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Predictors of quality of care in mental health supported accommodation services in England: a multiple regression modelling study

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| Abstract: | <p>Abstract</p> <p>Background</p> <p>Specialist mental health supported accommodation services are a key component to a graduated level of care from hospital to independently living in the community for people with complex, longer term mental health problems. However, they come at a high cost and there has been a lack of research on the quality of these services. The QuEST (Quality and Effectiveness of Supported tenancies) study, a five-year programme of research funded by the National Institute for Health Research, aimed to address this. It included the development of the first standardised quality assessment tool for supported accommodation services, the QuIRC-SA (Quality Indicator for Rehabilitative Care – Supported Accommodation). Using data collected from the QuIRC-SA, we aimed to identify potential service characteristics that were associated with quality of care.</p> <p>Methods</p> <p>Data collected from QuIRC-SAs with 150 individual services in England (28 residential care, 87 supported housing and 35 floating outreach) from four different sources were analysed using multiple regression modelling to investigate associations between service characteristics (local authority area index score, total beds/spaces, staffing intensity, percentage of male service users and service user ability) and areas of quality of care (Living Environment, Therapeutic Environment, Treatments and Interventions, Self-Management and Autonomy, Social Interface, Human Rights and Recovery Based Practice).</p> <p>Results</p> <p>The local authority area in which the service is located, the service size (number of beds/places) and the usual expected length of stay were each negatively associated with up to six of the seven QuIRC-SA domains. Staffing intensity was positively associated with two domains (Therapeutic Environment and Treatments and Interventions) and negatively associated with one (Human Rights). The percentage of male service users was positively associated with one domain (Treatments and Interventions) and service user ability was not associated with any of the domains.</p> <p>Conclusions</p> <p>This study identified service characteristics associated with quality of care in specialist mental health supported accommodation services that can be used in the design and specification of services.</p> |
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| Response to Reviewers: | <p>Dear Editor,</p> <p>Thank you for the further comments and suggestions on our manuscript, 'Predictors of quality of care in mental health supported accommodation services in England: a multiple regression modelling study' (BPSY-D-18-00235). We greatly appreciate the time of the editors and reviewers, and feel we have been able to improve the paper again because of their ideas.</p> <p>We have resubmitted a revised and cleaned manuscript as requested. Please see the editor comments and [authors' responses] below.</p> <p>Best wishes, Christian Dalton-Locke</p> <p>1 - Research involving human subjects (including human material or human data) that is reported in the manuscript must have been performed with the approval of an appropriate ethics committee. Research carried out on humans must be in compliance with the Helsinki Declaration (http://www.wma.net/en/30publications/10policies/b3/index.html). A statement to this effect must appear in the appropriate Declaration subsection of the manuscript, including the name of the body which gave approval, with a reference number where appropriate.</p> <p>If the need for ethics approval were waived, then please clearly state this, including the name of the ethics committee that provided the exemption, together with the reasons for the waiver, or a reference to the relevant legislation.</p> <p>[From BMC Editorial Policies: "In accordance with BioMed Central editorial policies and formatting guidelines, all submissions to BMC Psychiatry must have a Declarations section...Where a mandatory section is not relevant to your study design or article type, for example, if your manuscript does not contain any individual persons data, please write "Not applicable" in these sections."</p> <p>Our paper did not use any data on individual persons. We have therefore left the relevant sub-sections to 'Declarations' as "Not applicable". However, if the editors wish, we are happy to change to the following:</p> <p>Ethics approval and consent to participate The study used secondary data collected from service managers regarding their service. Service managers consented to completing the QuIRC-SA and no data regarding individuals was used. The data was originally collected for the purpose of the QuEST project (www.ucl.ac.uk/quest), which received ethical approval from Harrow Research Ethics Committee (reference 12/LO/2009) and North West - Liverpool Central Research Ethics Committee (15/NW/0252).</p> <p>Consent for publication Service managers that provided the data about their services provided informed consent for their data to be used in other future studies and publications.]</p> <p>2 - For all research involving human subjects, informed consent to participate in the study should be obtained from participants (or their parent or guardian in the case of children under 16) and a statement to this effect should appear in the 'Ethics approval and consent to participate' section of the Declarations including whether the consent was written. When reporting on such studies, individual patient data should not be made available unless consent for publication has also been obtained.</p> <p>If the need for informed consent has been waived by an IRB or is deemed unnecessary according to national regulations, please clearly state this with details, including the name of the Board or a reference to the relevant legislation in the 'Ethics</p> |

approval and consent to participate' section of the Declarations.

[See above, point 1.]

3 - Please specify if this is a service evaluation.

[This is a research study, not a service evaluation. The type of study is stated in the title (see page 1, lines 1-2), in the Abstract (see page 2, lines 31-31) and the stated study aim in the Backgrounds section (see page 6, lines 46-47).]

4 - Please include your tables in the main manuscript at the end of the document and not as separate files in the file inventory. Please check that the numbering is correct and in order.

[Done, numbering corrected.]

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[Done.]

7 - The analyses are appropriate.

Although the authors decided to transform the variables, the interpretation of coefficients are OK.

One suggestion to the authors would be to present the coefficients for the non-transformed rate variables reduce confusion.

If not, then table 5 may be separated in two to present models with standardized and non-transformed variables so readers will not confuse interpretation of coefficients (even though there is a note on bottom of table).

The authors could add that the data for rate variables were transformed / why this was done.

[Text describing table 4 and title of table (corrected from table 5), has been changed to more clearly (see page 10, lines 224-227). We have also changed the table so that is includes non-transformed rates.]

21 **Abstract**

22 Background

23 Specialist mental health supported accommodation services are a key component to a graduated
24 level of care from hospital to independently living in the community for people with complex, longer
25 term mental health problems. However, they come at a high cost and there has been a lack of
26 research on the quality of these services. The QuEST (Quality and Effectiveness of Supported
27 tenancies) study, a five-year programme of research funded by the National Institute for Health
28 Research, aimed to address this. It included the development of the first standardised quality
29 assessment tool for supported accommodation services, the QuIRC-SA (Quality Indicator for
30 Rehabilitative Care – Supported Accommodation). Using data collected from the QuIRC-SA, we
31 aimed to identify potential service characteristics that were associated with quality of care.

32 Methods

33 Data collected from QuIRC-SAs with 150 individual services in England (28 residential care, 87
34 supported housing and 35 floating outreach) from four different sources were analysed using
35 multiple regression modelling to investigate associations between service characteristics (local
36 authority area index score, total beds/spaces, staffing intensity, percentage of male service users
37 and service user ability) and areas of quality of care (Living Environment, Therapeutic Environment,
38 Treatments and Interventions, Self-Management and Autonomy, Social Interface, Human Rights and
39 Recovery Based Practice).

40 Results

41 The local authority area in which the service is located, the service size (number of beds/places) and
42 the usual expected length of stay were each negatively associated with up to six of the seven QuIRC-
43 SA domains. Staffing intensity was positively associated with two domains (Therapeutic Environment
44 and Treatments and Interventions) and negatively associated with one (Human Rights). The

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2 45 percentage of male service users was positively associated with one domain (Treatments and
3 Interventions) and service user ability was not associated with any of the domains.
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5 47 Conclusions
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8 48 This study identified service characteristics associated with quality of care in specialist mental health
9 supported accommodation services that can be used in the design and specification of services.
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14 50 **Keywords**
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17 51 Mental health, supported accommodation, quality assessment, quality of care, predictors of quality,
18 multiple regression
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65 **Background**

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3 66 Specialist mental health supported accommodation services support an estimated 60,000 people in
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5 67 England[1, 2] and form an essential component of the whole-system care pathway for people with
6
7 68 complex, longer term mental health problems[3]. They provide a graduated level of support for
8
9 69 people discharged from hospital and are usually found in countries which have gone through a
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12 70 process of deinstitutionalisation i.e. the closure of asylums and development of community care.
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16 71 In England, these services can be classified into three main types[4]: (1) residential care homes,
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18 72 which are staffed 24 hours per-day, provide day-to-day necessities such as meals and medication
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20 73 administration, and are usually not time-limited; (2) supported housing services, which provide time-
21
22 74 limited tenancies with shared or self-contained flats with staff on-site up to 24 hours per-day; and
23
24 75 (3) floating outreach services, which provide visiting (off-site) support to service users in permanent
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26 76 (not time-limited) tenancies. Most service users in residential care and supported housing have a
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28 77 diagnosis of psychosis compared to around half of those using floating outreach (the remainder have
29
30 78 common mental disorders such as depression or anxiety). Service users in residential care have the
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32 79 highest level of needs followed by supported housing and floating outreach[3].
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38 80 Despite the large number of people using mental health supported accommodation services and the
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40 81 associated costs, these services have been under researched. The Quality and Effectiveness of
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42 82 Supported Tenancies for people with mental health problems project (QuEST), a five-year research
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44 83 programme that commenced in 2012 funded by the National Institute for Health Research (NIHR)
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46 84 (Application RP-PG-0610-10097), aimed to address this evidence gap. It included: the adaptation of a
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48 85 standardised quality assessment tool (the Quality Indicator for Rehabilitative Care – QuIRC) for use
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50 86 in supported accommodation services; a national survey of supported accommodation services and
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52 87 their service users across England[3]; a naturalistic, prospective cohort study investigating 30-month
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54 88 outcomes for service users; and a feasibility study to assess whether it is possible to carry out a large
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89 scale randomised control trial comparing two supported accommodation models (supported
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90 housing and floating outreach).

91 The QuIRC was developed to assess the quality of care in psychiatric and social care facilities
92 for adults with longer term mental health problems across Europe and its development has
93 been described elsewhere[5]. In summary, its content was derived from triangulation of the
94 results of a systematic literature review[6], international Delphi exercise[7] and review of
95 care standards in each of ten participating European countries. Item scores are collated to
96 assess seven domains of care: the Living (built) Environment; the Treatments and
97 Interventions provided; the Therapeutic Environment (culture of the unit); the promotion of
98 Self-management and Autonomy; the promotion of Social Interface with the community
99 and family/friends; the protection of Human Rights; the implementation of Recovery Based
100 Practice. Examples of questions and the domains they score on are presented in box 1.
101 Some questions score on more than one domain, for example, question ‘Roughly what
102 percentage of your residents/service users will be assisted to vote in the next political
103 election?’ scores for Social Interface, Human Rights and Recovery Based Practice.

104
105 *Box 1 here*
106

107 The QuIRC has good inter-rater reliability[5] and the domain scores derived are positively
108 associated with service users’ experiences of care[8]. It is available as a web based
109 application (www.quirc.eu) in the ten languages of the countries that participated in its
110 development. Results are presented in a printable report showing the unit’s performance on
111 each domain as a percentage on a “spider web” diagram, which also shows the average
112 performance for similar units in the same country.

113
114 The QuIRC was adapted for supported accommodation services (QuIRC-SA) through an
115 iterative process of consultation with relevant stakeholders in England during the QuEST
116 Study and its psychometric properties assessed[9]. Specifically, focus groups were carried
117 out with staff from the three main types of supported accommodation service and three
118 expert panels were consulted (two comprised individuals with lived experience of supported
119 accommodation services and one comprised senior professionals and policy makers with

120 expertise in supported accommodation) to suggest appropriate amendments. The adapted
121 tool has good psychometric properties [9]. . The QuIRC-SA comprises the same seven domains as
122 the original QuIRC but floating outreach services are not assessed on the Living Environment domain
123 as staff visit service users in their own homes (the service does not provide the building)..

124

125 The QuIRC has been used in national and international studies investigating longer term mental

126 health services [7,8] which have found quality of services to be positively associated with

127 geographic location (urban/rural) and smaller, mixed sex units with an expected maximum length of

128 stay and where there is a range of disability amongst service users.

129 The QuIRC-SA was used in the QuEST programme during the national survey of supported

130 accommodation carried out in 2013-14[3]. This involved 87 services (22 residential care, 35

131 supported housing, 30 floating outreach) randomly selected from 14 nationally representative areas

132 across England. Supported housing services scored higher than residential care and floating outreach

133 on six of the seven QuIRC-SA domains and floating outreach scored highest on the human rights

134 domain.

135 In 2016, the QuIRC-SA was also completed with four supported housing service managers during the

136 feasibility study component of the QuEST programme, and with 80 supported housing services as

137 part of a national survey of staff morale being undertaken by the QuEST team. It was also completed

138 with managers of 54 supported accommodation services in the London boroughs of Camden and

139 Islington as part of a local audit in 2016 (11 residential care, 34 supported housing, nine floating

140 outreach).

141 We aimed to use these four sources of QuIRC-SA data to investigate service characteristics

142 associated with quality of care in mental health supported accommodation services in England.

143 **Method**

144 *Sample*

145 A total of 195 QuIRC-SAs were completed for 150 specialist mental health supported
146 accommodation services across England between October 2013 and January 2017. Where a service
147 had completed the QuIRC-SA more than once (45 services), only the most recently completed
148 QuIRC-SA was retained for the current analysis. The final sample comprised 28 residential care, 87
149 supported housing and 35 floating outreach services. Table 1 shows the data sources for this study.

150

151 *Table 1 here*

152

153 *Data analysis*

154 The sample of 150 services provided 80% power to estimate the association of six service
155 characteristics with each of the seven QuIRC-SA domain scores with a small to medium effect size (of
156 0.35) at a significance level of 0.7%[10]. This reduced significance level accounts for the multiple
157 hypothesis testing conducted (seven regression models, one for each domain of the QuIRC-SA).

158 The following six service characteristics were investigated for their association with domain scores
159 and entered as independent variables into multiple linear regression models using Stata 14: (1) local
160 authority area rank index score for the location of the service. This is a sampling index developed
161 previously by Priebe and colleagues[11]used to sample the geographical regions across England from
162 where the supported accommodation services were recruited for the national survey conducted
163 during the QuEST study[3]. It provides a spread of scores on local authority areas on factors that
164 influence mental health supported accommodation provision (mental health morbidity, social
165 deprivation, degree of urbanisation, provision of community mental health care, provision of
166 supported accommodation, mental health care spend per capita and housing demand); (2) service
167 size (total number of service user beds/places per service); (3) staffing intensity (total full-time-
168 equivalent (FTE) staff divided by total number of service user beds/places); (4) usual expected length

169 of stay; (5) service user sex ratio (total number of males divided by total number of occupied
170 beds/places) and (6) service user ability (number of current service users 'generally able to do very
171 little without assistance' divided by the number of service users 'generally able to do some things
172 without assistance' plus the number of service users 'generally able to most things without
173 assistance').

174 Staffing intensity withstanding, these characteristics were selected as they have previously been
175 shown to be associated with quality of care in inpatient mental health rehabilitation services[12, 13].
176 We included staffing intensity as we were aware this varies considerably between different types of
177 supported accommodation services. We used the local authority area rank index[11] score rather
178 than the previously used urban/rural dichotomous variable[12] as it provided a more comprehensive
179 composite score of factors relating to location, including urban/rural setting. The other five variables
180 are descriptive items collected during the completion of the QuIRC-SA (they do not contribute to any
181 of the domain scores). These six variables were tested for multicollinearity and found not to be
182 highly correlated.

183 All seven QuIRC-SA domain scores were normally distributed and were separately analysed as
184 dependent variables using multiple linear regression models (thus creating seven models).
185 Parameter estimates of the linear regression models were computed using robust clustered
186 standard errors, with service type as the cluster variable (residential care, supported housing,
187 floating outreach). Changes in domain scores per one unit increase for service variables with
188 continuous data and their 95% confidence intervals (estimated using bootstrapping) are presented
189 (local authority area index score, total beds/places and expected usual length of stay). For service
190 variables that are ratios (staffing intensity, service user sex and service user ability), we present
191 change in the domain score for one standard deviation (SD) increase in service variable.

192 **Results**

193 *Missing data*

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3 194 Having an expected usual length of stay was missing for 13 of the 150 completed QuIRC-SAs (12
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5 195 residential care and 1 supported housing services). It was assumed that this was most likely to be
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8 196 due to the service not having an expectation of service users moving on and thus no usual expected
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10 197 length of stay. Therefore, these missing values were replaced with the maximum value for this
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13 198 variable (20 years) prior to any analysis.

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16 199 *Service characteristics*

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19 200 The total number of beds/places per service ranged from 3 to 80 with floating outreach tending to
20
21 201 have larger services (mean 23 places) and supported housing having the fewest places per service
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23 202 (mean 11). Residential care services had the highest staff to client ratio (0.72), and floating outreach
24
25 203 the lowest (0.17). The mean length of stay was longest in residential care services (mean 12.32
26
27 204 years) and lowest in floating outreach (2.83 years). The percentage of beds/places occupied by male
28
29 205 service users was similar for residential care (70%) and supported housing (71%), and slightly lower
30
31 206 for floating outreach (59%). Seven (24%) residential care and 19 (22%) supported housing services
32
33 207 only accepted male service users. As expected, residential care services had a much higher
34
35 208 proportion of residents able to do very little without assistance (28%), compared to supported
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37 209 housing (11%) and floating outreach (12%) services. Table 3 shows the service characteristics.
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47 211 *Table 2 here*

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53 213 *Service quality (QuIRC-SA domain scores)*

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56 214 Supported housing scored higher than residential care on all seven of the QuIRC-SA domains, and
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58 215 higher than floating outreach on six of the domains. Floating outreach scored 88% on the Social

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216 Interface domain, the highest domain score by service type. On average (mean), the Social Interface
217 domain was also the highest scoring out of all the domains across the service types (81%), and
218 Human Rights the lowest (52%). Table 3 shows the mean and standard deviation of each QuIRC-SA
219 domain score by service type and across services.

220
221 *Table 3 here*

222
223 *Associations between service quality (QuIRC-SA domain scores) and service characteristics*
224 Table 4 shows the estimated change in QuIRC-SA domain score per one unit increase in the service
225 variable. Where the service variable is a ratio (staffing intensity, service user gender ratio and service
226 user ability), the change in domain score per one SD increase in the service variable is also
227 presented. Associations between service variables and domain scores with p values less than 0.05
228 are described below.

229
230 *Table 4 here*

231
232 *Living Environment*

233 For this domain there were no ratings available for floating outreach services and therefore analysis
234 was based on 115 rather than 150 services. The mean Living Environment domain score across all
235 services was 78% (residential care 77%, supported housing 78%). Each one point increment in the
236 local authority area index score was associated with a reduction in the Living Environment score of

237 2.3 percentage points. With each additional year of usual expected length of stay, the Living

238 Environment domain score decreased by 0.2 percentage points (95% CI: -0.4 to -0.0).

239 *Therapeutic Environment*

240 The mean Therapeutic Environment domain score across all services was 60% (residential care 57%,

241 supported housing 61%, floating outreach 59%). Each one point increment in the local authority area

242 index score was associated with a reduction in the Therapeutic Environment score of 1.8 percentage

243 points. Each additional bed/place was associated with a decrease in the Therapeutic Environment

244 domain score of 0.1 percentage points (95% CI: -0.1 to 0.0). An increase in the staff to service user

245 ratio of 0.3 (one SD) was associated with an increase of 0.5 percentage points in the Therapeutic

246 Environment domain score (95% CI: 0.3 to 0.7). With each additional year of usual expected length

247 of stay, was associated with a decrease in the Therapeutic Environment domain score of 0.4

248 percentage points (95% CI: -0.5 to -0.3).

249 *Treatments and Interventions*

250 The mean Treatments and Interventions domain score across all services was 67% (residential care

251 63%, supported housing 69%, floating outreach 66%). Each additional bed or place per service was

252 associated with a reduction in this domain score of 0.1 percentage points (95% CI: -0.2 to -0.1). Each

253 increase in the staff to service user ratio of 0.3 (one standard deviation) was associated with an

254 increase in the Treatments and Interventions domain score of 2.0 percentage points (95% CI: 3.9 to

255 8.1). With each additional year of usual expected length of stay was associated with a decrease in

256 the Treatments and Interventions domain score of 0.1 percentage points (95% CI: -0.2 to 0.0). An

257 increase of 0.2 (one SD) in the ratio of male service users to places was associated with an increase

258 in the Treatments and Interventions domain score of 1.4 percentage points (95% CI: 0.2 to 2.6).

259 *Self-Management and Autonomy*

1 260 The mean Self-Management and Autonomy domain score across all services was 54% (residential
2 261 care 51%, supported housing 55%, floating outreach 53%). Each additional year of usual expected
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4 262 length of stay was associated with a decrease in this domain score of 0.4 percentage points (95% CI -
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7 263 0.8 to -0.1).

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10 264 *Social Interface*

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13 265 The mean Social Interface domain score across all services was 81% (residential care 76%, supported
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15 266 housing 80%, floating outreach 88%). Each additional year of usual expected length of stay was
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18 267 associated with a decrease in this domain score of 0.3 percentage points (95% CI: -0.4 to -0.2).

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21 268 *Human Rights*

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25 269 The mean Human Rights domain score across all services was 52% (residential care 53%, supported
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27 270 housing 53%, floating outreach 48%). Each one point increment in the local authority area index
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29 271 score was associated with a reduction in the Human Rights domain score of 2.2 percentage points.
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32 272 An increase in the staff to service user ratio of 0.3 (one SD) was associated with a decrease in this
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34 273 domain score of 2.0 percentage points (95% CI: -3.5 to -0.6). An increase in the ratio of male service
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36 274 users to places of 0.2 (one SD) was associated with a reduction in the Human Rights domain score of
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39 275 0.6 percentage points (95% CI: -1.2 to 0.0).

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42 276 *Recovery Based Practice*

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45 277 The mean Recovery Based Practice domain score across all services was 67% (residential care 61%,
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47 278 supported housing 69%, floating outreach 66%). Each one point increment in the local authority area
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50 279 index score was associated with a reduction in this domain score of 2.0 percentage points. Each
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52 280 additional bed/place per service was associated with a reduction in this domain score of 0.1
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55 281 percentage points (95% CI: -0.2 to 0.0) and each additional year of usual expected length of stay was
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57 282 associated with a reduction of 0.7 percentage points (95% CI: -0.8 to -0.6).

283 Resident ability was not associated with any of the QuIRC-SA domains.

284 **Discussion**

285 Supported accommodation is a key component of community mental health care for service users
286 with more complex needs. Identification of service characteristics that are associated with better
287 quality care is of obvious importance. The QuIRC-SA is a standardised quality assessment measure
288 with good inter-rater reliability across a range of different service types.

289 Six of the seven service characteristics we investigated were associated with one or more of the
290 QuIRC-SA domain scores; local authority area index score, service size (number of beds/places),
291 proportion of male service users, staffing intensity, and the expected usual length of stay. The latter
292 variable was negatively associated with six of the seven QuIRC-SA domains. The Local Authority
293 index had the most influence on domain scores, with a one point increment being associated with a
294 reduction of up to 2.3% in four of the QuIRC-SA domains. This multi-dimensional index includes
295 markers of demand (urbanicity, psychiatric morbidity and housing) and investment (spend on mental
296 health and supply of community based services). Salisbury and colleagues recently established the
297 association between the amount spent on mental health in a geographic area and the quality of
298 longer term care[14]. Our results appear to corroborate this at the local level, suggesting that local
299 investment needs to respond to local demands to ensure adequate quality of care is provided to
300 people with longer term and more severe mental health problems living in supported
301 accommodation.

302 Staffing intensity was positively associated with two domains (Therapeutic Environment, Treatments
303 and Interventions), and negatively associated with one of the domains (Human Rights). This is
304 consistent with findings by Sandhu and colleagues[15], where adequate staffing was considered by
305 staff and service users to be key to facilitating recovery. The negative association we found between
306 this variable and Human Rights could perhaps reflect services with higher staffing having a more

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307 restrictive approach to supporting service users with more complex needs. In supported housing
308 services in Canada, authoritarian staff management structures were found to have the least positive
309 impact on services users where a “democratic, shared decision-making style” (p.1256) of staffing
310 was preferred[16]. Additionally, Nelson and colleagues[17] report lower levels of staffing
311 encouraged increased engagement with service users.

312 Increasing service size was negatively associated with Therapeutic Environment, Treatment and
313 Interventions and Recovery Based Practice domain scores. This finding concurs with previous
314 research[6, 13], suggesting that larger services tend to be more institutional and less able to offer an
315 individualised, rehabilitative approach.

316 Our results on the proportion of male service users per service differs somewhat from a previous
317 study showing a negative association between the percentage of male service users in an inpatient
318 rehabilitation unit and quality[12]. We found that having a higher proportion of male service users
319 was negatively associated with the Human Rights domain score but positively associated with the
320 Treatments and Interventions domain score. This could be an artefact in that many male only
321 supported accommodation services cater for service users who have a forensic history, offering
322 specialist treatments (such as substance misuse interventions) in an environment which is
323 necessarily more rule bound than other services since service users are often subject to legal
324 restrictions and conditions associated with being permitted to live in the community.

325 We found no association between service user ability and quality of care. This concurs with findings
326 from a national survey of inpatient mental health rehabilitation services[12]. This is important as
327 service user ability can sometimes be cited by staff as a reason for being unable to deliver a high
328 quality service.

329 *Strengths and limitations*

1 330 The data analysed in this study were collected using a specialist, standardised service quality
2 331 assessment tool for mental health supported accommodation services that has been shown to have
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4 332 good psychometric properties[9]. We used multilevel modelling for our data analysis to take account
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7 333 of clustering at the service type level. We agreed the variables that we would investigate for their
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9 334 association with quality of care prior to carrying out our analyses, choosing these on the basis of
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11 335 previous research. In addition, our sample size was adequate for our analyses. The sample included
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14 336 more supported housing services than the other two service types, in keeping with national
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16 337 provision[3]. However, our analyses used data collected for other purposes and not all the services
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18 338 were randomly selected (87 were randomly selected for the QuEST national survey). Furthermore,
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21 339 we only included services based in England and therefore the findings cannot be generalised to
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24 340 supported accommodation services in other countries.

25 26 27 341 *Implications*

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30 342 Whilst under resourcing of supported accommodation services can only be addressed at a political
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32 343 level, we have identified other factors that are associated with better service quality that could be
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34 344 incorporated into service planning. Having a shorter expected length of stay was associated with
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37 345 better quality services, presumably because it facilitates a more focused approach to individual goal
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39 346 setting with service users that can assist their recovery and help them gain the necessary skills to
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42 347 move on successfully to more independent accommodation (reflected in the Self-Management and
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44 348 Autonomy QuIRC-SA domain). This creates a positive and hopeful culture reflected in the
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46 349 Therapeutic Environment and Recovery Based Practice domains, and is not limited by general service
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49 350 user ability. However, adequate staffing is clearly essential to achieve this, a factor related to the size
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52 351 of the service. Larger service size was negatively associated with three of the seven QuIRC-SA
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54 352 domains. A balance therefore has to be struck between providing adequate staffing and a service
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56 353 size that is economically viable. Finally, services with higher male service user ratios fared better on
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2 354 quality, but single sex services will continue to be needed due to the challenges posed by individuals
3 355 with certain types of risk.
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5 356 **Conclusions**
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9 357 This study has helped to identify general service structures and characteristics that can drive up
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11 358 quality of care in supported accommodation services. Services should adopt an expected usual
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13 359 length of stay and be of a moderate size with adequate staffing to support service users to gain and
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15 360 regain skills for more independent living. However, the feasibility of such changes are likely to be
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17 361 constrained by resources and the nature of services; an expected usual length of stay and move-on
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19 362 to more independent settings might be less realistic for services to implement that provide high
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21 363 levels of support.
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26 364 **Abbreviations**
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29 365 FTE: full-time-equivalent; NIHR: National Institute for Health Research; QuEST: Quality and
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31 366 Effectiveness of Supported Tenancies for people with mental health problems; QuIRC: Quality
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33 367 Indicator for Rehabilitative Care; QuIRC-SA: Quality Indicator for Rehabilitative Care-Supported
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35 368 Accommodation; SD: standard deviation.
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377 **Declarations**

378 *Ethics approval and consent to participate*

379 The study used secondary data collected from service managers regarding their service. Service
380 managers consented to completing the QuIRC-SA and no data regarding individuals was used. The
381 data was originally collected for the purpose of the QuEST project (www.ucl.ac.uk/quest), which
382 received ethical approval from ().

383 *Consent for publication*

384 Service managers that provided the data about their services provided informed consent for their
385 data to be used in other future studies and publications.

386 *Availability of data and material*

387 All data supporting our findings will be shared on request.

388 *Competing interests*

389 The authors declare that they have no competing interests.

390 *Funding*

391 No funding.

392 *Authors' contributions*

393 CDL, RT, HK and SW conceived and designed the study. The data were analysed by CDL & RT under
394 the supervision of SW. CDL and RT made the first draft of the article which was reviewed and revised
395 by HK and SW. All authors reviewed and amended the draft and agreed the final version for
396 publication (CDL, RT, HK and SW).

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3
4 400 and collected the data; and the DEMoBinc team (Development of a European Measure of Best
5
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7 401 Practice) for their development of the QuIRC.
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419 **References**

- 420 1. Department for Communities and Local Government. Research into the effectiveness of floating
421 support services for the Supporting People programme. 2008.
- 422 2. National Statistics. Community Care Statistics, Supported residents (adults) - England, 2007.
423 London; 2007.
- 424 3. Killaspy H, Priebe S, Bremner S, McCrone P, Dowling S, Harrison I, et al. Quality of life, autonomy,
425 satisfaction, and costs associated with mental health supported accommodation services in England:
426 a national survey. *The Lancet Psychiatry*. 2016;3:1129–37.
- 427 4. Priebe S, Saidi M, Want A, Mangalore R, Knapp M. Housing services for people with mental
428 disorders in England: Patient characteristics, care provision and costs. *Soc Psychiatry Psychiatr*
429 *Epidemiol*. 2009;44:805–14.
- 430 5. Killaspy H, White S, Wright C, Taylor TL, Turton P, Schützwohl M, et al. The development of the
431 Quality Indicator for Rehabilitative Care (QuIRC): A measure of best practice for facilities for people
432 with longer term mental health problems. *BMC Psychiatry*. 2011;11.
- 433 6. Taylor TL, Killaspy H, Wright C, Turton P, White S, Kallert TW, et al. A systematic review of the
434 international published literature relating to quality of institutional care for people with longer term
435 mental health problems. *BMC Psychiatry*. 2009;9:55.
- 436 7. Turton P, Wright C, White S, Killaspy H. Promoting Recovery in Long-Term Institutional Mental
437 Health Care: An International Delphi Study. *Psychiatr Serv*. 2010.
- 438 8. Killaspy H, White S, Wright C, Taylor TL, Turton P, Kallert T, et al. Quality of longer term mental
439 health facilities in Europe: Validation of the quality indicator for rehabilitative care against service
440 users' views. *PLoS ONE*. 2012.
- 441 9. Killaspy H, White S, Dowling S, Krotofil J, McPherson P, Sandhu S, et al. Adaptation of the Quality

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442 Indicator for Rehabilitative Care (QuIRC) for use in mental health supported accommodation services
443 (QuIRC-SA). *BMC Psychiatry*. 2016;16.

444 10. Dunlap WP, Xin X, Myers L. Computing aspects of power for multiple regression. *Behav Res*
445 *Methods, Instruments, Comput*. 2004;36:695–701.

446 11. Priebe S, Saidi M, Kennedy J, Glover G. How to select representative geographical areas in mental
447 health service research: a method to combine different selection criteria. *Soc Psychiatry Psychiatr*
448 *Epidemiol*. 2008;43:1004–7. doi:10.1007/s00127-008-0383-4.

449 12. Killaspy H, Marston L, Omar RZ, Green N, Harrison I, Lean M, et al. Service quality and clinical
450 outcomes: an example from mental health rehabilitation services in England. *Br J Psychiatry*.
451 2013;202:28–34. doi:10.1192/bjp.bp.112.114421.

452 13. Killaspy H, Cardoso G, White S, Wright C, Caldas de Almeida JM, Turton P, et al. Quality of care
453 and its determinants in longer term mental health facilities across Europe; a cross-sectional analysis.
454 *BMC Psychiatry*. 2016;16.

455 14. Salisbury TT, Killaspy H, King M. Relationship between national mental health expenditure and
456 quality of care in longer-term psychiatric and social care facilities in Europe: cross-sectional study. *Br*
457 *J Psychiatry*. 2017;211:45–9. doi:10.1192/bjp.bp.116.186213.

458 15. Sandhu S, Priebe S, Leavey G, Harrison I, Krotofil J, McPherson P, et al. Intentions and
459 experiences of effective practice in mental health specific supported accommodation services: A
460 qualitative interview study. *BMC Health Serv Res*. 2017;17.

461 16. McCarthy J, Nelson G. An evaluation of supportive housing for current and former psychiatric
462 patients. *Hosp Community Psychiatry*. 1991;42:1254–6.
463 <http://search.proquest.com/docview/618111957?accountid=14512%5Cnhttp://ucelinks.cdlib.org:88>
464 [88/sfx_local?url_ver=Z39.88-](http://search.proquest.com/docview/618111957?accountid=14512%5Cnhttp://ucelinks.cdlib.org:88/sfx_local?url_ver=Z39.88-)

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465 2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ%3Apsycinfo&atitle=A
466 n+evaluation+of+supportive+housing+for+cur.
467 17. Nelson G, Hall GB, Walsh-Bowers R. A comparative evaluation of supportive apartments, group
468 homes, and board-and-care homes for psychiatric consumer/survivors. J Community Psychol.
469 1997;25:167–88. doi:10.1002/(SICI)1520-6629(199703)25:2<167::AID-JCOP6>3.0.CO;2-V.
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Box 1 QuIRC-SA domains and example questions*

| Domain | Example question 1 [and response options/format] | Example question 2 [and response options] |
|------------------------------|---|--|
| Living Environment | What do you think of the general condition of the building outside? (Select one) [Very poor condition / Quite poor condition / Acceptable condition / Quite good condition / Very good condition] | What do you think of the general décor indoors? (Select one) [Very poor condition / Quite poor condition / Acceptable condition / Quite good condition / Very good condition] |
| Therapeutic Environment | How hopeful are you that the majority of your current residents/service users will show improvement in their general functioning over the next 2 years? [Number] | We know it is not always possible to keep staff up to date with new developments but we are interested in knowing what types of training the staff in your project/service have received. In which of the following areas have your staff received FORMAL training in the last 12 months and how many staff members received this training? [Yes / No to several areas in mental health (e.g. communication skills, mental health awareness), and number of staff that received training] |
| Treatments and Interventions | How many of your residents/service users regularly take part in programmed activities in the project/service? [Number] | Do you use individual care-plans for all residents/service users? [Yes / No] |

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| Self-Management and Autonomy | Do residents/service users who have legal capacity have full control over their finances? [Yes / No] | Is there a process for supporting service users to manage their own medication? [Yes / No] |
| Social Interface | How many of your residents/service users have regular contact with non-service user friends? [Number] | Roughly what percentage of your residents/service users will be assisted to vote in the next political election? [Percentage] |
| Human Rights | Are patient's/residents' records kept in a locked environment (e.g. locked staff office, locked cabinet, password-protected computer)? [Yes / No] | Do you have a formal complaints procedure? [Yes / No] |

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Recovery
Based
Practice

In general, how would you say your project/service mostly aims to assist residents/service users? (Select one)
[To assist residents/service users to gain and regain skills to live more independently / To provide residents/service users with the care they need because of their disability / Both equally]

How often do you have meetings where staff and residents/service users discuss the running of the project/service? (Select one)
[Never / Every 7 to 12 months / Every 4 to 6 months / Every 2 to 3 months / Every 2 to 6 weeks / Weekly or more than weekly]

*Please note that some questions score on to more than one domain

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Table 1 Data sources and number of QuIRC-SAs completed and retained in the current analysis

| Data source | Residential care | | | Supported housing | | | Floating outreach | | | All services | | |
|---------------------|------------------|-----------------------------------|---------------------|-------------------|-----------------------------------|---------------------|-------------------|-----------------------------------|---------------------|--------------|-----------------------------------|---------------------|
| | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* |
| National survey | 22 | 5 | 17 | 6 | 5 | 1 | 31 | 5 | 26 | 59 | 5 | 44 |
| Staff morale survey | 0 | 0 | 0 | 79 | 0 | 79 | 0 | 0 | 0 | 79 | 0 | 79 |
| Local audit | 11 | 0 | 11 | 4 | 0 | 4 | 9 | 0 | 9 | 24 | 0 | 24 |
| Feasibility trial | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 3 |
| TOTAL | 33 | 5 | 28 | 92 | 5 | 87 | 40 | 5 | 35 | 165 | 5 | 150 |

*Where services completed more than one QuIRC-SA, only the most recently completed QuIRC-SA was retained for the regression models

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Table 2 Descriptive statistics of service variables, by type of service

| Service variable | Residential care | | | Supported housing | | | Floating outreach | | | All types | | |
|--|------------------|-------------|--------------|-------------------|-------------|--------------|-------------------|-------------|---------------|-----------|-------------|---------------|
| | N | Range | Mean (SD) | N | Range | Mean (SD) | N | Range | Mean (SD) | N | Range | Mean (SD) |
| Local authority area index score | 28 | -0.54, 1.78 | 0.91 (0.83) | 87 | -0.76, 1.96 | 0.90 (0.99) | 35 | -0.76, 1.78 | 0.62 (0.92) | 150 | -0.76, 1.96 | 0.84 (0.95) |
| Total beds/places | 28 | 7.00, 40.00 | 19.46 (7.59) | 87 | 3.00, 28.00 | 11.20 (5.20) | 35 | 5.00, 80.00 | 29.97 (22.90) | 150 | 3.00, 80.00 | 17.12 (14.35) |
| Staffing intensity (total staff FTE divided by total beds/places)* | 28 | 0.34, 2.25 | 0.72 (0.40) | 87 | 0.10, 1.61 | 0.45 (0.27) | 35 | 0.03, 0.97 | 0.17 (0.17) | 150 | 0.03, 2.25 | 0.43 (0.33) |
| Expected usual length of stay (years) | 28 | 2.00, 20.00 | 12.32 (7.82) | 87 | 1.00, 20.00 | 3.38 (3.43) | 35 | 1.00, 9.00 | 2.83 (2.16) | 150 | 1.00, 20.00 | 4.92 (5.63) |
| Service user sex ratio (percentage of male service users)* | 28 | 0.30, 1.00 | 0.70 (0.22) | 87 | 0.00, 1.00 | 0.71 (0.25) | 35 | 0.00, 0.90 | 0.59 (0.20) | 150 | 0.00, 1.00 | 0.68 (0.24) |
| Service user ability (percentage 'able to do very little')* | 28 | 0.00, 1.00 | 0.28 (0.30) | 87 | 0.00, 0.71 | 0.11 (0.18) | 35 | 0.00, 0.50 | 0.12 (0.16) | 150 | 0.00, 1.00 | 0.15 (0.21) |

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Table 3 QuIRC-SA domain scores, by service type

| QuIRC-SA domain | Residential care (n=28) | | Supported housing (n=87) | | Floating outreach (n=35) | | All types (n=150*) | |
|--------------------------------|-------------------------|-----------|--------------------------|-----------|--------------------------|-----------|--------------------|-----------|
| | Range | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) |
| Living Environment % | 54, 96 | 77 (10) | 62, 96 | 78 (8) | - | - | 54, 96 | 78 (8) |
| Therapeutic Environment % | 38, 72 | 57 (7) | 41, 77 | 61 (7) | 45, 71 | 59 (5) | 38, 77 | 60 (7) |
| Treatments and Interventions % | 32, 80 | 63 (11) | 54, 84 | 69 (7) | 58, 75 | 66 (4) | 32, 84 | 67 (7) |
| Self Management and Autonomy % | 30, 67 | 51 (9) | 28, 85 | 55 (12) | 38, 77 | 53 (9) | 28, 85 | 54 (11) |
| Social Interface % | 55, 96 | 76 (10) | 58, 92 | 80 (8) | 77, 97 | 88 (5) | 55, 97 | 81 (9) |
| Human Rights % | 39, 69 | 53 (7) | 36, 78 | 53 (8) | 35, 62 | 48 (6) | 35, 78 | 52 (8) |
| Recovery Based Practice % | 20, 86 | 61 (14) | 47, 87 | 69 (10) | 50, 77 | 66 (7) | 20, 87 | 67 (10) |

*Floating outreach services do not score for Living Environment, therefore 35 QuIRC-SAs are removed from the total sample of 150 for this domain

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Table 4 Change in domain score per one unit/SD* increase in service variable (95% confidence intervals) and p values, for each linear regression model (domain)

| Service variable | SD for ratio service variables* | Living Environment (n=115) | Therapeutic Environment (n=150) | Treatments and Interventions (n=150) | Self-Management and Auton. (n=150) | Social Interface (n=150) | Human Rights (n=150) | Recovery Based Practice (n=150) |
|--|---------------------------------|----------------------------|---------------------------------|--------------------------------------|------------------------------------|---------------------------|---------------------------|---------------------------------|
| Local authority area index score | - | -2.3 (-2.6, -2.0), <0.001 | -1.8 (-3.2, -0.5), 0.007 | -1.4 (-3.3, 0.5), 0.140 | -0.4 (-1.5, 0.7), 0.512 | -2.9 (-6.6, 0.7), 0.114 | -2.2 (-3.8, -0.6), 0.006 | -2.0 (-2.9, -1.2), <0.001 |
| Total beds/places | - | -0.0 (-0.4, 0.4), 0.908 | -0.1 (-0.1, 0.0), 0.001 | -0.1 (-0.2, -0.1), 0.001 | -0.1 (-0.2, 0.0), 0.072 | -0.1 (-0.3, 0.0), 0.052 | 0.0 (-0.3, 0.3), 0.996 | -0.1 (-0.2, 0.0), 0.043 |
| Staffing intensity (total staff FTE divided by total beds/places)* | - | -0.4 (-1.5, 0.7), 0.474 | 1.5 (0.8, 2.2), <0.001 | 6.0 (3.9, 8.1), <0.001 | 1.4 (-10.6, 7.8), 0.061 | -1.4 (-10.6, 7.8), 0.767 | -6.1 (-10.4, -1.8), 0.006 | 1.3 (-3.4, 6.0), 0.598 |
| | 0.3 | -0.1 (-0.5, 0.2), 0.474 | 0.5 (0.3, 0.7), <0.001 | 2.0 (1.3, 2.7), <0.001 | 0.5 (0.0, 0.9), 0.061 | -0.5 (-3.5, 2.6), 0.767 | -2.0 (-3.5, -0.6), 0.006 | 0.4 (-1.1, 2.0), 0.598 |
| Expected usual length of stay (years) | - | -0.2 (-0.4, 0.0), 0.017 | -0.4 (-0.5, -0.3), <0.001 | -0.1 (-0.2, 0.0), 0.019 | -0.4 (-0.8, -0.1), 0.019 | -0.3 (-0.4, -0.2), <0.001 | -0.3 (-0.6, 0.1), 0.151 | -0.7 (-0.8, -0.6), <0.001 |
| Service user sex ratio (percentage of male service users)* | - | -1.5 (-10.7, 7.8), 0.753 | 3.2 (-1.3, 7.7), 0.166 | 5.9 (1.0, 10.8), 0.018 | 3.9 (-0.7, 8.5), 0.098 | 5.0 (-0.2, 10.3), 0.061 | -2.5 (-5.0, 0.0), 0.046 | 4.6 (-4.3, 13.5), 0.308 |
| | 0.2 | -0.4 (-2.5, 1.8), 0.753 | 0.8 (-0.3, 1.8), 0.166 | 1.4 (0.2, 2.6), 0.018 | 0.9 (-0.2, 2.0), 0.098 | 1.2 (-0.1, 2.4), 0.061 | -0.6 (-1.2, 0.0), 0.046 | 1.1 (-1.0, 3.2), 0.308 |
| Service user ability | - | -0.1 (-2.0, 1.9), 0.942 | -1.5 (-7.0, 3.9), 0.583 | 1.0 (-8.3, 10.3), 0.83 | -3.7 (-14.2, 6.7), 0.485 | 5.1 (-5.8, 16.1), 0.357 | -1.4 (-8.2, 5.5), 0.691 | -5.5 (-13.1, 2.2), 0.160 |

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|--|-----|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|
| (percentage 'able to do very little')* | 0.2 | 0.0 (-0.4, 0.4), 0.942 | -0.3 (-1.5, 0.8), 0.583 | 0.2 (-1.8, 2.2), 0.833 | -0.8 (-3.0, 1.4), 0.485 | 1.1 (-1.2, 3.4), 0.357 | -0.3 (-1.8, 1.2), 0.691 | -1.2 (-2.8, 0.5), 0.160 |
|--|-----|---------------------------|----------------------------|---------------------------|----------------------------|---------------------------|----------------------------|----------------------------|

*For service variables that are ratios (staffing intensity, service user gender ratio and service user ability), the change in domain score per one SD increase in the service variable has also been included

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Box 1 QuIRC-SA domains and example questions*

| Domain | Example question 1 [and response options/format] |
|------------------------------|--|
| Living Environment | What do you think of the general condition of the building outside? (Select one) [Very poor condition / Quite poor condition / Acceptable condition / Quite good condition / Very good condition] |
| Therapeutic Environment | How hopeful are you that the majority of your current residents/service users will show improvement in their general functioning over the next 2 years? [Number] |
| Treatments and Interventions | How many of your residents/service users regularly take part in programmed activities in the project/service? [Number] |
| Self-Management and Autonomy | Do residents/service users who have legal capacity have full control over their finances? [Yes / No] |
| Social Interface | How many of your residents/service users have regular contact with non-service user friends? [Number] |
| Human Rights | Are patient's/residents' records kept in a locked environment (e.g. locked staff office, locked cabinet, password-protected computer)? [Yes / No] |

Recovery Based
Practice

In general, how would you say your project/service mostly aims to assist residents/service users? (Select one)
[To assist residents/service users to gain and regain skills to live more independently / To provide residents/service users with the care they need because of their disability / Both equally]

*Please note that some questions score on to more than one domain

Example question 2
[and response options]

What do you think of the general décor indoors? (Select one)
[Very poor condition / Quite poor condition / Acceptable condition / Quite good condition / Very good condition]

We know it is not always possible to keep staff up to date with new developments but we are interested in knowing what types of training the staff in your project/service have received. In which of the following areas have your staff received FORMAL training in the last 12 months and how many staff members received this training?
[Yes / No to several areas in mental health (e.g. communication skills, mental health awareness), and number of staff that received training]

Do you use individual care-plans for all residents/service users?
[Yes / No]

Is there a process for supporting service users to manage their own medication?
[Yes / No]

Roughly what percentage of your residents/service users will be assisted to vote in the next political election?
[Percentage]

Do you have a formal complaints procedure?
[Yes / No]

How often do you have meetings where staff and residents/service users discuss the running of the project/service? (Select one)

[Never / Every 7 to 12 months / Every 4 to 6 months / Every 2 to 3 months / Every 2 to 6 weeks / Weekly or more than weekly]

Table 1 Data sources and number of QuIRC-SAs completed and retained in the current analysis

| Data source | Residential care | | | Supported housing | | | Floating out | |
|---------------------|------------------|-----------------------------------|---------------------|-------------------|-----------------------------------|---------------------|--------------|-----------------------------------|
| | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* | N | Services completed > one QuIRC-SA |
| National survey | 22 | 5 | 17 | 6 | 5 | 1 | 31 | 5 |
| Staff morale survey | 0 | 0 | 0 | 79 | 0 | 79 | 0 | 0 |
| Local audit | 11 | 0 | 11 | 4 | 0 | 4 | 9 | 0 |
| Feasibility trial | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 0 |
| TOTAL | 33 | 5 | 28 | 92 | 5 | 87 | 40 | 5 |

*Where services completed more than one QuIRC-SA, only the most recently completed QuIRC-SA was

| reach | All services | | |
|---------------------|--------------|-----------------------------------|---------------------|
| QuIRC-SAs retained* | N | Services completed > one QuIRC-SA | QuIRC-SAs retained* |
| 26 | 59 | 5 | 44 |
| 0 | 79 | 0 | 79 |
| 9 | 24 | 0 | 24 |
| 0 | 3 | 0 | 3 |
| 35 | 165 | 5 | 150 |

retained for the regression models

Table 2 Descriptive statistics of service variables, by type of service

| Service variable | Residential care | | | Supported housing | | | Floating outreach | | | N |
|--|------------------|-------------|--------------|-------------------|-------------|--------------|-------------------|-------------|---------------|-----|
| | N | Range | Mean (SD) | N | Range | Mean (SD) | N | Range | Mean (SD) | |
| Local authority area index score | 28 | -0.54, 1.78 | 0.91 (0.83) | 87 | -0.76, 1.96 | 0.90 (0.99) | 35 | -0.76, 1.78 | 0.62 (0.92) | 150 |
| Total beds/places | 28 | 7.00, 40.00 | 19.46 (7.59) | 87 | 3.00, 28.00 | 11.20 (5.20) | 35 | 5.00, 80.00 | 29.97 (22.90) | 150 |
| Staffing intensity (total staff FTE divided by total beds/places)* | 28 | 0.34, 2.25 | 0.72 (0.40) | 87 | 0.10, 1.61 | 0.45 (0.27) | 35 | 0.03, 0.97 | 0.17 (0.17) | 150 |
| Expected usual length of stay (years) | 28 | 2.00, 20.00 | 12.32 (7.82) | 87 | 1.00, 20.00 | 3.38 (3.43) | 35 | 1.00, 9.00 | 2.83 (2.16) | 150 |
| Service user sex ratio (percentage of male service users)* | 28 | 0.30, 1.00 | 0.70 (0.22) | 87 | 0.00, 1.00 | 0.71 (0.25) | 35 | 0.00, 0.90 | 0.59 (0.20) | 150 |
| Service user ability (percentage 'able to do very little')* | 28 | 0.00, 1.00 | 0.28 (0.30) | 87 | 0.00, 0.71 | 0.11 (0.18) | 35 | 0.00, 0.50 | 0.12 (0.16) | 150 |

| All types | |
|-------------|---------------|
| Range | Mean (SD) |
| -0.76, 1.96 | 0.84 (0.95) |
| 3.00, 80.00 | 17.12 (14.35) |
| 0.03, 2.25 | 0.43 (0.33) |
| 1.00, 20.00 | 4.92 (5.63) |
| 0.00, 1.00 | 0.68 (0.24) |
| 0.00, 1.00 | 0.15 (0.21) |

Table 3 QuIRC-SA domain scores, by service type

| QuIRC-SA domain | Residential care (n=28) | | Supported housing (n=87) | | Floating outreach (n=35) | | All (n=150) |
|--------------------------------|----------------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|----------------|
| | Range | Mean (SD) | Range | Mean (SD) | Range | Mean (SD) | |
| Living Environment % | 54, 96 | 77 (10) | 62, 96 | 78 (8) | - | - | 54, 96 |
| Therapeutic Environment % | 38, 72 | 57 (7) | 41, 77 | 61 (7) | 45, 71 | 59 (5) | 38, 77 |
| Treatments and Interventions % | 32, 80 | 63 (11) | 54, 84 | 69 (7) | 58, 75 | 66 (4) | 32, 84 |
| Self Management and Autonomy % | 30, 67 | 51 (9) | 28, 85 | 55 (12) | 38, 77 | 53 (9) | 28, 85 |
| Social Interface % | 55, 96 | 76 (10) | 58, 92 | 80 (8) | 77, 97 | 88 (5) | 55, 97 |
| Human Rights % | 39, 69 | 53 (7) | 36, 78 | 53 (8) | 35, 62 | 48 (6) | 35, 78 |
| Recovery Based Practice % | 20, 86 | 61 (14) | 47, 87 | 69 (10) | 50, 77 | 66 (7) | 20, 87 |

*Floating outreach services do not score for Living Environment, therefore 35 QuIRC-SAs are removed from the total sample of 150 for this domain

types
(n=150*)
Mean (SD)

78 (8)

60 (7)

67 (7)

54 (11)

81 (9)

52 (8)

67 (10)

from the

Table 4 Change in domain score per one unit/SD* increase in service variable (95% confidence interval)

| Service variable | SD for ratio service variables* | Living Environment (n=115) | Therapeutic Environment (n=150) | Treatments and Interventions (n=150) |
|--|---------------------------------|----------------------------|---------------------------------|--------------------------------------|
| Local authority area index score | - | -2.3 (-2.6, -2.0), <0.001 | -1.8 (-3.2, -0.5), 0.007 | -1.4 (-3.3, 0.5), 0.140 |
| Total beds/places | - | -0.0 (-0.4, 0.4), 0.908 | -0.1 (-0.1, 0.0), 0.001 | -0.1 (-0.2, -0.1), 0.001 |
| Staffing intensity (total staff FTE divided by total beds/places)* | - | -0.4 (-1.5, 0.7), 0.474 | 1.5 (0.8, 2.2), <0.001 | 6.0 (3.9, 8.1), <0.001 |
| | 0.3 | -0.1 (-0.5, 0.2), 0.474 | 0.5 (0.3, 0.7), <0.001 | 2.0 (1.3, 2.7), <0.001 |
| Expected usual length of stay (years) | - | -0.2 (-0.4, 0.0), 0.017 | -0.4 (-0.5, -0.3), <0.001 | -0.1 (-0.2, 0.0), 0.019 |
| Service user sex ratio (percentage of male service users)* | - | -1.5 (-10.7, 7.8), 0.753 | 3.2 (-1.3, 7.7), 0.166 | 5.9 (1.0, 10.8), 0.018 |
| | 0.2 | -0.4 (-2.5, 1.8), 0.753 | 0.8 (-0.3, 1.8), 0.166 | 1.4 (0.2, 2.6), 0.018 |
| Service user ability (percentage 'able to do very little')* | - | -0.1 (-2.0, 1.9), 0.942 | -1.5 (-7.0, 3.9), 0.583 | 1.0 (-8.3, 10.3), 0.83 |
| | 0.2 | 0.0 (-0.4, 0.4), 0.942 | -0.3 (-1.5, 0.8), 0.583 | 0.2 (-1.8, 2.2), 0.833 |

*For service variables that are ratios (staffing intensity, service user gender ratio and service user ability variable has also been included)

tervals) and p values, for each linear regression model (domain)

| Self-Management and Auton. (n=150) | Social Interface (n=150) | Human Rights (n=150) | Recovery Based Practice (n=150) |
|------------------------------------|------------------------------|------------------------------|---------------------------------|
| -0.4 (-1.5, 0.7), 0.512 | -2.9 (-6.6, 0.7), 0.114 | -2.2 (-3.8, -0.6), 0.006 | -2.0 (-2.9, -1.2), <0.001 |
| -0.1 (-0.2, 0.0), 0.072 | -0.1 (-0.3, 0.0), 0.052 | 0.0 (-0.3, 0.3), 0.996 | -0.1 (-0.2, 0.0), 0.043 |
| 1.4 (-10.6, 7.8), 0.061 | -1.4 (-10.6, 7.8), 0.767 | -6.1 (-10.4, -1.8), 0.006 | 1.3 (-3.4, 6.0), 0.598 |
| 0.5 (0.0, 0.9), 0.061 | -0.5 (-3.5, 2.6), 0.767 | -2.0 (-3.5, -0.6), 0.006 | 0.4 (-1.1, 2.0), 0.598 |
| -0.4 (-0.8, -0.1), 0.019 | -0.3 (-0.4, -0.2), <0.001 | -0.3 (-0.6, 0.1), 0.151 | -0.7 (-0.8, -0.6), <0.001 |
| 3.9 (-0.7, 8.5), 0.098 | 5.0 (-0.2, 10.3), 0.061 | -2.5 (-5.0, 0.0), 0.046 | 4.6 (-4.3, 13.5), 0.308 |
| 0.9 (-0.2, 2.0), 0.098 | 1.2 (-0.1, 2.4), 0.061 | -0.6 (-1.2, 0.0), 0.046 | 1.1 (-1.0, 3.2), 0.308 |
| -3.7 (-14.2, 6.7), 0.485 | 5.1 (-5.8, 16.1), 0.357 | -1.4 (-8.2, 5.5), 0.691 | -5.5 (-13.1, 2.2), 0.160 |
| -0.8 (-3.0, 1.4), 0.485 | 1.1 (-1.2, 3.4), 0.357 | -0.3 (-1.8, 1.2), 0.691 | -1.2 (-2.8, 0.5), 0.160 |

r ability), the change in domain score per one SD increase in the service