. (2006). *Statistiske metoder i medisin og helsefag*. Oslo: Gyldendal.
- Astrand, P. O., Rodahl, K., Hans, D., & Sigmund, B. S. (2003). *Textbook of work physiology: physiological bases of exercise*. Champaign (IL): Human Kinetics.

## RESEARCH ARTICLE

# **Relationships between physical work capacity and functional outcomes in individuals with schizophrenia**

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Running title: Physical capacity and function in schizophrenia

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## **Abstract.**

**Objective:** Describe physical work capacity and functional capacity, and investigate associations between physical work capacity and functional capacity and everyday functioning in schizophrenia, both in the overall sample and by gender.

**Methods:** 25 outpatients (16 men),  $35.5 \pm 9.4$  years participated. Physical work capacity was peak oxygen uptake ( $VO_{2peak}$ ) and One Repetition Maximum relative to body mass (1RM/BM). Functional outcomes were 6-minute walk test (6MWT), stair test, 30-second sit-to-stand test (30sSTS), University of California San Diego Performance-based Skills Assessment (UPSA-B), Specific Level of Functioning (SLOF) and the SF-36® Health Survey (SF-36).

**Results:** Men had higher  $VO_{2peak}$  ( $p=0.013$ ), 1RM/BM ( $p=0.009$ ) and 6MWT performance ( $p=0.006$ ) than women.  $VO_{2peak}$  correlated strongly with 6MWT ( $r=0.82$ ,  $p=0.000$ ), stair test ( $r=-0.64$ ,  $p=0.001$ ) and moderately with 30sSTS ( $r=0.48$ ,  $p=0.017$ ). 1RM/BM correlated moderately with the 6MWT ( $r=0.48$ ,  $p=0.017$ ), stair test ( $r=-0.48$ ,  $p=0.015$ ) and strongly with 30sSTS ( $r=0.54$ ,  $p=0.005$ ).  $VO_{2peak}$  correlated strongly with UPSA-B total score ( $r=0.71$ ,  $p=0.003$ ) and SLOF total score ( $r=0.59$ ,  $p=0.022$ ) in men.  $VO_{2peak}$  was positively associated with SF-36 sub score Physical functioning in women ( $r=0.9$ ,  $p=0.001$ ).

**Conclusions:** Better physical work capacity is associated with better performance in 6MWT, stair test and 30sSTS in individuals with schizophrenia. Reduced  $VO_{2peak}$  is associated with reduced functional capacity in men.

**Keywords:** schizophrenia, 1RM,  $VO_{2peak}$ , 6MWT, functional outcomes

### **Significant outcomes**

- Men have similar functional capacity and everyday functioning to women, despite having better physical work capacity.
- High  $VO_{2peak}$  and 1RM/BM was associated with better performance in physical functioning, measured by the 6MWT, stair test and 30sSTS.
- Reduced  $VO_{2peak}$  is associated with reduced functional capacity and everyday functioning in men, but not women.

### **Limitations**

- Several correlations were tested in this study and hence the risk of chance findings is possible. However, adjusting the p-values would increase the risk of type II error.
- The sample size was small, particularly in respect to female participants. This increases the risk of a type II error in the female group.

## Introduction

Adequate functional capacity is fundamental for all humans' ability to participate in the community. Individuals with schizophrenia have poor performance in functional outcomes (i.e. self-care, housework, communication, interpersonal relationships and work skills) and reduced physical work capacity (i.e. peak oxygen uptake ( $VO_{2peak}$ ) and One Repetition Maximum (1RM)), but the degree to which these characteristics are related is unknown. Impaired everyday functioning is common (1, 2). Nearly every person with schizophrenia have disability in functional domains (2). The debilitating features of the illness is characterized by symptoms like personality disorganisation, distortion of reality and dysfunction in social activities, domestic chores and occupational performance (3). Symptoms as affective flattening, apathy, social withdrawal, isolation and cognitive impairments represent the main drivers of disability (1, 4)

Schizophrenia is a chronic illness that often appears at a young age. Due to severe symptoms and poor functioning, people with this illness are in need of long-lasting treatment and extensive care. Lack of participation in working life (5) render schizophrenia among the most costly illnesses in terms of human suffering and societal consumption (6, 7).

Schizophrenia is life-shortening, primarily due to poor physical health and physical comorbidity (5). Individuals suffering from schizophrenia have a mortality risk that is 2-3 times higher than the general population and 20-25 years reduced life expectancy (8, 9). Their reduced physical work capacity affects their physical health, mental health, functional ability and activities of daily living (ADL) (5). ADLs, regularly defined as everyday functioning include activities such as self-care, functional mobility, financial and medication management, housework, cooking, job skills and transportation within the community (10). Consequently, reduced physical work capacity result in reduced independence and quality of life (QoL) (5).

A low level of physical work capacity is associated with impaired physical functioning and disability (11). The reduced physical work capacity normally associated with aging, interacts with cognitive skills and deficits and exacerbate ADL disability and physical health (5). In older adults aging and reduced physical functioning implies loss of muscle mass, strength impairments and mobility disability, and this influence their physical functioning (11). In contrast to the elderly population, physical functioning in schizophrenia may be limited by other factors, influenced by the mental illness. Even in schizophrenia, endurance and muscle strength may be reduced to a level that impair the ability to carry out activities of everyday functioning, and may increase morbidity, reduce (QoL) and well-being (12-14). Participation in aerobic endurance and strength training improve physical work capacity (12, 15), and would probably be associated with better everyday functioning (16).

The need for describing associations between physical capacity and functional capacity in this patient group have been recognized (5). A study recently showed that individuals suffering from schizophrenia had reduced  $VO_{2peak}$  compared with healthy adults (15), but it is not known whether reduced  $VO_{2peak}$  is correlated with functional capacity in this patient group. Studies investigating maximal muscle strength are still scarce (15), and it is unclear how everyday functioning is connected to physical and functional capacity.

### **Aims of the study**

Describe physical work capacity and functional capacity, and investigate associations between physical work capacity and functional capacity and everyday functioning in schizophrenia, both in the overall sample and by gender.

## **Material and methods**

### **Participants and setting**

Participants took part in a randomised controlled trial (RCT) of long-term exercise training therapy in patients with schizophrenia (ClinicalTrials.gov Identifier: NCT02743143). The sample in the present study all took part in the RCT. The inclusion criteria for the RCT were ICD-10 schizophrenia, schizotypal or delusional disorders (F20 to F29) (17), between 18-65 years old, and able to carry out long-term exercise. Exclusion criteria were contra-indications for exercise training and testing according to the American College of Sports Medicine specifications (18); life threatening or terminal medical condition; not being able to carry out intervention or test procedures; current pregnancy, mothers less than 6 month post-partum.

During 2016, 25 participants completed the baseline testing that constitutes the data material in the present correlational study. The study procedure was approved by the Regional Ethics Committee of Central Norway and conducted according to the Helsinki declaration. Patients were given both oral and written information before giving their written consent to participate.

### **Outcome measurements**

#### ***Physical work capacity***

Muscle strength was measured as 1RM strength-test in a Plate-Loaded Linear Leg press machine (Hammer Strength, United States of America) (19). The lift was performed from extension to 90 degrees angle in the knee joint and back to complete extension. The load was increased successively by 5-10 kgs until the participant was not able to lift the weight. Due to a very heterogeneous group, 1RM is expressed both as on absolute value and relative to body mass (19).



Direct assessment of oxygen uptake was measurement by a Metamax II portable metabolic test system (Cortex Biophysik GmbH, Leipzig, Germany) and the Polar S 610i heart rate monitor (Polar Electro, Finland), respectively. The test has previously been used both in individuals with schizophrenia and healthy people (15). Warm-up was ten minutes walking or running on the treadmill at an intensity corresponding to 60-70 % of predicted  $HR_{peak}$ . The test started from warm-up speed with 5 % inclination, after which the speed or inclination was increased every 2-3 minutes (1-2  $km \cdot h^{-1}$  or 1-3 % inclination, respectively) to a level that brought the participant to exhaustion. The highest oxygen uptake was determined as  $VO_{2peak}$ .

### ***Performance-based measures of physical function***

The 6-minute walk test (6MWT) (20). Participants were instructed to walk as fast as possible, back and forth between 2 cones on a flat, hard surface for 6 minutes, without running or jogging (21). The submaximal intensity of the test corresponds well to the needs of everyday activities, similar (21, 22).

Stair test (23). Participants were instructed to ascend and descend 18 average-sized steps ( $17 \pm 1$  cm) 3 consecutive times as fast as possible, without skipping any of the steps. The stairs include a platform in-between the steps (24). The performance is measured in seconds. (23).

The 30-second sit-to-stand test (30sSTS) is a measure of lower extremity strength. Participants started from a seated position with arms folded across the chest, they were instructed to complete as many full stands as possible in 30 seconds (25). The numbers of full stands were recorded.

Test results in the performance-based tests are highly dependent on strength and endurance capacity. Variation in test performance between men and women reflects

conventional gender variations in 1RM and  $VO_{2peak}$ .

### ***Performance-based measurement of functional capacity***

University of California San Diego Performance-based Skills Assessment (UPSA-B) (26) measures functional competence, skills which are important for independent functioning. It is a measure of functional capacity in which patients are asked to perform everyday tasks related to communication and finances (27). Raw scores are converted into a total score ranging from 0 to 100, with higher scores indicating better functional capacity (27).

### ***Everyday functioning***

Functioning in ADL was assessed by Specific Level of Functioning (SLOF). SLOF (28) includes 43 items, and is an observer-rated scale that indexes the patient`s behaviour and functioning in six domains. An informant familiar with the study participant administered the survey. Each item is rated on a 5-point Likert scale with anchors describing the frequency of the behaviour and/or the patient`s level of independence (29).

### ***Subjective functioning***

The SF-36<sup>®</sup> Health Survey (SF-36) (30) was used to assess the physical and mental health aspects of health related QoL, regularly defined as subject functioning (31). The questionnaire consist of eight sub scores, and 0 reflects the poorest health whereas 100 reflects the best health (32).

## Statistical analysis

The Statistical Package for the Social Sciences (SPSS) version 24.0 (IBM, Corp., Armonk, 2016) was used for statistical analysis. All values are exposed as mean  $\pm$  standard deviation (SD) unless otherwise noted. Data were tested for normality using the Kolmogorov-Smirnov test and found normally distributed. The independent t-test was used to compare differences between men and women. We used the Pearson's correlation test to determine the relationship between 1RM/BM (kg),  $VO_{2peak}$  ( $ml \cdot kg^{-1} \cdot min^{-1}$ ) and the 6MWT (m), stair test (s), 30sSTS, each domain of UPSA-B, SLOF and SF-36. The following correlation classification was used (33): 0-29 = small; 30-49 = medium; and 50-100 = large. The significance level ( $\alpha$ ) was set at  $p < 0.05$  (2-tailed).

## Results

We included 25 participants, sixteen men and nine women, 20-56 years old, with ICD-10 schizophrenia, schizotypal or delusional disorders. All participants were under antipsychotic medical treatment. Participant characteristics are presented in Table 1.

**Table 1.** Participant characteristics

	All (n = 25)	Men (n = 16)	Women (n = 9)
Age (years)	35.5 $\pm$ 9.4	34.6 $\pm$ 8.8	37.1 $\pm$ 10.7
Height (m)	1.76 $\pm$ 0.09	1.82 $\pm$ 0.06	1.65 $\pm$ 0.05
Weight (kg)	95.6 $\pm$ 23.6	97.1 $\pm$ 21.4	92.3 $\pm$ 28.2

Data are presented as mean  $\pm$  SD (standard deviation)

### Physical work capacity, functional capacity and gender differences

There were significant differences between men and women in  $VO_{2peak}$ , 1RM/BM and 6MWT (Table 2). Compared to women, men had significantly higher  $VO_{2peak}$  ( $36.1 \pm 9.7 ml \cdot kg^{-1} \cdot min^{-1}$  versus  $25.7 \pm 7.6 ml \cdot kg^{-1} \cdot min^{-1}$ ;  $p = 0.013$ ), 1RM/BM ( $3.06 \pm 1.12 kg \cdot kg^{-1}$  versus  $2.05 \pm 0.64 kg \cdot kg^{-1}$ ;  $p = 0.009$ ), and physical functioning (6MWT:  $566.4 \pm 94.6 m$  versus  $452.4 \pm 74.6$ ;  $p = 0.006$ ).

**Table 2.** Sample characteristics and gender differences in functional outcomes

	Range	Mean + SD	Mean + SD	Mean + SD
		All (N=25)	Men (N =16)	Women (N=9)
<b>VO<sub>2peak</sub></b> (L·min <sup>-1</sup> )		3 ± 0.7	3.4 ± 0.4	2.3 ± 0.4
<b>VO<sub>2peak</sub></b> (ml·kg <sup>-1</sup> ·min <sup>-1</sup> )		32.3 ± 10.1	36.1 ± 9.7 *	25.9 ± 7.6
<b>1RM</b>		248 ± 85.3	284 ± 75.8	186.2 ± 64.5
<b>1RM/BM</b> (kg·kg <sup>-1</sup> )		2.7 ± 1.08	3.06 ± 1.12 **	2.05 ± 0.64
<b>6MWT</b> (meter)		525.3 ± 103.9	566.4 ± 96.4 **	452.4 ± 74.6
<b>Stair test</b> (second)		53.5 ± 23.2	48.8 ± 24.4	62 ± 19.5
<b>30sSTS</b> (stands)		13.8 ± 4.1	14.2 ± 4.2	13 ± 4.1
<b>UPSA-B:</b>				
<b>UPSA-B Total score</b>	0 – 100	84.3 ± 14.4	85.4 ± 13.1	82.5 ± 17.2
Finance	0 – 50	45.5 ± 6.3	47.2 ± 4.7	42.4 ± 7.9
Communication	0 – 50	38.9 ± 10.4	38.2 ± 9.7	40.1 ± 12
<b>SLOF:</b>				
<b>SLOF Total score</b>	43 – 215	185.5 ± 15.9	184.3 ± 16.6	187.7 ± 15.2
Physical functioning	5 – 25	24.8 ± 0.5	24.8 ± 0.6	24.8 ± 0.4
Personal care skills	7 – 35	32.9 ± 3.1	32.9 ± 3.4	33 ± 2.6
Interpersonal relationships	7 – 35	24.6 ± 4.9	24.3 ± 4.7	25.1 ± 5.3
Social acceptability	7 – 35	32.6 ± 2	32.8 ± 1.7	32.2 ± 2.4
Activities	11 – 55	47.8 ± 6.8	47.1 ± 7.3	48.9 ± 6.1
Work skills	6 – 30	22.9 ± 4.6	22.5 ± 5.1	23.7 ± 3.9
<b>SF-36:</b>				
Physical function	0 – 100	78.7 ± 19.5	78.9 ± 19.1	78.3 ± 21.4
Role-physical	0 – 100	61.5 ± 43	65 ± 44.1	55.6 ± 42.9
Bodily pain	0 – 100	69.8 ± 24.7	72.1 ± 23.2	65.6 ± 27.9
General health	5 – 100	54.2 ± 15.2	53.6 ± 15.2	55.2 ± 16
Vitality	0 – 100	45.8 ± 17.4	49.3 ± 18.7	39.4 ± 13.6
Social function	0 – 100	57.5 ± 24.5	58.6 ± 22.7	55.6 ± 28.7
Role-emotional	0 – 100	51.4 ± 46	62.2 ± 45.2	33.3 ± 44.1
Mental health	0 – 100	69.2 ± 10.7	72 ± 8.5	64.2 ± 12.8

All: all participants. 1RM/MB: Leg press one repetition maximum relative to body mass. 6MW: 6-minute walk test, measures in meters. Stair test: measure in seconds. 30sSTS: 30-second sit-to-stand test, measures the number of full stands. UPSA-B: Brief UCSD Performance-based Skills Assessment, overall score ranging from 0-100, higher scores indicate better functional capacity. SLOF: Specific Level of Functioning Scale, higher score indicating better functioning. SF-36: Short-Form Health Survey: 0 reflects the poorest health whereas 100 reflects the best health, higher score indicates a better health state.

\* p < 0.05, \*\* p < 0.01 compared to women, independent T-test.

## Association between physical work capacity and performance-based measures of physical functioning

1RM/BM correlated moderately with the performance in the 6MWT ( $r = 0.48$ ,  $p = 0.017$ ,  $r^2 = 0.23$ ), stair test ( $r = -0.48$ ,  $p = 0.015$ ,  $r^2 = 0.23$ ) and strongly with 30sSTS ( $r = 0.54$ ,  $p = 0.005$ ,  $r^2 = 0.29$ ) (Table 3).  $VO_{2peak}$  was strongly correlated with the performance in the 6MWT ( $r = 0.82$ ,  $p = 0.000$ ,  $r^2 = 0.67$ ), stair test ( $r = -0.64$ ,  $p = 0.001$ ,  $r^2 = 0.41$ ) and moderately correlated with 30sSTS ( $r = 0.48$ ,  $p = 0.017$ ,  $r^2 = 0.23$ ).

**Table 3.**

Correlation between physical work capacity and performance-based measures of physical function

	Correlation with 1RM/BM ( $kg \cdot kg^{-1}$ )	Correlation with $VO_{2peak}$ ( $ml \cdot kg^{-1} \cdot min^{-1}$ )
	All (N=25) r	All (N=25) r
$VO_{2peak}$ ( $ml \cdot kg^{-1} \cdot min^{-1}$ )	0.75**	
1RM/BM ( $kg \cdot kg^{-1}$ )		0.75 **
6MWT (meter)	0.48*	0.82**
Stair test (second)	-0.48 *	-0.64 **
30sSTS (stands)	0.54 **	0.48 *

All: all participants. 1RM/BM: Leg press one repetition maximum relative to body mass. 6MW: 6-minute walk test. 30sSTS: 30-second sit-to-stand test

Pearson's correlation coefficient: \* $p < 0.05$ , \*\*  $p < 0.005$

## Association between physical work capacity and performance-based measures of functional capacity

In males there were strong correlations between  $VO_{2peak}$  and UPSA-B total score ( $r = 0.71$ ,  $p = 0.003$ ,  $r^2 = 0.5$ ), sub score finance ( $r = 0.70$ ,  $p = 0.004$ ,  $r^2 = 0.49$ ) and sub score communication ( $r = 0.62$ ,  $p = 0.013$ ,  $r^2 = 0.38$ ). The correlations are presented in Table 4.

## Association between physical work capacity and everyday functioning

In men there were strong correlations between  $VO_{2peak}$  and SLOFs total score ( $r = 0.59$ ,  $p = 0.022$ ,  $r^2 = 0.35$ ), the domain personal care skills ( $r = 0.63$ ,  $p = 0.013$ ,  $r^2 = 0.4$ ) and the

activities domain ( $r = 0.72$ ,  $p = 0.002$ ,  $r^2 = 0.52$ ). For the women there were strong correlation between  $VO_{2peak}$  and the domain of physical functioning ( $r = 0.78$ ,  $p = 0.014$ ,  $r^2 = 0.61$ ) (Table 4).

### Associations between physical work capacity and subjective functioning

For the women there were strong correlations between  $VO_{2peak}$  and the sub scores Physical Functioning ( $r = 0.9$ ,  $p = 0.001$ ,  $r^2 = 0.81$ ) and Role Physical ( $r = 0.8$ ,  $p = 0.009$ ,  $r^2 = 0.64$ ) of the SF-36 questionnaire, respectively (Table 4).

**Table 4.**

Correlations between physical work capacity, functional capacity, everyday functioning and subjective functioning

	Correlation with 1RM/BM ( $kg \cdot kg^{-1}$ )		Correlation with $VO_{2peak}$ ( $ml \cdot kg^{-1} \cdot min^{-1}$ )	
	Men (N =16)	Women (N=9)	Men (N =16)	Women (N=9)
	r	r	r	r
<b>UPSA-B:</b>				
<b>UPSA-B Total score</b>	0.24	-0.32	0.71 **	-0.08
Finance	0.23	-0.02	0.70 **	0.33
Communication	0.21	-0.45	0.62 **	-0.30
<b>SLOF:</b>				
<b>SLOF Total score</b>	0.24	-0.01	0.59 *	-0.11
Physical functioning	0.38	0.27	0.04	0.78*
Personal care skills	0.21	-0.26	0.63*	-0.5
Interpersonal relationships	0.02	0.11	0.31	-0.34
Social acceptability	0.15	0.32	0.29	0.39
Activities	0.48	-0.03	0.72 **	0.03
Work skills	-0.08	-0.21	0.12	-0.30
<b>SF-36:</b>				
Physical function	0.49	0.51	0.5	0.9 **
Role-physical	0.31	0.61	0,09	0.8 **
Bodily pain	0.29	0.58	-0.20	0.06
General health	-0.10	0.17	-0.36	0.58
Vitality	-0.08	-0.19	-0.17	0.04
Social function	-0.02	0.52	-0.47	0.04
Role-emotional	0.06	0.54	-0.39	0.24
Mental health	-0.11	0.22	-0.59 *	0.15

UPSA-B: Brief UCSD Performance-based Skills Assessment. SLOF :Specific Level of Functioning Scale. SF-36: Short-Form Health Survey.

Pearson's correlation coefficient: \* $p < 0.05$ , \*\*  $p < 0.005$

## **Discussion**

### **General findings**

The main findings in this study are that men had higher  $VO_{2peak}$  and 1RM/BM, and performed better on the 6MWT than women. The physical work capacity and performance-based physical functioning found can be characterised as low for both men and women. Higher  $VO_{2peak}$  and 1RM/BM were associated with better performance in physical functioning in men and women. Lower  $VO_{2peak}$  was associated with reduced functional capacity and everyday functioning in men, but not in women.

### **Physical work capacity, functional capacity and gender differences**

The participants'  $VO_{2peak}$  were similar to normative values for healthy men aged 60-69 years and women aged  $\geq 70$  years, respectively (34), supporting previous findings in the same patient group (15, 35). As expected, men had significant better  $VO_{2peak}$  and 1RM/BM than women. This has previously been reported both in healthy populations and individuals with schizophrenia (19, 34-36). According to the HUNT 3 Fitness Study women had a 34% lower  $VO_{2peak}$  than men in the same age group (36), which is quite similar to our result where women had a 28 % lower  $VO_{2peak}$  than men.

Regarding performance-based functional capacity measured by UPSA-B, the patients in our study scored better than expected, averaging 84 %. A previous study has shown lower total scores, 59 % for patients with schizophrenia, compared to 93 % for healthy persons (26). The results in the present study showed that men have a perception of similar functional capacity and everyday functioning to women, despite having better physical work capacity. Since there is limited knowledge if, and to what degree, gender influences everyday functioning and QoL (5, 37), research describing physical and functional capacity in larger samples of patients with schizophrenia is needed.

## **Associations between physical work capacity and performance-based measures of physical function**

This study showed that physical capacity correlated positively with performance in physical function, measured by the 6MWT, stair test and 30sSTS. These findings are in line with previous studies on physical capacity in individuals with schizophrenia (16, 38). In addition, there was a tendency towards stronger associations between  $VO_{2peak}$  and performance-based measures of physical function, compared to 1RM/BM and physical function. This indicates that aerobic endurance could be more important for physical function than muscle strength, as shown in previous studies (35, 39, 40). It would be of interest to examine the effect of aerobic endurance compared to muscle strength training in individuals in relation to performance of everyday functioning. Future research should investigate functional outcomes in various ways before and after long-term supervised exercise training therapy.

## **Associations between physical work capacity and performance-based measurement of functional capacity**

The findings of associations between  $VO_{2peak}$  and UPSA-B scores indicate that individuals with good functional capacity might be more able to maintain their physical work capacity. The health benefits of aerobic exercise and effects of high-intensity aerobic training for this patient group are well documented (7), but few studies have investigated the effect from strength training (12, 35). Future research might investigate muscle strength and its associations with functional capacity in this patient group. The clinic should enhance focusing on activities that require both physical and functional skills for individuals with schizophrenia.



## **Physical work capacity, everyday functioning and subjective functioning**

Our findings of strong correlation between the variables SLOF total score and  $VO_{2peak}$  in men, but not women was somewhat surprising. Previous research has presented moderate correlations between SLOF and  $VO_{2peak}$ , but has not divided the patient group into genders, making a direct comparison difficult (5, 41). However, the lack of an association in women might be due to the small sample size of women in our study (14). Some training studies have concluded that physical exercise programs help improve everyday functioning and QoL in individuals with schizophrenia, but these studies have not described any correlations between physical work capacity and everyday functioning (42, 43). Intervention studies should investigate whether improved muscle strength and aerobic endurance could improve everyday functioning.

The present study also showed associations between  $VO_{2peak}$  and the sub-scores Physical Function (self-care, walking, climbing stairs, bending, lifting, and moderate and vigorous exercises) and Role-Physical (how physical health interferes with work or other daily activities) of SF-36 for women, but not for men. This is in line with findings in studies investigating the relationships between oxygen uptake and QoL, where high levels of  $VO_{2peak}$  were associated with high scores on QoL for women, but not for men (44, 45). Future studies should investigate gender differences in physical and functional capacity, in order to offer designed initiatives for men and women with schizophrenia in mental health services. In the present study 1RM/BM did not correlate with any outcome measures of everyday functioning or subjective functioning. This is in line with previous research showing that  $VO_{2peak}$  had a greater influence on everyday functioning than muscle strength (37). Clinicians might be able to offer more information to individuals with schizophrenia about the importance of aerobic endurance as a support treatment.

## **Methodological limitations**

The sample in the present study was small. Although this is one of very few studies investigating gender differences in performance-based functional capacity and everyday functioning (39), few females took part in the present study. The sample thus limits the generalizability of the findings. In addition, many variables and multiple correlational tests increase the risk of bias. The results should therefore be interpreted with caution. Another limitation of the present study was the study design. A correlational study cannot tell us anything about cause and effect. Future research should be conducted in randomized controlled trials to investigate effects from changes in  $VO_{2peak}$  on functional capacity. The SLOF and SF-36, measuring everyday functioning and QoL, respectively, could be difficult to perform. SLOF is an observer-rated questionnaire, and the test-results depend on how familiar the informant is with the participant. Similarly, SF-36 is a self-report questionnaire with several questions on functioning, which can be challenging for persons with cognitive problems.

In conclusion, men had similar functional capacity and everyday functioning to women despite having better physical work capacity. Better physical work capacity is associated with better performance in 6MWT, stair test and 30sSTS in individuals with schizophrenia. Reduced  $VO_{2peak}$  is associated with reduced functional capacity in men. Future studies should investigate whether improved physical work capacity could improve functional capacity.

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## Declaration of Interest

The author declared that there is no conflict of interest.

## References.

1. STRASSNIG MT, RAYKOV T, O'GORMAN C, et al. Determinants of different aspects of everyday outcome in schizophrenia: The roles of negative symptoms, cognition, and functional capacity. *Schizophr Res.* 2015 6//;165:76-82.
2. HARVEY PD, HEATON RK, CARPENTER JR WT, GREEN MF, GOLD JM, SCHOENBAUM M. Functional impairment in people with schizophrenia: Focus on employability and eligibility for disability compensation. *Schizophr Res.* 2012 9//;140:1-8.
3. ORGANIZATION WH. International Statistical Classification of Diseases and Related Health Problems. World Health Organization; 2010 [updated 2010; cited 2017 07.03]; Available from: <http://apps.who.int/classifications/icd10/browse/2010/en#F20-F29>.
4. FAULKNER GEJ. Exercise as an adjunct treatment for schizophrenia. In: Faulkner GEJ, Taylor, A. H., ed. *Exercise, health and mental health: emerging relationships*. New York: Routledge; 2005. p. 27-47.
5. STRASSNIG M, SIGNORILE J, GONZALEZ C, HARVEY PD. Physical performance and disability in schizophrenia. *Schizophrenia Research: Cognition.* 2014 6//;1:112-21.
6. VAN OS J, KAPUR S. Schizophrenia. *The Lancet.* 2009 //;374:635-45.
7. GORCZYNSKI P, FAULKNER G. Exercise therapy for schizophrenia. *The Cochrane database of systematic reviews.* 2010 05/12:CD004412-CD.
8. SAHA S, CHANT D, MCGRATH J. A systematic review of mortality in schizophrenia: Is the differential mortality gap worsening over time? *Arch Gen Psychiatry.* 2007;64:1123-31.
9. HENNEKENS CH, HENNEKENS AR, HOLLAR D, CASEY DE. Schizophrenia and increased risks of cardiovascular disease. *Am Heart J.* 2005 12//;150:1115-21.
10. MARDER S, R.,. *Novel Antischizophrenia Treatments*. Berlin: Springer-Verlag; 2012.
11. STEWART AL. Conceptual challenges in linking physical activity and disability research. *Am J Prev Med.* 2003;25:137-40.
12. HEGGELUND J, MORKEN G, HELGERUD J, NILSBERG GE, HOFF J. Therapeutic effects of maximal strength training on walking efficiency in patients with schizophrenia – a pilot study. *BMC Res Notes.* 2012;5:344.
13. HEGGELUND J, NILSBERG GE, HOFF J, MORKEN G, HELGERUD J. Effects of high aerobic intensity training in patients with schizophrenia-a controlled trial. *Nord J Psychiatry.* 2011;65.
14. HARVEY PD, STRASSING M. Predicting the severity of everyday functional disability in people with schizophrenia: cognitive deficits, functional capacity, symptoms, and health status. *World Psychiatry.* 2012;11:73-9.

15. HEGGELUND J, HOFF J, HELGERUD J, NILSBERG GE, MORKEN G. Reduced peak oxygen uptake and implications for cardiovascular health and quality of life in patients with schizophrenia. *BMC Psychiatry*. 2011 12/05;11:188-.
16. VANCAMPFORT D, ROSENBAUM S, PROBST M, et al. Promotion of cardiorespiratory fitness in schizophrenia: a clinical overview and meta-analysis. *Acta Psychiatr Scand*. 2015 Aug;132:131-43.
17. ORGANIZATION WH. The ICD-10 classification of mental and behavioural disorders: diagnostic criteria for research. Geneva: World Health Organization; 1993.
18. IN MH, WHALEY, P. H., BRUBAKER, R. M., OTTO, L. E., ARMSTRONG, E.D.S.,. American College of Sports Medicine. Baltimore: Lippincott Williams & Wilkins; 2006.
19. AASTRAND PO, RODAHL K, HANS D, SIGMUND BS. Textbook of work physiology: physiological bases of exercise. Champaign (IL): Human Kinetics; 2003.
20. BURR JF, BREDIN, S. S., FAKTOR, M. D., WARBURTON, D. E.,. The 6-minute walk test as a predictor of objectively measured aerobic fitness in healthy working-aged adults. *Phys Sportsmed*. 2011:133-9.
21. SOCIETY AT. ATS statement: guidelines for the six- minute walk test. . *Am J Respir Crit Care Med*. 2002:111-7.
22. KERVIO G, CARRE F, VILLE NS. Reliability and intensity of the six-minute walk test in healthy elderly subjects. *Med Sci Sports Exerc*. 2003 Jan;35:169-74.
23. CATANEO DC, CATANEO, A. J.,. Accuracy of the stair climbing test using maximal oxygen uptake as the gold standard. . *J Bras Pneumol*. 2007:128-33.
24. TVETER AT, DAGFINRUD H, MOSENG T, HOLM I. Health-Related Physical Fitness Measures: Reference Values and Reference Equations for Use in Clinical Practice. *Arch Phys Med Rehabil*. 2014 7//;95:1366-73.
25. JONES CJ, RIKLI, R. E., BEAM, W. C.,. A 30-s chair-stand test as a measure of lower body strength in community-residing older adults. *Res Q Exerc Sport*. 1999;70:113-9.
26. PATTERSON TL, GOLDMAN S, MCKIBBIN CL, HUGHS T, JESTE DV. UCSD Performance-Based Skills Assessment: Development of a New Measure of Everyday Functioning for Severely Mentally Ill Adults. *Schizophr Bull*. 2001;27:235-45.
27. MAUSBACH BT, HARVEY PD, GOLDMAN SR, JESTE DV, PATTERSON TL. Development of a Brief Scale of Everyday Functioning in Persons with Serious Mental Illness. *Schizophr Bull*. 2007 03/06;33:1364-72.
28. SCHNEIDER LC, STRUENING EL. SLOF: a behavioral rating scale for assessing the mentally ill. *Soc Work Res Abstr*. 1983;19:9-21.
29. CARDENAS V, ABEL S, BOWIE CR, et al. When Functional Capacity and Real-World Functioning Converge: The Role of Self-Efficacy. *Schizophr Bull*. 2013 02/10;39:908-16.
30. WARE JE, SHERBOURNE CD. The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection. *Med Care*. 1992;30:473-83.
31. WARE JE, KOSINSKI M, GANDEK B. SF-36 health survey: manual & interpretation guide. Lincoln, RI: QualityMetric Inc.; 2000.
32. SU C-T, NG H-S, YANG A-L, LIN C-Y. Psychometric evaluation of the Short Form 36 Health Survey (SF-36) and the World Health Organization Quality of Life Scale Brief Version (WHOQOL-BREF) for patients with schizophrenia. *Psychol Assess*. 2014;26:980-9.

33. FIELD A. Discovering statistics using SPSS. Sage publications; 2009.
34. ASPENES ST, NILSEN, T. I., SKAUG, E. A., BERTHEUSSEN, G. F., ELLINGSEN, O., VATTEN, L., WISLOFF, U., . Peak oxygen uptake and cardiovascular risk factors in 4,631 healthy women and men. *Med Sci Sports Exerc.* 2011;43:1465-73.
35. STRASSNIG M, BRAR JS, GANGULI R. Low cardiorespiratory fitness and physical functional capacity in obese patients with schizophrenia. *Schizophr Res.* 2011 3//;126:103-9.
36. LOE H, STEINSHAMN S, WISLØFF U. Cardio-Respiratory Reference Data in 4631 Healthy Men and Women 20-90 Years: The HUNT 3 Fitness Study. *PLoS One.* 2014;9:e113884.
37. VANCAMPFORT D, PROBST M, SCHEEWE T, KNAPEN J, DE HERDT A, DE HERT M. The functional exercise capacity is correlated with global functioning in patients with schizophrenia. *Acta Psychiatr Scand.* 2012;125:382-7.
38. VANCAMPFORT D, KNAPEN J, PROBST M, SCHEEWE T, REMANS S, DE HERT M. A systematic review of correlates of physical activity in patients with schizophrenia. *Acta Psychiatr Scand.* 2012;125:352-62.
39. MARZOLINI S, JENSEN B, MELVILLE P. Feasibility and effects of a group-based resistance and aerobic exercise program for individuals with severe schizophrenia: A multidisciplinary approach. *Mental Health and Physical Activity.* 2009 6//;2:29-36.
40. BEEBE LH, TIAN L, MORRIS N, GOODWIN A, ALLEN SS, KULDAU J. EFFECTS OF EXERCISE ON MENTAL AND PHYSICAL HEALTH PARAMETERS OF PERSONS WITH SCHIZOPHRENIA. *Issues Ment Health Nurs.* 2005 2005/01/01;26:661-76.
41. KIMHY D, VAKHRUSHEVA J, BARTELS MN, et al. Aerobic fitness and body mass index in individuals with schizophrenia: Implications for neurocognition and daily functioning. *Psychiatry Res.* 2014 12/30//;220:784-91.
42. DAUWAN M, BEGEMANN MJH, HERINGA SM, SOMMER IE. Exercise Improves Clinical Symptoms, Quality of Life, Global Functioning, and Depression in Schizophrenia: A Systematic Review and Meta-analysis. *Schizophr Bull.* 2016;42:588-99.
43. GOMES E, BASTOS T, PROBST M, RIBEIRO JC, SILVA G, CORREDEIRA R. Effects of a group physical activity program on physical fitness and quality of life in individuals with schizophrenia. *Mental Health and Physical Activity.* 2014 9//;7:155-62.
44. SLOAN RA, SAWADA SS, MARTIN CK, CHURCH T, BLAIR SN. Associations between Cardiorespiratory Fitness and Health-Related Quality of Life. *Health and Quality of Life Outcomes.* 2009 05/28;7:47-.
45. FRANQUELO-MORALES P, SÁNCHEZ-LÓPEZ M, NOTARIO-PACHECO B, et al. Association Between Health-Related Quality of Life, Obesity, Fitness, and Sleep Quality in Young Adults: The Cuenca Adult Study. *Behav Sleep Med.* 2016:1-11.

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The *Significant Outcomes* and the *Limitations* are placed immediately below the Abstract/Keywords.

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The *Summations* and *Considerations* are placed immediately below the Abstract/Keywords.

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One to two pages concluded by the subtitle *Aims of the Study* (3 to 5 lines without literature references and abbreviations).

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ISMAIL K. Unraveling the pathogenesis of the depression-diabetes link. In KATON W, MAJ, M, SATORIOUS N, eds. *Depression and diabetes*, Wiley-Blackwell, UK, 2010.

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## Appendix 2 – Approval from REK



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Vår referanse må oppgis ved alle henvendelser

Jørn Heggelund  
St.Olavs Hospital

### 2015/1611 Fysisk trening som langtidsbehandling for å redusere hjerte-karsykdom hos mennesker med Schizofreni

Forskningsansvarlig: St.Olavs Hospital  
Prosjektleder: Jørn Heggelund

Vi viser til søknad om forhåndsgodkjenning av ovennevnte forskningsprosjekt. Søknaden ble behandlet av Regional komité for medisinsk og helsefaglig forskningsetikk (REK sør-øst) i møtet 17.09.2015. Vurderingen er gjort med hjemmel i helseforskningsloven (hfl.) § 10, jf. forskningsetikkloven § 4.

#### Prosjektomtale

*Mennesker med schizofreni har dobbelt så høy risiko for å dø av hjerte-karsykdom (HK) og dør 15-25 år tidligere enn resten av befolkningen. Schizofreni medfører usunn livsstil, redusert fysisk form, redusert egenomsorg og vanskeligheter med å ivareta egen helse og funksjon i dagliglivet. Denne studien skal undersøke om nødvendig støtte til å delta og gjennomføre effektiv fysisk trening kan øke selvhjelpenhet, funksjon i dagliglivets aktiviteter og redusere HK-risiko hos mennesker med schizofreni. 60 deltakere med schizofreni blir «loddtrukket» til A: Fysisk trening og Motiverende Intervjusamtaler, oppfølging ved Treningssklinikken 2 ganger per uke i 12 måneder og støtte fra Trondheim Kommune, eller B: tradisjonell oppfølging fra primær- og spesialist helsetjenestene. Gjennom perioden undersøkes antall treningsøkter, utholdenhet, muskelstyrke, gangfunksjon, risikofaktorer for HK, kognitive ferdigheter, funksjon i dagliglivets aktiviteter og bruk av helsetjenester.*

#### Vurdering

Utvalget i denne studien består av mennesker med schizofreni, og søker angir i forbindelse med samtykkeinnhenting: *Samtykke innhentes fra alle deltakere i studien. Gruppen vurderes generelt som samtykkekompetente, men samtykkekompetanse vurderes individuelt ved inklusjon.*

Komiteen legger denne inklusjonsbeskrivelsen til grunn, men antar også at vurdering av samtykkekompetanse vil være en kontinuerlig prosess i dette prosjektet. All den tid studien omfatter langvarig oppfølging og treningsintervensjon, er det grunn til å tro at samtykkekompetansen kan variere underveis. Det forutsettes dermed at prosjektgruppen har høy oppmerksomhet på dette aspektet, særlig med tanke på akutt fase/forverring av sykdom.

Søknaden består – slik komiteen leser den – av to ulike aspekter. På den ene siden dreier søknaden seg om den intervensjonsstudien som skal gjennomføres. På den andre siden dreier søknaden seg om det formaliserte samarbeidet med TOP-studien, her gjennom inklusjon til det som omtales som «TOP-minstepakke». Det er utarbeidet separate informasjonsskriv og samtykkeerklæringer til de to delene.

---

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Kindly address all mail and e-mails to the Regional Ethics Committee, REK sør-øst, not to individual staff



Komiteen mener likevel at det informasjonsskrivet som viser til «TOP-minstepakke», i liten grad reflekterer at TOP-studien drives og utgår fra Oslo universitetssykehus. Slik innholdet i skrivet nå er utformet, og dels fordi logoen til NTNU preger skrivet, gis det inntrykk av at studien foregår ved St. Olavs Hospital. Det bes derfor om at institusjonell tilhørighet og samarbeid mellom institusjonene, fremkommer noe tydeligere av skrivet.

Komiteen gjør videre oppmerksom på at *TOP-minstepakke* har egen REK-godkjenning og behandlingsgrunnlag (REK-ref. 2013/1727). Tidsavgrensningen for denne søknaden forholder seg således ikke til tidsavgrensningen til *TOP-minstepakke*.

Flere steder i søknaden refereres det til samarbeid med tilsvarende studier i Bergen og Vestfold, og det angis at det vil bli gjort forsøk på å sammenstille data mellom de pågående prosjektene. I motsetning til samarbeidet med TOP-studien, er ikke samarbeidet med Haukeland og Sykehuset i Vestfold konkretisert i særlig grad. Det planlagte datasamarbeidet er således ikke realitetsbehandlet i denne omgang.

Dersom samarbeid mellom den her omsøkte studien, og studiene i Bergen og Vestfold, blir aktuelt, vil dette kreve en prosjektendringssøknad i henhold til helseforskningslovens § 11.

#### **Forskningsbiobank og samtykke**

Humant biologisk materiale fra prosjektet – herunder den delen som er knyttet til TOP-minstepakke – vil oppbevares i *Regional forskningsbiobank Midt-Norge*.

*Regional forskningsbiobank Midt-Norge* er en generell forskningsbiobank, men det er de avgitte samtykkene som hjemler bruken av materialet i dette prosjektet. Disse samtykkene er klare på hva deltakerne avgir prøver til, og hva formålet med prøvene er.

Komiteen understreker med dette at deltakerne således ikke har avgitt et *bredt* samtykke til bruk av humant biologisk materiale.

Ut fra dette setter komiteen følgende vilkår for prosjektet:

1. Vurdering av samtykkekompetanse skal gjøres kontinuerlig underveis i prosjektet.
2. Informasjonsskrivet til deltakelse i *TOP-minstepakke* skal revideres i tråd med det ovennevnte.

#### **Vedtak**

Prosjektet godkjennes under forutsetning av at ovennevnte vilkår oppfylles, jf. helseforskningslovens §§ 9 og 33.

I tillegg til vilkår som fremgår av dette vedtaket, er tillatelsen gitt under forutsetning av at prosjektet gjennomføres slik det er beskrevet i søknaden og protokollen, og de bestemmelser som følger av helseforskningsloven med forskrifter.

Tillatelsen gjelder til 31.12.2035. Av dokumentasjonshensyn skal prosjektopplysningene likevel bevares inntil 31.12.2040. Opplysningene skal lagres aidentifisert, dvs. atskilt i en nøkkel- og en opplysningsfil. Opplysningene skal deretter slettes eller anonymiseres, senest innen et halvt år fra denne dato.

Komiteens avgjørelse var enstemmig.

#### *Sluttmelding og søknad om prosjektendring*

Prosjektleder skal sende sluttmelding til REK sør-øst på eget skjema senest 05.02.2036, jf. hfl. § 12. Prosjektleder skal sende søknad om prosjektendring til REK sør-øst dersom det skal gjøres vesentlige endringer i forhold til de opplysninger som er gitt i søknaden, jf. hfl. § 11.

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Du kan klage på komiteens vedtak, jf. forvaltningsloven § 28 flg. Klagen sendes til REK sør-øst. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK sør-øst, sendes

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## Appendix 3 – Declaration of consent Lexus project

### Forespørsel om deltakelse i forskningsprosjektet

#### *”Fysisk trening som langtidsbehandling for å redusere hjerte-karsykdom hos mennesker med Schizofreni”*

#### Bakgrunn og hensikt

Dette er et spørsmål til deg om å delta i en forskningsstudie som vil undersøke om regelmessig styrke- og utholdenhetstrening kan hjelpe mennesker med alvorlig psykisk lidelse til bedre helse. Hensikten med studien er å undersøke om fysisk trening kan gjennomføres regelmessig i 1 år og om behandlingen reduserer risikoen for Hjerte-karsykdom og bedre funksjonsnivå i dagliglivets aktiviteter. Det er St. Olavs Hospital som er ansvarlig for studien.

#### Hva innebærer studien?

Studien vil undersøke effekten av 1 år trening ved Treningsklinikken sammenlignet med effekten av den tradisjonelle oppfølgingen som mennesker med alvorlig psykisk lidelse får fra kommune og sykehus. Halvparten av deltakerne vil delta i treningsgruppen. Den andre halvparten fortsetter med tradisjonell oppfølging men deltar på testene som inngår i studien. Etter at du har samtykket til å delta i studien vil det «trekkes lodd» for å avgjøre hvilken gruppe du skal delta i. Alle deltakerne får før oppstart en legeundersøkelse for å undersøke helsetilstand og for å vurdere om du kan delta i studien. Ved oppstart og underveis i studien testes utholdenhet, styrke og aktivitetsnivå. Vi ønsker også å ta blodprøver for å undersøke risikofaktorer for hjerte- og karsykdom. Noen undersøkelser vil være spørreskjema og intervju. I tillegg vil det samles inn informasjon fra journalene om hvor mye helsetjenester du får fra kommunen og sykehuset. Som deltaker får hjelp til å planlegge å gjennomføre avtaler som inngår i studien. Undersøkelser honoreres.

#### Mulige fordeler og ulemper

En fordel med studien er at alle deltakere får oppfølging og vurdering av sin fysiske form og helse. Deltakerne i treningsgruppen får i tillegg støtte og hjelp til å møte opp til og gjennomføre trening. Man vil tilegne seg kunnskap om trening og helsegevinster. Det er ingen kjente ulemper ved å delta studien.

#### Hva skjer med prøvene og informasjonen om deg?

Prøvene tatt av deg og informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene og prøvene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger og prøver gjennom en navneliste. Det er kun autorisert personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg. Videre ber vi om å få innhente og sammenkople med relevante opplysninger fra sykehusets journal (Doculive) og besøksregistrering (PAS) og kommunens journal (Geric). Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

### **Frivillig deltakelse**

Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser for din videre behandling. Dersom du ønsker å delta, undertegner du samtykkeerklæringen på siste side. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at det påvirker din øvrige behandling. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Jørn Heggelund telefonnummer 72 82 30 28.

**Ytterligere informasjon om studien finnes i kapittel A – utdypende forklaring av hva studien innebærer.**

**Ytterligere informasjon om biobank, personvern og forsikring finnes i kapittel B – Personvern, biobank, økonomi og forsikring.**

**Samtykkeerklæring følger etter kapittel B.**

## **Kapittel A- utdypende forklaring av hva studien innebærer**

Mennesker med schizofreni har økt risiko for å dø av hjerte-kar sykdom og vanskeligheter med å delta i samfunnets dagligdagse aktiviteter. God utholdenhet og muskelstyrke forbindes derimot med lav risiko for hjerte-kar sykdom og god kapasitet til å delta i dagligdagse fysiske gjøremål. Mennesker med schizofreni sliter ofte med å komme i gang med og opprettholde regelmessig trening. Vi vil derfor undersøke om regelmessig effektiv trening og oppmøtehjelp vil hjelpe mennesker med schizofreni til å trene regelmessig, redusere risiko for hjerte-karsykdom og øke kapasiteten til å delta i dagligdagse aktiviteter.

For å delta i studien må man være mellom 18 og 65 år og ha alvorlig psykisk lidelse.

I treningsperioden på 1 år vil deltakerne i treningsgruppen få faste treningsavtaler 2 ganger per uke. Det er deltakers ansvar å møte til planlagte avtaler. Hvis man blir forhindret i å delta ønsker vi at du gi beskjed til Treningsklinikken og forsøker å finne et nytt avtaletidspunkt.

Undersøkelser vil bli gjennomført før oppstart, etter 12 uker, 6 måneder, 12 måneder og 2 år etter oppstart. Undersøkelsene er fysiske tester på treningsklinikken (utholdenhet, styrke og gangfunksjon), risikofaktorer for hjertekarsykdom, funksjon i dagliglivets aktiviteter. Noen undersøkelser vil bli gjennomført i forbindelse med treningsøktene eller ved eget oppmøte. Testmetodene er spørreskjema og intervju, testbaserte undersøkelser eller observasjon og blodprøver. I tillegg innhentes informasjon om mottak av helsetjenester og behandling for aktuell lidelse fra journal.

Som ledd i dette prosjektet ønsker vi å få samle blod og arvestoff fra deg i en biobank med biologisk materiale og opplysninger fra dette fra et stort antall pasienter for å undersøke om det er noen sammenheng mellom arvestoff og din lidelse og hvordan behandlingen fungerer. Dette gjøres på hele gruppen av pasienter, og



arvestoffundersøkelsen kan ikke si noe om din lidelse for deg personlig. For å oppnå hensikten med studien, er det nødvendig å hente informasjon fra et stort antall deltakere. Dette er tidkrevende slik at prosjektet varer over flere år.

Du vil få et gavekort på inntil kr 500.- i kompensasjon for tapt arbeidsfortjeneste og reise- og oppholdsutgifter i forbindelse med undersøkelse.

## **Kapittel B - Personvern, biobank, økonomi og forsikring**

### **Personvern**

Opplysninger som registreres om deg er fra fysiske tester ved Treningsklinikken, intervju, spørreskjema og blodprøver. Vi vil også hente inn relevant informasjon i journal der du er blitt behandlet for aktuell sykdom. St Olavs Hospital ved administrerende direktør er databehandlingsansvarlig.

### **Biobank**

Blodprøvene som blir tatt vil bli lagret i en forskningsbiobank ved St. Olavs Hospital. Hvis du sier ja til å delta i studien, gir du også samtykke til at det biologiske materialet og analyseresultater inngår i biobanken. Cüneyt Güzey er ansvarshavende for forskningsbiobanken. Det biologiske materialet kan bare brukes etter godkjenning fra Regional komité for medisinsk og helsefaglig forskningsetikk (REK). Biobanken planlegges å vare til 2035. Etter dette vil opplysningene bli destruert og slettet etter interne retningslinjer.

### **Utlevering av materiale og opplysninger til andre**

Hvis du sier ja til å delta i studien, gir du også ditt samtykke til at prøver og aidentifiserte opplysninger utleveres til våre samarbeidspartnere ved Norges teknisk-naturvitenskapelige universitet (NTNU), Sykehuset i Vestfold og Haukeland Universitetssykehus.

### **Rett til innsyn og sletting av opplysninger om deg og sletting av prøver**

Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigeret eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede prøver og opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

### **Økonomi og Helsedirektoratets rolle**

Studien er finansiert gjennom midler fra Helsedirektoratet, St. Olavs Hospital og Trondheim Kommune. De har ingen økonomiske interesser i forskningsresultatene.

### **Forsikring**

Ordinær pasientskadeerstatning er gjeldende

## Informasjon om utfallet av studien

Resultatene av studien vil bli publisert i vitenskapelige tidsskrift. Deltakere vil få et skriftlig sammendrag av resultatene. Ellers kan man få informasjon gjennom kontakt med prosjektleder.

## Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

-----  
(Signert av prosjektdeltaker, dato)

Jeg bekrefter å ha gitt informasjon om studien

-----  
(Signert, rolle i studien, dato)

## Appendix 4 – The specific level of functioning assessment scale

### THE SPECIFIC LEVEL OF FUNCTIONING ASSESSMENT SCALE (SLOF) (Schneider & Struening, 1983)

Sett kryss ved det tallet som best beskriver denne personens vanlige funksjonsnivå på hvert spørsmål som er listet nedenfor. Vær så nøyaktig du greier. Hvis du er usikker, spør noen som kan ha kunnskap eller se i journal. Sett kun ett kryss ved hvert spørsmål og besvar alle spørsmålene.

Navn utfyller:  
Utfyllers yrkestittel:  
Dato for utfylling:

**Brukerinformasjon:**  
Navn bruker:  
Personnr:  
Fødselsdato:  
Kjønn: Mann  Kvinne

**På de følgende sidene vil du bli spurt om å ta noen avgjørelser om denne personens ferdigheter og evner.**

Svarene dine bør reflektere det som har vært mest typisk i løpet av den siste uken mesteparten av tiden. Baser svarene dine på hvordan personer med tilsvarende alder, kjønn, og bakgrunn mestrer disse aktivitetene i dagliglivet.

Sett **ett** kryss i den ruten du mener passer best for hvert spørsmål/tema.

**IVARETAKELSE AV SEG SELV**

<b>A. Fysisk funksjon</b>	Ingen vansker	Noe vansker, men ingen reduksjon av funksjon	Reduserer funksjon noe	Begrenser funksjon betydelig	Hindrer funksjon
	5	4	3	2	1
1.Syn					
2. Hørsel					
3. Talevansker					
4. Gangvansker					
5. Bruk av hender og armer					

<b>B. Personlig stell</b>	Selvhjulpen	Trenger muntlig rettleiding	Trenger noe praktisk assistanse	Trenger mye hjelp	Helt avhengig av hjelp
	5	4	3	2	1
6. Gå på toalettet (Bruk av toalett og renslighet)					
7. Spise selv (bruk av bestikk og spiseadferd)					
8. Personlig hygiene (kroppsvask og tannstell)					
9. Påkledning (valg av passende klær og påkledning)					
10. Utseende (hår, make-up, generelt inntrykk)					
11. Ta vare på eiendeler					
12. Ta vare på bolig					

## SOSIAL FUNKSJON

<b>C. Interpersonlige forhold</b>	Beskriver personen veldig godt	Beskriver personen godt	Beskriver personen noe	Beskriver personen i liten grad	Beskriver ikke personen
	5	4	3	2	1
13. Tolererer kontakt med andre (trekker seg ikke tilbake eller går unna)					
14. Tar initiativ til kontakt med andre					
15. Kommuniserer godt (tale og kroppsspråk er forståelig og meningsfull)					
16. Deltar i aktiviteter uten påminning					
17. Deltar i gruppeaktiviteter					
18. Knytter og opprettholder vennskap					
19. Spør om hjelp ved behov					

<b>D. Sosialt passende oppførsel</b>	<b>Aldri</b>	<b>Sjelden</b>	<b>Noen ganger</b>	<b>Ofte</b>	<b>Alltid</b>
	5	4	3	2	1
20. Angriper andre verbalt					
21. Angriper andre fysisk					
22. Ødelegger gjenstander					
23. Skader seg selv					
24. Er klengende, gråtende og engstelig					
25. Tar andres eiendeler					
26. Utfører gjentatte formålsløse handlinger (vandring, vugging, lager lyder, etc)					

**FERDIGHETER I FORHOLD TIL DAGLIGE AKTIVITETER**

<b>E. Aktiviteter</b>	<b>Selvhelpen</b>	<b>Trenger muntlig rettleiding</b>	<b>Trenger noe praktisk assistanse</b>	<b>Trenger mye hjelp</b>	<b>Helt avhengig av hjelp</b>
	5	4	3	2	1
27. Husarbeid (rengjøring, matlaging, klesvask, etc)					
28. Innkjøp (Velge varer, velge butikker, betale ved kassen)					
29. Holde orden på egen økonomi (budsjett, betale regninger)					
30. Bruke telefon (Finne nummer, ringe, snakke, lytte)					
31. Bevege seg utenfor hjemmet uten å gå seg bort					
32. Bruk av offentlig transport (velge rute, bruke rutetabell, betale, gjøre rutebytter)					
33. Fritidsaktiviteter (lesing, besøke venner, høre på musikk, etc)					
34. Oppdage og unngå vanlige faresituasjoner (trafikk sikkerhet, brannsikkerhet etc)					
35. Medisinbruk (forstå hensikt, ta medisin som foreskrevet, gjenkjenne bivirkninger)					
36. Bruk av helsetjenester og andre offentlige tjenester (vite når og hvordan)					
37. Lesing, skriving, og regning (nok til daglig behov)					

<b>F. Arbeidsfunksjon</b>	Beskriver personen veldig godt	Beskriver personen godt	Beskriver personen noe	Beskriver personen i liten grad	Beskriver ikke personen
	5	4	3	2	1
38. Har arbeidsferdigheter					
39. Kan jobbe selvstendig					
40. Opprettholde arbeidsinnsats (holde fokus, tåler arbeidspress)					
41. Møter i rett tid til avtaler					
42. Følger godt muntlige instruksjoner					
43. Fullfører pålagte oppgaver					

#### ANNEN INFORMASJON

44. Ut fra din kjennskap om denne personen, er det andre ferdigheter eller problemer som ikke er dekket av dette skjemaet som er viktige for denne personens evne til å fungere selvstendig? Hvis ja, vennligst spesifiser

---



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45. Hvor godt kjenner du ferdighetene og adferden til personen du nettopp har gitt informasjon om? (Kryss i EN av boksene)

Svært godt

Ganske godt

Lite kunnskap

5

4

3

2

1

46. Har du diskutert utfyllingen av dette skjemaet med personen det gjelder? (Kryss av i EN av boksene)

Ja

Nei

Hvis ja, er personen enig i vurderingen? (Kryss av i EN av boksene)

Ja

Nei

Hvis nei, vennligst kommenter her:

---

Utfyllers signatur \_\_\_\_\_

## Appendix 5 – SF-36

### Spørsmål om helse

INSTRUKSJON: Dette spørreskjemaet handler om hvordan du ser på din egen helse. Disse opplysningene vil hjelpe oss til å få vite hvordan du har det og hvordan du er i stand til å utføre dine daglige gjøremål.

Hvert spørsmål skal besvares ved å sette en ring rundt det tallet som passer best for deg. Hvis du er usikker på hva du skal svare, vennligst svar så godt du kan.

1. Stort sett, vil du si at din helse er: (sett ring rundt ett tall)

Utmerket .....	1
Meget god .....	2
God.....	3
Nokså god .....	4
Dårlig .....	5

2. Sammenlignet med for ett år siden, hvordan vil du si at din helse stort sett er nå? (sett ring rundt ett tall)

Mye bedre nå enn for ett år siden.....	1
Litt bedre nå enn for ett år siden.....	2
Omtrent den samme som for ett år siden .....	3
Litt dårligere nå enn for ett år siden.....	4
Mye dårligere nå enn for ett år siden .....	5



3-12 De neste spørsmålene handler om aktiviteter som du kanskje utfører i løpet av en vanlig dag. Er din helse slik at den begrenser deg i utførelsen av disse aktivitetene nå? Hvis ja, hvor mye?

(sett ring rundt ett tall på hver linje)

<u>AKTIVITETER</u>	Ja, begrenser meg mye	Ja, begrenser meg litt	Nei, begrenser meg ikke i det hele tatt
3. Anstrengende aktiviteter som å løpe, løfte tunge gjenstander, delta i anstrengende idrett	1	2	3
4. Moderate aktiviteter som å flytte et bord, støvsuge, gå en tur eller drive med hagearbeid	1	2	3
5. Løfte eller bære en handlekurv	1	2	3
6. Gå opp trappen flere etasjer	1	2	3
7. Gå opp trappen en etasje	1	2	3
8. Bøye deg eller sitte på huk	1	2	3
9. Gå mer enn to kilometer	1	2	3
10. Gå noen hundre meter	1	2	3
11. Gå hundre meter	1	2	3
12. Vaske deg eller kle på deg	1	2	3

13-16 I løpet av de siste 4 ukene, har du hatt noen av de følgende problemer i ditt arbeid eller i andre av dine daglige gjøremål på grunn av din fysiske helse?

(sett ring

rundt et tall på hver linje)

	JA	NEI
13. Du har måttet redusere tiden du har brukt på arbeid eller på andre gjøremål	1	2
14. Du har utrettet mindre enn du hadde ønsket	1	2
15. Du har vært hindret i å utføre visse typer arbeid eller gjøremål	1	2
16. Du har hatt problemer med å gjennomføre arbeidet eller andre gjøremål ( f.eks. fordi det krevde ekstra anstrengelser)	1	2

17-19 I løpet av de siste 4 ukene, har du hatt noen av de følgende problemer i ditt arbeid eller i andre av dine daglige gjøremål på grunn av følelsesmessige problemer ( som f.eks. å være deprimert eller engstelig)

( sett ring rundt ett tall på hver

linje)

	JA	NEI
17. Du har måttet redusere tiden du har brukt på arbeid eller på andre gjøremål	1	2
18. Du har utrettet mindre enn du hadde ønsket	1	2
19. Du har utført arbeidet eller andre gjøremål mindre grundig enn vanlig	1	2

20. I løpet av de siste 4 ukene, i hvilken grad har din fysiske helse eller følelsesmessige problemer hatt innvirkning på din vanlige sosiale omgang med familie, venner, naboer eller foreninger?

(sett ring rundt ett

tall)

Ikke i det hele tatt.....	1
Litt.....	2
Endel.....	3
Mye.....	4
Svært mye.....	5

21. Hvor sterke kroppslige smerter har du hatt i løpet av de siste 4 ukene?

(sett ring rundt ett

tall)

Ingen.....	1
Meget svake.....	2
Svake.....	3
Moderate.....	4
Sterke.....	5
Meget sterke.....	6

22. I løpet av de siste 4 ukene, hvor mye har smerter påvirket ditt vanlige arbeid (gjelder både arbeid utenfor hjemmet og husarbeid)?

(sett ring rundt ett

tall)

Ikke i det hele tatt.....	1
Litt.....	2
Endel.....	3
Mye.....	4
Svært mye.....	5

23-32. De neste spørsmålene handler om hvordan du har følt deg og hvordan du har hatt det de siste 4 ukene. For hvert spørsmål, vennligst velg det svaralternativet som best beskriver hvordan du har hatt det. Hvor ofte i løpet av de siste 4 ukene har du:

(sett ring rundt ett tall på hver linje)

	Hele tiden	Nesten hele tiden	Mye av tiden	Endel av tiden	Litt av tiden	Ikke i det hele tatt
23. Følt deg full av tiltakslyst?	1	2	3	4	5	6
24. Følt deg veldig nervøs?	1	2	3	4	5	6
25. Vært så langt nede at ingenting har kunnet muntre deg opp?	1	2	3	4	5	6
26. Følt deg rolig og harmonisk?	1	2	3	4	5	6
27. Hatt mye overskudd?	1	2	3	4	5	6
28. Følt deg nedfor og trist?	1	2	3	4	5	6
29. Følt deg sliten?	1	2	3	4	5	6
30. Følt deg glad?	1	2	3	4	5	6
31. Følt deg trett?	1	2	3	4	5	6

32. I løpet av **de siste 4 ukene**, hvor mye av tiden har din **fysiske helse eller følelsesmessige problemer** påvirket din sosiale omgang ( som det å besøke venner, slektninger osv.)?

tall)

(sett ring rundt ett

Hele tiden.....	1
Nesten hele tiden.....	2
Endel av tiden.....	3
Litt av tiden.....	4
Ikke i det hele tatt.....	5

33-36. Hvor RIKTIG eller GAL er hver av de følgende påstander for deg?

( sett ring rundt ett tall på hver linje)

	Helt riktig	Delvis riktig	Vet ikke	Delvis gal	Helt gal
33. Det virker som om jeg blir syk litt lettere enn andre	1	2	3	4	5
34. Jeg er like frisk som de fleste jeg kjenner	1	2	3	4	5
35. Jeg tror at helsen min vil forverres	1	2	3	4	5
36. Jeg har utmerket helse	1	2	3	4	5

## Appendix 6 – UPSA-B

### UPSA-B-N RÅSKÅRESKJEMA

	RESPONS:	SKÅRE:
<b>IA. FINANS</b>		
Telle penger og utregning av vekslpenger		Riktig (1 poeng) Feil (0 poeng)
Kr 51.50 (i mynter)	_____	_____
Kr 362.50	_____	_____
Kr 133.00	_____	_____
		Riktig (2 poeng) Feil (0 poeng)
Veksel fra kr 100 (kr 35.50)	_____	_____
<b>IB. FINANS</b>		
Betaling av regning:		Riktig (1 poeng) Feil (0 poeng)
Firma	_____	_____
Hvor mye	_____	_____
Sum brukt på SMS	_____	_____
Betalingsfrist	_____	_____
Sum betales høyere enn total bruk	_____	_____
-Mva/ Faste avgifter	_____	_____
Kontonummer	_____	_____
<b>Total skåre:</b>	_____	

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RESPONS:

SKÅRE:

**2. KOMMUNIKASJON**

Riktig (1 poeng)  
Feil (0 poeng)

Ring Nødnummer #	_____	_____
Ring Opplysningen #	_____	_____
Berit Johansen, Nærstad	_____	_____
Ring # 432 85 497	_____	_____
Ring # fra brev 23 54 67 99	_____	_____
Bytt avtale:		
-Eget navn	_____	_____
-Tidspkt. opprinnelig time	_____	_____
-Tidspkt. påfølgende dag	_____	_____
-Tlf.nr hvor du kan nåes	_____	_____
Ta med til legetime:		
-Henvisning	_____	_____
-Liste over medisiner	_____	_____
Faste før blodprøve	_____	_____

**Total skåre:** \_\_\_\_\_

**UPSA-B-N sumskåre, kun de første to moduler (0-100):** \_\_\_\_\_

(Se utregning side 18)