Predictors of move-on from mental health supported accommodation in England; a national cohort study.

Professor Helen Killaspy*, PhD, Professor of Rehabilitation Psychiatry, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF h.killaspy@ucl.ac.uk,
Tel. 0207 679 9710

Professor Stefan Priebe, FRCPsych, Professor of Social and Community Psychiatry, Unit for Social and Community Psychiatry, Queen Mary University of London, Newham Centre for Mental Health, London E13 8SP s.priebe@qmul.ac.uk

Peter McPherson, DPsych, Research Associate, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF p.mcpherson@ucl.ac.uk

Zohra Zenasni, MSc, Statistician, Pragmatic Clinical Trials Unit, Queen Mary University London, Blizard Institute, Barts and The London School of Medicine and Dentistry, 58 Turner Street, London, E1 2AB z.zenasni@qmul.ac.uk

Lauren Greenberg, Lauren Greenberg, Pragmatic Clinical Trials Unit, Queen Mary University London, Blizard Institute, Barts and The London School of Medicine and Dentistry, 58 Turner Street, London, E1 2AB laurengreenberg@hotmail.co.uk

Professor Paul McCrone, PhD, Professor of Health Economics, King's Health Economics, King's College London, De Crespigny Park, London SE5 8AF paul.mccrone@kcl.ac.uk

Sarah Dowling, MSc, Project Manager, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF sarah.dowling@ucl.ac.uk

Isobel Harrison, BSc, Research Associate Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF isobel.harrison@ucl.ac.uk

Joanna Krotofil, PhD, Research Associate, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF j.krotofil@ucl.ac.uk

Christian Dalton-Locke, BSc, Research Assistant, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF c.dalton-locke@ucl.ac.uk

Rose McGranahan, PhD, Research Assistant, Unit for Social and Community Psychiatry, Queen Mary University of London, Newham Centre for Mental Health, London E13 8SP rose.mcgranahan@qmul.ac.uk

Maurice Arbuthnott, BA, Service User Representative, North London Service-user Research Forum, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF mauricea@easy.com

Professor Sarah Curtis, DPhil, Professor Emerita, Department of Geography, Durham University, South Road, Durham DH1 3LE S.E.Curtis@durham.ac.uk
Professor Gerard Leavey, PhD, Bamford Centre for Mental Health & Wellbeing, University of Ulster, Northland Road, Derry, Londonderry, Northern Ireland BT48 7JL
g.leavey@ulster.ac.uk

Professor Geoff Shepherd, PhD, Senior Policy Adviser, Centre for Mental Health, Maya House, 134-138 Borough High St, London SE1 1LB
Geoff.Shepherd@centreformentalhealth.org.uk

Professor Sandra Eldridge, PhD, Professor of Biostatistics, Pragmatic Clinical Trials Unit, Queen Mary University London, Blizard Institute, Barts and The London School of Medicine and Dentistry, 58 Turner Street, London, E1 2AB s.eldridge@qmul.ac.uk

Professor Michael King, PhD, Professorial Research Associate, Division of Psychiatry, University College London, Maple House, 149 Tottenham Court Road, London W1T 7NF
michael.king@ucl.ac.uk

*Corresponding author

Declaration of interests

HK, SP, MK, SE, PMcC, MA, SC, GL and GS report a grant from National Institute of Health Research during the conduct of the study. ZZ, SD, IH, JK, PMcP, CD-L and RMcG report having no conflicts to disclose.

Funding

The study was funded by the National Institute of Health Research (RP-PG-0610-10097). The funders had no role in the collection, analysis or interpretation of data, in the writing of the manuscript or the decision to submit for publication. The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.

Acknowledgements

We thank our funders (National Institute of Health Research), the fund holders (Camden and Islington NHS Foundation Trust), members of our service-user reference group (Katherine Barrett, James Bennett and Gavin McCabe) and the participants at each site for their support.

Author contribution

HK, SP, MK, SE, PMcC, MA, SC, GL and GS conceived and designed the study. SD, IH, JK, PMcP, CD-L and RMcG collected and collated the data which were analysed by LG and ZZ with supervision from SE. PMcC carried out the health economic analysis. All authors were involved in the interpretation of the data. HK drafted the article which was reviewed and revised by all authors. All authors approved the final version of the manuscript and agreed their accountability in ensuring that any questions related to the accuracy or integrity of any part of the work were appropriately investigated and resolved.

Data availability

All data supporting our findings will be shared on request made to the corresponding author.

Abstract

Background

Around 60,000 people in England live in mental health supported accommodation. There are three main types; residential care (RC), supported housing (SH), and floating outreach (FO). Both SH and FO aim to support service-users to move on to more independent accommodation within two years, but there has been little research investigating their effectiveness.

Aims

To conduct a 30-month prospective cohort study investigating outcomes for users of mental health supported accommodation across England.

Methods

We used random sampling, that accounted for geographical variation in factors relevant to mental health supported accommodation, to recruit 87 services (22 RC, 35 SH and 30 FO) and 619 service-users (RC=159; SH=251; FO=209) across England. We contacted services every three months to investigate the proportion of service-users who moved on to more independent accommodation successfully. Multilevel modelling was used to estimate how much of the variation in outcome and costs of care was due to service type and quality, after accounting for service-user characteristics.

Results

Overall, 243/586 (41.5%) participants achieved successful move-on (RC 15/146 [10.3%], SH 96/244 [39.3%], FO 132/196 [67.3%]). This was most likely for FO service-users (vs RC, OR=7.96 [95% CI 2.92-21.69, p<0.001]; vs SH, OR=2.74 [95% CI 1.01-7.41, p<0.001]) and associated with reduced costs of care and two aspects of service quality; promotion of human rights and recovery based practice.

Conclusions

Most people do not move-on from supported accommodation within the expected timeframe. Greater focus on human rights and recovery based practice may increase the clinical and cost-effectiveness of these services.

Introduction

Supported accommodation is a key component of the 'whole system care pathway' for people with complex, longer term mental health problems[1,2] serving around 60,000 people in England. Despite the substantial costs of providing these services, there is a dearth of empirical research evaluating their effectiveness. The most recent Cochrane Review in the field (updated 2010), identified no relevant randomised controlled trials of adequate quality[3,4]. A recent trial in Canada showed benefits in housing stability for recipients of an outreach model targeting homeless people, but well conducted studies of other models are rare[5,6]. The QuEST study (Quality and Effectiveness of Supported Tenancies for people with mental health problems) was the first research programme to investigate the effectiveness of mental health supported accommodation services in England (www.ucl.ac.uk/quest). It comprised: adaptation of a quality assessment tool[7]; a national survey [8]; a cohort study investigating longer-term outcomes; a qualitative investigation of staff and service-user experiences[9]; a feasibility randomised trial comparing the effectiveness of two service types. This paper reports on the cohort study. Our national survey described the three main types of mental health supported accommodation in England; residential care, supported housing, and floating outreach[8]. Residential care (RC) homes comprise communal facilities, staffed 24 hours, where day to day needs are provided (e.g. meals, supervision of medication and cleaning) and placements are not time limited. Supported housing (SH) is provided in shared or individual self-contained, time-limited tenancies with staff based on-site up to 24 hours a day who assist the person to gain skills to move on to less supported accommodation. Floating outreach (FO) services provide support to people living in time-unlimited, self-contained, individual tenancies. Staff are based off-site and visit for a few hours per week, providing practical and emotional support, with the aim of reducing support over time to zero. Staff are not mental health professionals but usually undertake relevant training (e.g. National Vocational Qualifications). In England, individuals often move from higher to lower supported accommodation every few years as their skills improve, with the goal of managing an independent tenancy. The aim of the cohort study was to assess the proportion of people who successfully moved on to more independent accommodation over 30-months, and to identify service and service-user factors (including costs) associated with this. Our specific research questions were:

1) What proportion moved on to more independent accommodation and sustained it for 30-months?

2) How much of the variation in outcome was due to service type and service quality, before and after accounting for service-user characteristics (age, sex, diagnosis, length of stay, morbidity)?

Methods

The study was approved by Harrow Research Ethics Committee (reference 12/LO/2009). The full protocol for the study is available on the corresponding author's institution's website (www.ucl.ac.uk/quest/protocol). The cohort comprised all service-users participating in the national survey component of the QuEST programme. Full details of the sample size calculation, sampling and recruitment are described elsewhere[8]. In brief, between October 2013 and October 2014, we recruited 619 users of mental health supported accommodation across England (159 RC, 251 SH, 209 FO), randomly sampled from 87 services (22 RC, 24 SH, 25 FO). These services were randomly sampled from 14 nationally representative Local Authority areas using an index developed by Priebe et al[10] that includes characteristics relevant to mental health supported accommodation (e.g. mental health morbidity, social deprivation, provision of community mental health care, housing demand). A mean seven service users were recruited per service. Written informed consent was obtained from all participants. The sample size was calculated to estimate the difference in proportion of people moving on from each of the three types of supported accommodation 30 months after recruitment to within 5%. Recruitment took place from 1st October 2013 to 31st October 2014.

The sample is fully described elsewhere[8]. In summary, users of RC and SH had more severe mental health problems than users of FO (primary diagnosis of psychosis; 83% RC, 72% SH; 52% FO) and those in RC had the highest needs and longest contact with mental health services (mean [range] years RC 23 [15-33]; SH 11 [5-20]; FO 15 [8-24]). Over half of all users were considered at risk of self-neglect (72% RC, 52% SH, 50% FO) and over a third vulnerable to exploitation (41% RC, 37% SH, 36% FO). At recruitment, each service's quality was assessed using the Quality Indicator for Rehabilitative Care - Supported Accommodation (QuIRC-SA) which rates seven domains: Living Environment; Therapeutic Environment; Treatments and Interventions; Self-management and Autonomy; Social Interface; Human Rights; Recovery-Based Practice[7]. Data on service-user participants were collected from key staff as follows: clinical and risk history; challenging behaviours - Special Problems Rating Scale (SPRS)[11;] needs - Camberwell Assessment of Needs Short

Assessment Scale (CANSAS)[12;] substance use - Clinician Alcohol and Drug Scale (CADS)[13;] social functioning - Life Skills Profile (LSP)[14]. Sociodemographic details were collected from service-user participants along with ratings of their: quality of life - Manchester Short Assessment of Quality of Life (MANSA)[15;] autonomy - Resident Choice Scale (RCS)[16]; and satisfaction with services - the Client Assessment of Treatment Scale[17].

The primary outcome, 'successful move-on' was defined as the proportion of participants who moved to more independent accommodation without placement breakdown over the 30-month follow-up period. Since FO is provided to people living in a permanent tenancy, the primary outcome for this group was defined as managing with fewer hours of support per week rather than moving home.

We also investigated a secondary outcome, defined as the proportion who sustained move-on to more independent accommodation for 30-months, without hospital admission/s (an indirect marker of community tenure).

Data collection

During follow-up, the researchers contacted services every three months to monitor participants' moves to other accommodation and hospital admissions. For any that moved to another supported accommodation, staff contact details at the new service were obtained. If the service-user moved on to fully independent accommodation, with no supported accommodation staff involvement, their care co-ordinator (where applicable) was contacted for ongoing monitoring.

At 30-month follow-up, the researchers completed telephone interviews with supported accommodation staff or care co-ordinators and corroborated details of any moves or hospital admissions, including the length of time in each accommodation and/or admission, during the 30-months. An overall assessment of the primary and secondary outcomes was made from this information. If a relevant staff member could not be identified (e.g. if the service-user had moved to a fully independent tenancy and been discharged from mental health services), NHS case records were accessed to collect outcome data on move-on. Case notes of all participants were reviewed to clarify the number and length (in days) of any hospital admissions.

To estimate service use costs, information was collected from staff using a short version of the Client Service Receipt Inventory[18] on the frequency of the service-user's contact with specific professionals in the previous three months and whether contacts were one-to-one or in groups. It was assumed that group sessions involved four participants on average. Total inpatient days during the whole 30-month follow-up were collected as described above. Other costs (based on the previous three months) were not extrapolated across the 30-month period.

Data Analysis

Data were entered into a bespoke database. Data checks were completed on all records, comparing collected and entered data. After cleaning, data were transferred to Stata statistical software for analysis[19]. Descriptive analyses were conducted for all variables.

Primary outcome

For the primary outcome (successful move-on), a logistic mixed effects model was fitted using xtmelogit, with a random intercept for service and a fixed effect for area as this was used in the sampling frame as a design variable. Univariate analysis was used to identify service and service-user variables with a significant association ($p<10\%$) with the primary outcome. The QuIRC-SA Therapeutic Environment domain score was not included in the analysis because this domain and the Recovery Based Practice QuIRC-SA domain were very highly correlated (Spearman's rho = 0.87) and the variance inflation factor (VIF) exceeded 10. We chose to remove this domain as the Recovery Based Practice domain score had previously been shown to predict successful discharge from inpatient rehabilitation services[21]. The QuIRC-SA domains included in the univariable analysis were therefore restricted to Treatments & Interventions, Self-Management & Autonomy, Social Interface, Human Rights and Recovery Based Practice. Living Environment was excluded as it does not apply to FO services. The following service-user variables were included in the univariable analysis: socio-demographic characteristics (age, sex), diagnosis (non-psychotic vs. psychotic disorder), length of stay with supported accommodation service, social functioning (LSP), total unmet needs (CANSAS), substance misuse (CADs), challenging behaviours (SPRS), risk of self-neglect and/or vulnerability to exploitation, risk to others, risk of self-harm.

Sensitivity analyses

In order to address factors that may have influenced our primary outcome, the following sensitivity analyses were conducted:

- We calculated propensity scores from the following variables: social function (Life Skills Profile score) at recruitment; age; diagnosis of psychosis/no-psychosis; a composite risk variable (vulnerability to risk of exploitation +/- risk to others +/- self-harm in the last two years). We used inverse probability of treatment weighting based on these propensity scores to create a synthetic sample in which covariates were balanced between intervention and treatment groups, thus mimicking a trial population, and enabling us to estimate an Average Treatment Effect (ATE)[20] freer of bias due to confounding.
- Excluding participants who did not have a diagnosis of psychosis.
- Replacing the geographical area variable with the geographic area sampling index score[10].
- Only categorising FO service-users as having a positive outcome if the number of hours per week of support had reduced by at least 50% since recruitment.
- Comparing service-users who had been in the supported accommodation for less than nine months at recruitment with those who had been there for over nine months.

Secondary outcome

A logistic mixed effects model was fitted using *xtmelogit*, with a random intercept for service and a fixed effect for area to assess the secondary outcome by service type.

Costs of care

Care costs at 30-month follow-up were compared between the original service settings. This used a mixed-effects model with service settings entered as the main independent variables and adjustment made for background characteristics. These were socio-demographic characteristics (age, sex), diagnosis (non-psychotic vs. psychotic disorder), and whether there were problems with alcohol or drug use. Cost data are usually skewed but mean costs are still relevant in economic evaluations and the sample size was large enough to produce robust results.

The association between primary outcome and costs was investigated in two ways. First, costs were compared for each service type for those who did and did not achieve the primary outcome. Second, multilevel models were used to investigate the relationship between costs and the primary outcome. We expected that movement to less supported accommodation

would have lower costs and the model was therefore adjusted for participant characteristics to quantify the impact more precisely. The variables included are as listed above.

Results

Participant flows in the cohort are shown in supplementary Figure 1 available at <hyperlink>. After accounting for withdrawals (*n*=7) and deaths (*n*=26), we followed 586/619 (95%) participants over 30-months (RC=146; SH=244; FO=196). There were very little missing primary or secondary outcome data.

Descriptive data

Participants' hospital admissions and risk incidents over 30-months by service type are shown in Table 1, along with the number (%) ready for move-on but awaiting a suitable vacancy in a less supported service. Overall, 110/586 (18.8%) had a hospital admission during follow-up. Incidents of risk to others were highest amongst RC service-users (14.0% RC, 11.5% SH, 4.1% FO) and self-harm was most common amongst SH and FO service-users (4.2% RC, 17.3% SH, 14.8% FO). Around one third of SH service-users who had not moved on were considered by staff as ready to do so (8.5% RC, 30.5% SH, 6.9% FO).

Table 1 about here

Primary outcome

Overall, 243/586 (41.5%) participants achieved successful move-on to less supported accommodation (RC 15/146 (10.3%), SH 96/244 (39.3%), FO 132/196 (67.3%). The odds ratio of achieving the primary outcome for users of FO vs RC was 7.96 (95% CI 2.92-21.69, p<0.001), for FO vs SH service-users 2.74 (95% CI 1.01-7.41, p<0.001) and for users of SH vs RC 2.90 (95% CI 1.05-8.04, p=0.04).

The multivariable analysis identified positive associations between the primary outcome and service quality, specifically the QuIRC-SA domain scores for Human Rights (OR 1.09, 95% CI 1.02-1.16, p=0.007) and, marginally, Recovery Based Practice (OR 1.04, 95% CI 1.00-1.08, p=0.054) assessed at recruitment. The QuIRC-SA Social Interface domain score was negatively associated with the primary outcome (OR 0.95, 95% CI 0.91-0.98, p=0.001). Service-user total unmet needs, length of time in the supported accommodation service and a

composite risk variable (vulnerability to exploitation +/- self-harm) at recruitment were also negatively associated with the primary outcome. See Table 2.

Table 2 about here

Sensitivity analyses

The results of the sensitivity analyses are shown in supplementary Table 1 available at <hyperlink>. All showed a similar pattern of results to the main adjusted and unadjusted models.

Secondary outcome

Few (17/243, 7%) individuals who moved on to less supported services had a subsequent admission during the 30-month follow-up (0/15 RC [0%], 12/96 SH [12.5%], 5/132 FO [3.8%]). The odds ratios associated with the secondary outcome show a similar pattern to the primary outcome results, with successful move-on and no subsequent admission being more likely for users of FO than SH (OR 1.65, 95% CI 0.97- 2.33, $p<0.001$) and RC (OR 3.15, 95% CI 2.28-4.02, $p<0.001$), and more likely for users of SH than RC (OR 1.65, 95% CI 0.97-2.33 $p<0.001$).

Costs of care

From the staff-reported service use information reported in Table 3 it can be seen that SH service-users were more likely to have had care co-ordinator contacts in the three-month period prior to the 30-month follow-up than users of RC or FO. Contacts with psychiatrists and other doctors were relatively common, although less so for FO service-users. Planned face-to-face and group contacts with supported accommodation staff were most likely for RC service-users. During the 30-month follow-up period, SH service-users were twice as likely as FO service-users to have a psychiatric admission. There was little difference in the proportions having inpatient stays due to physical health problems between the three service types and little difference in the intensity of service use amongst those in contact with services. The average number of planned face-to-face contacts with supported accommodation staff was highest for FO service-users. For those who had a psychiatric admission, the number of inpatient days over the 30-month period was highest for RC service-users.

Table 3 about here

Table 3 also shows the costs of care. Excluding inpatient days, care costs over the previous three months were around twice as high for RC service-users (£1434) compared to SH (£718) and FO (£640), with the highest costs attributed to personal care, planned face-to-face contacts with supported accommodation staff, and contacts with a doctor other than the psychiatrist. The standard deviations were very high which is common for cost data, with interquartile ranges £298-1275 for RC, £213-884 for SH and £0-572 for FO. Amongst SH service-users, the highest costs were for planned face-to-face contacts with supported accommodation staff followed by contacts with care co-ordinators. Planned face-to-face contacts with supported accommodation staff was also the highest service cost for FO service-users. After controlling for demographic and clinical variables in the multi-level regression model, users of RC had costs that were on average £440 more than those for SH service-users (95% CI, -£245 to £1124) and £601 more than FO service-users (95% CI, -£54 to £1257) but these differences were not statistically significant.

Psychiatric inpatient costs (assessed over the 30 month follow-up period) were similar for users of RC and SH and about twice that of FO service-users. After controlling for demographic and clinical variables, RC service-users' inpatient costs were on average £5214 more than for SH (95% CI, -£2844 to £13,272) and £7481 more than for FO service-users (95% CI, -£210 to £15,172) but again, these differences were not statistically significant.

Table 4 shows the costs for users of each of the three service types at 30-month follow-up for those who did and those who did not achieve the primary outcome. Unsurprisingly, costs were lower for those who moved to less supported services. In the unadjusted multilevel regression model, not including the costs of inpatient care, those who achieved the primary outcome had mean (SD) service costs at follow-up of £388 (£700) while those who did not had mean (SD) costs of £1214 (£2594). After adjustment, those who moved on to less supported services had costs that were on average £427 lower than those who did not (95% CI, £43 to £811). The mean (SD) inpatient costs for those who achieved the primary outcome were £2713 (£10,062) and for those who did not £15,142 (£40,463). The adjusted multilevel model revealed that inpatient costs for those who moved on were £14,608 less than for those who did not (95% CI, £8593 to £20,624).

Table 4 about here

Discussion

We conducted the first national cohort study investigating outcomes for users of mental health supported accommodation in England. We achieved a high follow-up rate, collecting primary outcome data on 95% of participants at 30-month follow-up, enabling robust assessment of the proportion who successfully moved on from RC or SH to more independent accommodation or, for those receiving FO services, were able to manage with less support.

In our primary outcome analysis, 42% of participants achieved move on (two-thirds of those receiving FO services, one third of those in SH and one in ten of those in RC), and very few of those who moved on had a subsequent hospital admission (our secondary outcome). Our sensitivity analyses supported the findings of our primary outcome analyses. In England, most SH and FO services are contracted to work with individuals for around two years, in keeping with the Government's 'short-term supported accommodation' model. Our results show a clear divergence between this expected timeframe and reality which could pose a risk to individuals who require longer-term support, placing them and service staff under inappropriate pressure to move-on prematurely.

Users of different services had similar levels of risk at 30-month-follow-up as at recruitment[8], with around one quarter of those living in SH and FO considered at risk of self-harm. Service-users with more unmet needs, more risks and longer length of stay in the service (all of which are indicators of greater morbidity) were less likely to achieve successful move-on. After adjusting for these characteristics, FO service-users were more likely than those in RC and SH to move-on successfully, and those in SH were more likely to move-on successfully than those in RC. Whilst service costs between the three service types did not vary once sociodemographic and clinical variables were accounted for, service costs for those who moved on were significantly lower than for those who did not, even after adjustment.

Successful move-on was positively associated with service quality, specifically the degree to which the service promoted service-users' Human Rights and adopted Recovery Based Practice (as assessed by the QuIRC-SA). The Human Rights domain includes the degree to which the service protects service-users' privacy and dignity, their legal rights and their access to advocacy. The Recovery Based Practice domain includes: the degree to which the service promotes collaboration between staff and service-users in care planning; involves service-users in the running of the service; helps service-users to gain independent living

skills; holds a culture that embodies hope for service-users to progress, including a maximum expected length of stay. The association between successful move-on and Recovery Based Practice concurs with a previous national cohort study in England that investigated service characteristics associated with successful community discharge from inpatient mental health rehabilitation services[21]. This therefore suggest that gaining skills in Recovery Based Practice is key for staff that work with this service-user group. The association between the promotion of Human Rights and our primary outcome highlights the importance of access to advocacy services and legal representation to assist progression through the supported accommodation system.

The negative association between the QuIRC-SA 'Social Interface' score and successful move-on may seem paradoxical, but this domain includes the degree to which family members are involved in service-users' care and to which the service engages service-users with local community resources. It is possible that services that facilitate greater family engagement may experience greater resistance from family members for service-users to move on to more independent accommodation, an issue identified in previous studies[22]. Additionally, services that facilitate service-users' engagement with local community resources may find them more reluctant to move to alternative accommodation in a different locality.

Almost one third of SH user groups (and 16% of the whole sample) were considered ready to move-on by staff, suggesting that there is under provision of supported accommodation nationally.

Limitations

Our findings must be viewed in light of a number of limitations. First, successful move-on for FO service-users was operationalised as managing with fewer hours of support per week than at recruitment; arguably, this is a lower threshold for 'success' than that applied to users of residential care and supported housing services and thus the proportion of successful move-on we found for FO service-users may have been over estimated. Nevertheless, our sensitivity analysis that reclassified FO service-users as having a successful outcome only if the number of hours of support they were receiving had reduced by at least half, found similar results. Second, although we designed out study to ensure that primary and secondary outcomes could be collected from case notes (a strength of our design), this may have led to

further over estimation of successful move-on, particularly for those in FO. Specifically, since outcome data for service-users who had been discharged from the supported accommodation service had to be collected from clinical case notes (as they no longer had a key staff member to report on their outcomes), it is possible that some of this group may have returned to some form of supported accommodation without being taken on again by clinical services and thus this would not be reported in their case notes. Third, for service-users whose follow-up data could only be collected from case-notes, other data, such as contacts with family (used in our costs of care analysis) could not be collected. Fourth, service use data provided by staff (also used in our health economic analysis) may have been prone to recall error. However, the period of interest was three months, short enough to mitigate against this possibility, and any recall bias would apply equally to all three service types.

Conclusion

Mental health supported accommodation services are crucial to the 'whole system pathway' that enables recovery for individuals with complex mental health needs[23] and achieving successful move-on is one of their main aims. We found that most people do not move on from SH and FO services within the expected two-year timeframe, suggesting a need for greater flexibility. However, investment in staff training to enhance delivery of the aspects of service quality that facilitate successful move-on (recovery based practice and the promotion of human rights) may increase the clinical and cost-effectiveness of these services.

Table 1. Service-user admissions and risk incidents at follow-up by service type

	Residential Care N=146 (%)	**Supported Housing n=244 (%)**	**Floating Outreach n=196 (%)**	**Total N=586 (%)**
Number of psychiatric admissions	**n=144**	**n=243**	**n=196**	**n=583**
0	117 (81.3)	183 (75.3)	173 (88.3)	473 (81.1)
1	16 (11.1)	31 (12.8)	11 (5.6)	58 (9.9)
>1	11 (7.6)	29 (11.9)	12 (6.1)	52 (8.9)
Number of involuntary psychiatric admissions				
0	125 (86.8)	201 (82.7)	182 (92.9)	508 (87.1)
1	11 (7.6)	27 (11.1)	8 (4.1)	46 (7.9)
>1	8 (5.6)	15 (6.2)	6 (3.1)	29 (5.0)
Any episodes of being in prison?	**n=143**	**n=243**	**n=196**	**n=582**
	5 (3.5)	9 (3.7)	2 (1.0)	16 (2.7)
Any incidents of violence?	**n=143**	**n=243**	**n=196**	**n=582**
	20 (14.0)	28 (11.5)	8 (4.1)	56 (9.6)
Any episodes of self-harm?	**n=143**	**n=243**	**n=196**	**n=582**
	6 (4.2)	42 (17.3)	29 (14.8)	77 (13.3)
Any incidents of fire-setting?	**n=142**	**n=242**	**n=196**	**n=580**
	1 (0.7)	4 (1.7)	1 (0.5)	6 (1.0)
Any incidents of sexual offending?	**n=141**	**n=243**	**n=195**	**n=579**
	4 (2.8)	4 (1.6)	0 (0.0)	8 (1.4)
For participants who have not moved on, are they considered ready to do so?	**n=94**	**n=95**	**n=72**	**n=261**
	8 (8.5)	29 (30.5)	5 (6.9)	42 (16.1)

Table 2. Results of the univariable and multivariable analyses of the primary outcome - move-on without subsequent placement breakdown

	Odds Ratio	**95% CI**	**P-value**
Primary Analysis - unadjusted			
Supported Housing vs Residential Care	5.64	(2.30, 13.84)	**<0.001**
Floating Outreach vs Residential Care	28.81	(11.53, 72.02)	**<0.001**
Floating Outreach vs Supported Housing	5.11	(2.47, 10.57)	**<0.001**
Primary Analysis - adjusted*			
Supported Housing vs Residential Care	2.90	(1.05, 8.04)	**0.04**
Floating Outreach vs Residential Care	7.96	(2.92, 21.69)	**<0.001**
Floating Outreach vs Supported Housing	2.74	(1.01, 7.41)	**<0.001**
Association of service-user variables and primary outcome			
Age (years)	0.99	(0.97, 1.01)	0.373
Psychosis	0.63	(0.36, 1.09)	0.101
Length of stay with service (months)	0.99	(0.98, 0.99)	**<0.001**
Social function (LSP total)	1.01	(0.99, 1.03)	0.498
Unmet needs (CANSAS total unmet)	0.81	(0.70, 0.94)	**0.006**
Challenging behaviours (SPRS total)	0.98	(0.84, 1.13)	0.739
Drug use (CADS problematic use)	0.83	(0.39, 1.79)	0.642
Self-neglect &/or vulnerable to exploitation	0.58	(0.35, 0.98)	**0.040**
Association of service variables and primary outcome			
QuIRC-SA Social Interface domain score	0.95	(0.91, 0.98)	**0.001**
QuIRC-SA Human Rights domain score	1.09	(1.02, 1.16)	**0.007**
QuIRC-SA Recovery-Based Practice domain score	1.04	(1.00, 1.08)	**0.054**

All models fitted using xtmelogit with a random intercept for service and fixed effect for area and service type

*adjusted for QuIRC-SA domains (Social Interface, Human Rights, Recovery-Based Practice), participant age, whether the participant had psychosis, length of stay with service in months, LSP total at baseline, CANSAS unmet needs at baseline, SPRS total at baseline, drug use assessed by CADs at baseline, self-neglect and/or vulnerability to exploitation.

Table 3. Service use and costs at 30-month follow-up.

Service	Residential care (n=141)			Supported housing (n=242)			Floating outreach (n=193)		
	N (%) using services	Mean (SD) contacts by users	Mean (SD) cost (£s)	N (%) using services	Mean (SD) contacts by users	Mean (SD) cost (£s)	N (%) using services	Mean (SD) contacts by users	Mean (SD) cost (£s)
External staff									
Care coordinator	65 (46)	3.2 (3.4)	55 (106)	144 (60)	4.0 (3.6)	91 (131)	48 (25)	4.2 (4.7)	40 (113)
Psychiatrist	55 (39)	1.2 (0.4)	49 (67)	101 (42)	1.2 (0.5)	55 (76)	42 (22)	1.3 (0.7)	30 (67)
Other doctor	92 (65)	3.1 (2.6)	91 (131)	124 (51)	2.7 (2.9)	59 (105)	84 (44)	3.0 (3.1)	57 (108)
Psychologist	7 (5)	2.3 (1.9)	16 (87)	8 (3)	1.8 (0.5)	6 (37)	6 (3)	3.3 (2.2)	14 (93)
CMHN	23 (16)	2.7 (1.9)	16 (46)	43 (18)	5.1 (4.6)	32 (99)	21 (11)	3.9 (2.5)	15 (53)
OT	5 (4)	3.0 (1.9)	2 (14)	14 (6)	2.3 (2.9)	3 (19)	17 (9)	1.5 (0.6)	3 (10)
Social worker	14 (10)	1.9 (1.4)	7 (27)	18 (7)	2.4 (1.8)	7 (31)	10 (5)	3.9 (7.1)	8 (70)
Counsellor	2 (1)	7.0 (4.2)	2 (21)	3 (1)	6.7 (4.7)	2 (20)	5 (3)	8.8 (6.9)	3 (21)
Art therapist	7 (5)	6.7 (5.5)	20 (148)	5 (2)	11.0 (8.6)	10 (84)	5 (3)	6.6 (4.5)	8 (51)
Contact with supported accommodation staff									
Planned face-to-face session	98 (70)	12.2 (11.4)	240 (417)	144 (60)	16.6 (16.1)	344 (683)	81 (42)	22.8 (34.6)	445 (1470)
Group session	93 (66)	9.5 (11.4)	63 (91)	96 (40)	11.4 (11.4)	62 (172)	15 (8)	4.6 (6.8)	4 (24)
Personal care	41 (29)	70.1 (49.8)	849 (3356)	5 (2)	97.4 (51.6)	46 (395)	0 (0)	-	0 (0)
Total non-inpatient costs			**1434 (3501)**			**718 (906)**			**640 (1584)**
Inpatient care									
Psychiatric inpatient	27 (18)	176.3 (211.1)	11,376 (39,336)	60 (25)	126.0 (149.1)	10,816 (31,900)	23 (12)	122.3 (175.5)	5011 (24,763)
Physical inpatient	20 (14)	8.4 (7.3)	671 (2286)	41 (17)	13.8 (27.0)	1352 (7068)	23 (12)	10.7 (23.2)	729 (4963)
Total inpatient costs			**12,046 (39,356)**			**12,169 (32,281)**			**5739 (25,144)**

Table 4. Mean (SD) costs by achievement of primary outcome

	Residential care		Supported housing		Floating outreach	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**
Non-inpatient care	398 (317)	1552 (3676)	590 (713)	801 (1005)	240 (687)	1517 (2432)
Inpatient care	0 (0)	13,426 (41,339)	4754 (12,955)	16,978 (39,433)	1537 (7747)	14,407 (41,458)

Note: costs in 2013/14 £s

References

1. National Statistics. Community Care Statistics. Supported Residents (Adults), England. London; 2006.
2. Department of Community and Local Government. Research into the effectiveness of floating support services for the Supporting People programme. Final Report. London; 2006.
3. Mcpherson P, Krotofil J, Killaspy H. Mental health supported accommodation services: a systematic review of mental health and psychosocial outcomes. BMC Psychiatry. 2018;18(128).
4. Krotofil J, Mcpherson P, Killaspy H. Service user experiences of specialist mental health supported accommodation: A systematic review of qualitative studies and narrative synthesis. Heal Soc Care Community. 2018;26:787–800.
5. Chilvers R, Macdonald GM, Hayes A. Supportive housing for people with severe mental disorders. Cochrane Database Syst Rev 2006; 4: CD000453.
6. Stergiopoulos V, Gozdzik A, Misir V, Skosireva A, Connelly J, Sarang A, et al. Effectiveness of ousing first with intensive case management in an ethnically diverse sample of homeless adults with mental illness: a randomized controlled trial. PLoS One. 2015;10:e0130281.
7. Killaspy H, White S, Dowling S, Krotofil J, McPherson P, Sandhu S, et al. Adaptation of the Quality Indicator for Rehabilitative Care (QuIRC) for use in mental health supported accommodation services (QuIRC-SA). *BMC Psychiatry,* 2016;16:101.
8. Killaspy H, Priebe S, Bremner S, McCrone P, Dowling S, Harrison I, et al. Quality of life, autonomy, satisfaction, and costs associated with mental health supported accommodation services in England: a national survey. *The Lancet Psychiatry,* 2016; 3:1129-37.
9. Sandhu S, Priebe S, Leavey G, Krotofil J, Harrison I, McPherson P. et al. Intentions and Experiences of Effective Practice in Mental Health Specific Supported Accommodation Services: A Qualitative Interview Study. *BMC Health Services Research*, 2017; 17: 471.
10. Priebe S, Saidi M, Kennedy J, Glover G. How to select representative geographical areas in mental health service research. *Social Psychiatry and Psychiatric Epidemiology,* 2008; 43:1004-7.
11. Leff J, Szmidla A. Evaluation of a special rehabilitation programme for patients who are difficult to place. *Social Psychiatry and Psychiatric Epidemiology,* 2002;37:532-6.
12. Slade M, Phelan M, Thornicroft G, Parkman S. The Camberwell Assessment of Need (CAN): comparison of assessments by staff and patients of the needs of the severely mentally ill. *Social Psychiatry and Psychiatric Epidemiology*, 1996;31:109-13.
13. Drake, R.E., Mueser, K.T., and McHugo GJ. Clinician rating scales: Alcohol Use Scale (AUS), Drug Use Scale, (DUS) and Substance Abuse Treatment Scale (SATS). In: Sederer, L.I. & Dickey B, editor. Outcomes Assess. Clin. Pract. Baltimore: Williams & Wilkins; 1996.
14. Parker G, Rosen A, Emdur N, Hadzi-Pavlov D. The Life Skills Profile: psychometric properties of a measure assessing function and disability in schizophrenia. *Acta Psychiatrica Scandinavica,* 1991;83:145–52.
15. Priebe S, Huxley P, Knight S, Evans S. Application and Results of the Manchester Short Assessment of Quality of Life (Mansa). *International Journal of Social Psychiatry,* 1999;45:7-12.

16. Hatton C, Emerson E, Robertson J, Gregory N, Kessissoglou S, Walsh PN. The Resident Choice Scale: a measure to assess opportunities for self-determination in residential settings. *Journal of Intellectual Disability Research*, 2004;48:103-13.
17. Sandhu S, Killaspy H, Krotofil J, McPherson P, Harrison I, Dowling S. et al. Development and psychometric properties of the client's assessment of treatment scale for supported accommodation (CAT-SA). *BMC Psychiatry*, 2016;16:43.
18. Beecham, Jennifer and Knapp M. Costing psychiatric interventions. In: Thornicroft G, editor. Measuring Mental Health Needs. 2nd ed. London: Gaskell; 2001. p. 524.
19. StataCorp. Stata Statistical Software: Release 12. College Station, Texas: 2011, StataCorp LP.
20. Austin, P. An Introduction to Propensity Score Methods for Reducing the Effects of Confounding in Observational Studies. Multivariate Behavioral Research, 46:399–424, 2011
21. Killaspy, H., Marston, L., Green, N., Harrison, I., Lean, M., Holloway, F., Craig, T., Leavey, G., Arbuthnott, M., Koeser, L., McCrone, P., Omar, R., King, M. Clinical outcomes and costs for people with complex psychosis; a naturalistic prospective cohort study of mental health rehabilitation service-users in England. *BMC Psychiatry*, 2016; 16:95.
22. Tanzman B. An Overview of Surveys of Mental Health Consumers' Preferences for Housing and Support Services. *Psychiatric Services*, 1993;44:450-5.
23. Joint Commissioning Panel for mental Health. Guidance for commissioners of rehabilitation services for people with complex mental health needs. London: Royal College of Psychiatrists Publications, 2012 (revised 2016).