

# **Vocational Rehabilitation for Individuals with Schizophrenia: The Societal Case**

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## **Doctoral Thesis**

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## List of papers

The present thesis is based upon the papers listed below.

Paper 1

**Prevalence, employment rate, and cost of schizophrenia in a high-income welfare society: A population-based study using comprehensive health and welfare registers.**

Stig Evensen, Torbjørn Wisløff, June Ullevoldsæter Lystad, Helen Bull, Torill Ueland, Erik Falkum.

Schizophrenia Bulletin 42:476-83, 2016

Paper 2

**Employment outcome and predictors of competitive employment at two-year follow-up of a vocational rehabilitation programme for individuals with schizophrenia in a high-income welfare society**

Stig Evensen, Torill Ueland, June Ullevoldsæter Lystad, Helen Bull, Ole Klungsøyr, Egil W. Martinsen, Erik Falkum.

Nordic Journal of Psychiatry, 2016, Oct 24:1-8.

Paper 3

**Cost-effectiveness of a vocational rehabilitation programme in a high-income welfare society**

Stig Evensen, Torbjørn Wisløff, June Ullevoldsæter Lystad, Helen Bull, Egil W. Martinsen, Torill Ueland, Erik Falkum.

Submitted





## Summary

Employment is an important factor in recovery for individuals with schizophrenia. The illness is, however, associated with consistently high unemployment rates. The high unemployment in this group is found to be associated with a number of both illness-related barriers and system-related barriers to employment.

The main aim of this thesis was to further investigate the barriers to employment in participants with broad schizophrenia spectrum disorders in Norway, a high-income Scandinavian welfare-society, and the societal consequences of a vocational rehabilitation programme augmented with cognitive remediation (CR) or cognitive behaviour therapy (CBT). Results from Paper I revealed a lower than expected prevalence of individuals treated for schizophrenia (0.17%) using comprehensive and mandatory health and welfare registers. Low employment rates and high societal costs were also found. Lost productivity due to unemployment and high costs associated with inpatient care were the main causes of the high societal costs.

Paper II found that at two-year follow-up of the Job Management Programme (JUMP) study, 21% of the participants had obtained competitive employment and 16% had wages as their primary income. An additional 25% had work placements in competitive workplaces where the social services paid their income. We found that high global functioning and self-esteem were strongly associated with competitive employment outcome, and low baseline odds of employment can be compensated for by improvements in global functioning and self-esteem. Competitive employment outcome was also associated with increased global functioning and higher self-esteem.

In Paper III, the cost-effectiveness of the JUMP was examined. We compared health and welfare service costs during the two-year follow-up period with the two-year period prior to inclusion in the programme and found significant reductions in inpatient care. We compared the cost-effectiveness between the JUMP group and a treatment as usual (TAU) group and found that inclusive of the JUMP intervention costs the treatment costs in the JUMP group were € 7 949 lower than in the TAU group, adjusted for baseline differences. In addition the JUMP group had higher effect in terms of quality adjusted life years, making it a cost-

effective intervention compared to normal care. Finally we found that the CBT group was more cost-effective than the CR group in the JUMP study.

These results confirm that the total burden of schizophrenia is significant, both for the afflicted individuals but also for society at large. We found that Norway has a higher density of inpatient services than most countries within the Organisation for Economic Co-operation and Development (OECD), and consequently a higher expenditure on mental health services. Although Norway is allocating more resources on mental health services than many comparable countries, this does not necessarily generate recovery in patients with schizophrenia, with employment rates as low as 10%. Despite many of the participants having global functioning scores in a range where employment would be expected at baseline, they did not work, indicating that external barriers to employment play an important role. Further investigation are indicated to explore these barriers including how services earmarked for assisting individuals with schizophrenia obtain employment are being integrated. Based on our results, the JUMP was not only effective in helping individuals obtain employment, but it was also an effective treatment approach resulting in larger reductions in treatment costs compared to TAU.

## **Abbreviations**

CBT	Cognitive Behavioural Therapy
CDSS	Calgary Depression Scale
COI	Cost of Illness
CR	Cognitive Remediation
DDD	Defined Daily Dose
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders – IV
GAF	Global Assessment of Function
GLM	Generalized Linear Model
ICER	Incremental Cost-Effectiveness Ratio
IPS	Individual Placement and Support
JUMP	Job Management Programme
NAV	Norwegian Labour and Welfare Administration
OECD	The Organisation for Economic Co-operation and Development
QALY	Quality Adjusted Life Years
RSE	Rosenberg Self-Esteem Scale
SE	Supported Employment
SPSS	Statistical Package for the Social Sciences
TAU	Treatment as Usual
VR	Vocational Rehabilitation



## 1. Introduction

*“As a young woman, I was in a psychiatric hospital on three different occasions for lengthy periods. My doctors diagnosed me with chronic schizophrenia, and gave me a prognosis of “grave.” That is, at best, I was expected to live in a board and care, and work at menial jobs. Fortunately, I did not actually enact that grave prognosis. Instead, I’m a chaired Professor of Law, Psychology and Psychiatry at the USC Gould School of Law, I have many close friends and I have a beloved husband”*

Dr. Elyn Saks, Professor of Law, Psychology, Psychiatry and the Behavioural Sciences  
University of Southern California Law School

Although she had experienced several symptoms of mental illness from a very young age, it was not until she started to study at university that Elyn Saks had her first admission to a psychiatric hospital, with a full-blown psychotic episode with terrifying suicidal fantasies and hallucinations. Later, while studying at Yale Law School she had a breakdown that left her singing on the roof of the library at midnight. She was taken to the emergency room where she was detained in a psychiatric ward for the next five months and given a poor prognosis. During most of her adult life she experienced psychotic symptoms but managed to pursue her academic career. She puts her own success down to three important factors:

*“Everything about this illness says I shouldn't be here, but I am. And I am, I think, for three reasons: First, I've had excellent treatment. Second, I have many close family members and friends who know me and know my illness. These relationships have given my life a meaning and a depth, and they also helped me navigate my life in the face of symptoms. Third, I work at an enormously supportive workplace at USC Law School. This is a place that not only accommodates my needs but actually embraces them. It's also a very intellectually stimulating place, and occupying my mind with complex problems has been my best and most powerful and most reliable defence against my mental illness” (Saks, 2012).*

The idea of work being beneficial in recovery from mental illnesses is not new. Several reports from the era before the availability of antipsychotic medications describe the rehabilitative benefits of work for individuals with mental illnesses (BRIGGS, 1918; Brigham, 1847). When medication and deinstitutionalisation were introduced in the second half of the 20<sup>th</sup> century, however, there was a shift in attitude, whereby persons with mental illness were considered not able to work or that they should not work (Killackey, 2015). There were still,

however, some reports of positive effects from work on the outcome from schizophrenia during this period (Brown, Carstairs, & Topping, 1958). From the 1990's onwards there has been a growing interest in studying the effects of employment on mental illness, and a number of studies have found associations with self-confidence, stress management, self-sufficiency, self-esteem, recovery and symptom remission as well as improved quality of life and lower relapse rates (Bush, Drake, Xie, McHugo, & Haslett, 2009; Dunn, Wewiorski, & Rogers, 2008; Krupa, 2004; McGurk, Mueser, Feldman, Wolfe, & Pascaris, 2007; Schennach, Musil, Moller, & Riedel, 2012; Ucock, Gorwood, & Karadayi, 2012). Despite strong evidence of positive effects from employment on mental health problems, it appears employment is still not sufficiently recognised as an integrated part of rehabilitation services for individuals with schizophrenia (Berge & Falkum, 2013). Thus estimates of the employment rates are consistently low, ranging from 6% to 20% for competitive employment and up to 39% when a broader definition of work is used (Davidson et al., 2015; Jonsdottir & Waghorn, 2015; Owen, Sawa, & Mortensen, 2016).

Unemployment amongst individuals with schizophrenia generates a significant burden, both for the individual and society at large with lost productivity being the main contributing factor to the overall societal cost of the illness (Chong et al., 2016; Cloutier et al., 2016; Owen et al., 2016). An important area of research has been to develop effective vocational rehabilitation (VR) programs for this demographic group. It has been frequently reported that individuals' success of obtaining and maintaining employment is dependent upon the interplay between illness-related and system-related barriers to employment, and by the level of support provided in order to overcome these barriers.

In terms of internal factors impacting employment, strong associations have been established between functional outcome and neurocognition, psychotic symptoms, comorbid mood- or anxiety disorders and social impairments in individuals with schizophrenia (Buckley, Miller, Lehrer, & Castle, 2009; Haro et al., 2015; Jordan et al., 2014; Tsang, Leung, Chung, Bell, & Cheung, 2010). These factors can be targeted through psychosocial interventions such as cognitive remediation (CR) and cognitive behaviour therapy (CBT). Cognitive remediation consists of interventions geared at improving or compensate for impaired neurocognitive functioning (Harvey & Bowie, 2012). CR appears most useful when accompanied with VR as this enables participants to apply their skills in a functional real-world setting (McGurk et al., 2007). Cognitive behaviour therapy is a solution-focused therapy oriented towards solving

problems and learning skills. The evidence of CBT being effective in improving symptom severity and general functioning is comprehensive (Nordentoft & Austin, 2014; Rector & Beck, 2001; Tarrrier & Wykes, 2004). The CBT intervention has received less focus in terms of improving occupational functioning, but recent studies display promising results (Lecomte, Corbiere, & Lysaker, 2014; Lecomte, Corbiere, Simard, & Leclerc, 2014; Lysaker, Davis, Bryson, & Bell, 2009; Reme, Grasdal, Lovvik, Lie, & Overland, 2015).

Several external barriers to employment for individuals with schizophrenia are frequently reported. These include stigma (Baldwin, 2016) and fragmented health and welfare services where work or education is not a goal for treatment (Bevan, Steadman, Taskila, Thomas, & Moise, 2013; OECD, 2013b), and limited access to VR or supported employment services (Bond & Drake, 2008).

This thesis takes the perspective of the decision maker as it aims to investigate the societal implications of vocational rehabilitation for individuals with schizophrenia spectrum disorders in Norway, a Scandinavian high-income welfare society. The first aim of this thesis was to examine the prevalence, employment rate and total costs of schizophrenia in Norway. The thesis further aims to examine the employment outcome and cost-effectiveness of CR or CBT-augmented vocational rehabilitation.

## **1.1 The evolution of the diagnostic concept of schizophrenia**

A range of definitions have been used throughout history to describe what the term psychosis means. Some define psychosis narrowly by restricting it to distorted perceptions of reality through hallucinations or delusional thoughts with limited or lack of insight into the pathological nature of the condition. Less restrictive definitions include hallucinations that the individual recognises as pathological. Broader definitions also include symptoms like disorganised speech and catatonic or disorganised behaviour (van Os & Kapur, 2009).

During the second half of the 19<sup>th</sup> century various descriptions emerged of disorders with unknown causes. These disorders generally affected young people, and often became long-term health issues (A. Jablensky, 2010). Based on his longitudinal observations of patients with concomitant severe cognitive and neurological decline, Emil Kraepelin proposed a diagnostic category called “dementia praecox,”(Kraepelin, 1919). Kraepelin’s concept of dementia praecox was modified by Eugen Bleuler who found from his research that some

individuals did not progress into the “terminal state” of deterioration which Kraepelin had considered to be the hallmark of this disease (A. Jablensky, 2010). Bleuler replaced “dementia praecox” with the term “schizophrenia” and stated that schizophrenia “*is not a disease in the strict sense, but appears to be a group of diseases [ ...] Therefore we should speak of schizophrenias in the plural*” (Bleuler, 1950). Bleuler made a distinction between *basic* and *accessory* symptoms of the disorder, which still influence contemporary definitions of psychosis today (Tandon, Nasrallah, & Keshavan, 2009). The basic symptoms included disorganised thoughts and speech, ambivalence, affective incongruence, and withdrawal from reality. According to Bleuler these were the symptoms that gave schizophrenia its distinctive diagnostic profile (A. Jablensky, 2010). The accessory symptoms consisted of delusions and hallucinations, which is what we today refer to as “positive symptoms”. These were further elaborated by Schneider’s introduction of 1<sup>st</sup> and 2<sup>nd</sup> rank symptoms (Hoenig, 1983).

Today, more than a century after Kraepelin’s distinction of dementia praecox, the aetiology, neuropathology, and pathophysiology of schizophrenia remain elusive. Despite the presence of criteria allowing for reliable diagnostic identification (e.g. DSM-IV and ICD-10), schizophrenia can best be described as a broad clinical syndrome defined by reported subjective experiences, loss of function and variable courses of the illness (A. Jablensky, 2010). Consequently the diagnostic definition of psychosis and schizophrenia is still an ongoing process.

In this thesis DSM-IV categories referred to as the broad schizophrenia spectrum disorders are used. They include the diagnostic groups: schizophrenia, schizoaffective disorder, delusional disorder, and psychotic disorder not otherwise specified (APA, 1994).

## **1.2 Schizophrenia spectrum disorders**

DSM-IV subdivides schizophrenia and other psychotic disorders into nine subgroups with varying criteria (Appendix 1). A common criterion for all nine subgroups is the presence of psychotic episodes occurring over time independent of affective episodes. The symptomatology of the psychotic disorders is overlapping, but schizophrenia is typically distinguished from the other psychotic disorders by long duration, bizarre delusions, negative symptoms and few affective symptoms (van Os & Kapur, 2009). Prevalence estimates of the illness vary between studies (McGrath, Saha, Chant, & Welham, 2008; Saha, Chant, Welham, & McGrath, 2005) but current estimates indicate a point prevalence of 0.33% and a lifetime



morbid risk of around 0.7% (McGrath et al., 2008; Owen et al., 2016; Saha et al., 2005). Despite the low prevalence of schizophrenia, the total burden of the illness is great both for the afflicted individuals and for society at large, making it the 11<sup>th</sup> leading cause of years lived with disability (YLD) globally (Vos, Murray, & Barber, 2015). Schizophrenia generally onsets during early adulthood and is often associated with recurrent hospitalisations, need for long-term community support, poor social functioning and high unemployment rates (Knapp, Mangalore, & Simon, 2004; Mangalore & Knapp, 2007; Neil, Carr, Mihalopoulos, Mackinnon, & Morgan, 2014; Rossler, Salize, van Os, & Riecher-Rossler, 2005).

The greatest single risk factor for developing schizophrenia is having a first-degree relative with the illness. If one parent is affected the risk of their offspring developing schizophrenia is approximately 13%. If both parents are affected the risk is nearly 50% (Hersen & Beidel, 2011). Having a second-degree relative with schizophrenia also enhances the risk of developing the illness (NIMH, 2016). In addition, a large number of environmental risk factors for developing schizophrenia have been identified. These include urbanisation, migration, poverty and social exclusion (Cantor-Graae & Selten, 2005; Krabbendam & van Os, 2005; Saha et al., 2005). Other known factors are prenatal infections or malnutrition (Penner & Brown, 2007), autoimmune diseases and paternal age (Messias, Chen, & Eaton, 2007), substance abuse (Arendt, Rosenberg, Foldager, Perto, & Munk-Jorgensen, 2005) and psychosocial stress (A. Jablensky, 2000). The development of schizophrenia is generally considered to be determined by an interplay of genetic and environmental risk factors (van Os & Kapur, 2009).

The core features of schizophrenia are positive symptoms (delusions, hallucinations and thought disorders), negative symptoms (lack of motivation, reduced spontaneous speech, and social withdrawal), and cognitive impairment. In many cases the positive symptoms tend to relapse and remit, whilst the negative and cognitive symptoms tend to be chronic and are associated with more severe and long-term effects on social and occupational function (Haro et al., 2015; NIMH, 2016; Owen et al., 2016).

Schizophrenia is a complex and heterogeneous illness where the outcome can range from good to poor. As an example of the heterogeneity of the illness one study reported that less than half of the patients with schizophrenia utilize 97% of the available treatment resources (Davies & Drummond, 1994). Several prospective studies have reported a fairly good

outcome with independent living and periods of employment for 20–50% of patients (Owen et al., 2016; van Os & Kapur, 2009). Schizophrenia, however can also result in severe negative outcomes such as lower life expectancy due to increased suicide risk and comorbid cardiovascular disease, reduced quality of life and high unemployment rates (Alonso et al., 2009; Davidson et al., 2015; Jonsdottir & Waghorn, 2015; Mangalore & Knapp, 2007; Ringen, Engh, Birkenaes, Dieset, & Andreassen, 2014).

Despite the often grave prognosis that accompanies schizophrenia it is important to recognise that with advances in treatment and rehabilitation, many individuals with the disorder are able to recover and live productive and fulfilling lives (Bevan et al., 2013).

*“Today, schizophrenia sufferers stand a better chance than at any other time in history of leading a normal life. And thanks to the fast pace of on-going medical research, a good outcome is increasingly likely”* (Burton, 2012).

### **1.3 The role of employment in schizophrenia**

Employment is a key element in the recovery from schizophrenia (McGurk, Mueser, DeRosa, & Wolfe, 2009) and an important and defining role in life. Employment provides opportunities for social inclusion, structure, feelings of self-worth and recognition (Baldwin, 2016; Berge & Falkum, 2013; Nordt, Muller, Rossler, & Lauber, 2007). Employment is further associated with improved self-esteem, quality of life and reduced reliance on mental health services (Burns et al., 2009; Bush et al., 2009; Luciano, Bond, & Drake, 2014; Mueser et al., 1997). In contrast, unemployment is detrimental to health and is associated with an increased risk of a number of mental and physical illnesses leading to premature death and an increased economic burden on society (Dorling, 2009). Past research highlights a need for decision makers within the public health and welfare system to develop efficient strategies to increase employment via supporting individuals with schizophrenia into the workplace.

Individuals with schizophrenia experience some of the highest unemployment rates among all vocationally disadvantaged groups, estimates ranging from 6% to 39% (Cloutier et al., 2016; Davidson et al., 2015; Jonsdottir & Waghorn, 2015). Consequently, the reliance upon disability pensions and/or the financial support of family members is high (Drake et al., 2013; Ellingsen, 2013). Many individuals with schizophrenia require vocational rehabilitation and support in order to overcome the challenges they face in the workforce, both in order to attain

work but also to maintain employment (Bond, Drake, & Becker, 2008). These resources are, however, often scarce (Bevan et al., 2013).

### **1.3.1 Barriers to employment for individuals with schizophrenia**

The high unemployment rates characteristic of schizophrenia is influenced by lack of education and work history, and illness-related factors such as psychotic symptoms and neurocognitive impairment (Tsang et al., 2010). The ability to obtain employment is also strongly affected by a number of external factors, such as limited access to supported employment/vocational rehabilitation services and fragmented health and disability policies (Bond & Drake, 2008; OECD, 2013b, 2014).

#### ***Illness related barriers to employment***

One of the most studied and established barriers to employment for individuals with schizophrenia is neurocognitive impairment (Tsang et al., 2010). This is often present prior to illness onset and is an important predictor of working capacity and performance, with employed individuals generally performing better than those who are unemployed (August, Kiwanuka, McMahon, & Gold, 2012; W. C. Chang, Hui, Chan, Lee, & Chen, 2016; Lystad et al., 2016). Neurocognitive deficits are also known to negatively impact on response to VR as participants unable to fully engage in the programme are not likely going to benefit (O'Connor et al., 2011).

Poor premorbid functioning is also predictive of poor occupational functioning (MacBeth & Gumley, 2008; Malla & Payne, 2005; Tsang et al., 2010). Premorbid difficulties with social and functional decline, as well as the actual onset of psychosis often affects the ability to complete educational milestones, which in turn reduces the employability for individuals with schizophrenia (Gould, Sabbag, Durand, Patterson, & Harvey, 2013; Harvey et al., 2012). Educated individuals are more attractive on the job market, and they are more likely to be employed in positions with more flexibility in terms of accommodating for functional impairments (Baldwin, 2016; W. C. Chang et al., 2016).

Up to 40% of individuals with schizophrenia experience persistent psychotic symptoms even though they are using antipsychotic medications (Buchanan, 2007; Chue & Lalonde, 2014). Hallucinations can be both distracting and distressing and interfere with both social and occupational functioning (Haro et al., 2015; Jordan et al., 2014; Lin et al., 2013). Delusions

can often lead to behaviours that may be perceived as odd or frightening by co-workers, customers and employers, which would reduce the number of job opportunities, or lead to dismissal from the workplace. It appears, however, that positive symptoms only have a moderate impact on occupational functioning (T. O. Christensen, 2007; Tsang et al., 2010), which is likely related to their tendency to remit over time (Owen et al., 2016). Negative symptoms, on the other hand, tend to be relatively stable over time and is a stronger predictor of occupational functioning than positive symptoms (Bull et al., 2016; W. C. Chang et al., 2016; T. O. Christensen, 2007; Haro et al., 2015; Tsang et al., 2010).

The comorbidity between schizophrenia and anxiety, depression and substance abuse is high (Buckley et al., 2009). These comorbid disorders are in themselves strongly associated with unemployment and are likely to exacerbate the employability for individuals with schizophrenia (Henderson, Harvey, Overland, Mykletun, & Hotopf, 2011; Kaspersen et al., 2015; Nygren et al., 2013; OECD, 2013b; Rizvi et al., 2015; Saal, Forschner, Kemmann, Zlatosch, & Kallert, 2016).

### ***External barriers to employment***

*"So much of what we call management consists in making it difficult for people to work."*  
Peter Drucker, 1946

Individuals with schizophrenia often require long-term community support, coordinated health and welfare services, and support in obtaining employment. Health and welfare services are, however, often fragmented and bureaucratic which in itself poses barriers to employment for individuals reliant on their support. Compared to other OECD - countries Norway has one of the highest rates of both hospitalisations and re-hospitalisations amongst individuals with schizophrenia, indicating insufficient community care and rehabilitation following inpatient care (OECD, 2013b). Furthermore, the mental health and employment services are fragmented with a narrow focus on treatment as purely symptom relief. Such an approach does not consider the positive effects of employment in the recovery process (OECD, 2013b). Traditionally, clinicians have paid little attention to the benefits employment can have on their patient's mental health, and their knowledge of the vocational services are often limited. At the same time, acquiring knowledge about mental health issues has not been a priority within the vocational services, and clients have been expected to adapt to standardised VR programmes with little room for individualised adjustments. The mental

health services and the vocational services have operated separately from each other and the VR programmes have thus rarely been able to accommodate for challenges individuals with severe mental illnesses face in the workforce (Berge & Falkum, 2013). Some of these challenges are related to the type of work that is available for individuals with little education and work experience. Jobs that do not require qualifications are often characterised by little flexibility in work tasks and working hours. Such restrictions are likely to have a negative impact on the ability to sustain long-term employment for individuals with schizophrenia (F. H. Chang, 2015).

It is well documented that individuals with schizophrenia experience stigma in almost every aspect of their lives (Whitley, 2016), but especially their working lives. (Baldwin, 2016; Schulze & Angermeyer, 2003; Thornicroft, Brohan, Rose, Sartorius, & Leese, 2009). Employers and co-workers have often had little experience working with colleagues with schizophrenia, and may have unrealistic or negative expectations of what the illness entails. In a survey of 190 employers investigating their experiences with, and attitudes towards employees and job seekers with mental illnesses, 67% reported being uncomfortable employing a person using antipsychotic medication. A further 53% were uncomfortable working with someone who had received inpatient psychiatric treatment. In comparison, only 15% had concerns about working with persons with physical disabilities (Scheid, 2005). In a Swiss study, companies who provided vocational education and training were asked about their willingness to accept individuals with various disabilities for training at their workplace based on five hypothetical profiles. Only 9% of the companies were willing to accept the profiles related to mental illnesses, and even fewer were willing to accept patients with psychotic disorders (Deuchert, Kauer, & Meisen Zannol, 2013). Individuals with schizophrenia have reported difficulties being understood, included and accepted by their colleagues and employers because they are perceived as being different (F. H. Chang, 2015). These reports may reflect negative attitudes and a view that people with mental illness are incompetent, dangerous, vulnerable and dependent (Tsang et al., 2007), and only able to perform low-skill tasks (Baron & Salzer, 2002). Such stigma is likely to influence an employer's willingness to hire individuals with schizophrenia, and thus represents a strong barrier against employment.

Another external barrier to employment is the *low expectations* of individuals with schizophrenia which can occur in various settings. It is not uncommon that health care

professionals assume that patients have a poor prognosis such that they directly or indirectly discourage them from seeking a job. For various reasons, work or education is generally not seen as a goal for treatment. In the Norwegian Mental Health Services, therapy is generally administered by treating doctors or psychologists who tend to have a narrow focus. Issues related to education, employment and economy are delegated to allied health professionals, and are often not fully incorporated into therapy (Berge & Falkum, 2013). The work capacity of the patient is either ignored or belittled (Bevan et al., 2013; OECD, 2013b), or only non-competitive work is encouraged (Marwaha, Balachandra, & Johnson, 2009). Documented reasons for such low expectations are concerns for mental well-being, a primary focus on symptom remission (OECD, 2013b), and failure to view employment as a treatment outcome. In turn, low expectations may lead to fear and self-doubt, potentially resulting in internal attributions and self-stigma.

Scandinavian welfare systems are recognised for providing generous disability benefits (OECD, 2013b). Although these systems ensure low prevalence of poverty (OECD, 2014) they may also affect the individual's motivation to seek employment (OECD, 2014; Tandberg et al., 2011). The fear of possibly losing a disability pension status after obtaining employment may also be a reason some individuals avoid seeking work, for concerns that should their health deteriorate and they were unable to work, they have no security net. This is referred to as the *benefit trap*. Also, the Scandinavian employment markets are heavily regulated with strong employee protection legislation, where employers risk long term follow-up and cost in the case of sickness absence. This may be a deterrent for employing someone with a severe mental illness.

Finally, the access to VR and support services for individuals with schizophrenia is limited in Norway (Falkum, Evensen, Lystad, Bull, & Ueland, 2015; OECD, 2013b). In view of all the barriers, both illness-related and external, individuals with schizophrenia are faced with in the workforce, many are in need of support in order to obtain employment. The lack of such support is currently a major barrier to employment for individuals with schizophrenia in Norway.

### **1.3.2 Vocational rehabilitation**

In broad terms VR can be described as whatever helps someone with a health problem to stay, return to or remain in work (Waddell, Burton, & Kendall, 2013). Over the years a number of

different approaches to integrate individuals with impaired occupational functioning into the workforce have been tried. The various models can be divided into two main groups of VR based on their approach to the fundamental question of when in the rehabilitation process the individual should enter the regular workforce (Frøyland, 2006).

Traditional VR, often referred to as the “train, then place” approach, consist of a gradual stepwise process. Such programmes usually start with pre-vocational training, followed by comprehensive assessment to determine «job readiness». Thereafter, the individual receives more individually customised assistance with obtaining employment. Unpaid positions and sheltered employment is viewed as a necessary preparation stage for competitive employment (Waghorn, Dias, Gladman, Harris, & Saha, 2014). The idea behind this approach is to improve the individual’s occupational functioning, skills and competence through practicing work tasks and behaviours prior to seeking competitive employment (Frøyland, 2006). Although the educational framework of such an approach appears sound at the outset, its effectiveness in helping individuals gain competitive employment has been menial (Tenden & Pettersen, 2012). The lack of effect from approaches based on pre-vocational training can probably be attributed to the fact that the learning is often abstract and out of context. From the perspective of situated learning theory, learning is a function of the activity, context and culture in which it occurs, and social interaction is a critical component of the stated learning (Lave & Wenger, 1990). Thus, it would be more effective to gain new skills and knowledge in the environment where it is to be used, rather than in an artificial environment, which is essentially the focus of pre-vocational training.

The other main group of VR are Supported Employment (SE) approaches. SE is known as the “place and train” approach, and is based on rapid competitive employment followed by on-the-job training and support (Frøyland, 2006). The SE approaches have gained great momentum as the preferred VR model for individuals with severe mental illnesses (Bond, 2004; Bond & Drake, 2012, 2014; Bond et al., 2008; Bond, Drake, & Becker, 2012; Drake & Bond, 2014; Kinoshita et al., 2013; Mueser, Drake, & Bond, 2016). The evidence based SE, also known as Individual Placement and Support (IPS), is a manualised form of SE which has been found to be more effective than traditional VR in a number of randomised controlled trials in the US, Europe, Australia and Asia (Bond et al., 2008; Burns et al., 2007; Fioritti et al., 2014; Killackey et al., 2013; Mueser et al., 2016; Tsang, 2011). The SE/IPS approach is based on integration of mental health treatment and employment services, and consists of

eight key principles including rapid commencement of a competitive job based on the individual's preferences (Bond, Drake, & Campbell, 2014). One of the key differences between the two groups of VR is that while traditional VR is based on a gradual and educational framework with employment as the end goal (Waghorn et al., 2014), employment is considered both the beginning and the end of the SE approaches.

### ***Vocational rehabilitation in Norway***

Norwegian VR services are typically outsourced from the Norwegian Labour and Welfare Administration (NAV) to enterprises that provide a range of VR services; pre-vocational training, supported employment, sheltered work and work placements in competitive workplaces (Spjelkavik, 2012). The NAV monitors these programmes through established thresholds for time-limits and expected employment outcome for the various programmes. In order to reach the thresholds it appears that many enterprises have employed a “cherry picking” approach where only the least disadvantaged clients are offered SE, whilst those with more severe disabilities (i.e. schizophrenia) often end up in the traditional VR services where the expectations and demands on employment outcome are lower (Frøyland, 2006; Hagen, Härkäpää, & Spjelkavik, 2011; Spjelkavik, 2012). Individuals who are offered pre-vocational training and sheltered work are considered to have lower working capacity than those who are offered work placements. Individuals who have work placements are generally subjected to similar work demands as if they had competitive employment. Their income is, however, paid by NAV through various schemes, and NAV have in many cases negotiated long-term work placement agreements with some companies. This approach is designed to reduce the employers' risk of financial losses, and at the same time provide the clients with opportunities to gain work experience. In an evaluation of work placements, most clients expressed satisfaction with their job despite receiving the same social security benefit, and as many as 96% of the employers reported that clients did a good or satisfactory job. Work placement, however, rarely led to paid employment (Spjelkavik, 2012).

Although the general employment rate in Norway is high, and some VR programmes appear efficient, the mental health-related unemployment gap is the highest among all OECD countries (OECD, 2013b). This indicates that the current model appears to have shortcomings in terms of aiding individuals with severe mental illnesses to obtain employment.

Consequently, VR has been included in clinical guidelines (Helsedirektoratet, 2013) and recent years have seen an increase in SE/IPS programmes in Scandinavia (Bejerholm,



Areberg, Hofgren, Sandlund, & Rinaldi, 2015; T. N. Christensen et al., 2015; Sveinsdottir et al., 2014).

The study presented in this thesis (The Job Management Programme (JUMP)) is carried out within the traditional VR services, but with a greater emphasis on supported employment and integration between mental health services and employment services than in traditional VR. Although competitive employment was the ultimate aim for the intervention, work placements and sheltered work was also considered a positive outcome for the participants.

### **1.3.3 Vocational rehabilitation augmented with psychosocial interventions**

Supported employment in general, and IPS in particular, is currently the most effective approach in terms of aiding individuals with schizophrenia obtain competitive employment (Bond & Drake, 2012; Marshall et al., 2014). There are, however, studies raising concerns about the sustainability of employment gained through SE/IPS programmes (Jager et al., 2013). Also, the amount of paid work has been reported to be low, with up to 97% of participants still being reliant on social security benefits despite having competitive employment (Drake et al., 2013). Furthermore, despite better employment outcome than in traditional VR, there is still a large number of participants in SE/IPS programmes who do not attain competitive employment or only have short-term jobs (Bond et al., 2008). This warrants further investigations into how VR services can be delivered in order to further maximise the outcome. Past studies have reported improved employment outcome when augmenting SE/IPS with cognitive remediation (McGurk et al., 2007). Better results in employment outcome were also found when augmenting SE/IPS with work-related social skills training (WSST), as compared to IPS alone. This study also found the job tenure to be almost twice as long in the WSST group (Tsang, 2011).

The JUMP study incorporated cognitive remediation (CR) and cognitive behavioural therapy (CBT) as adjuncts to the vocational rehabilitation services. CR consists of a range of interventions targeting thought processes (Galletly & Rigby, 2013) through compensatory strategies or restorative methods (Galletly & Rigby, 2013; Medalia & Saperstein, 2013). The aim of the restorative methods is to retrain or repair impaired neurocognitive processes (Medalia & Choi, 2009), while the aim of compensatory methods is to compensate for impaired neurocognition through acquiring new skills. CBT consists of interventions targeting the thought contents, and is aimed at better understanding of one's illness and to identify

strategies to manage symptoms such as persistent psychotic symptoms, social impairment and comorbid mood- or anxiety- disorders (Buckley et al., 2009; Haro et al., 2015; Kingdon & Turkington, 2005; Morrison, 2009). There is comprehensive evidence that CBT is beneficial in improving symptoms, social relations and general functioning (Rector & Beck, 2001; Sarin, Wallin, & Widerlov, 2011; Tarrier & Wykes, 2004).

#### **1.4 The economic burden of schizophrenia**

Due to the early onset and often chronic course of the illness, together with recurrent hospitalisations, need for community support and high unemployment rates, the economic burden of schizophrenia is substantial (Charrier, Chevreur, & Durand-Zaleski, 2013; Chong et al., 2016; Cloutier et al., 2016; de Silva, Hanwella, & de Silva, 2012; Ekman, Granstrom, Omerov, Jacob, & Landen, 2013; Hu, 2006; Knapp et al., 2004; Konnopka, Klingberg, Wittorf, & Konig, 2009; Mangalore & Knapp, 2007; Neil, Carr, Mihalopoulos, Mackinnon, Lewin, et al., 2014; Neil, Carr, Mihalopoulos, Mackinnon, & Morgan, 2014; Rössler et al., 2005; Sado et al., 2013; Whiteford et al., 2013; Zhai, Guo, Chen, Zhao, & Su, 2013).

Broadly speaking, the economic burden of schizophrenia can be reported in terms of direct costs, indirect costs and intangible costs (Knapp et al., 2004). Direct costs consist of all types of inpatient- and outpatient- care, community-based services, nursing home care, staffed housing and institutional care, rehabilitation, diagnostic tests, prescription drugs, and medical supplies (Kleine-Budde et al., 2014; Ng, Lee, Toh, & Ko, 2014). Indirect costs are defined as productivity losses related to morbidity and premature mortality. Morbidity costs represent the monetary value of productivity loss due to absenteeism or sick leave, decreased work productivity, unemployment, permanent disability, and early retirement for patients, family members, or caregivers (Dadoun et al., 2014; Filipovic, Walker, Forster, & Curry, 2011; Ng et al., 2014). Mortality cost is defined as the monetary value of lost production due to the premature death of the patient (Dadoun et al., 2014). Other consequences, such as legal system costs and imprisonment are also considered indirect costs of the illness (Mangalore & Knapp, 2007). The third category of costs is referred to as intangible costs. These relate to reduced quality of life to patients, families, and friends due to other factors, such as pain or suffering (Kleine-Budde et al., 2014). It is difficult to quantify these costs into a meaningful monetary value, thus they are generally omitted from economic studies (Cooper, 2000).

The estimates of the economic burden of schizophrenia vary significantly between countries and between studies (Chong et al., 2016). The differences are partially explained by variations in costs of health and welfare services as well as income levels between countries, which pose barriers to the generalisability of estimates (Husereau et al., 2013). Furthermore, the costs included also depend on the perspective of the study. The most comprehensive perspective, which consistently yields the highest economic burden, is the societal (Chong et al., 2016), which includes both direct and indirect costs. But even between studies with the same perspective there are great variations in the costs that are included based on availability of data, whether a top-down or a bottom-up approach is used, and which method is used to estimate the indirect costs of lost productivity. The most common method used to estimate lost productivity costs is the human capital approach. This method estimates the potentially lost income as a consequence of the illness, which tends to generate a substantial sum given the low employment rates for schizophrenia. Some studies, however, argue that the friction cost method is more appropriate as absence from work will be covered by someone drawn from the ranks of unemployed individuals or by reallocating existing employees (Koopmanschap & Rutten, 1996). By using the friction cost method the lost productivity costs are assumed to be confined to the period an organisation needs to replace an ill worker, which generally yields much lower cost estimates than the human capital approach (Koopmanschap & Rutten, 1996).

Due to the variations mentioned above, estimates of the global costs associated with schizophrenia vary greatly (Chong et al., 2016; Knapp et al., 2004). The World Health Organisation estimated that direct costs of schizophrenia in Western countries range from 1.6% to 2.6% of the total health care expenditures (Barbato, 1998). More recent reviews indicate a lower proportion in the range 0.02% - 1.65% (Chong et al., 2016), and a median value of 1.1% (Charrier et al., 2013). Despite the wide variation in methodologies and cost components in studies included in these reviews, the authors conclude that there is a general consensus that schizophrenia imposes a substantial economic burden on society, which is primarily driven by high indirect costs.

### **1.5 Economic evaluations of health care programmes for schizophrenia**

One of the pillars of welfare societies like that found in Norway, is that all residents are entitled to the same health and welfare services, regardless of their background, ethnicity, gender, economic or social status (Schjøtz, 2003). One of the challenges of a modern welfare

society is the gap between available knowledge and technology, and the limited resources that are available. Competing interests are measured against each other and choosing one course of action over another will have effects on health, resource allocation and effects outside of health care services. Health economic evaluations are conducted to inform decisions about health care resource allocation, and are defined as “the comparative analysis of alternative courses of action in terms of both their costs and their consequences” (Husereau et al., 2013). The effects or consequences of the alternative courses are evidenced by clinical trials, while the economic evaluation complements the clinical evaluations and provides a framework for considering alternatives in terms of health, costs, and other valuable outcomes (Drummond, Sculpher, Claxton, Stoddart, & Torrance, 2015).

Economic evaluations can be applied to all health technologies, including drugs, procedures, devices, and the organisation of health care services (Drummond et al., 2015). Such evaluations, however, have been undertaken more often in pharmaceutical or technology trials compared with psychosocial interventions or preventative health care services (Norheim et al., 2014). Economic evaluations of treatment for schizophrenia are scarce, and even more so for psychosocial interventions. When searching the cost-effectiveness analysis registry, 41 studies involving economic evaluations for schizophrenia were identified, of which 37 were pharmaceutical trials (CEA, 2016).

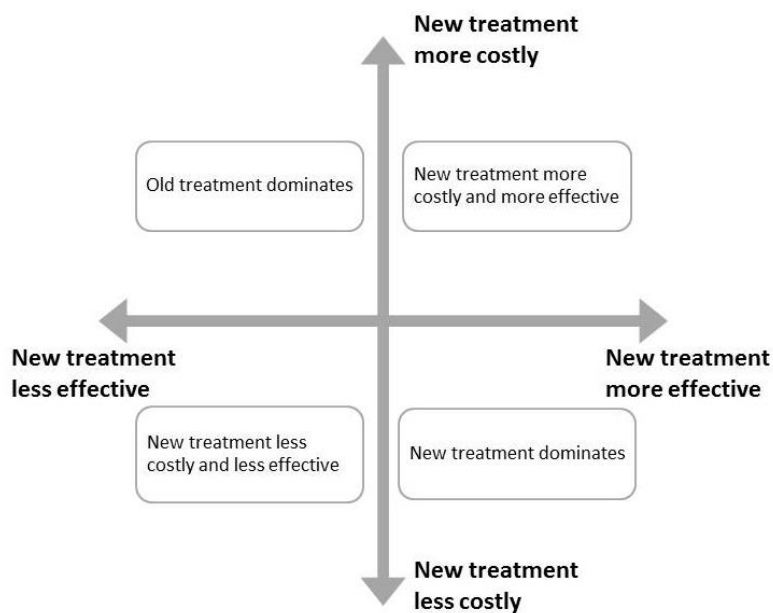
As for estimates of the economic burden of schizophrenia, comparison of economic evaluations can be challenging, both due to methodological differences in the evaluations and due to differences in pricing across different sectors in the welfare society (e.g. health care and welfare services) (Norheim et al., 2014). In an effort to improve the generalisability of economic evaluations, the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Task Force developed a checklist to optimise reporting of health economic evaluations. The ISPOR Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement’s objective is to ensure that the methodology used in economic evaluations are made clear to the reader. This is achieved by addressing a 24-item checklist with accompanying recommendations (Appendix 2) (Husereau et al., 2013)

Any economic evaluation of health care services requires a comparison of two or more alternative courses of action where both the costs and consequences of each alternative is considered (Drummond et al., 2015). The costs of one treatment programme should be considered the value of the programme it displaces (i.e. the social opportunity cost). Which

costs should be included depends largely on the perspective of the evaluation, and can broadly be categorised to health sector costs, other sector costs, patient/family costs, and productivity losses (Drummond et al., 2015). From the decision maker's perspective it would, for example, be appropriate to include health sector and other sector costs as well as productivity losses, while costs to the patient and their families would be of less relevance. In terms of evaluating the consequences of the alternatives, a generic measure of health outcomes such as a health-related quality of life measure is the preferred option. A generic measure enables comparisons of outcomes across different types of diseases, incorporating both advantages and disadvantages of a treatment programme (Drummond et al., 2015; Norheim et al., 2014). In comparison, specific measures of, for example psychotic symptoms, may not consider unwanted side effects from the treatment that can affect the overall health outcome. A commonly used measure of health outcome is quality-adjusted-life-years (QALY). This combines the function of length of life with the quality of life and is based on the underlying assumption that one year of life lived in perfect health is worth one QALY while death is worth zero. QALY is the recommended outcome measure for economic evaluations of health services by the Norwegian Directorate of Health (Helsedirektoratet, 2012)

### **1.5.1 Cost-effectiveness analysis**

Policy-makers in the healthcare sector increasingly use information from economic evaluations to optimise the allocation of healthcare resources. These evaluations often take the form of a cost-effectiveness analysis, using QALYs as the outcome measure (Bobinac, van Exel, Rutten, & Brouwer, 2014). Cost-effectiveness analyses compare alternative treatment programmes that may have differential success in achieving the health outcome as well as differential costs. One programme is generally used as a reference programme (e.g. existing treatment) and other programmes (e.g. new treatment) are compared to the reference in terms of effectiveness and the incremental costs (Gold, Siegel, Russel, & Weinstein, 1996). To determine if a programme is cost-effective it is useful to use the cost-effectiveness plane (Figure 1). If the mean value of a programme falls into the bottom right quadrant (more effective and less costly) than the reference programme, it is clearly cost-effective and should be adopted as it is the dominant strategy. Likewise, if a programme falls into the top left quadrant (less effective and more costly) it should be rejected. If the new programme falls into the top right (more effective and more costly) or the bottom left (less effective and less costly) the incremental cost effectiveness needs to be evaluated against the opportunity costs (Drummond et al., 2015; Norheim et al., 2014).



**Figure 1: The Cost-effectiveness plane**

One way of determining if a programme is cost-effective when there is no dominant strategy, is to evaluate the incremental cost-effectiveness ratio (ICER) against a cost-effectiveness threshold. The threshold represents the incremental costs society is willing to incur in order to gain one QALY. Several countries have established such thresholds and use them consistently for decision making. Although it has been recommended that Norway establish a country-specific cost-effectiveness threshold (Norheim et al., 2014), such a threshold is not currently available. Thus a preliminary threshold of € 60 000 per QALY is usually used for cost-effectiveness analyses in Norway (Helsedirektoratet, 2007).

Although cost-effectiveness studies of VR programmes are scarce, there is evidence that supported employment programmes are more cost effective than the more traditional ‘train, then place’ approach (Dixon et al., 2002; Heslin et al., 2011; Hoffmann, Jackel, Glauser, Mueser, & Kupper, 2014; Knapp et al., 2013). The heterogeneity of study designs and costs of services between the sites of these studies does, however, affect the generalisability of the results (Husereau et al., 2013).

## **1.6 Synopsis and areas in need of further investigations**

It is well documented that schizophrenia generates a substantial economic and societal burden, of which a large proportion is related to high unemployment rates. The cost estimates of the illness do, however, vary substantially between studies. One explanation for the variations may be that the majority of the studies are based on prevalence estimates, and estimates of point prevalence vary greatly between studies. Other reasons for the variations are country specific variations in both costs of services and unemployment rates among individuals with schizophrenia. The reasons for the high unemployment rates are multifaceted and consist of both internal illness-related barriers such as neurocognition and psychotic symptoms, and external barriers such as fragmented services and a lack of focus on employment as a treatment outcome. Illness-related factors such as global functioning, depression and self-esteem have received little attention. To date there has been no study that has shown a direct link between self-esteem and occupational status among individuals with schizophrenia. Self-esteem however, has been demonstrated to have a positive effect on job satisfaction (Orth, Robins, & Widaman, 2012) and the ability to persist at difficult tasks (Baumeister, Campbell, Krueger, & Vohs, 2003). High self-esteem is also predictive of rapid re-employment after job loss in the general population (Solove, Fisher, & Kraiger, 2015), and there is strong evidence that low self-esteem is a significant predictor of depression (Sowislo & Orth, 2013), which is strongly associated with unemployment (Kaspersen et al., 2015; Lamberg, Virtanen, Vahtera, Luukkaala, & Koskenvuo, 2010; Nygren et al., 2013; Rizvi et al., 2015).

Over the past two decades, there have been no estimates of either prevalence or cost of Schizophrenia in Norway. Any estimates regarding employment rates among individuals with schizophrenia have been based on relatively small samples or on questionnaires within selected groups. Consequently the evidence for the current status on prevalence, costs and employment in Norway is limited. Estimates from other countries are often used although the generalisability of such estimates between countries is questionable.

Despite several studies documenting positive employment outcomes in supported employment programmes internationally, Norway and other Scandinavian countries routinely offer sheltered work in a “train, then place” tradition. Implementation of supported employment has further proven challenging in Scandinavia due to the existing organisation of the welfare society (Mueser et al., 2016). It is therefore necessary to investigate whether employment is attainable also for individuals with schizophrenia in the Norwegian welfare

society, and to investigate organisational models of supported employment that can be incorporated into routine care within the Norwegian health and welfare services. Also, economic evaluations of VR programmes for individuals with schizophrenia are scarce, and the generalisability between studies is limited. In order to aid decision-makers in prioritisation of resource allocation, further research into the cost-effectiveness of such programmes is required.

This thesis aims to address the lack of up-to-date knowledge regarding prevalence, employment rate, and cost of schizophrenia in Norway. It also aims to shed further light on the association between global functioning, depression and self-esteem, and employment outcome from a VR programme earmarked for individuals with schizophrenia. Finally this thesis will examine the cost-effectiveness of a VR programme.



## **2. Aims**

The overall aim of this thesis was to investigate the societal impact of a novel VR programme earmarked for individuals with schizophrenia in Norway, a high-income Scandinavian welfare society.

The first aim was to establish the 12-month prevalence of patients treated for schizophrenia, 12-month employment rate, and 12-month cost of schizophrenia in Norway using comprehensive and compulsory health- and welfare- registers (Paper 1).

The second aim was to investigate if the employment rate could be improved through a novel VR programme. We examined the rate of competitive employment at two-year follow-up of the JUMP. We examined if baseline global functioning, self-esteem and depression predicted employment outcome on job tenure. We also examined if change on the same variables during the JUMP intervention period predicted employment outcome (Paper 2).

The third aim was to evaluate the cost-effectiveness of the JUMP study. We examined health and welfare costs for the JUMP participants during the 24 month period prior to inclusion (T0) and the 24 month period from inclusion to two-year follow-up (T1). Effect was measured as incremental QALYs based on tariff scores for employment. We compared the JUMP group with a TAU control group in terms of specialised mental health service costs. Finally, we examined the cost-effectiveness between the two intervention groups in the JUMP study (Paper 3).



### **3. Material and methods**

#### **3.1 The Job Management Programme**

This thesis is part of the JUMP study, a multi-site VR programme for adults with schizophrenia spectrum disorders in Norway. Efforts were made to integrate mental health services and VR services through formalised collaborations where employment specialists were supervised by experienced mental health professionals. The study aimed to address both illness-related and external barriers to employment. The illness-related barriers were addressed through augmenting the VR with either cognitive behavioural techniques (CBT) or cognitive remediation (CR). The external barriers were addressed through a 10-month VR programme consisting of work placements, competitive or sheltered work, and close collaboration between health and vocational services, employers and employment specialists.

##### **3.1.1 Ethics**

The JUMP study was approved by the Regional Committee of Medical Research Ethics and the Norwegian Data Protection Authority. ClinicalTrials.gov Identifier: NCT01139502. All participants were provided with information regarding the study including: the purpose, procedures, data collection, data security and confidentiality. Patients who were willing to participate provided written informed consent prior to commencement of the study.

Research involving individuals with psychotic disorders require extra attention, ensuring the participants are able to fully comprehend what they are consenting to, as the illness involve periods of impaired reality testing or ability to process information. Only participants who displayed a clear understanding of the protocol were included.

All participants in the JUMP study were reliant on some level of disability benefits or welfare benefits upon inclusion in the study. Individuals who make the transition from welfare benefits to paid employment lose or have their benefits reduced once their income reaches a threshold. Participants were informed of this and guidance was given in order to prevent participants encountering financial loss from participating in the study.

Participants were informed that they could withdraw from the study at any given time and that this would have no negative consequence for future health services, employment services or NAV services.

Paper I was a separate study based on aggregated population based data. Two registers were merged based on unique personal identification numbers. This was approved by the Norwegian Data Protection Authority, notification 70403.

The cost-effectiveness analysis (paper III) was not part of the original design of the JUMP study, thus participants did not consent to extraction of data from health registers at inclusion. These registers contain detailed and sensitive information about individuals' health, such as diagnoses, medications, and utilisation of health services. Consequently, this analysis was approved separately by the Regional Committee of Medical Research Ethics and the Norwegian Data Protection Authority (14/00035-5/EOL). Written informed consent was sought for the extraction of register data, of which 69 out of 148 participants consented.

### **3.1.2 Design and procedure**

Six regions of Norway were included in this study. Three were randomised to provide the CBT intervention (Nord-Trøndelag, Oppland and Oslo) and three were randomised to provide the CR intervention (Buskerud, Telemark and Vest-Agder). Participants were given the intervention available within their catchment area. Participants were assessed at baseline, at the end of the intervention period approximately 10 months after baseline, and 2 years after inclusion in the programme.

### **3.1.3 Inclusion and exclusion criteria**

The inclusion criteria were age between 18 and 65 years, an IQ above 70, a diagnosis within the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) (APA, 1994) criteria for a broad schizophrenia spectrum disorder, and adequate understanding of the Norwegian language. A further requirement was that the participant had expressed motivation to find employment.

Exclusion criteria were head injury with unconsciousness for more than ten minutes or requiring medical treatment, neurological disorders, IQ below 70, unstable or uncontrolled medical conditions interfering with cognitive function, and a score of 3 or above on items 1-3 (alcohol or substance abuse, violent behaviour and suicidal ideation) on the Health of the Nation Outcome Scales (HoNOS) (Wing, Curtis, & Beevor, 1996).

### **3.1.4 Participants**

Participants were recruited from local mental health centres and vocational services within the six catchment areas. Self-referral was also possible. One hundred and forty-eight participants met the inclusion criteria and were included in the study between August 2009 and March 2012. Ninety-five percent of the participants used antipsychotic medication upon inclusion in the study. Eighty-four participants were recruited within the CBT sites and 64 within the CR sites.

The study in paper III was not part of the original design and separate consent was sought. Sixty-nine of the 148 participants consented to this study. No significant differences were found between those who consented and those who declined on central variables (diagnosis, age, sex, units of DDD of antipsychotic medication, psychotic symptoms, education, previous work experience, employment outcome at two-year follow-up).

### **3.1.5 Interventions**

At each site the JUMP study was organised with teams consisting of a mental health coordinator, a coordinator from NAV and employment specialists who were employed at VR enterprises. The interventions consisted of: 1. psychoeducation (symptoms, course, treatment, prevention, rehabilitation and prognosis) geared at the project teams, participants, and in some cases employers and colleagues; 2. VR supervised by the mental health coordinator; and 3. CBT at three sites and CR at three sites. The psychoeducation was identical in both the CBT and the CR intervention groups. The employment specialists in both groups received weekly supervision by the mental health coordinators who were experienced mental health professionals (occupational therapists, mental health nurses and social workers). The mental health coordinators were easily accessible for both employment specialists and employers outside scheduled meetings. The employment specialists underwent basic training (40 hours) in CBT or CR and implemented the interventions with ongoing supervision by the mental health coordinators throughout the project period.

#### ***Vocational rehabilitation***

The JUMP study was established within the traditional model of VR, which is based on the “train, then place” tradition with use of sheltered work and unpaid work placements (Hagen et al., 2011; Spjelkavik, 2012). The ultimate aim of VR in the JUMP study, however, was competitive employment. As the project progressed more focus was placed on rapid work

placement in positions matched to participant's preferences and qualifications, as many participants stated this as a primary goal. Prevocational training in sheltered workshops was offered only after attempts had been made to obtain competitive work or work placements in competitive workplaces. On-the-job support and task adaptive accommodations were provided whenever required. Furthermore, the employment specialists assisted participants with their career profiles, provided career guidance when required, and assistance with disclosing of mental illness to potential employers. The employment specialists collaborated closely with the participants' mental health provider and the mental health coordinator throughout the project period, the aim being to integrate employment in mental health services. The employment specialists also conducted continuous job development and job searches to match their participants' preferences.

### ***Cognitive remediation***

The CR in JUMP was administered by employment specialists who had undertaken 40 hours of training in neurocognitive impairment in psychotic disorders (i.e. characteristics, prevalence, interaction with other symptoms, and consequences for occupational functioning). Basic principles of cognitive remediation were also included in the training (i.e. use of computer software and strategies to enhance motivation and performance). The primary aim of the intervention was to transfer knowledge and skills acquired in training to real-life work settings. The CR programme included: feedback from neurocognitive assessments; establishing individualised goals for the intervention; psychoeducation about cognitive impairment; and two hours per week of computer based training. The participants had CR sessions twice a week with the employment specialist.

### ***Cognitive behavioural therapy***

The CBT intervention was also administered by employment specialists who had undertaken 40 hours training in CBT methods with a primary focus on work-related challenges frequently reported by individuals with psychotic disorders (e.g. social withdrawal, substance abuse, passivity, delusions and hallucinations that interfere with the ability to work). The training was based on the textbook "*Cognitive Therapy of Schizophrenia*" (Kingdon & Turkington, 2005). Frequently used methods were: cognitive restructuring, motivational interviewing, homework, and graded exposure. The CBT intervention was not administered as an alternative to psychotherapy, but central elements of CBT were used to overcome work-related challenges (e.g. coping with voices, exploring and challenging delusional beliefs, and

use of graded exposure to overcome anxiety interfering with the job). The participants had two weekly CBT sessions with the employment specialist.

### **3.2 Measurements and data sources**

The JUMP study protocol included an extensive battery of tests. Only the measures relevant for this thesis are described below.

#### **3.2.1 Clinical assessment**

##### ***Diagnosis***

Diagnostic interviews were performed by trained clinicians using the Norwegian version of M.I.N.I PLUS (Sheehan et al., 1998) modules A, C, D, K, L, and M. All assessors were trained and calibrated. During assessment, the Longitudinal observation, Expert opinion, All Data (LEAD) (Kranzler, Kadden, Babor, & Rounsaville, 1994; Spitzer, 1983) principle was applied where necessary.

##### ***Self-esteem***

Self-esteem was assessed through the Rosenberg Self-Esteem Scale (RSE) (Rosenberg, 1965). The RSE is a 10-item scale that measures global self-worth by measuring both positive and negative feelings about one's self. All items are answered using a 4-point Likert scale format ranging from strongly agree to strongly disagree. RSE was administered as a self-report measure and was used in paper II of this thesis.

##### ***Depression***

Depression was measured through the Calgary Depression Scale for Schizophrenia (CDSS) (Addington, Addington, & Schissel, 1990). The CDSS is specifically developed to assess the level of depression in schizophrenia separate from psychotic symptoms. The CDSS was scored by trained mental health professionals in a structured interview and was used in paper II.

##### ***Duration of illness***

Duration of illness was retrieved from hospital records and was defined as the time between the first contact with the mental health services for psychotic symptoms and the participant's inclusion into the JUMP study. Duration of illness was entered into the analyses of paper II.

### ***Antipsychotic medication***

We recorded whether or not the participant was using antipsychotic medication upon inclusion in the study. If they were, type (typical versus atypical antipsychotics), dosage and number of months of use were recorded. For statistical purposes, we converted main dosages into a measure of defined daily doses (DDD) (WHO, 2011). The DDD measure indicates the relative potency of intake of antipsychotic medication, with the value of 1 expressing the standard daily dose of a specific drug. The DDD system has been established to reliably standardise medication doses (Nose et al., 2008). The DDD for antipsychotic dosages was used in the analyses of paper II.

### **3.2.2 Functional assessment**

#### ***Education and previous employment***

Level of education was collected through structured interviews performed by mental health coordinators. The highest level of education was recorded as number of years. Employment history was registered as the total number of months in part-time or full-time competitive employment, work placement or sheltered work. Education and previous employment were entered into the analyses of paper II. In paper III, data from welfare registers were used to calculate months of employment.

#### ***Global assessment of function***

Global functioning was assessed using the Global Assessment of Function (GAF), split version (GAF-Symptoms and GAF-Function)(Endicott, Spitzer, Fleiss, & Cohen, 1976). The GAF scale is intended to be a single measure of overall impairment caused by mental factors. Its intended use is to communicate the level of impairment, indicate the need of professional help, and reflect improvement or change over time (Pedersen & Karterud, 2012). GAF-S and GAF-F were scored by health professionals trained and experienced in the administration of these outcome measures.

#### ***Type of work***

Type of work was categorised as competitive, work placement in a competitive setting, or sheltered work in paper II and III. Occupational status (competitive employment, work placement in a competitive setting, sheltered work or unemployed), work tenure and number of working hours per week were recorded in paper II. In paper III the number of weeks worked between baseline and two-year follow-up was recorded. Work placement in a



competitive setting is a time-limited placement in a competitive job, where the person works for benefits.

### **3.2.3 Health and welfare registers**

In paper I and III, we extracted data from comprehensive health and welfare registers. For paper I, population-based data was extracted for all individuals registered with primary diagnoses of schizophrenia and schizoaffective disorder during 2012. For paper III, data were extracted based on unique identity numbers for the JUMP participants who had consented to extraction of this information. The data for paper III were extracted over a four-year period (two years prior to inclusion in the JUMP study to two-year follow-up).

#### ***The Norwegian Patient Register***

Data on specialist mental healthcare were obtained from the Norwegian Patient Register (NPR). Inpatient mental health services in Norway are capitation funded. All hospitals report their annual results to Statistics Norway, and mean and total costs per day in psychiatric hospitals are calculated.

#### ***The Norwegian Prescription Database***

All prescriptions of medications in Norway are registered with the Norwegian Prescription Database (NorPD) at the Norwegian Institute of Public Health. For paper I, data on all antipsychotic medications prescribed for schizophrenia and schizoaffective disorders in Norway during 2012 were extracted. For paper III, data were extracted for all antipsychotic medications, benzodiazepines, sedatives and antidepressants prescribed to participants in the JUMP study over a four-year period.

#### ***The Norwegian Health Economics Administration***

A large proportion of health services in Norway are provided in the municipalities. Local authorities in each municipality are responsible for primary care services, which include general medical services, home care services, nursing home care, and primary mental health care. The Norwegian Health Economics Administration (HELFO) reimburses general practitioners and psychologists working in the primary health care services for all consultations with patients. Patient appointments are registered with a primary diagnosis, and general practitioners and psychologists invoice HELFO for the consultation. For

paper I we obtained the total sum of reimbursements to general practitioners for treatment of patients with schizophrenia. For paper III we obtained the same variables for JUMP participants who consented to extraction of register data.

### ***The Individual-based Register of Care Services***

Municipality-based institutional care and home care services are reported to the Individual-based Register of Care Services (IPLOS). We extracted data on institutional care, home nursing and home care services from the IPLOS register.

### ***Statistics Norway: Norwegian Labour and Welfare Service***

All new employees in Norway must be registered with the Norwegian Labour and Welfare Administration (NAV) by their employer. Those who are self-employed are required to submit a coordinated register notification to the Register of Business Enterprises. Statistics Norway control data from these registers against the individual's tax return to generate register-based statistics on employment, self-employment, and national service. To be included in the statistics, individuals needed to be contracted to have at least 1 hour of paid work during a reference week. The Norwegian welfare system provides all unemployed residents with a base income. The NAV provides sick leave payments, disability pensions, and other benefits associated with absence from work. Data on competitive employment and welfare benefits were obtained from NAV via Statistics Norway.

## **3.3 Statistics**

The Statistical Package for the Social Sciences IBM SPSS Statistics version 21.0 (IBM, 2012) was used for all statistical analyses in paper I and II. For paper III, Stata version 13.1 (StataCorp, 2013) was also used. All tests were two-tailed, and the level of significance was set at  $p = .05$ . Baseline group differences across continuous variables were investigated with Student t-tests, and Chi Square tests were applied when comparing categorical data.

In paper I, a population-based top-down design was used to calculate resource utilisation and costs associated with schizophrenia over a twelve-month period. The “top-down” approach uses aggregate figures on resource consumption related to diagnoses and relies on available data which were obtained through national and

compulsory health and welfare registers for the period January 1 to December 31, 2012. Independent Samples t-tests were used to assess sex difference in utilisation of mental health services. In paper II, Independent Samples t-tests were used to examine group differences on employment outcome and change scores on GAF, RSE and CDSS. Furthermore, multiple logistic regressions were undertaken to determine the associations between predictors (GAF, RSE and CDSS) and employment outcome. Each scale was modelled separately with coefficients for baseline and change (from baseline to the end of the intervention period), and adjusted for age, gender, duration of illness and intervention group. We also undertook linear regressions to examine predictors of work tenure and hours of work per week. In paper III, we examined the cost-effectiveness of the JUMP study compared to a TAU group. Costs were assessed in terms of mental health service costs during the two-year follow-up period adjusted for baseline differences (two-year period prior to inclusion in the JUMP study). Effectiveness was calculated as QALYs gained during the two-year follow-up period as compared to the two-year baseline period. Generalised Linear models (GLM) with gamma family and identity link with baseline costs as a covariate were used to compare costs between groups during the two-year follow-up period. Cost data are often skewed and the GLM approach provides robust estimates of the mean through accommodating for this skewness. In the gamma family the variance of cost is assumed to be proportional to the square of the mean, which gives a better fit than the normal distribution (Kahn, 2016; Mihaylova, Briggs, O'Hagan, & Thompson, 2011). A detailed description of the statistical analyses used in this thesis is presented in the three papers.



## 4. Summary of papers

**Paper I: Prevalence, employment rate, and cost of schizophrenia in a high-income welfare society: A population-based study using comprehensive health and welfare registers.**

**Background:** Schizophrenia is associated with recurrent hospitalisations, need for long-term community support, poor social functioning, and low employment rates. Despite the wide ranging financial and social burdens associated with this illness, there is great uncertainty regarding prevalence, employment rates, and the societal costs of schizophrenia in Norway.

**Aim:** The current study investigates 12-month prevalence of patients treated for schizophrenia, employment rates, and cost of schizophrenia.

**Methods:** Using a population-based top-down approach, data were obtained from comprehensive and mandatory health and welfare registers in Norway.

**Results:** We identified a 12-month prevalence of 0.17% for the entire population. The employment rate among working-age individuals was 10.2%. The societal costs for the 12-month period were USD 890 million. The average cost per individual with schizophrenia was USD 106 thousand. Inpatient care and lost productivity due to high unemployment represented 33% and 29%, respectively, of the total costs. The use of mandatory health and welfare registers enabled a unique and informative analysis on true population-based datasets.

**Paper II: Employment outcome and predictors of competitive employment at two-year follow-up of a vocational rehabilitation programme for individuals with schizophrenia in a high-income welfare society.**

**Background:** Employment is an important part of recovery for individuals with schizophrenia. The employment rate for this group is as low as 10% in Norway and major system-related barriers to employment are evident.

**Aims:** This study reports the competitive employment outcome at two-year follow-up of a vocational rehabilitation (VR) study augmented with cognitive remediation (CR) or elements from cognitive behaviour therapy (CBT) for individuals with schizophrenia spectrum disorders. It also investigates if global functioning, self-esteem and depression at baseline predicts employment outcome, and if change in these variables during the intervention period is associated with employment outcome.

**Method:** 148 participants with schizophrenia spectrum disorders in six Norwegian regions received ten months VR augmented with either CBT (n=84) or CR (n=64). Both competitive and sheltered workplaces were used. Participants were assessed at baseline, at the end of the intervention period and at two-year follow-up.

**Results:** At two-year follow-up 21.2% had obtained competitive employment. A further 25.3% had work placements in competitive workplaces. We found significant improvements in global functioning, self-esteem and depression during the intervention period, but no significant differences between the two intervention groups. High baseline global functioning and self-esteem, as well as positive change in these variables during the intervention period, were significantly associated with higher competitive employment outcome at two-year follow-up. High baseline global functioning and self-esteem also predicted work tenure among those who gained competitive employment or work placements in competitive workplaces.

**Conclusion:** The results add to existing evidence that competitive employment is attainable for individuals with schizophrenia. High global functioning and self-esteem were strongly associated with competitive employment outcome and work tenure.

### **Paper III: Cost-effectiveness of a vocational rehabilitation programme for individuals with schizophrenia in a high-income welfare society**

**Background:** Unemployment rates among individuals with schizophrenia are disproportionately high. Despite strong associations between employment and quality of life, global functioning and recovery, access to vocational rehabilitation (VR) services is limited for this group. Lack of resources and high costs are commonly used arguments against such services.

**Aim:** The study examined the cost-effectiveness of a novel VR programme (The Job Management Programme – JUMP) earmarked for individuals with schizophrenia in Norway.

**Methods:** The JUMP provided VR augmented with either cognitive behaviour therapy (CBT) or cognitive remediation (CR). Costs were extracted from comprehensive and mandatory health and welfare registers. We compared costs during a two-year follow-up period with the two-year period prior to inclusion in the programme. Further, we compared the cost-effectiveness of JUMP with a treatment as usual (TAU) group, and the cost effectiveness between the two intervention groups in JUMP.

**Results:** During the follow-up period there were significant reductions in inpatient services in the JUMP group, both for those who obtained employment and those who did not. Adjusted for baseline differences, the total cost for JUMP (inclusive of intervention costs) were € 7 949 lower than the costs for the TAU group during the follow-up period. With better health effects and lower total costs JUMP dominated TAU. The CBT intervention was more cost-effective compared to the CR intervention.

**Conclusion:** The JUMP programme aided individuals with schizophrenia to obtain employment. The health benefits and cost-effectiveness of this mental health treatment approach should be of great interest to stakeholders.





## **5. Results**

### **5.1 Summary of main findings**

The main aim of this thesis was to investigate the societal consequences of unemployment and a VR programme earmarked for individuals with schizophrenia in Norway. We investigated the twelve-month treated prevalence, employment rate and cost of schizophrenia and schizoaffective disorder on a national level using comprehensive health and welfare registers. Furthermore, we sought to investigate the employment outcome among individuals who had completed a VR programme augmented with CBT or CR at two-year follow-up, and whether global functioning, self-esteem and depression was predictive of employment outcome, working hours, and work tenure. Finally we evaluated the cost-effectiveness of the JUMP study compared to TAU, and we examined the cost-effectiveness of the CBT augmented compared to the CR augmented VR. The main findings were:

#### ***Paper I***

- I. We identified 8399 individuals who received treatment for a primary diagnosis of schizophrenia or schizoaffective disorder in Norway during 2012, of which 59% were men. The 12-month prevalence for the entire population was 0.17%. Assuming all individuals with schizophrenia were over the age of 18, the 12-month prevalence for the population 18 years and older was 0.22%
- II. The employment rate (fulltime and part-time) among individuals with schizophrenia who were of working age was 10.2% (10.5% amongst men and 9.8% amongst women). The employment rate was consistently low across all age groups in contrast to the general population, where the employment rate peaks in the 40–49 age group.
- III. Observed and estimated total national costs associated with schizophrenia were USD 890,413,045.00 (NOK 7,913,534,423.00). Inpatient care and lost productivity due to unemployment represented 33% and 29%, respectively, of the total costs.

#### ***Paper II***

- IV. At two-year follow-up, 21.2% of the participants in the JUMP study had obtained competitive employment and were working an average of 28.5 hours per week. An additional 25.3% had work placements in ordinary workplaces and 13.7% had

sheltered work. High baseline global functioning and self-esteem predicted months of work.

- V. We found that high global functioning and self-esteem were strongly associated with competitive employment outcome, and low baseline odds of employment can be compensated for by improvements in global functioning and self-esteem. Competitive employment outcome was also associated with increased global functioning and higher self-esteem.

### ***Paper III***

- VI. Participants in the JUMP study experienced significant reductions in inpatient treatment services during the two-year follow-up period compared to the two-year period prior to inclusion in the study. The reduction was significant both for those who gained competitive employment and for those who had work placement or sheltered work.
- VII. The total mean mental health service treatment costs for the JUMP group (inclusive of intervention costs) were € 7 949 lower than for the TAU group, when adjusted for baseline differences. The JUMP group had higher effect in terms of QALY, both when calculating all types of employment and competitive employment only. In terms of cost-effectiveness, this makes JUMP the dominant strategy as it increases health and decreases costs.
- VIII. Due to the CR group having a longer mean duration in the programme, there was a non-significant difference in intervention costs in favour of the CBT intervention. With lower cost and higher QALYs for all types of employment, CBT was the favourable intervention.

## **6. Discussion**

### **6.1 Discussion of results**

Resources for the treatment of schizophrenia/mental health issues in terms of people, time, facilities, equipment, knowledge, and money, are scarce. Those responsible for planning, providing and paying for health and welfare services are constantly faced with the question of how to make the best use out of the limited resources available (Drummond et al., 2015). In order to make informed decisions, rather than base decisions on more or less educated guesses, an organised approach that assesses the current state and magnitude of an issue through a cost-of-illness study generates a reference point from which new interventions can be evaluated (Hu, 2006; Mangalore & Knapp, 2007).

#### **6.1.1 The prevalence of schizophrenia**

In paper I we found that the prevalence of individuals treated for schizophrenia in the Norwegian population older than 18 years was 0.22%. Based on results from another study that established the five-year prevalence (Nesvag et al., 2015), we estimate that our study captured 78% of the true prevalence (i.e. including those with the diagnosis not in contact with specialised mental health services during 2012). For decades it was generally thought that schizophrenia had a uniform lifetime morbidity risk of 1% across time, geography, and sex (Owen et al., 2016). More recent reviews and a meta-analysis have disentangled this view and provided central estimates of an incidence of roughly 15 men and 10 women per 100 000, a period prevalence of 0.33%, and a lifetime morbidity risk of approximately 0.7% (McGrath et al., 2008; Saha et al., 2005). McGrath and colleagues (2008) further documented large variations in the range of 0.13 – 0.82%, for period prevalence across studies that could not be attributed to diagnostic or other methodological differences. They concluded that this indicated real differences in occurrence and exposure to risk factors (McGrath et al., 2008). Saha and colleagues (Saha, Chant, Welham, & McGrath, 2006) discussed an interesting finding of a significantly higher prevalence of schizophrenia in developed countries at high latitudes (above 60°) compared to low (equator to 30°) and median (30° to 60°) latitudes. With the Norwegian mainland being positioned between 58°N and 71°N, the period prevalence identified in our study is contrary to Saha and colleagues' (2006) findings. Our results fall in the lower range of the estimates identified by McGrath and colleagues (McGrath et al., 2008). Some of the proposed factors influencing increased prevalence at high latitudes are high levels of urbanisation (Mortensen et al., 1999) and prenatal vitamin D deficiency (McGrath,

1999). Other known risk factors that may influence prevalence estimates include migration, poverty and social exclusion (Cantor-Graae & Selten, 2005; Krabbendam & van Os, 2005; Saha et al., 2005). The low prevalence found in our study may be partially explained by low urbanisation with two-thirds of the population living rural or in cities with populations of less than 100,000 (Statistics-Norway, 2015). Furthermore, the strong welfare system ensures low prevalence of poverty and social exclusion compared to the average for the European Union countries (14 % vs 18.2 %) (Di-Meglio, Rusu, & Rybkowska, 2014).

### **6.1.2 Treatment costs**

Despite the relatively low number of individuals treated for schizophrenia in Norway, the costs of the illness are substantial. Compared to other countries with similar health and welfare services, we found that Norway relies heavily on inpatient care as the treatment modality, with 83 psychiatric hospital beds per 100,000 capita compared to 54 in the United Kingdom and 47 in Sweden (OECD, 2014). Individuals with schizophrenia were hospitalised on average almost 24 days per year, which constituted 18% of the total number of hospitalisation days for all psychiatric conditions. Comparing the quality of mental health services between countries is challenging. The measure used by OECD when comparing countries is 30-day readmission rates after an admission for severe mental illness. This has been found to be a robust, useful and feasible indicator, since patients are not usually readmitted to hospital within a short interval if given appropriate care while in hospital and if followed-up after discharge (Hermann et al., 2006). Readmission rates for schizophrenia in Norway is among the highest of all OECD countries with almost one-third of patients being readmitted within 30 days after discharge (OECD, 2013a, 2013b). Fragmented services and poor communication between primary and secondary mental health services, as well as limited interaction between health services and vocational services have been identified as possible reasons for the high readmission rates (OECD, 2013b). Improvement in the coordination of follow-up services may help reduce the reliance on inpatient care.

In our study, we identified that the direct health care expenditure for schizophrenia was 1.68% of the total health expenditure in 2012 (Statistics-Norway, 2016). This is in accordance with past estimates from The World Health Organization, who estimated that direct costs of schizophrenia in Western countries range from 1.6% to 2.6% of total health care expenditures (Barbato, 1998). We further found that schizophrenia (direct and indirect costs) accounts for 0.28% of the Gross Domestic Product (GDP). This is similar to studies from Ireland (0.30%)

(Behan, Kennelly, & O'Callaghan, 2008) and Spain (0.26%) (Oliva-Moreno, Lopez-Bastida, Osuna-Guerrero, Montejo-Gonzalez, & Duque-Gonzalez, 2006), but much higher than in Sweden and the United Kingdom at 0.02% (Ekman et al., 2013; Guest & Cookson, 1999) and the Netherlands at 0.11% (Evers & Ament, 1995). Notably, however the proportion of GDP in our study was only half of what was found in a large retrospective study in Germany (Frey, 2014). Comparison of cost-of-illness studies is difficult, as there are great variations in health and welfare service costs as well as income levels and employment rates between countries. Such variations pose barriers to the generalisability of studies (Husereau et al., 2013). Furthermore, study design, methods of data collection, and which costs are included further limits generalisability (Chong et al., 2016; Knapp et al., 2004). Despite this, most studies find that direct costs associated with schizophrenia range from 1.5% to 3% of the total health service costs (Barbato, 1998; Charrier et al., 2013; Knapp et al., 2004), which represents a substantial economic burden to any society.

### **6.1.3 Unemployment and the societal burden**

From a societal perspective the single greatest cost in most cost-of-illness studies of schizophrenia is that of productivity losses (Charrier et al., 2013; Ekman et al., 2013; Mangalore & Knapp, 2007; Neil, Carr, Mihalopoulos, Mackinnon, Lewin, et al., 2014; Neil, Carr, Mihalopoulos, Mackinnon, & Morgan, 2014). In our study, where all direct and indirect costs were included, we found inpatient care to be the greatest cost ahead of productivity losses. We included welfare benefits as a cost in our analysis as they are considered costs from a government perspective. From a societal perspective these costs are considered transfer payments as they do not reflect resource consumption, and thus should not be included in societal cost estimates (Drummond et al., 2015). When we remove the welfare benefits from our estimates, inpatient care is still the greatest contributor to the overall societal costs at 38.7%, followed by productivity losses at 36%.

We found that only 10.2% of individuals of working age with schizophrenia were employed (10.5% of the men and 9.8% of the women). In contrast, the employment rate in the general working age population was 75.8% (OECD, 2015b). Furthermore, the employment rate amongst individuals with schizophrenia was stable at around 10% across all age groups while the employment rate in the general population peaks in the 40 – 49 age group. The employment rate identified in our study is generally lower than what has been identified in recent reviews (Jonsdottir & Waghorn, 2015), and supports past findings that Norway has one

of the highest mental health-related unemployment gaps of all OECD countries (OECD, 2013b). The reasons for the low employment rates are probably multifaceted. One issue is the impact of a broad social context in terms of cultural attitudes towards work. Many European governments have tolerated high levels of unemployment, partially driven by high employment protection in contrast to the ‘hire and fire’ culture seen in the USA (Sen, 2001). The relatively generous unemployment and disability benefits in Norway may be perceived or real financial disincentives to returning to work, the so-called ‘benefit trap’ (Burns, White, & Catty, 2008). The stable and low employment rates lend support to the notion of the ‘benefit trap’, where individuals with schizophrenia fall out of the workforce at an early age and remain reliant on disability benefits for the rest of their lives. This is further supported by findings that there is virtually no transfer from the ranks of recipients of disability pensions into the work force (OECD, 2013b).

Limited collaboration between primary and secondary mental health services, and fragmentation between mental health services and vocational services are also documented barriers to employment for individuals with schizophrenia in Norway (OECD, 2013b). Reasons for the fragmentation between mental health and vocational services include a narrow focus on treatment, reducing the focus to illness symptoms, and ignoring or underestimating the positive effects of work in recovery from mental illness (Bevan et al., 2013; OECD, 2013b). One of the objectives of the JUMP study was to address this fragmentation through establishing project groups that collaborated across the services. Employment specialists and mental health practitioners worked together in an effort to integrate a recovery focus in the therapy. In view of the growing evidence for the beneficial effects of employment, the Norwegian health services have taken steps to incorporate a more holistic approach to the treatment of psychotic illnesses, and have included a section on integrating employment and education in the current guidelines for treatment of psychotic disorders (Helsedirektoratet, 2013).

The high education levels in Norway may also pose a barrier to employment for individuals with schizophrenia. Due to free education to all residents, the proportion of the population aged 25-35 who have completed tertiary education is high at almost 50% (OECD, 2015a). With so many well educated persons, this reduces the job opportunities for those without education, which is often the case for individuals with schizophrenia (Gould et al., 2013; Harvey et al., 2012). Education is an important determinant of the probability of finding a

good job-match (Baldwin, 2016) with better educated individuals being more likely to attain work where their functional impairments have less impact on important job functions. Individuals without education are more likely to obtain work with little flexibility and fixed working schedules, which are unlikely to accommodate for functional impairments (F. H. Chang, 2015). Such working environments are also likely to provide less acceptance for being *different*, which in turn may lead to social exclusion due to stigma (Tsang et al., 2007) and rapid employment termination.

Another important factor for the low employment rates is probably associated with the Scandinavian model of VR. This model relies heavily on work placements and sheltered jobs. Despite employers generally expressing satisfaction with the quality of employees on work placements, it rarely results in employed work (Spjelkavik, 2012). This may be due to employers taking advantage of the opportunity to access temporary employees for free via work placement programmes, and/or insufficient emphasis on negotiating employed work at the end of a successful work placement. Such practices are also a likely contributing factor to the low success rate of traditional VR programmes. Furthermore, access to VR programmes appears limited for individuals with schizophrenia (Falkum et al., 2015).

#### **6.1.4 Employment outcome and predictors of employment in the JUMP study**

At two-year follow-up, 21.2% of the participants in the JUMP study had obtained competitive employment, a further 25.3% had work placements in ordinary workplaces and 13.7% had sheltered work. Compared to international IPS/SE studies, the success of obtaining competitive employment in the JUMP study appears low. It is, however, important to view the results in light of both the low base employment rate identified in paper I of this thesis, and also in light of the Scandinavian VR model, where pre-vocational training, work placements and sheltered work have been the common approach (Hagen et al., 2011; Spjelkavik, 2012). At the outset, the JUMP study was established within this tradition, and most participants were offered work placements or sheltered work with an ultimate goal of competitive employment. For many of the participants who had work placements in ordinary workplaces, the lack of competitive employment was not due to their work function, but rather a result of external barriers to competitive employment. It should also be noted that as many as 16.4% of the participants at two-year follow-up were in paid employed positions, such that they were no longer reliant on social security benefits. Information about income and reliance on social security benefits following VR programmes is scant in the literature,

but one study reported that 3% of the participants in an IPS programme earned enough to support themselves compared to 2% in the control group (Drake et al., 2013).

There is a general consensus in the IPS/SE literature that a zero exclusion policy should be a key feature of VR programmes (Drake & Bond, 2014; Swanson & Becker, 2011). From a decision maker's point of view, however, it is of relevance to analyse interventions on a subgroup level, in order to better be able to target interventions at those most likely to benefit (Drummond et al., 2015). Following that perspective, there have been made numerous attempts at disentangling the various illness-related factors and their associations with employment outcome (Au et al., 2015; Bell, Zito, Greig, & Wexler, 2008; Fiszdon, Fanning, Johannesen, & Bell, 2013; Tsang et al., 2010; Twamley et al., 2012). In the JUMP study, the zero-exclusion policy was abandoned in cases of high suicidal ideation, substance abuse that interfered with the ability to work, and high risk of violent behaviour.

In subgroup analyses of the JUMP study we found that global functioning and self-esteem at baseline was significantly associated with competitive employment outcome at two-year follow-up. Those with low self-esteem and low global functioning were more likely to be unemployed, while those with high baseline scores were more likely to have gained competitive employment. Although this may support a view that those with high baseline scores should be prioritised for VR services, we also found that change in global functioning and self-esteem during the 10-month intervention period was as strong a predictor of competitive employment outcome. This supports the zero exclusion policy - baseline scores alone appear insufficient to predict employment outcome as it is difficult, at best, to predict how an individual is going to manage when given the opportunity to work (Swanson & Becker, 2011).

Based on the strong associations between self-esteem and employment outcome, we expected similar associations with depression, as there is evidence that low self-esteem is a significant predictor of depression (Sowislo & Orth, 2013), which in turn is strongly associated with unemployment (Kaspersen et al., 2015; Lamberg et al., 2010; Nygren et al., 2013; Rizvi et al., 2015). Our study, however, did not find any significant associations between depression and any form of employment outcome, not even unemployment. These findings may be due to low prevalence of depression among the JUMP participants.



Improvements in global functioning and self-esteem have also been found in some past studies of VR for individuals with severe mental illness (Burns et al., 2009; Mueser et al., 1997). These studies, however, did not find any associations between baseline global functioning, self-esteem and employment outcome (Catty et al., 2008; Mueser et al., 1997). These discrepancies may be due to different definitions of competitive employment, or related to sample differences and country-specific barriers to employment. We found that approximately half of those who obtained competitive employment at two-year follow-up had baseline global functioning scores that were so high one would have expected them to already be employed. This indicates that external factors (e.g. limited access to VR services, the 'benefit trap', low expectations, narrow focus on rehabilitation, and fragmented services) play a large role for the employment status for individuals with schizophrenia in Norway.

### **6.1.5 Cost-effectiveness of vocational rehabilitation**

The JUMP interventions were expensive at an average of € 13 500 per person, which is approximately three times what has been identified in IPS/SE studies from the USA (Latimer, Bush, Becker, Drake, & Bond, 2004). The main reason for the high cost is that employment specialists in the JUMP study had a much lower caseload than the IPS/SE studies. The currency conversions were performed both with the average exchange rate and the purchasing power parities from 2015, which yielded more or less the same results. The reduced reliance on mental health services during the two-year follow-up period was, however, significant. Consequently, from a health service perspective, the JUMP interventions saved on average close to € 8 000 compared to the TAU group over the two-year period when adjusted for baseline differences.

Over the past three decades many psychosocial interventions have proven their effectiveness in randomised controlled trials (RCT), yet the access to such services is often limited (Latimer, Bond, & Drake, 2011). One reason for this may be that prioritising resources to one intervention generally involves a trade-off that involves reduced resources somewhere else. RCTs are undertaken in order to identify a treatment effect. They are not designed for decision-making. Decision-makers must consider both the costs and the consequences of prioritising one intervention over another, which is why economic evaluations are important (Drummond et al., 2015). Very few past studies have investigated cost-effectiveness of psychosocial interventions (CEA, 2016; Drummond et al., 2015; Norheim et al., 2014; Salkever, 2013). Estimating the cost-effectiveness of psychosocial interventions also pose

particular problems, as the effect may be contaminated by a multitude of events occurring in the participants' lives and that are unrelated to the interventions. In contrast, medication or technological trials are easier to control for confounding variables that can potentially affect the outcome.

Although rare, there are a few VR programmes that have been subjected to a cost-effectiveness analyses, with results favouring supported employment as more cost-effective than vocational services that incorporate work placements and sheltered work (Clark, Xie, Becker, & Drake, 1998; Dixon et al., 2002; Heslin et al., 2011; Knapp et al., 2013). The results of our study are not directly comparable, as we have compared the JUMP study to TAU, while the other studies have compared two modes of VR. Varying country-specific differences also limit the ability to compare results (Husereau et al., 2013). Our findings, however, are similar to past studies with respect to reduced inpatient care being the main cost reduction in the intervention groups.

Knapp and colleagues (Knapp et al., 2013) argued that the reduced reliance on inpatient care among individuals receiving IPS/SE may be due to the relationship between participants and the employment specialists. We suspect that such a potentially therapeutic relationship may have played a role in the JUMP study. The fact that the focus of the relationship was on the participants' resources rather than their symptoms probably enabled a positive personal identity rather than that of a patient. In addition to standard VR, the employment specialists met participants twice a week for CBT or CR sessions. Furthermore, in contrast to the fragmented services discussed in paper I, the JUMP study provided close collaboration between vocational and mental health services with a focus on employment and recovery, which is a new approach in this field.

Work in itself was also a likely contributor to the reduced reliance on inpatient care. In paper II, we found significant associations between employment and improvements in global functioning (both symptoms and function) and self-esteem. These results coincide with past studies demonstrating that individuals with schizophrenia who start working experience improvements in symptoms and self-esteem (Bond et al., 2001; Mueser et al., 1997), which may in turn reduce hospitalisations. Furthermore, studies that have considered the effects of working on overall treatment costs, have found a reduction in treatment costs for those

individuals who enter the work force (Bush et al., 2009; Perkins, Born, Raines, & Galka, 2005; Schneider et al., 2009).

## **6.2 Discussion of methodological issues**

The papers included in this thesis are based on different data sources, thus some of the methodological issues must be discussed separately. The first paper was an epidemiological study that examined prevalence, employment rate and costs of schizophrenia based on data from comprehensive and mandatory health and welfare registers. The second paper was based on data collected through interviews and self-report measures with the participants in the JUMP study. The measures used were standardised and widely accepted with good psychometric properties. In order to assure reliable assessments, all assessors were trained, calibrated and continuously supervised throughout the JUMP study. Paper III was based on a mixture of register data and collected data.

### **6.2.1 Representativity and generalisability**

#### ***Selection bias***

The use of unique personal identification numbers in the data extraction for paper I, and the fact that the registers are mandatory, ensures that all individuals who were treated for schizophrenia within the 12-month period we examined were included in the study. This method of data collection, however, does not include individuals who were not in contact with the mental health services during 2012. Based on past research (Nesvag et al., 2015), we estimated that paper I covered approximately 78% of all individuals with schizophrenia and schizoaffective disorders in Norway.

It is important to recognise some sources of potential selection bias amongst participants in the JUMP study. As relative fluency in the Norwegian language was an inclusion criterion in order to undertake the neurocognitive assessments, some individuals with immigrant background may have been excluded. Furthermore, the demands of the test protocol and a focus on competitive work or work placements may have indirectly excluded individuals in acute illness phases. As participants were recruited from mental health and welfare services it is also likely that service providers were more prone to refer individuals they considered most likely to benefit from VR. The option of self-referrals was made available for participants such that they were not reliant on their service provider's approval of joining the study. Despite potential sources of selection bias, the fact that participants were recruited from six

different catchment areas and from different services indicates that the participants in the JUMP study were representative of individuals with schizophrenia who met the pre-defined inclusion and exclusion criteria.

The cost-effectiveness analysis undertaken in paper III was not part of the original design of the JUMP study. Consequently a separate consent was sought from participants after completion of the study to extract data from health registers. Only 69 of the 148 participants consented to this. We were concerned that only those who had been successful in obtaining employment were willing to consent, which would have threatened the internal validity of the study. We compared the group that consented with those who declined on central variables (Table 1) and found no significant differences. Thus we assume the results are representative for the JUMP study as a whole.

**Table 1: Comparison on key variables between participants who consented to obtaining register data and participants who declined**

	Consent (N = 69)	Declined (N = 79)	Test Statistics	Group comparison ( <i>p</i> )
<b>Diagnosis</b>				
Schizophrenia	87.0 %	89.9 %		
Schizoaffective disorder	8.7 %	6.3 %	$\chi^2$ (4, n= 148) = 1.68	Ns
Psychosis NOS	1.4 %	2.5 %		
Delusional disorder	2.9 %	1.3 %		
<b>Age, mean (SD)</b>	33.2 (7.7)	32.6 (8.2)	$t$ (n=148) = 0.40	Ns
<b>Gender, male (%)</b>	45 (65.2 %)	58 (73.4 %)	$\chi^2$ (1, n= 148) = 1.17	Ns
<b>Education, highest completed</b>				
Primary school	30.4%	32.9%		
High school	29.0%	38.0%		
Trade school	8.7%	13.9%	$\chi^2$ (5, n= 148) = 8.27	Ns
College	21.7%	8.9%		
University	7.2%	6.3%		
Not completed primary school	2.9%			
<b>Units of DDD<sup>b</sup> main anti-psychotic, mean (SD)</b>	1.1 (0.9)	1.1 (0.7)	$t$ (n=140) = 0.83	Ns
<b>Duration of illness, mean years (DOI) (SD)</b>	8.0 (6.7)	6.5 (6.1)	$t$ (n=143) = 1.42	Ns
<b>Previous work experience, mean months (SD)</b>	64.15 (65.32)	66.69 (73.82)	$t$ (n=146) = -0.22	Ns
<b>Psychotic Symptoms (PANSS total) (SD)</b>	56.23 (15.35)	60.19 (15.34)	$t$ (n=141) = -1.52	Ns
<b>Employment outcome</b>				
Competitive employment	23.2%	21.4%		
Work placement	34.8%	18.6%	$\chi^2$ (3, n= 139) = 5.87	Ns
Sheltered work	13.0%	15.7%		
Unemployed	29.0%	44.3%		

### ***Information bias***

In epidemiological studies information bias refers to flaws in the accuracy of measures of the exposure or outcome variables. In paper I a top-down approach was used, which ensured all individuals registered with schizophrenia and schizoaffective disorder during 2012 were included in the study. A limitation of this approach is that those with the diagnoses, who did not utilise specialist mental health services during the 12-month period, are not included. This may have led to an underestimation of the employment rate among individuals with schizophrenia. However, the stable employment rate across age groups and evidence that almost no participants transferred to employment after receiving a disability pension (OECD, 2013b) suggest the 12-month employment rate of just over 10% is accurate.

Information bias should also be considered regarding the collection and use of retrospective data, especially data collected from participants through interviews. It may be difficult for participants to accurately recall details regarding past employment, substance abuse, symptom onset, number of hospital admissions, etc. To counteract such information bias, we collected objective data from patient journals on their first contact with mental health services, and we used register data to identify hospital admissions and months of employment during the last two years prior to inclusion in the study. Another potential source of information bias was that participants may have viewed the test protocol as some sort of a job interview, and consequently withheld information regarding symptom severity and illicit substance use out of fear of exclusion from the study. To counteract this it was emphasised that disclosure of symptoms would not determine their eligibility, and that only severe substance dependence was an exclusion criterion.

### ***Generalisability***

As previously emphasised, country-specific differences in costs, organisational design, service delivery, robustness of the welfare system, and the general income level, pose major barriers to the generalisability of economic evaluations of health services (Husereau et al., 2013). Even though efforts have been made to adhere to the CHEERS guidelines for economic evaluations of health interventions, the generalisability of our results is limited.

### **6.2.2 Design issues**

The JUMP study was designed with a cluster randomisation. We planned to randomise three regions to provide CR augmented VR, three regions to provide CBT augmented VR and three regions to recruit a control group already receiving standard VR within vocational rehabilitation enterprises. Despite considerable efforts over a lengthy period to recruit the control group, we were able to identify only a small number of individuals with schizophrenia spectrum disorders who were receiving VR services. This suggests that individuals with schizophrenia rarely accessed VR services, which in part explains the low employment rates (Falkum et al., 2015). The lack of an original control group had implications for our study, in that we were unable to further disentangle specific effective elements in the JUMP programme. We were also forced to draw a control group from the NPR for the cost-effectiveness analysis. Although this control group was matched with the JUMP group on age and gender, we were unable to compare the cost-effectiveness of the JUMP interventions with standard VR.

### **6.3 Strengths and limitations**

Strengths and limitations have been discussed in the respective papers included in this thesis, but some issues require further attention. The strength of this thesis is first and foremost that we have provided decision-makers with a base on which prioritisations can be made through a comprehensive examination of the status for individuals with schizophrenia in Norway in terms of employment, barriers to employment, and resource utilisation. We have further assessed a VR programme earmarked for individuals with schizophrenia in terms of employment outcome, participants global functioning and self-esteem, and cost-effectiveness.

The sample sizes in paper II and III is a limitation. Greater statistical power might have enabled us to detect between-group differences between the CR and CBT groups. Hence, the lack of significant differences in employment outcome and clinical measures may represent type II errors. We had no measure of health related quality of life in the JUMP study. The use of a generic health effect measure enables calculation of quality adjusted life years, which is of particular interest for cost-effectiveness analyses where programmes are compared against each other (Drummond et al., 2015). In paper III we overcame this limitation by using quality of life tariff scores related to employment from another study (Alonso et al., 2009) to calculate QALYs. The lack of a control group, receiving only VR without the addition of CR or CBT in paper II, is also a limitation, making it challenging to disentangle specific effective elements in the JUMP programme. Finally, the results presented in this thesis is based on a high-income Scandinavian welfare society, hence the generalisability to other societies may be limited.

### **6.4 Theoretical reflections**

The results presented in this thesis are based on data from health- and welfare- registers and from the JUMP study, a VR programme augmented with CR or CBT. The thesis took a societal perspective aiming to present evidence that may assist decision-makers in the prioritisation of resources.

The main argument of this thesis is that employment is attainable for individuals with schizophrenia, and interventions that increase the employment rate for this population will reduce the societal costs associated with the illness as well as improving the individual's quality of life. This argument is supported by a substantial and growing international evidence

base, that given the opportunity and adequate support, many individuals with schizophrenia are able to obtain and maintain employment.

The majority of studies into VR for individuals with schizophrenia over the past decade have been controlled studies examining the effect of SE/IPS studies in a number of countries. The JUMP study differs from these studies in that it attempted to integrate mental health services and vocational services within the established Scandinavian VR model and within the established welfare society. With increased awareness of the beneficial effects from employment, there is currently a SE/IPS study being undertaken in Norway (Sveinsdottir et al., 2014). When the results from the two studies are viewed together, the overall picture will likely provide decision-makers with a more robust knowledge base on which to prioritise resources for the management of schizophrenia in Norway.

We found that the reduced reliance of inpatient services among JUMP participants identified in paper III was equal regardless of their employment outcome. This may indicate that participants who had work placement or sheltered work experienced many of the same health benefits as those who obtained competitive employment. It may also indicate that the close follow-up by the employment specialist or the close collaboration between mental health services and vocational services prevented relapse and hospital admissions. Although we were unable to further disentangle the mechanisms behind these results, we can conclude that the JUMP interventions were more effective than normal care in avoiding costly hospital admissions. From a decision-maker perspective this would be an argument for prioritising VR services for individuals with schizophrenia.

In this thesis we have identified high unemployment rates among individuals with schizophrenia as well as a number of illness-related and external barriers to employment. From a societal point of view, the high unemployment and the external barriers to employment should be viewed together with Norway's high reliance on inpatient care and high treatment costs associated with schizophrenia. When interviewed about what was perceived as the greatest barriers to recovery, patients from a Canadian study reported stigma and hospitalisations (Whitley, 2016). This would indicate that Norway's reliance on inpatient care is detrimental to recovery, as inpatient care also increases stigma and affects employers' willingness to accept individuals with mental illnesses (Scheid, 2005; Tsang et al., 2007).



Furthermore, for the individual with schizophrenia, the low employment rate reduces their chance of experiencing recognition and self-worth as a productive member of society (Berge & Falkum, 2013). Several organisational problems such as fragmented services, lack of collaboration, and a narrow focus of mental health treatment have also been identified as important barriers to employment (OECD, 2013b).

In summary, the findings of this thesis highlight that a thorough examination of the organisation of mental health and welfare services in Norway is indicated. It appears that the reliance on inpatient care may lead individuals with schizophrenia into a vicious circle. In order to break this circle a sensible approach would be to shift resources away from inpatient care and towards recovery-based interventions focussing on aiding individuals with schizophrenia to obtain education and employment via community supports.

## **6.5 Implications**

There are several implications of the findings this thesis.

Firstly, the low employment rate and high treatment cost for individuals with schizophrenia in Norway has been established. This emphasises the need for implementation of evidence-based practices focussing on employment and recovery. Secondly, VR augmented with CBT or CR and integrated with mental health services was effective in aiding individuals with schizophrenia obtain employment. It was also effective in terms of improvements in self-esteem and global functioning, which was significantly associated with employment outcome and work tenure. Furthermore, the VR programme presented in this thesis was cost-effective from a health service perspective when compared to TAU, with lower costs and higher effect in terms of QALY. The cost reductions were also significant for those who did not gain competitive employment, indicating that the JUMP interventions had a positive impact on the participant's health regardless of the type of employment they had. This suggests that recovery-based psychosocial interventions should be prioritised in mental health services.

This thesis supports existing evidence that people with schizophrenia are willing and able to work when provided with the opportunity and adequate support. VR programmes tailored to the participants' individual preferences and needs may be an efficient approach to increase employment opportunities in this group, which is beneficial for both the individual's quality of life and to society at large.

Finally, from a decision-making perspective, results from a single study rarely provide sufficient information to make decisions on the adaptation of new treatment programmes. Decision models should rather be based on models where the effects and costs are obtained from several studies and modelled in order to predict the costs and effects of an intervention (Drummond et al., 2015).

## 7. Conclusion

Despite low prevalence, schizophrenia generates a significant economic burden with inpatient care and unemployment being the greatest contributing factors to the overall costs.

Individuals with schizophrenia face significant barriers to employment, and the JUMP study was designed to target both illness-related barriers and system-related barriers through the CR and CBT interventions and coordinated collaboration between the health and vocational services.

Global functioning and self-esteem were significantly associated with employment outcome and work tenure. The associations were of similar magnitude for baseline values and for change scores during the ten-month intervention period. Furthermore, JUMP participants experienced significant reductions in their reliance of inpatient care during a two-year follow-up period. The reductions in inpatient care were significant both for those who obtained competitive employment and for those who had work placements or sheltered work during and after the JUMP study. The reduced treatment costs were € 7 949 lower in the JUMP group than in the TAU group when adjusted for baseline differences. The incremental QALYs were also higher in the JUMP group making it a dominant strategy. Future research into the effectiveness of VR programmes would benefit from undertaking cost-effectiveness analyses in order to aid decision-makers make informed decisions when prioritising scarce health resources.

Our results indicate that individuals with schizophrenia in Norway face significant challenges in their endeavours to enter the workforce, both illness-related and system-related. We are, however, optimistic with respect to the future, as JUMP participants were able to overcome these challenges and obtain employment. We also demonstrated that VR can be cost-effective from a health service perspective, which may aid decision-makers to reallocate resources to these psychosocial interventions (Latimer et al., 2011).

Work is important and clearly beneficial. It is our hope that these findings may contribute to implementation of appropriate mental health policies, which will provide individuals with schizophrenia the opportunity to live a full life with productive work.



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## **9. Appendices**

### **DSM-IV-TR Schizophrenia and other psychotic disorders**

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#### **Subtypes**

Schizophrenia

Schizophreniform disorder

Schizoaffective disorder

Delusional disorder

Brief psychotic disorder

Shared psychotic disorder

Psychotic disorder due to general medical condition

Substance-induced psychotic disorder

Psychotic disorder not otherwise specified (NOS)

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#### **A. Criteria – Characteristic symptoms of schizophrenia**

Delusions

Hallucinations

Disorganised speech (e.g., frequent derailment or incoherence)

Grossly disorganised or catatonic behaviour

Negative symptoms, i.e., affective flattening, alogia, avolition, anhedonia

**CHEERS Checklist****Items to include when reporting economic evaluations of health interventions**

The **ISPOR CHEERS Task Force Report**, *Consolidated Health Economic Evaluation Reporting Standards (CHEERS)—Explanation and Elaboration: A Report of the ISPOR Health Economic Evaluations Publication Guidelines Good Reporting Practices Task Force*, provides examples and further discussion of the 24-item CHEERS Checklist and the CHEERS Statement. It may be accessed via the *Value in Health* or via the ISPOR Health Economic Evaluation Publication Guidelines – CHEERS: Good Reporting Practices webpage: <http://www.ispor.org/TaskForces/EconomicPubGuidelines.asp>

Section/item	Item No	Recommendation	Reported on page No/line No
<b>Title and abstract</b>			
Title	1	Identify the study as an economic evaluation or use more specific terms such as “cost-effectiveness analysis”, and describe the interventions compared.	_____
Abstract	2	Provide a structured summary of objectives, perspective, setting, methods (including study design and inputs), results (including base case and uncertainty analyses), and conclusions.	_____
<b>Introduction</b>			
Background and objectives	3	Provide an explicit statement of the broader context for the study. Present the study question and its relevance for health policy or practice decisions.	_____
<b>Methods</b>			
Target population and subgroups	4	Describe characteristics of the base case population and subgroups analysed, including why they were chosen.	_____
Setting and location	5	State relevant aspects of the system(s) in which the decision(s) need(s) to be made.	_____
Study perspective	6	Describe the perspective of the study and relate this to the costs being evaluated.	_____
Comparators	7	Describe the interventions or strategies being compared and state why they were chosen.	_____
Time horizon	8	State the time horizon(s) over which costs and consequences are being evaluated and say why appropriate.	_____
Discount rate	9	Report the choice of discount rate(s) used for costs and outcomes and say why appropriate.	_____
Choice of health outcomes	10	Describe what outcomes were used as the measure(s) of benefit in the evaluation and their relevance for the type of analysis performed.	_____
Measurement of effectiveness	11a	<i>Single study-based estimates:</i> Describe fully the design features of the single effectiveness study and why the single study was a sufficient source of clinical effectiveness data.	_____



	11b	<i>Synthesis-based estimates:</i> Describe fully the methods used for identification of included studies and synthesis of clinical effectiveness data.	_____
Measurement and valuation of preference based outcomes	12	If applicable, describe the population and methods used to elicit preferences for outcomes.	_____
Estimating resources and costs	13a	<i>Single study-based economic evaluation:</i> Describe approaches used to estimate resource use associated with the alternative interventions. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	_____
	13b	<i>Model-based economic evaluation:</i> Describe approaches and data sources used to estimate resource use associated with model health states. Describe primary or secondary research methods for valuing each resource item in terms of its unit cost. Describe any adjustments made to approximate to opportunity costs.	_____
Currency, price date, and conversion	14	Report the dates of the estimated resource quantities and unit costs. Describe methods for adjusting estimated unit costs to the year of reported costs if necessary. Describe methods for converting costs into a common currency base and the exchange rate.	_____
Choice of model	15	Describe and give reasons for the specific type of decision-analytical model used. Providing a figure to show model structure is strongly recommended.	_____
Assumptions	16	Describe all structural or other assumptions underpinning the decision-analytical model.	_____
Analytical methods	17	Describe all analytical methods supporting the evaluation. This could include methods for dealing with skewed, missing, or censored data; extrapolation methods; methods for pooling data; approaches to validate or make adjustments (such as half cycle corrections) to a model; and methods for handling population heterogeneity and uncertainty.	_____
<b>Results</b>			
Study parameters	18	Report the values, ranges, references, and, if used, probability distributions for all parameters. Report reasons or sources for distributions used to represent uncertainty where appropriate. Providing a table to show the input values is strongly recommended.	_____
Incremental costs and outcomes	19	For each intervention, report mean values for the main categories of estimated costs and outcomes of interest, as well as mean differences between the comparator groups. If applicable, report incremental cost-effectiveness ratios.	_____
Characterising uncertainty	20a	<i>Single study-based economic evaluation:</i> Describe the effects of sampling uncertainty for the estimated incremental cost and incremental effectiveness parameters, together with the impact	_____



		of methodological assumptions (such as discount rate, study perspective).	_____
	20b	<i>Model-based economic evaluation:</i> Describe the effects on the results of uncertainty for all input parameters, and uncertainty related to the structure of the model and assumptions.	_____
Characterising heterogeneity	21	If applicable, report differences in costs, outcomes, or cost-effectiveness that can be explained by variations between subgroups of patients with different baseline characteristics or other observed variability in effects that are not reducible by more information.	_____
<b>Discussion</b>			
Study findings, limitations, generalisability, and current knowledge	22	Summarise key study findings and describe how they support the conclusions reached. Discuss limitations and the generalisability of the findings and how the findings fit with current knowledge.	_____
<b>Other</b>			
Source of funding	23	Describe how the study was funded and the role of the funder in the identification, design, conduct, and reporting of the analysis. Describe other non-monetary sources of support.	_____
Conflicts of interest	24	Describe any potential for conflict of interest of study contributors in accordance with journal policy. In the absence of a journal policy, we recommend authors comply with International Committee of Medical Journal Editors recommendations.	_____

For consistency, the CHEERS Statement checklist format is based on the format of the CONSORT statement checklist

The **ISPOR CHEERS Task Force Report** provides examples and further discussion of the 24-item CHEERS Checklist and the CHEERS Statement. It may be accessed via the *Value in Health* link or via the ISPOR Health Economic Evaluation Publication Guidelines – CHEERS: Good Reporting Practices webpage: <http://www.ispor.org/TaskForces/EconomicPubGuidelines.asp>

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