JONNA TOLONEN, ERIKA JÄÄSKELÄINEN, VIRPI LEPPÄNEN, MARIANNE HAAPEA, JOUKO MIETTUNEN, KRISTIINA MOILANEN

THE IMPACT OF PSYCHIATRIC REHABILITATION - A STUDY OF OUTCOMES OF PERSONS WITH SEVERE MENTAL DISORDERS

ABSTRACT

Objective: To explore the changes between before and after residential psychiatric rehabilitation in functioning and psychiatric symptoms in young adults with severe mental disorders. Method: Participants (n = 39) were aged 18-29 and had been in residential psychiatric rehabilitation for the period 2011-2017. We gathered data retrospectively from clinical registers, day-to-day records, rehabilitation plans and interRAI community mental health evaluations. Changes in several outcomes of functioning and psychiatric symptoms were analysed in young adults with severe mental disorders at the end of rehabilitation. Results: Median length of rehabilitation was 29 months. Symptoms of depression (p=0.001), mania (p=0.009), negative symptoms (p=0.017), anhedonia (p=0.012), the risk of harming others (p=0.010) and severity of self-harm (p= 0.015) had decreased from before to end of rehabilitation. In addition, performance in activities of daily living (p=0.016) had improved and the number of persons living independently had increased (p=0.001). Conclusion: Psychiatric rehabilitation may be effective in decreasing psychiatric symptoms, improving functioning and increasing independent living among young adults with severe mental disorders. These results support the need for comprehensive psychiatric rehabilitation with evidence-based interventions. This important research area requires further investigation with larger sample sizes, prospective study settings and longer follow-up times.

KEY WORDS: PSYCHIATRIC REHABILITATION, RESIDENTIAL SERVICES, YOUNG ADULTS, SEVERE MENTAL DISORDER

INTRODUCTION

Studies on psychiatric rehabilitation are of key importance, since outcomes of severe mental disorders are not very favourable. For example, the proportion of persons meeting the criteria for recovery from one of the most severe psychiatric disorders, schizophrenia, had flatlined for decades until 2010 [1,2], and since 2010 the proportion of persons experiencing recovery may have even decreased [2]. There are no standardized criteria for recovery from severe mental illness, and definitions of recovery vary [3]. As an example, clinical recovery from schizophrenia is often defined as remission of symptoms of the illness, and social recovery as good social and/or functional outcomes, such as employment [2]. In recent years the recovery paradigm has moved the focus more on personal recovery, which is not defined by the absence of clinical symptoms but more on the personal experience of one`s recovery. This personal experience can be defined by connectedness with others, hopefulness about the future, sense of identity and meaning of life and feeling empowered [4].

Residential services are widely used for persons with severe mental disorders in Finland [5,6] and in other European countries such as UK [7]. In Finland municipalities are required to provide social welfare such as residential services for persons with psychiatric disorders who need support in accommodation, as well as nursing and care [8]. In 2020, of these services, 91% were provided by the private sector (including the third sector) [9]. In 2017 the number of persons with psychiatric disorders in residential services was 7806 persons, of which 55% were in assisted living (staff available on site 24h) [10].

In a systematic review of French residential facilities also offering schooling services for young adults with severe mental disorders the average duration of stay in the facility varied from 7.7 to 18.7 months. At the end of intervention, the proportion of persons experiencing clinical improvement varied from 54% to 74%, although their accommodation was not reported [11]. A systematic review of Australian community-based residential mental health rehabilitation for adults found only four quantitative studies, all with limited quality. The need for 24/7 assistance decreased in the follow-up time, and one residential service type was able to decrease long-term hospitalization [12]. In an English cohort study of persons with psychotic disorders, the average length of inpatient mental health rehabilitation was 18 months, and after 12 months 70% of participants were either discharged or ready for discharge [13].

In recent years, the knowledge base of mental health and psychiatric rehabilitation has been increasing [14–16]. The aim of psychiatric rehabilitation is to promote recovery by controlling psychiatric symptoms and enhancing community integration by removing barriers to social participation caused by the illness. In psychiatric rehabilitation the individual is helped to recover their abilities to live a meaningful life [4,17,18]. In many regions implementation of interventions for psychiatric rehabilitation have not been successful, even though evidence and regulation might support it [19,20], and this is also the case in Finnish psychiatric care [3,20].

Psychiatric rehabilitation's core features are its process and structured evidence-based interventions [21,22]: psychoeducation [23], cognitive remediation therapy (CRT) [24–26], individual placement and support (IPS) [27,28], cognitive behavioural therapy (CBT) [29] and social skills training (SST) [23]. All of these increase meaningful activities and can enhance functional capacity and recovery. Peer support has been included in many interventions as it may have a positive effective on personal recovery from mental illnesses, but according to a recent meta-analysis it does not seem to have an effect on psychiatric symptoms [30]. To our knowledge, these interventions have not been studied in combination with residential services.

There is a need for studies on the effectiveness of residential service models and practices [7]. Severe mental illnesses are a major burden individually, socially and financially. Residential services are especially costly, but scientific, statistical and clinical knowledge shows that they are still needed in the 2020s [5,7,31,32]. Combining residential services and psychiatric rehabilitation might be one solution to make these services more effective economically and, especially for individual people suffering from severe mental illness, by improving the prognosis of recovery. Thus, this an important area that needs further investigation.

AIMS OF THE STUDY

The aim of this study was to explore the changes in several outcomes of functioning and psychiatric symptoms in young adults with severe mental disorders at the end of residential psychiatric rehabilitation. To our knowledge, there are no studies of residential psychiatric rehabilitation combining evidence-based interventions for young adults with severe mental disorders.

MATERIAL AND METHODS

STUDY DESIGN, SETTING AND POPULATION

The data were gathered from a residential psychiatric rehabilitation facility for young adults aged 18-29 in Northern Ostrobothnia, Finland. The young adults came to psychiatric rehabilitation mainly from hospital or from their home, where they were no longer able to cope due to social isolation and lack of functional capacity (e.g., not able to take care of one`s home, not able to participate in studies or working life). The target population consisted of rehabilitees between the ages of 18-29 years that had been in rehabilitation between 1/2011–12/2017 (n = 114). Rehabilitees who had only been in the day programme of the rehabilitation services and one rehabilitee who was under 18 years of age were excluded. Of the study population, 39 (35%) persons gave their informed consent (*Figure 1*). The data were collected from the register of the residential psychiatric rehabilitation unit during 4/2018-12/2019. The study has been approved by the Northern Ostrobothnia Hospital District Ethical Committee 1/2018 (49/2017) and carried out in accordance with the Declaration of Helsinki.

CONTENT OF PSYCHIATRIC REHABILITATION

The main goal of the studied psychiatric rehabilitation programme was for the participant to be able to attain independent and meaningful living. Furthermore, participants had individual aims for the psychiatric rehabilitation [33]. The psychiatric rehabilitation combined active engagement of the individual in evaluating and planning the rehabilitation with a multi-disciplinary team. The team consisted of nurses and practical nurses, Bachelor of Social Services, community educator, occupational therapists and psychiatrist or adolescent psychiatrist. Rehabilitation consisted of individually planned week and day programmes including individually tailored components and amounts of intervention (*Table 1*). For example, a participant might participate in rehabilitative work for two hours a day and leisure activities three times a week.

Figure 1. Flow chart of the study participants

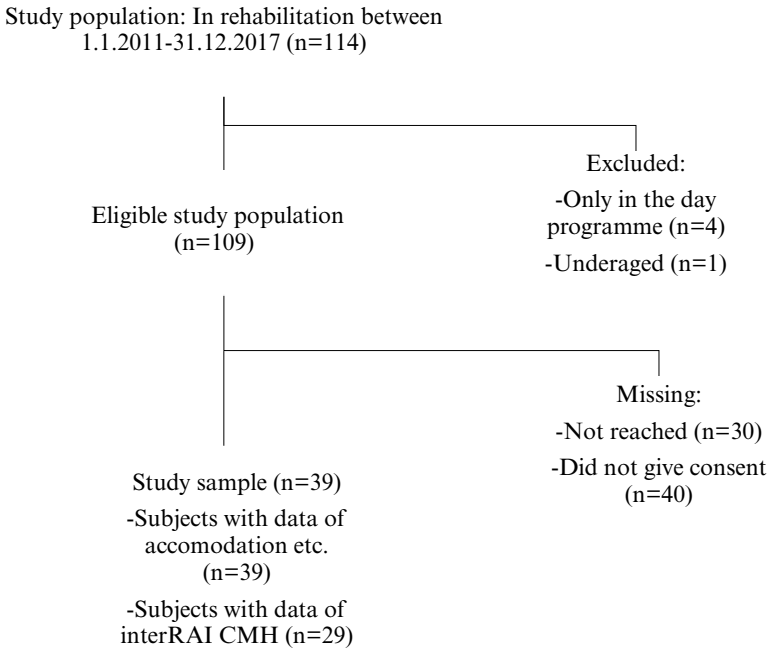

Table 1. Components of studied residential psychiatric rehabilitation

Components of the studied residential psychiatric rehabilitation	Description	Additional information
Accommodation	Accommodation departments 1-2: Staff on site 24h, staff patient ratio 0.59, high/moderate support, congregate setting, strong emphasis on move-on Accommodation departments 3-4: No staff on site, staff patient ratio 0.19, low/moderate support, department 3 congregate setting and department 4 individual accommodation, strong emphasis on move-on	Support for accommodation gradually decreased over the course of rehabilitation
Individual coaching	Support for mental health disorders and life skills minimum 1h per week with a nurse or a Bachelor of Social Services	E.g. psychoeducation, managing finances, education plans
Psychiatrists' services	One to two times per month	Consultation, prescriptions, individually planned meetings
Guidance for medication	Daily guidance by the staff for taking medication	Guidance for taking care of medication gradually decreased over the course of rehabilitation
Rehabilitation groups	Two times per week for one to one and a half hours by an occupational therapist accompanied once a week by a nurse or Bachelor of Social Services	E.g. Social and Interaction Training Groups, psychoeducation groups
Social rehabilitation	Daily active participation in community activities and activities in the residential facility	E.g. meeting for all residents every morning on the daily schedule and common matters
Cognitive remediation therapy	Individually implemented by a trained Cognitive Remediation Therapist	Three times per week altogether 40-44 hours
Functional rehabilitation in activities of daily living	Daily by the staff	Guidance for shopping, cleaning, etc.
Rehabilitative work/studies	Four times per week for three hours by a vocational counsellor	E.g. arts and crafts, studies online
Leisure activities	Guided by the staff five times per week and at least two times per week outside of the residence	E.g. gym, bowling
Sleep guidance	Staff available 24h	For accommodation departments 3-4 by phone

BACKGROUND AND OUTCOME VARIABLES

The data consisted of clinical register information of: i) day-to-day records, ii) rehabilitation plans, and iii) interRAI community mental health (CMH) evaluations. From the day-to-day records and rehabilitation plans we gathered and analysed information on age, gender, status of accommodation (before and at end of rehabilitation), psychiatric diagnoses, medication and length of rehabilitation for background information.

For statistical analysis the psychiatric diagnoses were categorized according to the International statistical classification of diseases and related health problems version 10 [34] on their severity as: i) any type of psychotic disorder (e.g., schizophrenia, psychotic depression, bipolar disorder with psychotic features), ii) affective disorder (e.g., non-psychotic bipolar or depressive disorder), iii) personality disorder (e.g., borderline personality disorder), and iv) anxiety disorder (e.g., social phobia). If the study subject had several diagnoses the most severe was considered as the main diagnosis and the other diagnoses were considered secondary. Medication records were categorized primarily using the Anatomical Therapeutic Chemical Classification System as: i) antipsychotics (N05A), ii) antidepressants (N06A), iii) psychostimulants (N06B), iv) psycholeptics and psychoanaleptics in combination (N06C), v) drugs used in addictive disorders (N07B), vi) benzodiazepines and related drugs, vii) antiepileptics (N03A), and viii) any other medication for psychiatric symptoms.

INTERRAI COMMUNITY MENTAL HEALTH (CMH)

interRAI CMH is one of the holistic evaluation instruments developed by the interRAI collaboration that measures health, psychiatric symptoms and functional capacity [35]. It was used in the present study at the beginning and end of psychiatric rehabilitation. The aim of the interRAI instrument family is to support the assessment and planning of care with the elderly, disabled and psychiatric service users [35] and, most recently, with children and youth [36]. In the development of the interRAI instruments for mental health the underlining principles have been rehabilitation, recovery and empowerment [37]. Evidence indicates that the interRAI instruments consider different issues relevant and suitable for service users in different care settings and in different cultures and languages [35,38,39]. The instruments base their trained-rater evaluation on multiple sources of information: observational data, clinical records, and communication with the service user, care givers and healthcare staff. Some items are restricted to self-report by the service user (e.g., self-reported depression). Items are evaluated on the absence or presence of a condition and its frequency or severity in the timeframe [35,39]. Evaluation is based on a limited timeframe of three days, but for service use the look-back period is seven days and 30 or 90 days, or even lifetime estimates are possible for certain items [38]. A higher score on a scale means inferior functioning or more severe symptoms [40]. Further information on the original scales is presented in supporting information (online supplement 1).

From the interRAI CMH instrument we gathered and analysed the following 14 (of 23) scales: Cognitive Performance (CPS_6), Depression Rating (DRS_14), Pain (PAIN_4), Activities of Daily Living Hierarchy (ADLH_6), Addictions and Substance Use (CAGE_4), Negative Symptoms (NSS_12), Positive Symptoms (PSS_24), Anhedonia (ANHEDONIA_12), Mania (MANIA_20), Severity of Self-Harm (SoS_6), Risk of Harm to Others (RHO_6), Communication (COMM_8) and Instrumental Activities of Daily Living (IADL_42 and IADL_21). Of the latter, IADL_42 measures a person's functional capacity in instrumental activities of daily living and IADL_21 their performance of these activities. The number after the scale refers to the sum of the scale. Scales that were not included were either shorter scales of the same subject, scales of the same subject from a different point of view, or scales that were primarily developed for a different population, e.g., the elderly. Regarding the psychometric properties of the instrument, inter-rater reliability has been shown to be excellent, internal consistency good to excellent, and validity from moderate to good [38]. For example, in a previous study the interRAI CMH Depression Severity Index (DSI) and Cognitive Performance Scale have been found to be feasible assessments of service delivery outcomes and effectiveness [41].

MISSING DATA

At the end of rehabilitation interRAI CMH evaluations were not available for 10/39 subjects. Also, there was missing data for one participant in five scales: Activities of Daily Living Hierarchy (both scales), Communication, Severity of Self-Harm, Mania and Pain.

We compared participants (n = 29) with at least two interRAI CMH instrument evaluations to participants with at most one evaluation (n = 10) with Pearson's chi-square test

on gender and diagnoses of mood disorders and psychosis and, with an independent samples t-test, on age. We found no differences between groups in any of the tested variables: sex (p>0.999), affective disorder (p=0.711), psychosis (p=0.462) and age (p=0.971).

STATISTICAL METHODS

Frequencies with proportions were calculated for gender, diagnoses, accommodation and use of medication. Mean and range were calculated for age at the start of the rehabilitation and median with interquartile range (IQR) was calculated for the length of rehabilitation. Change in interRAI CMH scales from baseline to end of rehabilitation was calculated by comparing means. For all variables normal distribution was tested with SPSS. Variables with a normal distribution were tested with a parametric paired samples t-test and other variables with a non-parametric Wilcoxon signed rank test. Paired samples t-test was performed on Depression Rating Scale, Activities of Daily Living Hierarchy, Pain, Addictions and Substance Use, Positive Symptoms, Mania, Risk of Harming Others and Communication scales, and independent living between the start and end of rehabilitation. For these variables means and 95% confidence intervals were presented. A Wilcoxon signed rank test was performed on Cognitive Performance, Negative Symptoms, Anhedonia, Severity of Self-Harm and Instrumental Activities of Daily Living scales to compare values at the start and end of rehabilitation. For these variables, medians and IQR were presented. All statistical analyses were performed with SPSS 26.0 software [42]. Cohen's d values were used to measure effect sizes (ES) of t-test outcomes. Cohen describes d values as 0.2 small, 0.5 medium and 0.8 large [43]. Effect sizes for Wilcoxon signed rank tests were calculated using the formula: r equals Z divided by squareroot of N [44] in Microsoft Excel [45]. A two-tailed *p*-value of <0.05 indicated a statistically significant change. When analysing the differences in means of the scales we did not adjust for length of rehabilitation.

RESULTS

CHARACTERISTICS OF THE SAMPLE

At the start of the rehabilitation the mean age of the participants (n = 39) was 22.28 years (range 18-33). The median length of rehabilitation was 29 months (IQR = 15;42). Over half of the participants (64.1%) were women. Most had several diagnoses (64.1%), and as a primary diagnosis affective disorder (48.7%) and psychotic disorder (30.8%) were the most common. Other diagnoses in the sample were anxiety or personality disorder, substance abuse and eating disorder (*Table 2*). Antipsychotics were the most used medication, by 71.8% of the participants (*Table 2*) and over half of the participants (64.1%) were using antidepressants. Benzodiazepines and related drugs (41.0%) and antiepileptics (33.3%) were also commonly used. Most participants had co-medications: concomitant use of two medications 28.2%, three medications 25.6% and four medications 17.9%.

CHANGE OF SYMPTOMS AND FUNCTIONING

The interRAI CMH scales showed statistically significant decreases with medium effect sizes in the Depression Rating Scale (*p*=0.001, ES -0.67), Mania Scale (*p*=.009, ES -0.53) and Risk of Harm to Others (*p*=0.10, ES -0.51) from baseline to the end of rehabilitation. There were statistically significant decreases with small effect sizes in the Negative Symptoms Scale (*p*=0.017, ES -0.44), Anhedonia Scale (*p*=0.012, ES -0.47) and Severity of Self-harm Scale (*p*=0.015, ES -0.45) from before to the end of rehabilitation. The Instrumental Activities of Daily Living scale (performance) (mean difference (*p*=0.016, ES -0.45) decreased, indicating an improvement in functioning, although with a small effect size. There were no statistically significant changes in the means of the other interRAI CMH scales (*Table 3*).

In addition, the number of persons living independently increased statistically significantly (mean difference (*p*=0.001, ES 0.61) from start to end of rehabilitation. At the start of the rehabilitation of participants 33% lived independently and 23% lived with their parents. At the end of rehabilitation 69% lived independently and 3% with their parents. From residential care to rehabilitation came 8% and to residential care after rehabilitation transferred 18%. For more details on accommodation see *Table 4*.

Table 2. Participant's diagnosis and medication according primarily to ATC classification system† (n = 39)

Diagnosis	**n (%)**
Psychotic disorder	12 (30.8%)
Affective disorder	24 (61.5%)
Anxiety disorder	16 (41.0%)
Personality disorder	9 (23.1%)
Substance abuse	3 (7.7%)
Eating disorder	2 (5.1%)
Primary diagnosis	
Psychotic disorder	12 (30.8%)
Affective disorder	19 (48.7%)
Personality disorder	2 (5.1%)
Anxiety disorder	6 (15.4%)
Medication ATC category †	**%**
Antipsychotics (N05A)	28 (71.8%)
Antidepressants (N06A)	25 (64.1%)
Psychostimulants (N06B)	2 (5.1%)
Psycholeptics and psychoanaleptics (N06C)	1 (2.6%)
Drugs used in addictive disorders (N07B)	3 (7.7%)
Benzodiazepines and related drugs ‡	16 (41.0%)
Antiepileptics (N03A)	13 (33.3%)
Other medication for psychiatric symptoms §	20 (51.3%)
Use of antipsychotics (NO5A) by primary diagnosis	
Psychosis	11 (91.7%)
Affective disorder	12 (63.2%)
Personality disorder	2 (100.0%)
Anxiety disorder	3 (50.0%)

† The Anatomical Therapeutic Chemical Classification System

‡ Included medication temazepam, clonazepam, lorazepam, oxazepam, chlordiazepoxide, diazepam, zopiclone

§ Included medication melatonin, metoclopramide hydrochloride, metoprolol succinate, propranolol hydrochloride, hydroxyzine hydrochloride and bisoprolol fumarate.

Table 3. Change of interRAI CMH scales and accommodation from beginning to the end of rehabilitation

	Mean, baseline	Mean, end	Mean Difference (95% Confidence Interval)	Effect size (Cohen's d)	*t*	*p*-value (t test)
Depression Rating Scale	3.28	1.41	-1.86 (-2.91; -0.81)	-0.67	-3.63	0.001*
Pain	0.61	0.25	-0.36 (-0.80; 0.08)	-0.32	-1.67	0.106
Activities of Daily Living Hierarchy	0.21	0.07	-0.14 (-0.32; 0.03)	-0.32	-1.69	0.103
Addiction and Substance Use	0.55	0.45	-0.10 (-0.62; 0.41)	-0.08	-0.41	0.682
Positive Symptoms Scale	3.09	1.79	-1.28 (-2.71; 0.16)	-0.39	-1.82	0.079
Mania Scale	3.54	2.18	-1.36 (-2.35; -0.36)	-0.53	-2.79	0.009*
Risk of Harm to Others	1.86	1.24	-0.62 (-1.08; -0.16)	-0.51	-2.77	0.010*
Communication Scale	0.86	0.57	-0.29 (-0.66; 0.09)	-0.29	-1.55	0.133
Instrumental Activities of daily living (performance)	2.53	1.00	-1.53 (-2.75; -0.31)	-0.45	-2.56	0.016*
Independent living	1.31	1.69	0.39 (0.18; 0.59)	0.61	3.79	0.001*
	Mean, baseline	**Median, end**	**Median of difference (inter quartile range)**	**Effect size (R)**	**Z**	***p*-value (Wilcoxon test)**
Cognitive Performance Scale	1	0	0 (-1.00; 0.00)	-0.24	-1.29	0.198
Negative Symptoms Scale	3	0	-1.50 (-4.50; 0.00)	-0.44	-2.38	0.017*
Anhedonia Scale	3	0	-1.50 (-4.50; 0.00)	-0.47	-2.52	0.012*
Severity of Self-Harm	3	1	0.00 (-2.50; 0.00)	-0.45	-2.44	0.015*
Instrumental activities of Daily Living (capacity)	3	0	-0.50 (-6.25; 0.75)	-0.33	-1.79	0.073

*Statistically significant change in p-value

Table 4. Accommodation status of the participants at baseline and at the end of rehabilitation

Accommodation	Baseline (n = 39)	End of rehabilitation (n = 39)
With parents	9 (23.1%)	1 (2.6%)
Individually/with partner	13 (33.3%)	27 (69.2%)
Supported housing	2 (5.1%)	1 (2.6%)
Residential Care	3 (7.7%)	7 (17.9%)
Other/Not known †	12 (30.7%)	3 (7.7%)

† Included those that were in inpatient care in a psychiatric hospital and there was no information on accommodation

DISCUSSION

MAIN RESULTS

In this study of residential psychiatric rehabilitation of persons aged 18-29 with severe mental disorders, clinical psychiatric symptoms decreased and functioning improved during rehabilitation. Depression and mania symptoms and risk of harming others decreased statistically significantly from start to end of rehabilitation with a medium effect size. Also, negative symptoms, anhedonia and self-harming conduct decreased statistically significantly with a small effect size. Performance in instrumental activities in daily living also decreased statistically significantly, with a small effect size, indicating an improvement in functioning. In addition, the proportion of persons living independently increased from 33% to 69%. Even though the sample size was small, using an unselected clinical sample is to be considered an important advantage.

COMPARISON TO EARLIER STUDIES AND CLINICAL IMPLICATIONS

In this study, the Depression Rating Scale scores decreased statistically significantly. There were also statistically significant decreases in negative symptoms and anhedonia. These two scales include partly the same items (online supplement 1), such as questions about withdrawal from activities of interest and decrease in motivation and/or social contacts. Also, severity of self-harm had decreased. Severity of self-harm measures self-destructive thoughts and behaviours. To our knowledge there are no studies that compare self-harming thoughts and behaviours before and after psychiatric rehabilitation and/or residential services. Previous studies have shown a connection between fewer depressive symptoms and an increase in subjective quality of life [46] and mental health recovery [47]. Unfortunately, we did not have a measure of quality of life in our sample. One may nevertheless hypothesize that decrease of symptoms and increase of functioning positively influence quality of life. Participants may have found ways to cope with their symptoms better, and thus they do not cause as much psychological distress.

The studied residential psychiatric rehabilitation did not have an effect on positive symptoms or cognitive and communication abilities. For positive symptoms, antipsychotic medications (ES 0.26-0.49) [48] and CBT (ES 0.65) are the most effective available interventions [49]. A systematic review of people with severe mental illness in supported accommodation showed mixed evidence on psychiatric symptoms: three studies showed improvements, two no change and two worsening of symptoms [7]. In recent studies of psychiatric rehabilitation, one study found no effect on positive symptoms [50] and in two studies positive symptoms decreased statistically significantly [51,52]. CBT was not available in the rehabilitation analysed in our study. In our sample for cognitive and communication deficiencies CRT and Social Cognitive and Interaction Therapy (SCIT) were offered based on individual assessment. These are considered to be efficient interventions [24–26]. It has

also been proposed that more scientific evidence is needed for recognizing individuals who benefit from cognitive rehabilitation, the timing and amount of the interventions [26] and the maintenance of results [53].

Independent living was the primary target of the studied rehabilitation. The study sample had markers of poor mental health and functional capacity: more than half of the sample had several diagnoses (64%), several co-medications (54%) and prior to rehabilitation over one third (36%) was either in supported accommodation or psychiatric inpatient care. We found that at the end of rehabilitation 69% of participants attained independent living, and of all participants, assisted (24/7 support) or supported living was needed by only 13%. The Boston psychiatric rehabilitation (BPR) is one approach to psychiatric rehabilitation and it has been studied in Europe [54–56]. A Swedish study found that while BPR outpatient care was effective regarding the goals of societal participation and contacts (including work and educational goals), it was not effective at improving living conditions [57]. An English cohort study of residential services found that most people did not move on to a more independent accommodation. From the compared residential service types the most statistically significantly effective service type in increasing move on was floating outreach [58]. Floating outreach is comparable to the studied rehabilitation's time point where there was less support for accommodation (e.g., staff not on site, staff patient ratio 0.19, congregate or individual accommodation, for more details see *Table 1*). Thus, our study result of a significant increase in individual living is a clinically meaningful result.

Good performance in IADL is needed in independent living and practised at all stages of the studied rehabilitation. In our study, performance in instrumental activities of daily living (IADL) improved. Notably however, a change was found only in performance (IADL_21 scale) and not functional capability (IADL_42 scale), although both IADL scales measure the same activities, such as taking medication or shopping. The interRAI CMH is based on the rater´s evaluation of observations and interview. In the studied rehabilitation the last interRAI CMH evaluation was in most cases performed at a time point where there was less support in accommodation (See *Table 1*). It could be that in functional capability of IADL skills, raters had less observations and that for performance they relied on the interview of the person evaluated.

Even though psychotic disorders were diagnosed in 31% of the participants, antipsychotic medication was used by 72% of the participants. Use of antipsychotics is also common in other than psychotic and bipolar disorders and, based on one systematic review, 45-70% of all use of antipsychotics is off-label [59]. In general, antipsychotics are used, e.g., in affective and anxiety disorders if other treatments have not been effective enough [59,60]. In clinical practice personality disorders and insomnia may also be reasons for antipsychotic use [59], although there is little evidence of their efficacy in these conditions [60]. Our sample had severe symptoms, comorbid conditions and low functioning, which may be one of the reasons behind the high use of antipsychotics.

Our study results point out that combining evidence-based psychiatric rehabilitation interventions with residential services can be beneficial. In residential services individuals are present at the intervention site and can get support for attendance, hence increasing the effect of the intervention. As mentioned in the introduction these interventions might not be implemented enough. There are many possible reasons for this such as the lack of economic, time and personnel resources in the public sector to organize psychiatric rehabilitation interventions. In the future it would be interesting to study long-term cost-effectiveness of psychiatric rehabilitation and residential services combined. It would be important to study and identify what elements of the combined residential services and psychiatric rehabilitation are effective, e.g., for gaining independent living, for decreasing symptoms and self-harm. In addition, it would be important to analyse the effect of residential services in different countries.

STRENGTHS AND LIMITATIONS

A major strength of our study is that this is one of the few studies on residential psychiatric rehabilitation. Our study was a clinical real-world sample of young persons with severe mental disorders, followed over a long period. This kind of study and population is difficult to perform as a randomized controlled trial (RCT) because the length of rehabilitation was on average 2.5 years. A RCT design would be very difficult and expensive to administer for so long. This was the first Nordic study considering outcomes of psychiatric rehabilitation using the interRAI CMH evaluation instrument, among other measures. We had a large amount of data on the participants, and we were able to study several outcomes. Analysed outcomes included both functioning and mental health-related outcomes.

There are limitations to this study. Firstly, considering the sample, the sample size was small (n = 39), although this is comparable to other European studies of psychiatric

rehabilitation [46,52,61]. The lack of statistical significances may be partly due to small sample size. It was not possible to determine the sample size prior to the study, since this sample was not originally collected for research purposes. The study population was 114 persons of which only 39 (34%) gave their informed consent, limiting the generalizability of the results. It can also be considered a limitation that some of the outcome variables may measure the same phenomena from a different perspective (e.g., anhedonia, negative symptoms), and while the goal of the psychiatric rehabilitation was independent living and good quality of life, quality of life was not measured in our sample. In addition, there was missing data in the interRAI CMH evaluation: for most of the scales data was available for 28-29 persons, and for IADL (performance) the data was available for 32 persons. Finally, the study design was retrospective and there was no comparison group. The changes found in outcomes might be a caused by some other undetected factor than the psychiatric rehabilitation.

FUNDING

This work was supported by Oulu University Hospital funding; Academy of Finland (grant number 316563); Juho Vainio Foundation (author JM); Yrjö Jahnsson Foundation (author JM). The funders had no role in the study design, data collection, data analysis, interpretation of the results, or the decision to publish the article.

DATA AVAILABILITY STATEMENT

The data that supports these findings contains sensitive personal data and cannot be made publicly available because of restrictions imposed by the EU and Finnish General Data Protection Regulation (GDPR). However, the restricted data can be applied for directly from the corresponding author in order to make the data as FAIR as possible. All requests will be accordingly replied to and the data will be made available if the request is adequate, responsible and reasonable.

Declaration of interests

We declare the following conflicts of interests:
Jonna Tolonen has been a minority owner (2011-2018), a member of the board of directors (2011-2018) and working for Sähäkkä Ltd. (2008-2020). As of 2021 Tolonen has been a freelancer of occupational therapy and irregularly works for the company. Virpi Leppänen has given professional guidance in Sähäkkä Ltd. (2017-2019). Erika Jääskeläinen, Marianne Haapea and Jouko Miettunen declare no conflict of interest. Kristiina Moilanen has worked for Sähäkkä Ltd. (2012-2019).

Supplementary Material

Supplementary data are available at Psychiatria Fennica online

Acknowledgements
We want to give a warm thank you to all the study participants. We want to thank nurse Marjo Typpö for resource help and public health nurse Jaana Riekki for participating Investigation. We also want to thank Raisoft Ltd. for their software assistance.

Authors

Jonna Tolonen[1,2,3]
Erika Jääskeläinen[2,3,4]
Virpi Leppänen[5]
Marianne Haapea[2,3,4]
Jouko Miettunen[2,3]
Kristiina Moilanen[1,4]

[1] Humana Sähäkkä Ltd., Ylivieska, Finland
[2] Research Unit of Population Health, University of Oulu, Oulu, Finland
[3] Medical Research Center Oulu, Oulu University Hospital and University of Oulu
[4] Department of Psychiatry, Oulu University Hospital, Oulu, Finland
[5] Department of Psychiatry, Oulu City Mental Health Services, Oulu, Finland

Correspondence to:

Jonna Tolonen
jonna.tolonen@oulu.fi

Research Unit of Population Health, University of Oulu
PL 8000
90014 Oulu
Finland

Jonna Tolonen: Conceptualization, Methodology, Formal analysis, Investigation, Resources, Data curation, Writing - Original draft preparation, Writing - Review & editing, Visualization.
Erika Jääskeläinen: Conceptualization, Methodology, Writing - Review & editing, Supervision.
Virpi Leppänen: Conceptualization, Writing - Review & editing.
Marianne Haapea: Formal analysis, Visualization, Writing - Review & editing.
Jouko Miettunen: Methodology, Formal analysis, Visualization, Writing - Review & editing.
Kristiina Moilanen: Conceptualization, Methodology, Investigation, Writing - Review & editing, Supervision.

References

1. Jääskeläinen E, Juola P, Hirvonen N, McGrath JJ, Saha S, Isohanni M, et al. *A systematic review and meta-analysis of recovery in schizophrenia*. Schizophr Bull 2013;39:1296–306. https://doi.org/10.1093/schbul/sbs130.

2. Huxley P, Krayer A, Poole R, Prendergast L, Aryal S, Warner R. *Schizophrenia outcomes in the 21st century: A systematic review*. Brain Behav 2021;11. https://doi.org/10.1002/BRB3.2172.

3. Nordling E. *Mitä toipumisorientaatio tarkoittaa mielenterveystyössä?* Duodecim 2018;134:1476–83.

4. Leamy M, Bird V, le Boutillier C, Williams J, Slade M. *Conceptual framework for personal recovery in mental health: systematic review and narrative synthesis*. Br J Psychiatry 2011;199:445–52. https://doi.org/10.1192/BJP.BP.110.083733.

5. Ketola J, Jahangiri E, Hakko H, Riipinen P, Räsänen S. *Assisted living for mentally ill-a systematic literature review and its recommendations*. Nord J Psychiatry 2021:1–20. https://doi.org/10.1080/08039488.2021.2001568.

6. Sadeniemi M, Joffe G, Pirkola S, Alanikkola T, Kontio R, Wahlbeck K. *Residential Services as a major cost driver in mental health and substance use services in Southern Finland*. Psychiatria Fennica 2021;52:60–74.

7. McPherson P, Krotofil J, Killaspy H. *Mental health supported accommodation services: A systematic review of mental health and psychosocial outcomes.* BMC Psychiatry 2018;18. https://doi.org/10.1186/S12888-018-1725-8.

8. Finnish Ministry of Justice. *Social Welfare Act*. Finland: 2014.

9. Finnish Institute for Health and Welfare. *Sosiaalihuollon laitos- ja asumispalvelut 2020: Sosiaalihuollon laitos- ja asumispalvelujen kokonaisasiakasmäärä kasvoi hieman*. Finland: 2021.

10. Finnish Institute for Health and Welfare. *Kotihoito ja sosiaalihuollon laitos- ja asumispalvelut 2017*. Finland: 2018.

11. Hirot F, Huas C, Durand D, Godart N. *The Evaluation of Therapeutic Residential Care for Adolescents and Young Adults in France: A Systematic Review.* Front Psychiatry 2021;12. https://doi.org/10.3389/FPSYT.2021.609365.

12. Parker S, Hopkins G, Siskind D, Harris M, McKeon G, Dark F, et al. *A systematic review of service models and evidence relating to the clinically operated community-based residential mental health rehabilitation for adults with severe and persisting mental illness in Australia*. BMC Psychiatry 2019;19. https://doi.org/10.1186/s12888-019-2019-5.

13. Killaspy H, Marston L, Green N, Harrison I, Lean M, Holloway F, et al. *Clinical outcomes and costs for people with complex psychosis; a naturalistic prospective cohort study of mental health rehabilitation service users in England*. BMC Psychiatry 2016;16. https://doi.org/10.1186/S12888-016-0797-6.

14. Craig TJ. *Social care: An essential aspect of mental health rehabilitation services*. Epidemiol Psychiatr Sci 2019;28:4–8. https://doi.org/10.1017/S204579601800029X.

15. van der Meer L, Wunderink C. *Contemporary approaches in mental health rehabilitation*. Epidemiol Psychiatr Sci 2019;28:9–14. https://doi.org/10.1017/S2045796018000343.

16. Killaspy H. *Contemporary mental health rehabilitation*. Epidemiol Psychiatr Sci 2019;28:1–3. https://doi.org/10.1017/S2045796018000318.

17. Martinelli A, Ruggeri M. *The impact on psychiatric rehabilitation of personal recovery-oriented approach.* Journal of Psychopathology 2020;2020:189–95. https://doi.org/10.36148/2284-0249-355.

18. Anthony WA, Farkas MD. A Primer on the Psychiatric Rehabilitation Process. 2009.

19. Hill H, Killaspy H, Ramachandran P, Ng RMK, Bulman N, Harvey C. *A structured review of psychiatric rehabilitation for individuals living with severe mental illness within three regions of the Asia-Pacific: Implications for practice and policy*. Asia-Pacific Psychiatry 2019;11. https://doi.org/10.1111/appy.12349.

20. Schön UK, Rosenberg D. *Transplanting recovery: Research and practice in the Nordic countries*. Journal of Mental Health 2013;22:563–9. https://doi.org/10.3109/09638237.2013.815337.

21. Farkas M, Coe S. *From Residential Care to Supportive Housing for People With Psychiatric Disabilities: Past, Present, and Future*. Front Psychiatry 2019;10. https://doi.org/10.3389/fpsyt.2019.00862.

22. Frost BG, Tirupati S, Johnston S, Turrell M, Lewin TJ, Sly KA, et al. *An Integrated Recovery-oriented Model (IRM) for mental health services: Evolution and challenges*. BMC Psychiatry 2017;17. https://doi.org/10.1186/s12888-016-1164-3.

23. Morin L, Franck N. *Rehabilitation Interventions to Promote Recovery from Schizophrenia: A Systematic Review*. Front Psychiatry 2017;8. https://doi.org/10.3389/FPSYT.2017.00100.

24. Cella M, Price T, Corboy H, Onwumere J, Shergill S, Preti A. *Cognitive remediation for inpatients with psychosis: A systematic review and meta-analysis*. Psychol Med 2020;50:1062–76. https://doi.org/10.1017/S0033291720000872.

25. Cella M, Preti A, Edwards C, Dow T, Wykes T. *Cognitive remediation for negative symptoms of schizophrenia: A network meta-analysis*. Clin Psychol Rev 2017;52:43–51. https://doi.org/10.1016/J.CPR.2016.11.009.

26. Rodrígues-Blanco L, Lubrini G, Vidal-Mariño C, Ríos-Lago M. *Efficacy of cognitive rehabilitation of attention, executive functions, and working memory in psychotic disorders: A systematic review*. Actas Esp Psiquiatr 2017;45:167–78.

27. Kinoshita Y, Furukawa TA, Kinoshita K, Honyashiki M, Omori IM, Marshall M, et al. *Supported employment for adults with severe mental illness*. Cochrane Database Syst Rev 2013;2013:CD008297. https://doi.org/10.1002/14651858.CD008297.pub2 [doi].

28. Modini M, Tan L, Brinchmann B, Wang MJ, Killackey E, Glozier N, et al. *Supported employment for people with severe mental illness: systematic review and meta-analysis of the international evidence*. Br J Psychiatry 2016;209:14–22. https://doi.org/10.1192/bjp.bp.115.165092 [doi].

29. Hofmann SG, Asnaani A, Vonk IJJ, Sawyer AT, Fang A. *The Efficacy of Cognitive Behavioral Therapy: A Review of Meta-analyses*. Cognit Ther Res 2012;36:427–40. https://doi.org/10.1007/s10608-012-9476-1.

30. White S, Foster R, Marks J, Morshead R, Goldsmith L, Barlow S, et al. *The effectiveness of one-to-one peer support in mental health services: a systematic review and meta-analysis*. BMC Psychiatry 2020;20. https://doi.org/10.1186/s12888-020-02923-3.

31. Dalton-Locke C, Marston L, McPherson P, Killaspy H. *The Effectiveness of Mental Health Rehabilitation Services: A Systematic Review and Narrative Synthesis*. Front Psychiatry 2021;11. https://doi.org/10.3389/FPSYT.2020.607933.

32. Killaspy H, Priebe S, Bremner S, McCrone P, Dowling S, Harrison I, et al. *Quality of life, autonomy, satisfaction, and costs associated with mental health supported accommodation services in England: a national survey*. Lancet Psychiatry 2016;3:1129–37. https://doi.org/10.1016/S2215-0366(16)30327-3.

33. Tolonen J, Kokkinen K, Jääskeläinen E, Sihvonen S, Kiviniemi L, Moilanen K. *Tavoitteet nuorten mielenterveyskuntoutuksessa*. Kuntoutus 2021;44:36–47. https://doi.org/10.37451/KUNTOUTUS.109478.

34. World Health Organisation. ICD-10. *International statistical classifications of diseases and related health problems*. 10th version. Geneva: 2019.

35. Hirdes JP, Ljunggren G, Morris JN, Frijters DH, Finne Soveri H, Gray L, et al. *Reliability of the interRAI suite of assessment instruments: A 12-country study of an integrated health information system*. BMC Health Serv Res 2008;8. https://doi.org/10.1186/1472-6963-8-277.

36. Stewart SL, Babcock SE. InterRAI Child and Youth Mental Health-Screener (ChYMH-S): *A Psychometric Evaluation and Validation Study*. Child Psychiatry Hum Dev 2020;51:769–80. https://doi.org/10.1007/s10578-020-01003-7.

37. Hirdes JP, Smith TF, Rabinowitz T, Yamauchi K, Pérez E, Telegdi NC, et al. *The resident assessment instrument-mental health (RAI-MH): Inter-rater reliability and convergent validity*. J Behav Health Serv Res 2002;29:419–32.

38. Hirdes JP, van Everdingen C, Ferris J, Franco-Martin M, Fries BE, Heikkilä J, et al. *The interRAI Suite of Mental Health Assessment Instruments: An Integrated System for the Continuum of Care*. Front Psychiatry 2020;10. https://doi.org/10.3389/fpsyt.2019.00926.

39. Gray LC, Berg K, Fries BE, Henrard J-C, Hirdes JP, Steel K, et al. *Sharing clinical information across care settings: The birth of an integrated assessment system*. BMC Health Serv Res 2009;9. https://doi.org/10.1186/1472-6963-9-71.

40. Hirdes JP, Morris JN, interRAI (Organization), CMH Coordinating Commitee interRAI Organization. *interRAI community mental health (CMH) assessment form and user`s manual.* vol. 9. 1st ed. interRAI; 2010.

41. Perlman CM, Hirdes JP, Vigod S. *Psychiatric rehospitalization: Development of a person-level indicator for care planning and quality assurance*. Prim Care Companion J Clin Psychiatry 2015;17. https://doi.org/10.4088/PCC.15m01784.

42. SPSS 26.0 for Mac 2019.

43. Cohen J. *A power primer*. Psychol Bull 1992;112:155–9. https://doi.org/10.1037/0033-2909.112.1.155.

44. Rosenthal R. Parametric measures of effect size. The handbook of research synthesis., New York, NY, US: Russell Sage Foundation; 1994, p. 231–44.

45. Microsoft Excel 2018.

46. Liljeholm U, Argentzell E, Bejerholm U. *An integrated mental health and vocational intervention: A longitudinal study on mental health changes among young adults*. Nurs Open 2020;7:1755–65. https://doi.org/10.1002/nop2.560.

47. Browne J, Penn DL, Meyer-Kalos PS, Mueser KT, Estroff SE, Brunette MF, et al. *Psychological well-being and mental health recovery in the NIMH RAISE early treatment program*. Schizophr Res 2017;185:167–72. https://doi.org/S0920-9964(16)30525-4 [pii].

48. Davis JM, Chen N, Glick ID. *A meta-analysis of the efficacy of second-generation antipsychotics*. Arch Gen Psychiatry 2003;60:553–64. https://doi.org/10.1001/ARCHPSYC.60.6.553.

49. Gould R, Mueser K, Bolton E, Mays V, Goff D. *Cognitive therapy for psychosis in schizophrenia: an effect size analysis.* Schixophrenia Research 2001;30:335–42.

50. Dubreucq J, Ycart B, Gabayet F, Perier CC, Hamon A, Llorca PM, et al. *Towards an improved access to psychiatric rehabilitation: availability and effectiveness at 1-year follow-up of psychoeducation, cognitive remediation therapy, cognitive behaviour therapy and social skills training in the FondaMental Advanced Centers of Expertise-Schizophrenia (FACE-SZ) national cohort*. Eur Arch Psychiatry Clin Neurosci 2019;269:599–610. https://doi.org/10.1007/S00406-019-01001-4.

51. Nibbio G, Barlati S, Cacciani P, Corsini P, Mosca A, Ceraso A, et al. *Evidence-Based Integrated Intervention in Patients with Schizophrenia: A Pilot Study of Feasibility and Effectiveness in a Real-World Rehabilitation Setting*. Int J Environ Res Public Health 2020;17. https://doi.org/10.3390/IJERPH17103352.

52. Lipskaya-Velikovsky L, Krupa T, Silvan-Kosovich I, Kotler M. *Occupation-focused intervention for in-patient mental health settings: Pilot study of effectiveness*. J Psychiatr Res 2020;125:45–51. https://doi.org/10.1016/J.JPSYCHIRES.2020.03.004.

53. Kim EJ, Bahk YC, Oh H, Lee WH, Lee JS, Choi KH. *Current status of cognitive remediation for psychiatric disorders: A review*. Front Psychiatry 2018;9:461. https://doi.org/10.3389/FPSYT.2018.00461/BIBTEX.

54. Sanches SA, Swildens WE, Schaefer B, Moerbeek M, Feenstra TL, van Asselt ADI, et al. *Effectiveness of the Boston University Approach to Psychiatric Rehabilitation in Improving Social Participation in People With Severe Mental Illnesses: A Randomized Controlled Trial*. Front Psychiatry 2020;11. https://doi.org/10.3389/fpsyt.2020.571640.

55. Sanches SA, Feenstra TL, Swildens WE, van Busschbach JT, van Weeghel J, van Asselt TDI. *Cost Effectiveness and Budget Impact of the Boston University Approach to Psychiatric Rehabilitation for Increasing the Social Participation of Individuals With Severe Mental Illnesses*. Front Psychiatry 2022;13:880482. https://doi.org/10.3389/fpsyt.2022.880482.

56. Svedberg P, Svensson B, Hansson L, Jormfeldt H. *A 2-year follow-up study of people with severe mental illness involved in psychosocial rehabilitation*. Nord J Psychiatry 2014;68:401–8. https://doi.org/10.3109/08039488.2013.851737.

57. Swildens W, van Busschbach JT, Michon H, Kroon H, Koeter MWJ, Wiersma D, et al. *Effectively working on rehabilitation goals: 24-month outcome of a randomized controlled trial of the boston psychiatric rehabilitation approach*. Canadian Journal of Psychiatry 2011;56:751–60. https://doi.org/10.1177/070674371105601207.

58. Killaspy H, Priebe S, McPherson P, Zenasni Z, Greenberg L, McCrone P, et al. *Predictors of moving on from mental health supported accommodation in England: national cohort study*. Br J Psychiatry 2020;216:331–7. https://doi.org/10.1192/BJP.2019.101.

59. Carton L, Cottencin O, Lapeyre-Mestre M, Geoffroy P, Favre J, Simon N, et al. *Off-Label Prescribing of Antipsychotics in Adults, Children and Elderly Individuals: A Systematic Review of Recent Prescription Trends*. Curr Pharm Des 2015;21. https://doi.org/10.2174/1381612821666150619092903.

60. Maglione M, Maher AR, Hu J, Wang Z, Shanman R, Shekelle PG, et al. *Off-Label Use of Atypical Antipsychotics: An Update. Off-Label Use of Atypical Antipsychotics: An Update*. Agency for Healthcare Research and Quality (US) 2011. Comparative Effectiveness Reviews 43.

61. Aloi M, de Filippis R, Grosso Lavalle F, Chiappetta E, Viganò C, Segura-Garcia C, et al. *Effectiveness of integrated psychological therapy on clinical, neuropsychological, emotional and functional outcome in schizophrenia: a RCT study*. Journal of Mental Health 2020;29:524–31. https://doi.org/10.1080/09638237.2018.1521948.