Ten-year employment patterns of patients with first-episode schizophrenia-spectrum disorders: comparison of early intervention and standard care services

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**Background**
Little is known about long-term employment outcomes for patients with first-episode schizophrenia-spectrum (FES) disorders who received early intervention services.

**Aims**
We compared the 10-year employment trajectory of patients with FES who received early intervention services with those who received standard care. Factors differentiating the employment trajectories were explored.

**Method**
Patients with FES (N = 145) who received early intervention services in Hong Kong between 1 July 2001 and 30 June 2002 were matched with those who entered standard care 1 year previously. We used hierarchical clustering analysis to explore the 10-year employment clusters for both groups. We used the mixed model test to compare cluster memberships and piece-wise regression analysis to compare the employment trajectories of the two groups.

**Results**
There were significantly more patients who received the early intervention service in the good employment cluster (early intervention: N = 98 [67.6%]; standard care: N = 76 [52.4%], P = 0.009). In the poor employment cluster, there was a significant difference in the longitudinal pattern between early intervention and standard care for years 1–5 (P < 0.0001). The number of relapses during the first 3 years, months of full-time employment during the first year and years of education were significant in differentiating the clusters of the early intervention group.

**Conclusions**
Results suggest there was an overall long-term benefit of early intervention services on employment. However, the benefit was not sustained for all patients. Personalisation of the duration of the early intervention service with a focus on relapse prevention and early vocational reintegration should be considered for service enhancement.

**Declaration of interests**
No relevant conflicts of interests reported by C.L.M.H., Y.N.S., P.S., H.H.P. and K.K.Y. S.K.W.C., W.C.C. and E.H.M.L. report that they are members of the working group of the Early Assessment Service for Young People with Psychosis (EASY) programme of the Hospital Authority in Hong Kong. E.Y.H.C. is the convener of the working group of the EASY programme of the Hospital Authority in Hong Kong.

**Keywords**
Schizophrenia; early intervention; long-term outcomes; employment; cluster analysis.

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there are none specifically focused on employment. A 20-year longitu-
dinal study on the social functioning of patients with psychotic disor-
ders suggested heterogeneity of the longitudinal functional outcomes.21 A review study reported that premorbid functioning and previous work consistently predicted employment outcomes and other factors such as positive and negative symptoms, cognitive functions and job-seeking attitude have also been suggested.18 However, most studies have explored the correlates of employment outcomes and the few longitudinal studies that have been conducted have had a small sample size,19 a single point of employment-out-
comes analysis20 or a short follow-up period. The aim of this study was to explore and compare the 10-year longitudinal trajec-
tories of employment patterns of patients who had received stand-
ard care with those of patients who had received the early inter-
vention service. Predictors that differentiate the longitudinal employment patterns were also explored. The results provide evi-
dence to further improve the early intervention service model.

Method

Study setting

The Early Assessment Service for Young People with Psychosis (EASY) programme was established by the public health provider in Hong Kong (Hospital Authority) in 2001 as a region-wide early intervention service for patients with first-episode psychosis. There were 4 teams serving a population of around 6 million. Each team has two psychiatrists, three case managers and a 0.25 full-time-equivalent clinical psychologist. The programme provides 2-year, phase-specific interventions for patients aged 15–25 years with first-episode psychosis.21 These phases include initial engage-
ment, psychoeducation, psychological adjustment, medication management and vocational support. After completing the initial 2 years of service, patients were transferred to the general adult mental health service in the third year, with the pace of transition depending on individual clinical needs. The standard service con-
sisted of publicly funded psychotic out-patient clinic consultation and in-patient care. Support and intervention from other profes-
sionals including community psychiatric nurses, clinical psycholo-
gists and social workers were available based on needs without a dedicated coordinator. About 6% of the patients discharged from the in-patient unit used the community support service.21

Samples

We used a historical control study method because the early inter-
vention service was implemented as a region-wide service in 2001, which precluded the possibility of having concurrent study samples. To minimise the potential cohort effects, the two samples were only 1 year apart. We identified patients with a diagno-
sis of schizophrenia-spectrum disorder who had received the early intervention service in Hong Kong between 1 July 2001 and 30 June 2002 from the centralised hospital database (clinical man-
agement system [CMS]). This is the centralised clinical database for the public healthcare service, which is responsible for more than 90% of tertiary healthcare in Hong Kong. Clinicians deter-
ned the baseline diagnosis, using ICD-10 (1992) criteria and all available clinical information. We excluded patients with comorbid organic brain conditions, drug-induced psychosis, intellectual dis-
abilities and those who had received prior psychiatric treatment for longer than 1 month before presentation to the early interven-
tion service. We individually matched the identified patients – based on gender, age at presentation and diagnosis at onset – with those who first presented to the standard care service between 1 July 2000 and 30 June 2001. The same inclusion and exclusion crit-
eria applied to the standard care group.

A total of 148 matched pairs were identified. All patients were ap-
proached for face-to-face interviews to determine their clinical and func-
tional status 10 years after their first presentation to the service. Written consent was obtained from all patients. The main results of these face-to-face interviews were reported previously.12 The longitudinal diagnoses were based on DSM-IV (1994) Axis I Disorders criteria and were determined using all available informa-
tion (clinical interviews and medical records). After reviewing the longitudinal diagnoses, six patients were excluded from the analysis as they did not fulfill the diagnostic criteria (two patients had sub-
stance-induced psychosis, three patients had affective psychosis and one patient had delusional disorder). As a result, each group con-
sisted of 145 patients. The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimen-
tation and with the Helsinki Declaration of 1975, as revised in 2008.

The study was approved by the Institutional Review Board (IRB) of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (approval number UW09-249) and ethics committees of the other six research sites in Hong Kong (Kowloon central/ Kowloon east cluster IRB: KC/KE-10-0213/ER-3; Kowloon West cluster IRB: Kw/Ex/11-007 (35-07); Hong Kong East Cluster IRB: HKEC-2010-083; New Territory East Cluster: CRE-2011.026; New Territory West Cluster: NTWC/CREC/902/10).

Ten-year employment history

We obtained the 10-year employment histories of all patients on a monthly basis for the first 3 years and every 3 months for the sub-
sequent 7 years from the CMS and written clinical records, using a standardised data-entry form. Patients who were in full-time or part-time competitive paid employment or full-time education (provided by a government-recognised educational institution) at any time during the assessment period were considered as employed for that period. Months of employment were calculated for each patient for each year. The inclusion of full-time education was to re-
fect the young age of the study population. Supported employ-
ment, volunteer work, working at a rehabilitation centre and part-
time education were not included. Given the young age of the patients, most of whom were living with family,12 reports of being a homemaker were not considered as employment.

Baseline and clinical information of the initial 3 years of treatment

Baseline and clinical information for patients during the first 3 years of treatment was obtained from the CMS and written clinical records. The baseline data included initial clinical diagnosis, age at onset, gender, duration of untreated psychosis and premorbid occupational impairment. Duration of untreated psychosis was defined as the period (in days) between the first emergence of psych-
otic symptoms and the initiation of effective antipsychotic medica-
tions.22 We retrieved monthly data for the first 3 years by using a stan-
dardised data-entry form based on operationalised definitions. This included the 2-year early intervention service and the third trans-
nitional year. Positive and negative symptoms were measured with the Clinical Global Impressions–Schizophrenia (CGI-SCH) scale.23 Other information included antipsychotic medication types and dosage, number of relapses and number of admissions to hospital. Relapse was operationally defined as a change in the CGI-SCH-positive scores from 1 to 3 or from 4–6 to 5–7, followed by an adjustment of antipsychotic medication or admission to hos-
pital.24 An average of CGI-SCH-positive and -negative symptoms
over the 3 years was calculated. We also calculated the number of months of full-time employment in the first year of treatment and mean defined daily dose of antipsychotic medications for each patient during the initial 3 years.

**Face-to-face interview**

We conducted semi-structured interviews with patients at their 10-year anniversary of entering into the service. Symptoms were assessed using the Positive and Negative Syndrome Scale (PANSS) for schizophrenia. We assessed information on social and occupational functioning by using the Social and Occupational Functioning Assessment Scale (SOFAS) and the Role Functioning Scale (RFS).

**Data analyses**

All statistical analyses were conducted using SPSS version 24.0 and R version 3.3.2, both for Windows 10. We used the last-observation-carried-forward method to manage missing information in the clinical record review. Total months of employment in each year over 10 years were used for hierarchical cluster analysis to identify distinct clusters of longitudinal employment trajectories for each group. We conducted a separate cluster analysis for each group, taking the different services they have received into account. We used a within-group method for the clustering algorithm, using the squared Euclidean distance for distance measuring. The average silhouette approach was used to determine the optimal number of clusters. A mixed model test was used to compare cluster memberships between early intervention and standard care groups because they were partially matched after exclusion of the six patients based on their longitudinal diagnoses. The slopes of the longitudinal trajectories of the early intervention and standard care groups were compared in different segments, years 1–5 and years 6–10, using piecewise regression analysis. Propensity score-based sensitivity analysis was used to assess the influence of missing data on the results of the hierarchical cluster and piecewise regression analysis. Propensity score-weighted patient characteristics reported according to the brief guidelines are given in Supplementary Table 1 available at https://doi.org/10.1192/bjp.2019.161.

A univariate relationship between the baseline and the clinical characteristics of the initial 3 years of treatment for the different clusters was estimated using logistic regression for the early intervention and standard care groups. All significant variables were included for multivariate analysis with the enter method. We compared the clinical and functional outcomes between the clusters in the early intervention and standard care groups at the 10-year follow-up assessment, using non-parametric tests depending on the number of clusters.

**Data quality and reliability**

Clinicians and researchers had fortnightly consensus meetings to monitor data quality during data collection. An experienced clinician and two researchers completed medical record reviews of 12 patients using the study’s data-collection form. An intraclass correlation coefficient (ICC) test was used to test the validity of the CGI-SCH-positive and CGI-SCH-negative scores. The validity test results (CGI-SCH positive: ICC = 0.89; CGI-SCH negative: ICC = 0.77) suggested that the ratings of the researchers were comparable with the ratings of the clinician. The interrater reliability of the researchers was also assessed using PANSS and SOFAS scores for ten patients. The results indicated satisfactory concordance between researchers (PANSS: ICC = 0.88; SOFAS: ICC = 0.97).

**Results**

There was no significant difference in demographic and baseline characteristics between the early intervention and standard care groups apart from the positive symptoms (Table 1). The successful interview rates for the standard care and early intervention groups were 70.3% (N = 104) and 74.3% (N = 110), respectively. After excluding patients with non-schizophrenia-spectrum diagnoses, there were 102 patients in the standard care group and 107 in the early intervention group (Supplementary Fig. 1).

**Hierarchical clustering analysis and comparison between early intervention and standard care**

The optimal cluster number was two for both early intervention and standard care groups (Fig. 1). Supplementary Fig. 2 shows the results of the silhouette test. The median percentage agreement of cluster allocation of the imputed 20 data-sets with the original is 95.2%, suggesting that the missing data has little influence on the clustering results. The good employment cluster had 98 (67.6%) patients who received the early intervention and 76 (52.4%) patients received standard care. There was a significant difference in the longitudinal pattern of this cluster between the early intervention and standard care groups in years 1–5 (P < 0.001) but not for years 6–10 (P = 0.12). The poor employment cluster had 47 (32.4%) patients who received the early intervention and 69 (47.6%) patients who received standard care. The early intervention patients in this cluster had a reduction in the number of months of employment after year 3 and the number remained low subsequently. There was a significant difference between the early intervention and standard care groups in this cluster for years 1–5.

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**Table 1** Comparison of demographic and baseline characteristics between early intervention and standard care groups

<table>
<thead>
<tr>
<th>Baseline characteristics</th>
<th>Early intervention (N = 145)</th>
<th>Standard care (N = 145)</th>
<th>t/z</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at onset (s.d.)</td>
<td>20.92 (3.09)</td>
<td>21.12 (3.43)</td>
<td>−1.13</td>
<td>0.26</td>
</tr>
<tr>
<td>Years of education (s.d.)</td>
<td>10.84 (2.34)</td>
<td>10.84 (2.56)</td>
<td>0.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Gender (male, n, %)</td>
<td>74 (57.03)</td>
<td>73 (50.34)</td>
<td>0.12</td>
<td>0.91</td>
</tr>
<tr>
<td>Log DUP (s.d.)</td>
<td>1.92 (0.78)</td>
<td>1.91 (0.74)</td>
<td>0.08</td>
<td>0.94</td>
</tr>
<tr>
<td>CGI-SCH positive (s.d.)</td>
<td>4.15 (0.93)</td>
<td>4.61 (0.96)</td>
<td>−4.23</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>CGI-SCH negative (s.d.)</td>
<td>2.75 (1.40)</td>
<td>2.82 (1.23)</td>
<td>−0.47</td>
<td>0.64</td>
</tr>
<tr>
<td>Premorbid occupation impairment (impaired, n, %)</td>
<td>12 (8.28)</td>
<td>13 (8.97)</td>
<td>−0.21</td>
<td>0.83</td>
</tr>
<tr>
<td>Diagnosis, n (%)</td>
<td></td>
<td></td>
<td>0.03</td>
<td>0.86</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>127 (87.60)</td>
<td>126 (86.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (brief psychotic disorders or psychosis NOS)</td>
<td>18 (12.40)</td>
<td>19 (13.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* t, partially paired t-test; z, z-value from mixed effect model; s.d., standard deviation; DUP, duration of untreated psychosis; CGI-SCH, Clinical Global Impressions–Schizophrenia; NOS, not otherwise specified.
(P < 0.0001) but not for years 6–10 (P = 0.12). The results of piecewise regression with multiple imputation were consistent with these findings. The mixed model analysis found significantly more patients who received the early intervention than patients who received standard care in the good employment cluster (P = 0.009). The propensity score-adjusted analysis was consistent with the mixed model analysis.

Demographic and early clinical characteristics of early intervention and standard care groups in the good and poor employment clusters

The patients who received the early intervention in the good employment cluster had significantly more years of education, more total months of full-time employment in the first year and fewer relapses over the initial 3 years (Table 2). The effects of relapse in each of the first 3 years on cluster membership were explored with χ² tests. Significantly more patients who had relapsed in years 2 or 3 were in the poor employment clusters (Supplementary Table 2). The model with years of education, total months of full-time employment in the first year and number of relapses over the initial 3 years was significant in explaining 19.1–26.7% of variance in the clusters (χ² = 30.77, P < 0.0001; Supplementary Table 2).

The patients who received standard care in the good employment cluster had significantly more years of education, more total months of full-time employment in the first year, lower mean negative symptoms, fewer admissions to hospital over the initial 3 years and fewer of them were male (Table 2). The model including these variables was significant in explaining 33.7–45% of the variance in the clusters (χ² = 59.65, P < 0.0001). Only total months of full-time employment in year 1 and mean negative symptoms over the initial 3 years were significant in the model (Supplementary Table 3).

Table 2 Comparison between the good and poor employment clusters on baseline clinical characteristics and clinical characteristics during the initial 3 years for both early intervention and standard care groups

<table>
<thead>
<tr>
<th></th>
<th>Early intervention group</th>
<th>Standard care group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good employment (N = 98)</td>
<td>Poor employment (N = 47)</td>
</tr>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age at onset (s.d.)</td>
<td>20.92 (3.32)</td>
<td>20.91 (2.65)</td>
</tr>
<tr>
<td>Years of education (s.d.)</td>
<td>11.19 (2.46)</td>
<td>10.11 (1.90)</td>
</tr>
<tr>
<td>Baseline characteristics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log DUP (s.d.)</td>
<td>1.89 (0.78)</td>
<td>1.98 (0.80)</td>
</tr>
<tr>
<td>Pre morbidity occupation impairment (yes, n, %)</td>
<td>6 (6.10)</td>
<td>6 (12.8)</td>
</tr>
<tr>
<td>CGI-SCH positive (s.d.)</td>
<td>4.14 (0.89)</td>
<td>4.17 (0.94)</td>
</tr>
<tr>
<td>CGI-SCH negative (s.d.)</td>
<td>2.61 (1.43)</td>
<td>3.04 (1.30)</td>
</tr>
<tr>
<td>Clinical characteristics of initial 3 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total months of FT employment in year 1 (s.d.)</td>
<td>7.07 (4.76)</td>
<td>3.19 (4.07)</td>
</tr>
<tr>
<td>Mean CGI-SCH positive over 3 years (s.d.)</td>
<td>1.58 (0.65)</td>
<td>1.59 (0.56)</td>
</tr>
<tr>
<td>Mean CGI-SCH negative over 3 years (s.d.)</td>
<td>1.36 (0.43)</td>
<td>1.50 (0.56)</td>
</tr>
<tr>
<td>Number of relapses over 3 years (s.d.)</td>
<td>0.60 (0.89)</td>
<td>1.00 (1.02)</td>
</tr>
<tr>
<td>Mean DDD over 3 years (s.d.)</td>
<td>0.51 (0.38)</td>
<td>0.65 (0.56)</td>
</tr>
<tr>
<td>Number of admissions to hospital over 3 years (s.d.)</td>
<td>0.91 (1.06)</td>
<td>1.00 (1.02)</td>
</tr>
</tbody>
</table>

DUP, duration of untreated psychosis; CGI-SCH, Clinical Global Impressions-Schizophrenia scale; CI, confidence interval; FT, full time; DDD, daily defined dose; s.d., standard deviation.

*P < 0.05; **P < 0.001; ***P < 0.0001.
Comparing clinical and functional outcomes of the good and poor employment clusters at the 10-year follow-up

At the 10-year follow-up, the early intervention and standard care groups in the good employment cluster had significantly lower PANSS-negative and -general scores, higher SOFAS scores and higher sub-scores of RFS compared with the poor employment cluster. Only the standard care group had higher PANSS positive scores (Table 3).

Discussion

This is one of the first studies to compare the longitudinal employment trajectories of patients who received early intervention with those who received standard care services. Significantly more patients who received the early intervention were in the good employment cluster. The beneficial effect of the early intervention service on employment for this group of patients was sustained over 10 years. In the poor employment clusters, there were significant differences between the early intervention and standard care groups for years 1–5 but not for years 6–10. This suggests that the patients who received the early intervention were more successful in achieving employment than those who received standard care during the initial few years, but they failed to sustain this employment. In the good employment clusters, there were significant differences between the early intervention and standard care groups in years 1–5, suggesting different early trajectories of vocational improvement between groups. The patients who received the early intervention had significantly more vocational functioning improvement in the first 2 years, whereas the standard care group improved more gradually. We found that years of education, months of full-time employment in the first year and number of relapses in the initial 3 years of treatment were significant indicators that differentiated patients who received the early intervention into the good and poor employment clusters. For patients who received standard care, negative symptoms in the initial 3 years and months of full-time employment in the first year were significant indicators that differentiated cluster membership.

The period between 15 and 25 years of age is an important developmental stage that signifies a transition to adulthood, which includes completing education and establishing an identity in the workplace. An onset of psychosis during this period often interrupts this significant life trajectory. Therefore, the vocational outcomes of patients with illness onset during this period are crucial. Reviews have reported a modest short-term effect of early intervention programmes to improve vocational outcomes. However, evidence of the longevity of such effects is scarce. The results of this study suggest that significantly more patients who received the early intervention achieved good longitudinal employment outcomes over 10 years compared with the standard care group, and the benefit was sustained beyond the intervention period. This finding supports the critical period hypothesis and highlights long-term benefits of the early intervention programme.

During the initial 3 years, the early intervention group in the poor employment cluster achieved better employment than the standard care group, but their employment status deteriorated to the same level as that of the standard care group between years 3 and 4 and subsequently remained unchanged. This suggests that the employment-related benefit of the 2-year early intervention service was not sustained in this group of patients. About 68% of the patients in the good employment cluster who received the early intervention maintained their employment, but in the poor employment cluster 32% of the patients who received the early intervention were not able to sustain their vocational functioning. These heterogeneous longitudinal trajectories of vocational outcomes highlight the need for personalisation of the duration of the early intervention service, which could be a key direction for future development of the early intervention service model.

Patients in the poor employment cluster had poor functional and clinical outcomes at the 10-year follow-up. This suggests that the specific clusters identified using the longitudinal employment data have important prognostic value. One of the factors differentiating the employment clusters for both early intervention and standard care groups is years of education. This result is in line with previous findings on the relationship between premorbid functioning and vocational outcome, because years of education can be a proxy of premorbid functioning. The number of months of full-time employment as early as the first year was also found to be a significant differentiating factor for both groups. Therefore, early vocational reintegration should be a key component of an enhanced early intervention programme.

Early relapse in patients with first-episode psychosis has been suggested as an important factor relating to long-term clinical outcomes and mortality. This study further suggests that a greater number of relapses during the first 3 years is associated with worse longitudinal vocational outcomes in patients who received the early intervention. The results of a detailed exploration of relapse patterns suggest that relapses in years 2 and 3 are particularly important. This time point is around the transition phase of a 2-year early intervention service programme. Patients who had a relapse during this period may not have sufficient recovery time before the transition to standard service. Therefore, a fixed-period early intervention service may not be sufficient for patients who have had a relapse during the latter part of the service provision. This
Highlights the possibility of a critical intervention period after early relapse and the need to provide a longer period of early intervention service for patients who relapsed in years 2 or 3. The important effect of early relapse on long-term outcomes and the lack of consistent beneficial impact of early intervention service on relapse reduction indicate a need to strengthen the early intervention service in terms of relapse prevention and management.

Negative symptoms during the initial 3 years were identified as one of the significant differentiating indicators of the employment clusters among the patients in the standard care group. This is in line with previous findings supporting the relationship between negative symptoms and functional outcomes. However, we did not find a significant role of negative symptoms in the early intervention group. It is possible that the patients who received the early intervention service had much improved negative symptoms. Such improvement might have narrowed the difference in negative symptoms between the good and poor employment clusters of the patients in the early intervention group, and hence led to a statistically non-significant result.

### References

2. Luciano A, Bond GR, Drake RE. Does employment after the course and outcome of schizophrenia and other severe mental illnesses? A systematic review of longitudinal research. *Schizophr Res* 2014; 159: 312–21.

Racenstein JM, Harrow M, Reed R, Martin E, Herbener E, Penn DL. The relationship between positive symptoms and instrumental work functioning in schizophrenia: a 10 year follow-up study. *Schizophr Res* 2002; 56: 95–103.


Kay SR, Fiszbein A, Opler LA. The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophr Bull* 1997; 13: 261–76.


