



# Predictors of work and education among people with severe mental illness who participated in the Danish individual placement and support study: findings from a randomized clinical trial

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## Abstract

**Purpose** People with severe mental illness experience disproportionately high rates of unemployment. Nonetheless, a substantial amount of research has demonstrated vocational benefits of the Individual Placement and Support (IPS) model and IPS supplemented with cognitive remediation (IPSE). The present study sought to examine demographic and clinical predictors of employment or education among people with severe mental illness and to investigate if IPS or IPSE can compensate for risk factors for unemployment.

**Methods** Seven hundred twenty participants were randomly assigned to IPS, IPSE or Service as Usual. During the 18-month follow-up period participants in the two experimental groups obtained significantly more work or education. A series of univariate and multiple logistic regression analyses were conducted to assess the predictive power of demographic and clinical factors for the total population and for the three groups individually.

**Results** The strongest predictor for vocational recovery, besides treatment allocation, was previous work history (OR = 1.78; 95% CI = 1.28–2.47). Men had a lower probability for vocational recovery compared to women (OR = 0.71; 95% CI = 0.50–0.99) and higher age was also negatively associated with work or education (OR = 0.79; 95% CI = 0.67–0.93). Moreover, vocational recovery was predicted by higher readiness for change, measured on the readiness for change scale (OR = 1.42; 95% CI = 1.19–1.70). Participation in IPS or IPSE could not compensate for negative risk factors such as low cognitive function or negative symptoms.

**Conclusions** In a multiple logistic regression analysis age, previous work history and motivation for change were statistically significant predictors of obtaining work or education among people with severe mental illness who participated in the Danish IPS trial.

**Keywords** Individual Placement and Support (IPS) · Supported employment · Cognitive remediation · Vocational rehabilitation · Severe mental illness

## Introduction

Despite the majority of unemployed people who experience severe mental illness (SMI) have a strong desire to work [1], it is well documented that the employment rate for this group

is remarkably low compared with the background population [2, 3]. Nonetheless, a substantial amount of research has demonstrated vocational benefits of the Individual Placement and Support (IPS) model. IPS is a well-defined form of supported employment that consists of an individualized and rapid search for competitive employment or education, with emphasis on client preferences, and with integration in mental health treatment teams [1]. IPS is widely recognized as an evidence-based intervention based on results of 30 randomised clinical trials showing that IPS is more effective than traditional vocational rehabilitation in obtaining competitive employment (RR = 1.63, 95% CI = [1.46, 1.82]) [4]. In a recent Danish trial that included 720 participants

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randomized to IPS or IPS supplemented with cognitive remediation and social skills training or services as usual, it was found that 60% in the two IPS groups obtained competitive employment or education during the 18 months follow-up compared with 46% in the group receiving service as usual [5]. However, likewise the majority of other trials investigating the effects of IPS, 40% of the participants did not archive their vocational goals despite their motivation to work or study [6, 7].

Previous research has attempted to identify demographic and clinical factors that predict who is more likely to achieve vocational recovery, but the results have often been inconsistent or even contradictory [8–10]. However, relative consistent are the findings that prior work history, negative symptoms and cognitive functioning predict the success of vocational programmes [8, 10, 11]. Moreover, clinical characteristics such as substance abuse and severe psychotic symptoms have often been used to exclude people with severe mental illness from vocational services. Nonetheless, it has been indicated that IPS may compensate for the negative impact of these risk factors [12, 13]. Identifying participants who have difficulty achieving their vocational goals and addressing the potential barriers to employment or education may be a way to improve the efficiency of the IPS intervention.

The aim of this study was to identify individual and sociodemographic factors that predict vocational recovery among people with severe mental illness in the Danish IPS trial and to investigate the potential advantages of participating in individual placement and support to overcome specific risk factors for unemployment. We hypothesized that the predictive strength of demographic and client factors, including poor work history negative symptoms and cognitive functioning, would be weaker for IPS participants.

## Methods

### Trial design and participants

Data for the present study was a secondary analysis from the Danish IPS trial, which is described in detail in the study protocol and effect article [5, 14]. In short, it was a randomised three-group parallel, assessor-blinded trial.

Between 2012 and 2018 participants were recruited from community mental health centres or early intervention teams (OPUS teams) in three Danish cities: Copenhagen (including the municipality of Frederiksberg), Odense, or Silkeborg. Inclusion criteria were as follows: (1) diagnosis of schizophrenia spectrum disorder (F20–F29); bipolar disorder (F31); or recurrent depression (F33) according to the International Classification of Diseases version 10 (ICD-10); (2) aged 18–64 years; (3) able to speak and understand Danish

sufficiently well to participate without an interpreter; (4) a desire to work competitively or completing education. The participants were recruited by the case managers on the psychiatric out-patient teams or self-selected after encountering advertisements and information available at the psychiatric centres. 756 participants were assessed for eligibility, and 36 were excluded because they did not meet inclusion criteria or declined to participate after receiving further information about the intervention. After the baseline interview 720 participants were randomly assigned to receive IPS ( $N=243$ ), IPS supplemented with cognitive remediation and social skills training (IPSE) ( $N=238$ ), or service as usual (SAU) ( $N=239$ ). Outcome assessors and all investigators involved in the trial were blinded, but participants and employment specialists were not. None of the participants was working or studying at baseline but had all expressed a clear interest in working competitively or starting education.

Over the 18-months follow-up period participants in the IPS group reached a significantly higher cumulative rate of competitive employment or education compared with participants who received service as usual. (59.9% vs. 46.5%; SRD 0.13 (95% CI 0.009–0.257). The difference between IPSE and SAU was (59.0% vs 46.5%; SRD 0.126 (95% CI 0.003–0.256). When the two IPS groups were combined and compared with SAU, the difference was (SRD 0.130 (95% CI 0.025–0.239). Participants in the two IPS groups also obtained employment or education faster, and they were significantly more satisfied with the treatment received [5].

### Measures

Data were obtained through researcher-administered semi-structured interviews by blinded researchers who were trained and certified in all instruments used, and by self-reported questionnaires, and register-based data. The primary outcome measure in this predictor study was whether participants obtained vocational recovery, defined as obtaining competitive employment or starting education, during the 18-months follow-up period. Employment outcomes were extracted from the Danish Register for Evaluation of Marginalization (DREAM) database extended with data from the Danish national income register with a 100% response rate [15, 16]. The registers cover the entire population and contain data on employment including salaries, sickness and cash benefits and disability pension. Educational outcomes were reported by the participants at the 18-month follow-up interview and were measured only if the participant studied actively in education aiming for competitive employment.

Sociodemographic predictor variables included sex, age and marital status (married or cohabitation). Baseline education was also collected and dichotomized as 9 years of school or higher. The cut-off at 9 years was chosen because

this is the duration of the primary/lower secondary school in Denmark. A total of 38.8% had a primary or lower secondary education as the highest educational degree at baseline which also means that the cut-off resulted in a relatively equal distribution in the two groups. Previous work history was assessed as 2 months of work the last five years before baseline. The cut-off of 5 years was to ensure that the most marginalized citizens were captured in this measure. Those people that the job-centre employees often do not dare to hope for can obtain ordinary employment. Five years has also been the cut-off in previous IPS studies [17–19]. Clinical predictor variables included diagnoses which were divided into schizophrenia spectrum disorder (F20–F29 ICD-10), bipolar disorder (F31–F31.9 ICD-10) and recurrent depression (F33–F33.9 ICD-10). The diagnoses were validated by a trained and certified researcher using the diagnostic interview Schedules for Clinical Assessment in Neuropsychiatry (SCAN) [20]. Psychotic and negative symptoms were measured with scale for the assessment of positive symptoms (SAPS) and scale for the assessment of negative symptoms (SANS) [21]. The outcome was divided into three domains; (a) Positive dimension symptoms including global rating of hallucinations and global rating of delusions; (b) Disorganized dimension including global rating of positive formal thought disorder, global rating of bizarre behaviour and inappropriate affect; (c) Negative dimension including global rating affective flattening or blunting, global rating of alogia, global rating of avolition and apathy and global rating of anhedonia and asociality [22]. Social functioning was measured with the Personal and Social Performance (PSP) scale, using a total score on the 100-point scale created out of the ratings on the four subdimensions; (1) socially useful activities; (2) personal and social relationships; (3) self-care and (4) disturbing and aggressive behaviour [23]. Symptoms of depression were measured by the Hamilton depression rating scale (HAM-D6) [24]. The six items were summed up to a score between 0 and 22 point. Cognitive function was measured with the Brief Assessment of Cognition in Schizophrenia (BACS) scale [25]. The BACS composite score was performed by transforming each baseline raw score, of the six subtests, to z-scores based on the mean and standard deviation from a healthy Danish control group [26]. A composite global BACS score was calculated as the mean of the standardized six z-scores and then rescaled based on the population reference values. Participants' self-esteem was assessed with the self-reported questionnaire the Rosenberg self-esteem scale. After the positively worded items were reversed the items were summed up to a score ranging from 10 to 40, with higher scores indicating higher self-esteem. Participants' self-efficacy was assessed with the general self-efficacy scale. All responses were added up to a sum score with a range from 10 to 40 points. The readiness to seek employment or education was measured by the Change

Questionnaire (CQ) consisting of 12 items covering six constructs: desire, ability, reasons, need, commitment and taking steps towards making the change, each with a score from 0 (definitely not) to 10 (definitely) [27]. The scores were summed to a total score from 0 to 120, and a higher score equals higher readiness to change. Substance abuse one month prior baseline was measured with Alcohol Use Disorders Identification Test (AUDIT) [28] and divided in the following measures; (1) at least 10 heavy drink days the last month; (2) cannabis at least three times the last month or (3) drugs other than cannabis the last month.

## Statistical analyses

Baseline characteristics are reported using mean and standard deviations for numeric variables and count (*n*) with percentages for categorical variables. The original outcome analysis was based on the intention to treat principles and to compensate for missing data on the education outcome, we used multiple imputation. This process is described thoroughly in the main trial reporting [5]. Missing values on the outcome variable are here substituted with the rounded average of all imputed sets. First, correlation analyses were conducted to examine the bivariate relationships among independent, covariate, and outcome variables. Secondly, a series of univariate logistic regression analyses were conducted to assess the unadjusted association between baseline predictor variables and competitive employment or education at 18 months follow-up. To be able to compare the relative effects of predictors measured on different scales all continuous variables were standardized. Thus, the odds ratios express the relative increase in odds of employment or education as the predictor variable moves up one standard deviation. Thirdly, all predictor variables associated with the outcome vocational recovery at a *p* value below 0.1 were retained for subsequent multivariate logistic regression analyses. Finally, the sample was divided into the original intervention groups and interactions of significant predictors with intervention groups were analysed, to demonstrate if IPS or IPS supplemented with cognitive remediation and work-related social skills training overcomes some of the client barriers.

## Results

In Table 1 the baseline characteristics are described for the total population (*n* = 720) and separately for those reaching competitive employment or education (*n* = 390, 54%) and those who did not reach the endpoint within the 18-months follow-up period (*n* = 330, 46%). Of the total population, 77% were diagnosed with a schizophrenia spectrum disorder, 12% with bipolar disorder and 11% with recurrent

**Table 1** Baseline characteristics divided in participants who obtained competitive employment or education and those who did not

|  | Employment or education during follow-up, <i>N</i> = 390 |         | No employment or education during follow-up, <i>N</i> = 330 |         | Total sample, <i>N</i> = 720 |         |
|--|--|---------|---|---------|------------------------------|---------|
|  | <i>N</i>   | (%)     | <i>N</i>  | (%)     | <i>N</i>                     | (%)     |
| Study conditions                                   |  |         |   |         |                              |         |
| IPS  | 140  | (35.9)  | 103   | (31.2)  | 243                          | (33.8)  |
| IPSE   | 152  | (39)    | 86  | (26.1)  | 238                          | (33.1)  |
| Service as usual                                   | 98   | (25.1)  | 141   | (42.7)  | 239                          | (33.2)  |
| Sex  |  |         |   |         |                              |         |
| Women  | 162  | (41.5)  | 114   | (34.5)  | 276                          | (38.33) |
| Men  | 228  | (58.5)  | 216   | (65.5)  | 444                          | (61.67) |
| Married or cohabiting                              |  |         |   |         |                              |         |
| Yes  | 81   | (20.8)  | 61  | (18.5)  | 142                          | (19.72) |
| Primary/secondary education or lower <sup>a</sup>  | 148  | (37.9)  | 131   | (39.7)  | 279                          | (38.75) |
| Previous work history <sup>b</sup>                 | 221  | (56.7)  | 134   | (40.6)  | 355                          | (49.31) |
| Diagnoses  |  |         |   |         |                              |         |
| Schizophrenia spectrum disorders (ICD-10: F20–F29) | 296  | (75.9)  | 255   | (77.3)  | 551                          | (76.53) |
| Bipolar disorder (ICD10: F31.0–F31.9)              | 52   | (13.3)  | 35  | (10.6)  | 87                           | (12.08) |
| Recurrent depression (ICD-10: F33.0–F33.9)         | 42   | (10.8)  | 40  | (12.1)  | 82                           | (11.39) |
| Alcohol and substance use                          |  |         |   |         |                              |         |
| At least 10 heavy drink days per month             | 15   | (3.8)   | 11  | (3.3)   | 26                           | (3.6)   |
| Cannabis at least three times 1 month prior        | 38   | (9.7)   | 37  | (11.2)  | 75                           | (10.4)  |
| Drugs other than cannabis 1 month prior            | 11   | (2.8)   | 11  | (3.3)   | 22                           | (3.1)   |
|  | Mean   | (SD)    | Mean  | (SD)    | Mean                         | (SD)    |
| Age  | 32.17  | (9.65)  | 34.06   | (10.11) | 33.04                        | (9.9)   |
| Psychiatric scale scores                           |  |         |   |         |                              |         |
| Personal and Social Performance Scale score        | 47.9   | (10.49) | 46.26   | (10.45) | 47.15                        | (10.5)  |
| Psychotic symptoms (SAPS)                          | 1.18   | (1.32)  | 1.21  | (1.32)  | 1.19                         | (1.32)  |
| Negative symptoms (SANS)                           | 1.82   | (0.76)  | 2.05  | (0.8)   | 1.92                         | (0.78)  |
| Disorganized symptoms (SAPS-SANS)                  | 0.26   | (0.47)  | 0.29  | (0.46)  | 0.27                         | (0.46)  |
| Cognitive functioning (BACS)                       | − 2.53   | (1.72)  | − 2.91  | (1.7)   | − 2.70                       | (1.72)  |
| Depressive symptoms- (Hamilton)                    | 6.05   | (4.08)  | 6.73  | (4.24)  | 6.41                         | (4.16)  |
| Self-efficacy (General self-efficacy Scale)        | 14.7   | (6.11)  | 12.82   | (6.36)  | 13.8                         | (6.3)   |
| Self Esteem (Rosenberg Self Esteem Scale)          | 14.81  | (6.06)  | 13.65   | (5.63)  | 14.27                        | (5.89)  |
| Readiness for change (Change questionnaire)        | 101.61   | (14.79) | 94.19   | (19.28) | 81.87                        | (14.47) |

*p* values based on Chi-squared test for categorical variables and rank-sum tests for numerical variables

IPS Individual Placement and Support, IPSE IPS enhanced with cognitive remediation and work-related social skills training, SANS Scale for the Assessment of Negative Symptoms, SAPS Scale for the Assessment of Positive Symptoms, BACS Brief Assessment of Cognition in Schizophrenia

<sup>a</sup>9 years of school or less

<sup>b</sup>At least 2 months paid job within last 5 years

depression [5]. Sixty-two percent were male, and the average age was 33 years at the time of inclusion. Fifty-one percent had a poor working history with less than 2 months of work within the last 5 years prior to baseline. Further, the participants' global level of cognitive functioning, was − 2.70 standard deviations lower compared with the reference healthy population.

Participants in the two IPS groups combined had 2.2 times higher odds of having worked or studied during the 18-month follow-period compared to participants in the treatment as usual group (OR = 2.22 95% CI 1.62 – 3.05). All other bivariate associations between baseline predictors and vocational recovery during the follow-up period are presented in Table 2. Predictors associated with employment

**Table 2** Predictors of vocational recovery at 18-month follow-up found by univariate and multiple logistic regression

|   | Simple |           |                | Multiple |           |                |
|---|--------|-----------|----------------|----------|-----------|----------------|
|   | OR     | CI        | <i>p</i> value | OR       | CI        | <i>p</i> value |
| Men   | 0.74   | 0.55–1.01 | 0.055          | 0.71     | 0.50–0.99 | 0.046          |
| Age (10-year increments)  | 0.83   | 0.71–0.96 | 0.011          | 0.79     | 0.67–0.93 | 0.005          |
| Married or cohabiting   | 1.16   | 0.80–1.67 | 0.443          |          |           |                |
| Primary/secondary education or lower <sup>a</sup>                     | 0.93   | 0.69–1.26 | 0.631          |          |           |                |
| Previous work history <sup>b</sup>                                    | 1.91   | 1.42–2.58 | 0.000          | 1.78     | 1.28–2.47 | 0.001          |
| Bipolar disorder (ICD10: F31.0–F31.9)                                 | 1.30   | 0.82–2.05 | 0.264          |          |           |                |
| Recurrent depression (ICD-10: F33.0–F33.9)                            | 0.87   | 0.55–1.39 | 0.570          |          |           |                |
| Personal and Social Performance Scale score                           | 1.17   | 1.01–1.36 | 0.039          | 0.91     | 0.75–1.10 | 0.315          |
| Psychotic symptoms (SAPS) (1.32 points increments)                    | 0.98   | 0.85–1.13 | 0.778          |          |           |                |
| Negative symptoms (SANS) (0.78 points increments)                     | 0.74   | 0.64–0.86 | 0.000          | 0.87     | 0.71–1.07 | 0.188          |
| Disorganized symptoms (SAPS-SANS) (0.46 points increments)            | 0.93   | 0.81–1.08 | 0.359          |          |           |                |
| Cognitive functioning (BACS) (1.72 points increments)                 | 1.25   | 1.08–1.46 | 0.003          | 1.16     | 0.97–1.37 | 0.099          |
| Depressive symptoms (Hamilton) (1.72 points increments)               | 0.85   | 0.73–0.98 | 0.030          | 0.93     | 0.77–1.13 | 0.476          |
| Self-efficacy (general self-efficacy Scale) (6.3 points increments)   | 1.36   | 1.16–1.59 | 0.000          | 1.13     | 0.91–1.40 | 0.287          |
| Rosenberg Self Esteem Scale   | 1.22   | 1.05–1.42 | 0.012          | 1.09     | 0.87–1.37 | 0.472          |
| Readiness for change (change questionnaire) (14.47 points increments) | 1.56   | 1.33–1.84 | 0.000          | 1.42     | 1.19–1.70 | 0.000          |
| At least 10 heavy drink days per month                                | 1.16   | 0.53–2.63 | 0.714          |          |           |                |
| Cannabis at least three times 1 month prior                           | 0.85   | 0.53–1.38 | 0.521          |          |           |                |
| Drugs other than cannabis 1 month prior                               | 0.84   | 0.36–1.99 | 0.691          |          |           |                |

*IPS* Individual Placement and Support, *IPSE* IPS enhanced with cognitive remediation and work-related social skills training, *SANS* Scale for the Assessment of Negative Symptoms, *SAPS* Scale for the Assessment of Positive Symptoms, *BACS* Brief Assessment of Cognition in Schizophrenia

<sup>a</sup>9 years of school or less

<sup>b</sup>At least 2 months paid job within last 5 years

or education with a *p* value below 0.05 were younger age, previous work history, higher social functioning (PSP Scale) fewer negative symptoms (SANS), higher cognitive function (BACS), fewer symptoms of depression (HAM-D6), higher self-efficacy (general self-efficacy scale), higher self-esteem (Rosenberg Self Esteem Scale) and higher readiness to change (change questionnaire). The strongest predictor for vocational recovery, besides treatment allocation, was previous work history. Participants who had been in work within the last five years prior to baseline were 1.9 times more likely to obtain employment or education in the 18 months follow-up period (OR = 1.91; 95% CI 1.42–2.58). Other variables that were evaluated but were not significantly associated with vocational recovery included being married or cohabiting, educational level, diagnosis, psychotic symptoms and alcohol/substance use.

In the subsequent multivariate logistic regression analyses sex, age, previous work history and readiness for changes were retained as significant predictors for work or education. Again, the strongest predictor was previous work history. Participants who had been working at least two months prior to baseline were 1.9 times more likely to obtain employment or education (OR 1.91; 95% CI 1.42 – 2.57).

Cognitive functioning, negative symptoms, depression, self-efficacy, and self-esteem were not retained as a significant predictor in the multivariate analysis. There were only a few statistically significant correlations among the baseline predictors, but none were large enough to indicate severe multicollinearity. The strongest correlations were between negative symptoms and functioning, self-esteem and depressive symptoms/self-efficacy with correlation coefficients of 0.51–0.63. All other relevant correlations were below 0.3. The full correlation matrix is available in the online supplementary materials. The associations reported above (except for treatment allocation) are not causal relationships that suggest the endpoint status to be some function of the predictor. Instead, the predictors likely often reflect the same underlying features that either facilitate or inhibit transfer to employment or education.

To qualify these correlational associations, we also estimate to what extent the significant predictors might moderate the treatment effects. This is done by testing differences in regression coefficients of predictors across treatment conditions.

The associations of the significant predictors when stratified by treatment allocation are shown in Table 3. Previous

**Table 3** Significant predictors of vocational recovery stratified by study condition (a) and tests of the corresponding interaction terms (b)

|   | SAU  |           |                | IPS         |           |                | IPSE        |           |                |
|---|------|-----------|----------------|-------------|-----------|----------------|-------------|-----------|----------------|
|   | OR   | 95% CI    | <i>p</i> value | OR          | 95% CI    | <i>p</i> value | OR          | 95% CI    | <i>p</i> value |
| (a) Predictors stratified by study condition                                |      |           |                |             |           |                |             |           |                |
| Sex (men)   | 0.80 | 0.47–1.36 | 0.413          | 0.94        | 0.56–1.59 | 0.822          | 0.46        | 0.25–0.81 | 0.009          |
| Age   | 1.01 | 0.77–1.30 | 0.967          | 0.74        | 0.58–0.95 | 0.020          | 0.72        | 0.54–0.95 | 0.022          |
| Previous work history <sup>a</sup>  | 2.58 | 1.52–4.41 | 0.000          | 1.72        | 1.03–2.90 | 0.038          | 1.64        | 0.96–2.80 | 0.070          |
| Personal and Social Performance Scale score                                 | 1.23 | 0.94–1.64 | 0.137          | 1.34        | 1.04–1.75 | 0.024          | 0.96        | 0.74–1.26 | 0.784          |
| Negative symptoms (SANS)  | 0.87 | 0.67–1.13 | 0.291          | 0.72        | 0.55–0.94 | 0.016          | 0.67        | 0.51–0.88 | 0.005          |
| Cognitive functioning (BACS)  | 1.19 | 0.91–1.57 | 0.202          | 1.67        | 1.26–2.26 | 0.001          | 1.10        | 0.86–1.41 | 0.431          |
| Readiness to change   | 1.61 | 1.19–2.22 | 0.003          | 1.57        | 1.22–2.05 | 0.001          | 1.59        | 1.16–2.20 | 0.004          |
| Depressive symptoms-(Hamilton)  | 0.96 | 0.73–1.25 | 0.735          | 0.80        | 0.61–1.03 | 0.085          | 0.85        | 0.66–1.10 | 0.227          |
| Self-efficacy (General self-efficacy Scale)                                 | 1.16 | 0.89–1.53 | 0.265          | 1.47        | 1.12–1.94 | 0.006          | 1.38        | 1.04–1.85 | 0.029          |
| Rosenberg Self Esteem Scale   | 1.17 | 0.89–1.53 | 0.256          | 1.45        | 1.12–1.92 | 0.006          | 1.01        | 0.76–1.35 | 0.923          |
| Readiness for change (Change questionnaire)                                 | 1.61 | 1.19–2.22 | 0.003          | 1.57        | 1.22–2.05 | 0.001          | 1.59        | 1.16–2.20 | 0.004          |
|   |      |           |                |             |           |                |             |           |                |
| IPS vs SAU  |      |           |                | IPSE vs SAU |           |                | IPSE vs IPS |           |                |
|   | OR   | CI        | <i>p</i> value | OR          | CI        | <i>p</i> value | OR          | CI        | <i>p</i> value |
| (b) Formal tests of interactions between each predictor and study condition |      |           |                |             |           |                |             |           |                |
| Sex (men)   | 1.17 | 0.56–2.46 | 0.674          | 0.57        | 0.26–1.25 | 0.164          | 0.49        | 0.22–1.06 | 0.073          |
| Age   | 0.74 | 0.52–1.06 | 0.100          | 0.72        | 0.49–1.05 | 0.089          | 0.97        | 0.67–1.41 | 0.875          |
| Previous work history <sup>a</sup>  | 0.67 | 0.32–1.40 | 0.287          | 0.63        | 0.30–1.35 | 0.236          | 0.95        | 0.45–1.99 | 0.889          |
| Personal and Social Performance Scale score                                 | 1.09 | 0.75–1.59 | 0.660          | 0.78        | 0.53–1.14 | 0.206          | 0.72        | 0.49–1.03 | 0.077          |
| Negative symptoms (SANS)  | 0.83 | 0.57–1.21 | 0.335          | 0.78        | 0.53–1.13 | 0.191          | 0.93        | 0.64–1.36 | 0.716          |
| Cognitive functioning (BACS)  | 1.40 | 0.94–2.09 | 0.096          | 0.92        | 0.64–1.33 | 0.673          | 0.66        | 0.45–0.96 | 0.032          |
| Readiness to change   | 0.98 | 0.65–1.46 | 0.907          | 0.99        | 0.63–1.54 | 0.958          | 1.01        | 0.67–1.53 | 0.953          |
| Depressive symptoms-(Hamilton)  | 0.83 | 0.58–1.21 | 0.338          | 0.89        | 0.62–1.29 | 0.547          | 1.07        | 0.74–1.54 | 0.720          |
| Self-Efficacy (General self-efficacy Scale)                                 | 1.26 | 0.86–1.85 | 0.235          | 1.19        | 0.80–1.76 | 0.396          | 0.94        | 0.63–1.40 | 0.764          |
| Rosenberg Self Esteem Scale   | 1.24 | 0.85–1.83 | 0.260          | 0.87        | 0.59–1.28 | 0.478          | 0.70        | 0.47–1.03 | 0.072          |
| Readiness for change (change questionnaire)                                 | 0.98 | 0.65–1.46 | 0.907          | 0.99        | 0.63–1.54 | 0.958          | 1.01        | 0.67–1.53 | 0.953          |

*IPS* Individual Placement and Support, *IPSE* IPS enhanced with cognitive remediation and work-related social skills training, *SANS* Scale for the Assessment of Negative Symptoms, *SAPS* Scale for the Assessment of Positive Symptoms, *BACS* Brief Assessment of Cognition in Schizophrenia

<sup>a</sup>At least 2 months paid job within last 5 years

Work history was a significant predictor in the SAU group who were 2.58 times more likely to have worked or studied in the 18-month follow-up period. The predictive power of work history was less in the IPS and IPSE groups where participants were 1.72 and 1.64 times more likely to obtain work or education respectively. However, when we test for the differences in association strengths between IPS and IPSE vs. SAU in any of the predictors the differences were statistically insignificant.

## Discussion

In a sample of 720 unemployed people with severe mental illness, a recent history of working was the strongest predictor of vocational recovery. Other client factors that

added predictive power in the univariate logistic regression analysis were lower age, higher social functioning, fewer negative symptoms, higher cognitive function, fewer symptoms of depression, higher self-efficacy, higher self-esteem and higher readiness to change. When added together in one predictive model, only female gender, lower age, previous work history and readiness for change remained significant predictors of obtaining competitive employment or education within the 18-months of follow-up. This also suggests that cognitive functioning, symptom severity, self-esteem and self-efficacy are less important individual determinants for obtaining competitive employment or education for the population in question.

The finding that previous work history was the strongest predictor for vocational recovery in both the univariate and multiple regression analysis are consistent with findings



from most previous studies [8, 13, 19, 29, 30]. There was also a tendency toward that IPS mitigate the negative effects of poor work history. However, this result was not statistically significant and could not confirm the findings in the Mental Health Treatment Study (MHTS) which was a multisite randomized controlled trial comparing the effectiveness IPS and service as usual among 2055 participants with severe mental illness [12]. In this study IPS participants were 2.2 times more likely to obtain employment if they had been working within the last two years prior baseline and SAU participants were 5.6 times more likely to obtain employment.

The association between higher cognitive functioning and vocational recovery in the univariate regression analysis also supports the findings from many previous studies [8, 10, 11]. In the present trial we sought to address this issue by supplementing IPS with cognitive computer training and training in cognitive coping strategies. However, this supplement did not affect the cognitive functioning or the number of participants who entered employment or education [5]. A small improvement was found in global cognitive functioning in all groups from baseline to the 18-month follow-up, but no difference was found between IPSE, IPS or SAU. This also explains that the predictive power of cognitive functioning was the same in IPSE and SAU. Moreover, cognitive functioning lost its predictive power in the multivariate logistic regression analyses which suggests that cognitive functioning is less important than for example self-assessed readiness to work. To date augmentations of IPS have mainly focussed on cognitive remediation and social skills training [31], but there are a host of other barriers such as lack of self-esteem and self-efficacy, negative symptoms, and lack of self-assessed readiness to change warranting targeted interventions. In this study self-assessed readiness to change seems as a stronger explanatory factor than psychiatric symptoms and cognitive functioning, and readiness to changes was also retrained as a significant predictor in the multivariate regression analysis. On this background future research, may profit from investigating the effects of individualized clinical interventions, provided by the out-patient psychiatry, such as motivational interviewing, tailored to this specific barrier to employment.

Notably, several client factors did not predict employment, including measures often identified as risk factors for social exclusion such as alcohol and substance use, psychotic symptoms and educational level. The findings, that substance abuse, was not associated with vocational recovery challenges the common practice in mental health care and vocational rehabilitation of labelling clients with certain clinical and background attributes as low chance of succeeding in work or education. This again stresses the importance of the zero-exclusion strategy in IPS as it can be extremely difficult for mental health professional

to assess the probability of success in an IPS programme. The fact that negative symptoms, depressive symptoms, self-efficacy, and self-esteem lose their predictive power in the multivariate analysis may in part be because these measures are closely related constructs. Self-esteem is an underlying measure in Ham-D6, and the general self-efficacy scale, and negative symptoms can be difficult to separate from depressive symptoms. These measures were also those how had the highest correlation coefficient, but the analysis did not indicate multicollinearity in terms of inflated or unstable coefficients.

Despite we included a variance of client and demographic factors that have been hypothesized to be important predictors for vocational recovery in the literature, there are other important factors which it was not possible to investigate in the present study. For example, a growing body of research has demonstrated that stigma is a major obstacle to find and keep work among people with SMI [2]. Employers and co-workers often have limited knowledge of SMI, resulting in mistrust and discrimination. In a cross-sectional survey in 27 countries, including 729 participants with schizophrenia, negative discrimination in finding a job was experienced by 29% of the participants [32]. Also, low expectations to people with SMI held by employers and mental health professionals is another prominent barrier to employment [33, 34]. Vocational rehabilitation is often not included in the treatment care plans of people with SMI, which may reflect low expectations among professionals [2]. The low expectations are caused by a dominance of treatment that emphasis symptoms and cure instead of a model of recovery, resulting in mental health professionals may underestimate the skills and resources of their patients and overestimate the risk to employers. It was not possible to include such factors as a baseline predictor in the present study, but it is important to remember that the barriers that many people with severe mental illness encounter in their attempt to obtain employment or education is not only related to their illness and past experience, but to a large extent also more structural challenges which are fundamentally beyond the person's ability to act.

## Conclusion

In a randomised clinical trial investigating the effects of individual placement and support (IPS) and IPS supplemented with cognitive remediation; age, previous work history and motivation for change were statistically significant predictors of obtaining work or education. Moreover, in contrast to previous findings, participation in IPS or IPSE could not significantly compensate for negative risk factors such as low cognitive function or lack of previous work history.

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**Availability of data and material** Data supporting the findings of this study are not publicly available due to legal restrictions from the Danish data protection agency and the European data protection regulation.

## Declarations

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest.

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