Cost-effectiveness analysis of a supported employment intervention for people with mood and anxiety disorders in Denmark - the IPS-MA intervention

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Manuscript: 4195 words

Abstract: 239 words
Abstract

Objectives: We aimed to investigate the cost-utility and cost-effectiveness of a modified Individual Placement and Support intervention for people with mood and anxiety disorders (IPS-MA).

Methods: Costs were assessed from a societal perspective. Health care costs were derived from registers and combined with data on use of IPS-MA services, municipal social care, and labour market services. EQ-5D was used to compute QALY. Missing data were imputed in a sensitivity analysis. We also computed the cost per gain in hours worked. Incremental cost-effectiveness ratios (ICER) were computed and bootstrapped to obtain confidence intervals for QALY and gain in hours worked.

Results: We found no difference in overall costs between groups. A significant saving was found in use of labour market services in the IPS-MA group. But the IPS-MA group had significantly lower wage earnings compared to the control group. The intervention group had a higher, though statistically in-significant, increase in QALYs than the control group. The ICER did not show statistically significant results, but there was a tendency, that IPS-MA could have a positive effect on health-related quality of life without any additional costs. However, participants in the IPS-MA group had a significantly lower gain in hours worked compared to the control group.

Conclusions: Despite a significant saving in use of labour market services, IPS-MA was not cost-effective. Participants in the IPS-MA group worked significantly fewer hours and earned significantly less than participants in the control group at one-year follow-up.

Keywords: individual placement and support, IPS-MA, cost-effectiveness
INTRODUCTION
The effectiveness of the vocational rehabilitation programme Individual Placement and Support (IPS) is well established as an evidence-based method to support people with severe mental illness in gaining competitive employment\(^1,2\). However, the effectiveness of IPS has primarily been investigated for people with severe mental illness, and evidence is sparse regarding people with mood and anxiety disorders. Given the different courses different mental disorders, one could speculate that the effect of IPS might differ according to diagnosis, accordingly IPS modified for specific groups of patients have been investigated in recent years.\(^3,4\) In Sweden the Individual Enabling and Support (IES) model, an IPS intervention adapted for people with affective disorders, was found to be superior to traditional vocational rehabilitation\(^3\). Another randomized trial investigated the effectiveness of an IPS intervention modified for people with mood and anxiety disorders (IPS-MA) compared to services as usual (SAU) in a Danish context\(^4\). The IPS-MA intervention has previously been described in detail\(^4,5\), but briefly, the intervention consisted of mentor support and career counselling, including five basic services: individualized mentor support based on psychiatric knowledge; coordination of services provided; career counselling; impartial help to clarify private economy; and contact with employers to help participants obtain jobs and keep them. Focus was on competitive employment and support was time unlimited, which meant that even though participants were discharged from treatment and terminated at the jobcentres, support from the mentors and career counsellors continued until participants had sustainably returned to work or education. Most studies of IPS have employment as their primary outcome, however many patients are rather young when they are diagnosed, and have not yet finished an education, accordingly education is their goal\(^6,7\). On this background, education on ordinary terms was included as an outcome in the IPS-MA trial. No difference was found between the IPS-MA group and the control group on number of participants who had returned to work or education after one or two years, number of weeks they had worked, or how fast they returned to work. Nevertheless, participants in the IPS-MA group were significantly more satisfied with the treatment they received compared to the SAU group after both one and two years\(^4\).

Surprisingly, only few studies have investigated the cost-effectiveness of IPS\(^8,9\). An European study\(^8\) investigated the cost-effectiveness of IPS compared to SAU in six European countries. In five of the six countries the IPS intervention was found to dominate SAU, being both less costly and more effective in getting people into competitive employment. In the sixth country the intervention was also found to be more effective but at a higher cost. The different labour market structures in the six countries is thought to have caused the varying effect across countries. Saha et al\(^10\) recently investigated the cost-effectiveness of the IES model, and found IES to be cost-
effective, however, they did not find any difference in quality-adjusted life years (QALYs). The authors argue, that this might be due to a small sample size and a limited timeframe of one year\textsuperscript{10}.

Since the organisation of IPS-MA is different than IPS’s, and the context and welfare systems varies between countries, it is relevant to investigate the cost-effectiveness of the IPS-MA intervention in association to health-related quality of life and employment in a Danish setting, using trial data merged with register-based data.

**Data and methods**

In total 326 participants were recruited from mental health centres and private practicing psychiatrists within the Capital Region of Denmark from 2011 to 2014. Participants had to be between 18 and 60 years old, and diagnosed according to the International Classification of Diseases – 10\textsuperscript{th} edition\textsuperscript{11} (ICD-10) with an affective disorder (ICD-10: F30-39) or anxiety (ICD-10: F40-41). In order to include participants who had only recently been diagnosed and who were not too far from the labour market, participants could not have had contact with mental health services for more than the past 3 years, and they had to have been employed or enrolled in education at some time during the past three years. Participants had to be motivated to return to work or education; however, they should be estimated not to be ready to return to work within three months. This was estimated by the researcher at the inclusion interview, using a screening tool used by the jobcenters\textsuperscript{12}. Finally, participants should be able to read and understand Danish; and give informed consent. Participants were excluded if they had somatic comorbidity causing reduced ability to work; large-scale alcohol or substance abuse as their primary challenge (assessed by means of the MINI International Neuropsychiatric Interview\textsuperscript{13}); or a legal guardian or forensic psychiatric arrangements. Participants were randomized to either IPS-MA plus SAU (n=162) or SAU alone (n=164), hence the IPS-MA intervention was an add-on to the services people would usually receive from mental health services, social services and the municipalities. The intervention was developed, implemented and tested in cooperation with a private company, Sherpa, that already provided supported employment interventions for people with a wide range of mental disorders\textsuperscript{14}. Sherpa consisted of two career counsellors with a background in human resources and six mentors with many years of experience as mental health professionals\textsuperscript{4}. Participants in the IPS-MA trial were interviewed at baseline and at 12- and 24-months follow-up with clinician-administered scales covering employment/education status, level of functioning, and symptoms. Furthermore, patient-reported outcomes were answered online at all three time-points. These measures comprised several instruments, including EQ-5D\textsuperscript{15}. EQ-5D is a generic preference-based measure of health-related quality of life comprising five dimensions: mobility,
self-care, usual activities, pain/discomfort, and anxiety/depression. Level of perceived problems within each dimension is scored according to three levels 1) indicating no problems, 2) indicating some problems, and 3) indicating extreme problems16. EQ-5D has been validated in many populations and countries and is one of the most frequently used measures in health economic evaluations17, hence, it was chosen to be able to compare our findings to other cost-effectiveness analysis in the field of supported employment.

Costs were assessed from a societal perspective. Health care-, social care-, and intervention costs were calculated for each individual in the 24-month follow-up period. Costs are in euro (2016 price level) and derived from registers as described in table 1. Hospital care is registered in the National Patient Register18, and costs were computed using nationally developed diagnosis-related groups (DRG) tariffs19. Psychiatric hospital care is registered in a separate register20 and no DRG-tariffs have been implemented. Psychiatric care is therefore valued by a unit cost of bed days, emergency room (ER) visits, and outpatient visits.

Intervention costs were analysed in a bottom-up approach using registration of services from the Sherpa organisation (table 1). Mentors and career counsellors registered their contacts in a time-management system, from which they could extract data on specific services provided, and average time consumption per service could be estimated. The length of patient trajectory varied considerably, with a mean of 636 days (range: 32-1,433). More than 25% of participants received the IPS-MA intervention for more than two years. Costs were calculated for the first year and the first two years for all participants, regardless of the length of their participation. Due to a large loss to follow up after two years (61.7%) only estimates for the first year are used in the cost-utility and cost-effectiveness analyses. Usual services could be provided by either municipal social services (e.g. group therapy or psycho-social support interventions) or labour market services. Data on social services used in the two groups was only available for the group of patients living in Copenhagen municipality (about 46 percent of the study population), therefore this information was only used to investigate if major differences between the two groups existed. Costs of labour market interventions were obtained from the Danish Agency for Labour Market and Recruitment21. Under the municipal jobcentres, citizens can receive mentor support, counselling, or courses and on-the-job internships. The latter is considered to have no additional costs. Only job-seeking courses for the control group were included, because all other course activity was considered formal education. Job-seeking courses was part of the IPS-MA intervention. Productivity costs were estimated using tax information on wage and number of hours worked during the first year after the intervention. The costs included in the analyses are presented in table 1.
Differences in costs within the first year are investigated using intervention costs, health care costs, productivity costs and labour market services as costs measures. Attributable costs, meaning costs in the intervention group minus costs in the control group, were computed both by crude estimation and in a regression analysis where age, gender, diagnosis and costs in the period prior to randomisation were included. The total costs were accumulated within the follow-up period, and the differences between the IPS-MA group and SAU were calculated by means of t-tests.

The effect of the IPS-MA intervention is measured in QALY, which is a measure used in cost-utility analysis\textsuperscript{22}. QALY’s consist of remaining life expectancy multiplied with a factor denoting health-related quality of life (HRQoL). In this study, we did not consider life expectancy beyond the intervention, and the QALY measure therefore reflects HRQoL only. EQ-5D-scores were transformed into single measures using the Danish preference weighting\textsuperscript{23,24}. As a sensitivity analysis, the EQ-5D score at 12 months was imputed using multiple imputation (mi) with truncated regression in STATA. QALY-gains were analysed both on raw and imputed data, using the difference in HRQoL from baseline to one year as expression of the development in QALYs, thus assuming a time horizon of 1 year for the QALY-gain.

Cost-utility was measured as the additional cost of gaining one additional QALY. Additional costs were computed as the difference-in-difference of costs, that is: The cost development was calculated as the costs in the year following randomisation, minus the costs in the year before randomisation for both groups. And the difference between the two differences are considered the additional costs.

Costs were measured as described above. Because QALYs were only measured for the first year after randomisation, so was cost-utility. For QALYs, the development was calculated as the mean difference in HRQoL from randomisation to one-year follow-up.

The incremental cost-effectiveness ratio (ICER) was computed as:

\[
ICER = \frac{C_{\text{intervention}} - C_{\text{control}}}{Q_{\text{intervention}} - Q_{\text{control}}}
\]

Where C denotes the development of costs from baseline (the year before randomisation) to follow-up (one year after randomisation) and Q denotes the development in QALYs from baseline to follow-up. The ICER expresses the additional cost of gaining one QALY\textsuperscript{22}. The magnitude of the ICER will, in this case, suggest whether the intervention is cost-effective, meaning that the cost of gaining an additional QALY is reasonable. To assess the uncertainty around the ICER estimates,
we used 10,000 bootstrap samples, the 2.5 and 97.5 quantiles of the bootstrapped data were interpreted as confidence limits\textsuperscript{22}. Each dot in the scatter plots represent one of the bootstrapped samples. Observations in the bottom-right quadrant reflects scenarios where the intervention is cheaper and better (Dominant) in relation to QALY and thus worth implementing directly. The upper-left quadrant reflects scenarios where the intervention is more expensive and less effective (Dominated) in which case the intervention could simply be rejected. In the upper-right quadrant the intervention is better but more expensive, and in the lower-left quadrant the intervention is cheaper but less effective (Assess CE), in these cases a more thorough health economic review should be conducted before deciding whether the intervention should be implemented. Cost-effectiveness was also investigated in relation to numbers of hours worked. In the randomised trial we only had access to data on weeks worked, but post hoc, we have gained access to data on numbers of hours worked from the electronic income register from the Danish Agency for Labour Market and Recruitment\textsuperscript{21}. These data give us a more precise picture, and we therefore decided to include the data in the present analysis. Number of hours worked within the first year of the intervention was calculated for each of the two groups, based on degree of employment ranging from 0 to 37 hours per week. In a linear regression the difference between groups was tested. The ICER was also calculated for cost-effectiveness with the development in hours worked as effectiveness measure. This computation included all patients, because it utilises register data only and there was thus no loss to follow-up. We calculated the development in hours worked as the difference between the year before and the year after randomisation.

We utilised the 10,000 bootstrap samples to calculate cost-effectiveness acceptability curves (CEACs)\textsuperscript{22}. The CEACs relate the ICER estimates to different monetary values of a QALY that decision makers could be willing to pay. The CEAC show the proportion of ICER estimates that are lower than the willingness-to-pay (WTP) meaning that the IPS-MA intervention is cost-effective at this specific WTP\textsuperscript{25}.

All analyses were conducted at the Statistics Denmark server\textsuperscript{26}, where personal information about individuals are encrypted, thus ensuring compliance with the data security regulations. A significance level < 0.05 was considered statistically significant. SAS\textsuperscript{®} v 9.4\textsuperscript{27} was used for data management and STATA\textsuperscript{®} MP v 15\textsuperscript{28} was used for analysis.

Results
Table 2 shows the total costs accumulated within the first 12 months of the follow-up period distributed between IPS-MA and the control group. Costs of the IPS-MA intervention amounts to an
average of € 1,183 per person in the first year. Overall, there is a small, but insignificant saving of € 2,221 in total costs at one year in the intervention group (p=0.423). The difference is primarily due to the IPS-MA group using labour market services less than the control group (€ 4,262, p=0.009), as there are no statistically significant differences between groups in the use of somatic, mental and primary health care and prescription pharmaceuticals. On average, participants in the IPS-MA group earned € 3,376 less than the control group, i.e. the productivity gain is significantly higher in the control group (p=0.017).

(Table 2 about here)

In Table 3 the development in costs and QALYs gained in the two groups, as well as the incremental cost-effectiveness ratios are shown.

In complete case as well as in imputed analyses, both groups have statistically significant lower costs in the follow-up period than in the year prior to randomisation (IPS-MA: -9,281(-12,518; -6,046) and CT: -7,730(-10,906; -4,554)) (table 3). None of the cost differences are statistically significant though (complete case diff: 1,551(-3,004;6,107). Both groups experience a statistically significant increase in QALYs from randomisation to one-year follow-up (IPS-MA: .144 (.097;.190) vs CT: .121(.081;.161)). However, only when missing QALY values are imputed, the IPS-MA group has a significantly higher increase in QALYs than the control group (difference IPS-MA vs CT: -.072 (-.133; -.012)). This indicates that the intervention is not cost saving, however, it might be associated with a higher gain in QALY compared to SAU.

(Table 3 about here)

None of the ICER estimates are statistically significant. The scatter plot resulting from the complete case calculation is shown in Figure 1. The dots to the right indicate that the intervention is better compared to SAU regarding gains in QALYs and the dots below 0 in additional costs that the intervention is cost saving. There might be a tendency that IPS-MA was slightly cost-saving and associated with a small gain in QALY. However, the results are not very robust.

(Figure 1 about here)
The CEAC (Supplementary figure 1) shows that with a societal willingness-to-pay of € 30,000 per QALY gained there is an 95 % probability of IPS-MA being cost-effective compared to SAU, meaning that with 95 % probability society would be willing to pay € 30.000 to gain an extra QALY. However, from the imputed data (Supplementary figure 2) it appears that the probability has dropped to around 83 %.

Regarding the cost-effectiveness in relation to numbers of hours worked, participants in the control group had worked significantly more hours during the 12-month follow-up than participants in IPS-MA (mean 297 hours, SE: 30.73 vs 177 hours, SE: 39.91, p=0.018) (Supplementary table 1). In figure 2 cost-effectiveness is calculated according to numbers of hours worked during the 12-month follow-up. There is a tendency that IPS-MA might be somewhat less expensive than SAU, but participants in IPS-MA worked significantly fewer hours.

(Figure 2 about here)

Discussion

In a cost-utility and cost-effectiveness analyses, we have investigated whether IPS-MA was cost-effective compared to SAU. We found a tendency that IPS-MA was related to a small insignificant saving in costs, and a small gain in health-related quality of life. However, results were not very robust. Furthermore, participants in the control group worked significantly more hours during the 12 months follow up compared to the IPS-MA group.

Only few studies have investigated the cost-effectiveness of IPS and only one study investigated the cost-effectiveness of a modified IPS intervention aimed at people with affective disorders. Most of the studies of IPS found this intervention to be cost-effective and Saha et al also found the modified IPS intervention - the IES intervention – to be related to a saving of € 7,247 and cost-effective compared to services as usual\textsuperscript{10}. This is in contrast with our study. A simple explanation could be that IPS-MA had a different organisational set up than the above-mentioned studies. Rather than being integrated with mental health services, Sherpa, the company delivering the IPS-MA intervention acted as a link between mental health services and jobcentres, without any authority. This may have prevented the IPS-MA support from being provided as intended. The organisation of the IPS-MA intervention is clearly a limitation compared to IPS, and would have affected fidelity following the original IPS fidelity scale\textsuperscript{29}. However, because people with mood and anxiety disorders are treated in many different settings in Denmark, it was not possible to integrate job support with treatment to the same extent as in IPS. We anticipated that the mentors
having an assertive outreach to job centers and mental health centers in order to coordinate services would be sufficient, however, this was probably not the case.

Fidelity measures are important in order to secure correct and sustained implementation and effectiveness of a new intervention. During the IPS-MA trial fidelity was measured four times. Each time, comments were made on the implementation of the workplace intervention which was part of the IPS-MA intervention; that is the support in contacting potential employers and negotiating workplace accommodations like shorter hours or lighter duties. Despite several attempts to highlight the importance of the workplace intervention, it was stated in the last fidelity review that the support seemed to be deliberately deselected; Sherpa stated that they wanted to focus on the participants’ ‘healthy self’ and did not wish to introduce the participant to a potential new employer as an employee with impairments. In line with this, Sherpa did not have regular discussions with the participants regarding disclose of their mental illness. However, in IPS the workplace intervention as well as disclosure, or a regular discussion of disclosure is a very important part of the support and two of the eight items most strongly associated with return to work. It is not unlikely, that the lack of implementation of the workplace intervention and regular discussion of disclosure could in part explain the lack of effect of the IPS-MA intervention.

There is an ongoing discussion that EQ-5D may not be sensitive enough to capture changes in HRQoL in patients with mental disorders, this may have underestimated the changes in HRQoL and affected the QALY, making it difficult to recognise a difference between groups. However, EQ-5D was chosen since it is the most frequently used measure in the calculation of QALYs. Future cost-effectiveness studies, including people with mental disorders might consider using a different measure more sensitive to changes in areas of HRQoL relevant for people with mental disorders.

It is well known that health professionals tend to underestimate work capacity, and fear work to be too stressful for individuals with mental disorders. In IPS-MA the mentors, who all had a background as health professionals was taught the principles and values of IPS, for instance that the goal was a rapid return to work, that most are able to work, and will benefit from working regardless of persistent symptoms. Furthermore, the career counsellors were recruited from the private business sector and were encouraged to focus on the competences and goals of the participants, and not diagnosis or symptoms. It cannot be ruled out that return to work has been postponed, or that participants have worked fewer hours due to the mentors and career counsellors trying to protect the participants from perceived stress related to returning to work. However, one could also speculate, that the control group has experienced pressure from the
jobcentres or an economic incentive to return to work full time, whereas the IPS-MA group may have had support in negotiating part time return to work or longer sick leave, which could explain why the IPS-MA group worked fewer hours.

Since the IPS-MA intervention was very intensive, thus quite expensive, and furthermore an add-on to SAU, we had expected the intervention to be more expensive than SAU, however, this was not the case, as the total cost of IPS-MA was the same as SAU. Looking at the cost in more detail, we found that the IPS-MA group used labour market services significantly less than the control group. This could indicate that the support offered by IPS-MA was adequate and superseded services provided by the usual labour market services. However, it may also be, that participants randomized to the control group have sought support elsewhere, inspired by the information they received about IPS-MA.

We found that participants in IPS-MA had significantly lower average wage earnings compared to the control group during the one-year follow-up. This is surprising, since the aim of the intervention was to support participants in a fast return to competitive employment, which we would have expected to generate higher earnings. The result is also in contrast with the findings of other studies\textsuperscript{10,34}. Saha et al found participants in the IES group to have a productivity gain € 5.948 higher than the control group. The lower productivity gain is in line with the finding, that participants in the IPS-MA group worked significantly fewer hours during the 12 months follow-up and could be explained by participants in the IPS-MA group working part-time to a higher extent. It would have been interesting to investigate whether participants received adequate workplace accommodations, and if participants got sick listed again to a higher extent in one of the two groups. This was outside the scope of the present study.

Strengths and limitations
A major strength of this study is that we had access to complete data from highly reliable registers on both health care costs, employment, wage earnings and services provided by the labour market services.

It is a limitation, however, that we did not have information about services used outside the public health care sector. If participants had sought treatment in the private sector, which does not render reimbursement it is not registered, and therefore not part of our estimate. If the control group had sought treatment in the private sector to a higher extent, the cost estimates in the control group could be underestimated and the difference in costs could be higher. Furthermore, we only had access to information on use of municipal services from the municipality of Copenhagen, therefore
this information was only used to investigate if there were major differences between the two groups and any variance in these costs was not reflected in the results.

Another limitation is the high number of missing data on EQ-5D at one-, and especially two-year follow-up. The high loss to follow-up was primarily on the patient reported outcomes which participants should answer online. Despite numerous reminders this was not done. The questionnaire was quit, comprehensive, which may have discouraged participants. Even though we used multiple imputations to account for the missing data, the rather large amount of missing data may have affected the results. It is likely that the study was under-powered for the purpose of an economic evaluation. It is possible that results after two years could have rendered more statistically significant results, however this was not deemed feasible because of the many missing observations. Therefore, as in Saha et al, the time horizon of one year, is a limitation. Many participants returned to work after one-year follow-up, and had we been able to use data from two-year follow-up, the result of the cost-effectiveness analysis might have been different.

In this study, the ICERs indicate that IPS-MA was slightly cost-saving and associated with a small gain in QALY, however, people worked significantly fewer hours. Since the ICERs are not robust, one should be careful to make any conclusions based on the ICERs. The lack of robustness of the ICER may be caused by a small sample size, aggravated by missing QALY data, large variations in costs and small variations in QALYs. It may also be, that the EQ-5D instrument is not sufficiently sensitive to changes in mental health-related quality of life.

In conclusion, IPS-MA was comparable to SAU in terms of QALYs, and costs, but participants in IPS-MA worked significantly fewer hours during the first 12 months, hence based on results from the present cost-effectiveness analysis the IPS-MA intervention was not cost-effective, and could not be recommended for implementation in its present form.
Authors contributions
All authors participated in the planning and design of the study, interpretation of the results, and have read and critically revised the manuscript. MK conducted the analysis and drafting of figures, and tables. LH wrote the manuscript. RTW made a systematic search for studies of cost-effectiveness in the area and wrote part of the introduction. MK wrote the materials and methods section regarding the cost-effectiveness analysis.

Competing interests
The authors declare no conflict of interests.

Funding
The randomized trial was funded by the Obel Family Foundation, the Tryg Foundation, and the Danish Agency for Labour Market and Recruitment. No current or future sponsors of the trial have had any role in the trial design, collection of data, analysis of data, data interpretation, or in publication of data from the trial.

Data availability
Data from the study is available on request due to privacy/ethical restrictions.

Compliance with ethical standards
Ethical approval:
The study was approved by The Regional Ethics Committees of the Capital Region (journal no: H-2-2011-FSP20), reported to the Danish Data Protection Agency (Journal no: 2007-58-0015, local journal no: RHP-2011-20), and registered at http://www.clinicaltrials.gov (identifier: NCT01721824).

Informed consent
All participants provided oral and written informed consent prior to inclusion in the study.
References


<table>
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<tr>
<th>Cost*</th>
<th>Definition</th>
<th>Source</th>
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</table>
| Hospital costs     | Inpatient, outpatient and emergency room contacts in somatic and psychiatric hospitals, valued with Danish national diagnosis-related groups (DRG)-tariffs.                                                     | The National Patient Register with DRG and outpatient tariffs.  
|                    |                                                                                                                                                                                                            | 18,19                                                                                                                                               |
| Primary health care costs | Contacts to general practitioners, practicing specialists and other health care professionals reimbursed (or partly reimbursed) by the Danish National Health Service, e.g. dental care or psychological treatment. Costs are valued with national service tariffs. | The National Health Service Register  
|                    |                                                                                                                                                                                                            | 36                                                                                                                                                 |
| Consumption of prescription pharmaceuticals. | The full price (regardless of subsidies etc) of prescription drugs purchased in Danish pharmacies.                                                                                                               | The Pharmaceutical Database  
|                    |                                                                                                                                                                                                            | 36                                                                                                                                                 |
| Costs of labour market interventions. | All interventions initiated by the municipal job centres: job seeking courses, offered to the control group as part of service as usual were valued at €20 per hour, mentor support in all groups was valued at €33 per hour and personal counselling in all groups was valued at €51 per hour. Education and on-the-job training were considered to not have additional costs | Data obtained from the Danish Agency for Labour Market and Recruitment  
|                    |                                                                                                                                                                                                            |  
| Costs of municipal social interventions | Social interventions, comprising counselling, course activities and other means of non-monetary support.                                                                                                      | Data obtained from Copenhagen municipality for those participants that lived in Copenhagen (46 % of participants). Means per group were calculated.  
|                    |                                                                                                                                                                                                            |  
| Intervention costs. | Costs of the IPS-MA intervention is calculated as the number of Sherpa services used, an estimate of the mean time used per service multiplied by the hourly wage of a social worker (40€).               | Data was registered by the employees in Sherpa  
|                    |                                                                                                                                                                                                            |  
| Productivity costs | Labour market affiliation, costs are measured as lost gains, or absence from gainful (competitive or supported) employment multiplied by an average wage. Protected employment included. | Days in gainful employment are measured in the electronic income register from the Danish Agency for Labour Market and Recruitment  
|                    |                                                                                                                                                                                                            |  

*Costs are in euro and 2016 price level.
Table 2 Total costs, one year after randomization, by group, €

<table>
<thead>
<tr>
<th></th>
<th>Intervention group</th>
<th>Control group</th>
<th>Attributable costs</th>
<th>Test for equality of means</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic health care</td>
<td>1,248</td>
<td>1,030</td>
<td>218</td>
<td>p=.488</td>
</tr>
<tr>
<td>Mental health care</td>
<td>5,489</td>
<td>8,161</td>
<td>-2,672</td>
<td>p=.078</td>
</tr>
<tr>
<td>Prescription pharmaceuticals</td>
<td>560</td>
<td>610</td>
<td>-50</td>
<td>p=.63</td>
</tr>
<tr>
<td>Primary health care</td>
<td>593</td>
<td>639</td>
<td>-46</td>
<td>p=.52</td>
</tr>
<tr>
<td>Labour market services</td>
<td>1,329</td>
<td>5,591</td>
<td>-4,262</td>
<td>p=.009</td>
</tr>
<tr>
<td>Intervention costs</td>
<td>1,183</td>
<td>-</td>
<td>1,183</td>
<td>n/a</td>
</tr>
<tr>
<td>Municipal social services</td>
<td>302</td>
<td>283</td>
<td>19</td>
<td>n/a</td>
</tr>
<tr>
<td>Average wage earnings*</td>
<td>5,034</td>
<td>8,410</td>
<td>-3,376</td>
<td>p=.017</td>
</tr>
<tr>
<td>Total costs at one year</td>
<td>5,485</td>
<td>7,706</td>
<td>-2,221</td>
<td>p=.423</td>
</tr>
</tbody>
</table>

Note: Computations on full study population: N=326. * Subtracted from total costs
### Table 3 Incremental cost-effectiveness in Euro, \( \text{€} \)

<table>
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<tr>
<th></th>
<th>Mean cost development, IPS-MA (95% confidence intervals), ( \text{€} )</th>
<th>Mean cost development, control (95%confidence intervals), ( \text{€} )</th>
<th>QALY gained, IPS-MA (95% confidence intervals), mean</th>
<th>QALY gained, control (95% confidence intervals), mean</th>
<th>ICER, IPS-MA vs control (95% confidence intervals)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complete case</strong></td>
<td>-9,281 (-12,518; -6,046)</td>
<td>-7,730 (-10,906; -4,554)</td>
<td>.144 (.097; .190)</td>
<td>.121 (.081; .161)</td>
<td>Dominant (-2.05e+09; 2.05e+09)</td>
</tr>
<tr>
<td>N=143</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Difference</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>IPS-MA vs control</td>
<td>1,551 (-3,004; 6,107)</td>
<td>-0.023 (-0.085; 0.040)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Imputed QALYs</strong></td>
<td>-8,085 (-10,859; -5,311)</td>
<td>-9,144 (-12,397; -5,891)</td>
<td>.056 (.010; .101)</td>
<td>-.017 (-.057; .023)</td>
<td>14,610 (-646,591; 675-811)</td>
</tr>
<tr>
<td>(N=255)</td>
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<tr>
<td><strong>Difference</strong></td>
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</tr>
<tr>
<td>IPS-MA vs control</td>
<td>-1,059 (-5,311; 3,194)</td>
<td>-.072 (-.133; -.012)</td>
<td></td>
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</tr>
</tbody>
</table>

NOTE: Figures in bold typeface are statistically significant at 5% level. *: QALY refers to gain in HRQoL.
Figure 1 Cost-effectiveness plane of IPS-MA relative to SAU, complete case
Figure 2 Cost-effectiveness plan related to gain in numbers of hours worked during 12 month follow up
Supplementary

Figure 1: Cost-effectiveness acceptability curve of SHERPA relative to TAU, raw data

Probability of IPS-MA being cost-effective

Willingness to pay per QALY (Euro)
Supplementary figure 2: Cost-effectiveness acceptability curve of IPS-MA relative to SAU, imputed data
Supplementary table 1. Incremental cost-effectiveness according to gain in hours worked, complete case.

<table>
<thead>
<tr>
<th>Complete case (N=326)</th>
<th>Cost development, IPS-MA (95 % CI)*</th>
<th>Cost development, control (95 % CI)</th>
<th>Gain in hours worked, IPS-MA (95 % CI)</th>
<th>Gain in hours worked, control (95 % CI)</th>
<th>ICER, IPS-MA vs control (95 % CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost development</strong></td>
<td>-9026 (-11653 - 6398)</td>
<td>-8156 (-11153 - 5159)</td>
<td>160 (104 - 216)</td>
<td>273 (202 - 345)</td>
<td>7.7 (-35 - 80)</td>
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<tr>
<td><strong>Gain in hours</strong></td>
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<tr>
<td><strong>Forskel Sherpa kontrol</strong></td>
<td>-869 (-4789 - 3071)</td>
<td>-113 (-203 - 25)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

NOTE: Figures in bold typeface are statistically significant at 5 percent level.

*95 percent confidence intervals