ASSISTED LIVING FOR MENTALLY ILL - A SYSTEMATIC LITERATURE REVIEW AND ITS RECOMMENDATIONS

Joel Ketola* Medical Doctor, BSc in economics and business administration, corresponding author

Erfan Jahangiri* Medical Doctor, PhD student, co-author

Helinä Hakko Ph.D biostatistician

Pirkko Riipinen professor of psychiatry

Sami Räsänen professor of psychiatry

University Of Oulu, Research unit of Clinical Neurosciences, psychiatry

Oulu University Hospital, department of psychiatry (OYS)

Aapistie 5, 90220, Oulu, Finland

* These authors contributed equally to the manuscript.

ABSTRACT

Background: The reduction in psychiatric hospital beds in the past decades has created a need for assisted living (AL). Even though AL is widely used, studies on it are scarce.

Aims: To identify 1) study characteristics of the reviewed articles, 2) characteristics of inhabitants and characteristics of different types of AL, 3) financial costs in different types of AL, 4) the individual outcomes in AL inhabitants and quality of care.

Methods: A systematic literature review on AL for mentally ill focusing on inhabitant and AL features and their costs was conducted. Articles written in English from January 2000 to June of 2020, concerning adults were included. Simple Taxonomy of Supported Housing (STAX-SA) was applied and used for categorizing types of AL.

Results: 25 papers met our criteria. Majority of inhabitants were unemployed single male with psychotic disorders. Type of AL is mainly categorized according to staffing, provided support and housing arrangement. In UK ALs with moderate support (STAX-SA 2-3) had the best quality of care while ALs with low support (STAX-SA 4) the cheapest. Quality of care was better in small units with preset expected length of stay for inhabitants. Hospital treatment was significantly more expensive than any type of AL. Living in AL improved quality of life compared to hospital treatment, also psychiatrics symptoms were reduced.

Conclusion: There is an evident need for evidence-based studies in a longitudinal comprehensive manner that evaluates different AL types, function of the inhabitants and costs in respect to quality of AL and care and outcome.

Key words: Assisted Living, Supported Housing, Mental illness, Cost, Outcome

INTRODUCTION

Mental illnesses are a global health problem, and 10.7% of the population worldwide are estimated to have some psychiatric disorder. Of these, psychotic disorders represent the most difficult and deteriorating disorders with the estimated 12-month prevalence being 3.5% and, in schizophrenia this prevalence is reported to vary from 0.3 to 1% ([1-4]). Evidently people suffering from psychotic disorders need, and they use, a substantial number of services both in primary and specialized level healthcare, as well as social services.

For decades there has been a global shift from psychiatric inpatient treatment to outpatient care and active rehabilitation, including housing services. This has been a trend in Nordic countries, as well ([5,6]). The main goal of deinstitutionalization has been to participate people with mental disorder to the society and therewith improve human rights and quality of life (QoL). Knapp et. al (2010) has stated that deinstitutionalization has not generated cost savings but it has been cost effective when compared to hospital treatment ([7]). Globally, the reduction of hospital beds has had a major effect on people suffering from psychotic disorders since individuals have moved from asylums to the society ([8,9]).

Despite previously found potential for successful rehabilitation in long-lasting housing services ([10]), it is not feasible to rehabilitate all patients into independent living due to the chronic nature of psychotic disorders, including deficiencies in functioning. Therefore, the global deinstitutionalizing process has developed a need for assisted living (AL) as a desirable alternative for long term hospital care. In general AL includes different types of accommodation options, common factor being that an inhabitant is under supervision and support of staff with adequate professional qualifications. AL for mentally ill provide not only housing services, but also comprehensive rehabilitation services including social rehabilitation and social guidance. AL services may also include healthcare services ([11]).

AL services for mentally ill are conventionally organized to meet practical needs, but they are also expected to be rehabilitative for the inhabitants. However, the rehabilitative approaches in AL are mostly based on long time experience of practical work rather than on science. The scientific basis is rather weak for what type of rehabilitative approach might be optimal considering the characteristics of the inhabitants with mental disorder. Review studies are scarce on the matter. Cochrane review (2006) ([12]) did not find any randomised, or quasi-randomised trials for AL for mentally ill and stated that no intervention has been shown to be better than another, and efficacy of supported housing remains untested. The attempt to provide equal services in society and lack of scientific based evidence may result insufficient services for individuals. Individual characteristics of inhabitants living in AL should be noted when assessing the support needed to achieve not only equality, but also equity. For the development and future studies in inhabitant-point of view or service-point of view of inhabitants in AL, a comprehensive summary on the literature so far is truly needed.

AIMS

This systematic literature review on AL for mentally ill aims to:

1. study characteristics of the reviewed articles.

2. identify socio-demographics and clinical characteristics of inhabitants, and characteristics of different types of AL according to service type.

3. identify financial costs in different types of AL in relation to costs due to psychiatric treatment.

4. identify the individual outcomes in AL inhabitants and quality of care.

METHODS

A systematic literature review on studies focusing on AL for inhabitants with mental disorders was conducted. AL is used as an umbrella term for the purpose of this paper. AL was defined as a living arrangement where an inhabitant needs different kind of services due to the mental disorder, either onsite or outreach. Consisting of various terms such as sheltered, supported, residential housing or accommodation as well as independent forms of living with support such as floating outreach all regardless of length of stay.

Data sources

Multiple keyword search was used for the database search addressing housing (assisted and supported living, housing and accommodation), economics (economics and costs) and disorders (psychiatric and mental). Different types of MesH-keywords were used in the searches. At first the keywords (((housin*) OR assisted living) AND mental*) AND ill* were used in a preliminary PubMed search in January of 2020. Through this preliminary search other relevant keywords were found for narrowing the search for focused studies, as seen in Figure 1. Another database search was conducted in PubMed in February of 2020. The searches were completed with comparative searches from OvidOnline, Scopus and Google Scholar, in which no additional articles for this review were found. Also, the review article references were read manually to find relevant papers for the study, but none were suitable for this study. The last database search was conducted in May of 2020 with the same abovementioned search criteria.

Figure 1. Literature review with inclusions and exclusions.

Study selection

Liberati et al (2009) Prisma statement ([13]) was used to identify the potential studies for the systematic literature review and Stroup et al (2000) MOOSE principal ([14]) for quality assessment of the included studies (Appendix 1). We excluded review articles from MOOSE principal. The abstracts were read by writers (JK) and (EJ).

Inclusion criteria

All the studies that focused on AL for mentally ill, published after the year 2000 in English, regardless of the type of the publication, were included in this review. Year 2000 was selected as the cut-off year since not very many studies were found prior 2000, and we wanted to assess how this subject has been studied in the past 20 years.

Exclusion criteria

Studies focusing on AL for primarily mentally retarded (7 studies) or physically disabled (1 study), elderly (41 studies) or homelessness (6 studies) and primarily focusing on substance abuse (2 studies) were excluded. Excluded were also publications regarding under aged subjects (under the age of 18 years) (7 studies).

Data extraction

The data extraction from each article included in the current review were made by using structured data collection procedure developed for this study. The data was collected by two of the authors (EJ and JK). The following information were collected from each article:

- Study related characteristics: Title, writer, country of origin, aims, study design, follow up, methodology, measurements and key findings
- Inhabitant characteristics: Participants (number of persons), age (in years), gender, psychiatric diagnoses substance abuse, number of psychiatric hospitalizations, possible forensic history of a patient, education (years or degree), marital status (single, married, never married) and employment (had paid job). The psychiatric diagnoses were classified into four categories: Schizophrenia, Psychoses, Mood Disorders and other psychiatric disorders.
- Characteristics of AL: Type of AL according to Simple Taxonomy for Supported Accomodation (STAX-SA) classification ([15]), services provided (staff and on-site interventions) and previous living arrangements (independent accommodation, AL, homeless, hospital).

- Financial characteristics: Costs (calculated to express average costs per patient per week) related to AL, psychiatric hospitalization, psychotropic medication and outreach services (psychiatric health services not provided in hospital or AL).
- Individual outcomes (hospitalizations, symptoms, quality of life, function, substance abuse) and Quality of care in AL.

The reviewed papers did not present any global taxonomy for AL types. A modified version of STAX-SA, introduced by McPherson et al (2018) ([15]), was developed for the purpose of this review, to enable comparison of different AL settings. STAX-SA is a categorial classification system for reporting key features of an AL unit. STAX-SA introduces five types of AL which are graded through four domains. The domains are staffing location, level of support, emphasis on move -on and physical setting. For example, a congregate unit with 24/h staff and no emphasis to move on is categorized as STAX-SA Type 1. In this review STAX-SA Types 2 and 3 were combined due to incoherent data in the reviewed studies. There was no need for the use of Type 5 a matter, which McPherson et al (2018) have addressed in their publication, as well. In our modified version the service levels are named STAX-SA followed by a number referring to the Type: STAX-SA 4 meaning the lowest level of support in AL, STAX-SA 2-3 with moderate support and STAX-SA 1 with the highest level of support in AL. The outcome measures of the reviewed papers were classified into four categories depending on the primary objective of the study. The categories were Function, Quality of Life and Quality of Care (QoC), Symptoms and Substance abuse, which followed the classification used in the study of Miettunen et al (2009) ([16]). The costs were transformed into costs per week by assuming 52 weeks in annum.

Results

The search provided 25 relevant studies published between 2000-2020 (June). Eight (32%) studies were from England ([12,17-23]) five (20%) studies from the USA ([8,24-27]), five (20%) studies from Australia ([28-32]) two (8%) from Norway ([33,34]), one (4%) study each from Sweden ([35]), Japan ([31]) Czech Republic ([36]) and India ([37]) also one multinational study from the EU ([38]) as seen in Figure 1 and Table 1. Table 1 includes all the main findings of the focus aspects of the studies found in this literature review. Inhabitant characteristics were addressed in 17 (68%) articles ([19-23,25,27-35,37,39]) (Table 2), Housing characteristics were described in 22 (88%) studies ([17-23,25-31,33-40]) (Table 2), Costs were evaluated in 9 (36%) studies ([18,19,23,27,30,31,35,36,39]) (Table 3). Quality measurements of AL was evaluated in 4 (16%) ([18-20,38]) studies (Table 4) and AL Outcomes was measured in 8 (32%) Studies ([25,27-31,37,39]) (Table 4).

Inhabitant demographics and Housing characteristics

In the articles reviewed, majority of inhabitants were men (50-95%), but in one study all the subjects were women ([37]). Mean age varied from 31.7-77. Diagnoses were reported in 15 (60%) studies ([19,20,23,25,27-31,33-

[35,37,39,41]) and schizophrenia (SCH) was the most common diagnosis representing 49-100% of inhabitants. SCH was reported to be more common in heavily supported ALs (STAX-SA 1), compared to less supportive ALs (STAX-SA 2-3, STAX-SA 4) where inhabitants had higher level of mood or neurotic disorders ([19,23]). In only six (24%) studies ([19,23,25,27,28,30]) substance abuse was reported. Up to 38% of the inhabitants had current problematic substance use ([27]). Thirteen (52%) studies reported previous hospitalization in different categories ([18,19,21,23,25,27-29,31,32,35,37,39]). In five studies forensic history were investigated and among those 13-29% had a previous criminal history ([18,19,23,28,39]). Only Killaspy's (2015) study showed 19% of subjects being a victim of crime in the previous year ([19]). Five studies (20%) reported habitants' education ([25,28,33,37,39]). In these studies, up to 55% had completed primary school education. Only six (24%) studies reported marital status, proportion of never married or cohabited was 14-79.5% ([19,22,23,28,37,39]). Eight (32%) studies reported employment and less than 20% of the inhabitants were employed ([19,23,25,28,33-35,39]). 21 (84%) studies reported AL level ([17-23,25,27-31,33-39,41]) and three (12%) of them used the same data ([17-19]). Only two (8%) studies reported previous living arrangements: only 42% came from independent accommodation ([19,21]).

The terminology for the type of AL was heterogeneous and varied between studies and countries. All AL types were re-classified into categories according to STAX-SA classification, for the purposes of this review. Services offered varied greatly and taxonomy did not describe how living and offered support was arranged in practice. Ratio of staff to service users in AL varied greatly depending on AL type. In Europe the mean ratio was 0.7 varying from 0.1 to 9.1 but study did not use any AL classification ([38]). In UK STAX-SA 1 units had highest ratio of 0.43, and STAX-SA 4 units lowest of 0.17 ([20]). Also, mean number of inhabitants varied according to the AL type, range being 3-80 in UK and even to 120 in Bulgaria ([20,38]). In UK the average number of inhabitants in the units belonging to STAX-SA 1 category was 14.4-19.5 and in those belonging to STAX-SA 4 category 23-33.8 inhabitants ([20,23,38]). Sandhu reported mean work experience in AL, 6.5 years ranging from 3 months to 22 years ([21]). Otherwise, staff was rarely mentioned, and on average 63% of units had psychiatrist and 49% had clinical psychologist in Europe ([38]). Mean length of stay in units in STAX-SA 1 category was 3.7-12.3 years and in STAX-SA 4 2.1-2.8 years ([19,21]).

Cost related to AL

Nine (36%) articles had reported costs relating to AL (Table 3) ([18,19,23,27,30,31,35,36,39]). Total costs were highest in units regarded to belong to STAX-SA 1 category, and lowest in STAX-SA 4, STAX-SA 2-3 category being in between ([18,19,23,36]). Housing itself was the most expensive part forming up to 75% of the total costs ([35,36]). Drug costs make only 4% of the total costs ([35,36]).

Indirect cost of AL was evaluated in one study, being 43% of the total costs ([35]). Total savings from the use of AL were estimated only in 2 studies from Australia ([30,39]).

Quality and Outcomes of AL

Individual outcomes of AL inhabitants were reported in eight studies ([25,27-31,37,39]) and, in general, individuals had better quality of life and managed to live in AL although support was lower than in hospital and was even reduced during living in AL ([28-31]). Functioning of AL inhabitants measured with the need of assistance or BASIS-32 was reported to improve or at least stay the same after individuals were discharged from psychiatric hospital to AL ([28,30,39]). Chan et al (2007) compared hospital group to heavily supported ALs (STAX-SA 1) and reported better functioning in social situations in STAX-SA 1 ([31]). Chan (2007) also reported that psychiatric symptoms improved more in STAX-SA 1 category units ([31]). Padmakar (2020) also reported that individuals had less psychiatric symptoms after being discharged from hospital ([37]). Number of hospitalizations was lower if an individual was living in moderate support ALs (STAX-SA 2-3) compared to living independently ([27]). Measured quality of life was improved after individuals were discharged to AL ([28,37,39]). Among different AL types, service quality was rated highest for those regarded to be STAX-SA 2-3 units ([19,20]). Small units and units where inhabitants had a shorter length of stay had better QoC, as did the units that had both men and women or units where the inhabitants showed better function ([19,20,38]). AL quality was reported to be better if AL was planned in advance and therefore had expected length of stay ([20,38]). These AL units had defined goals for inhabitants and promoted active rehabilitation and therefore pursued individuals moving to less supported AL ([19,20]). Only one study compared hospital treatment to AL resulting in less psychiatric symptoms, better QoL and better social functioning for the AL group ([31]).

Discussion

The use of AL for mentally ill has constantly increased for decades as a desired alternative for long term custodial psychiatric care, the development process being thus quite long. But, because the research-based knowledge on the subject is sparse, the content and service provided in AL are still based mainly on long term practice of the work with AL inhabitants, rather than on analyzed data. In answer to current need for the development of more cost effective, equal, and higher quality AL, up-to-date research-based knowledge on AL and their inhabitants would be of great importance, and a thorough aggregation of current knowledge is needed for future directions. This systematic review forms a comprehensive summary on literature of AL from the service-point-of-view and from the inhabitant-point-of-view, so far.

This systematic review confirmed the lack of the studies on AL for mentally ill in general, but especially the lack of the studies focusing on the optimal way to arrange AL both from the service-point-of-view and from the inhabitant-point-of-view. This review also revealed the methodological heterogeneity between the studies. Among quality assessed studies, only 29% reported external validity making no adjustment of the findings relevant ([18,20,22,30,33,36]) and furthermore only 43% studies reported selection bias ([18,20,22,27,28,30,33,35,38]). The studies varied in in size from less than 20 subjects ([32,34,37]) to more than 16 000

subjects ([22]). 48% of the studies were cross-sectional ([17-23,25,27,32,34,36]) which raises causality issues evenmore. Follow up was reported in only 28% of the studies ([18,28,30,31,35,37]) and Padmakar et al (2020) the follow up was only six months. Overall, this systematic review revealed methodological heterogeneity between the reviewed studies. These studies were still descriptive in nature a topic, which was addressed previously by Fakhoury et al 2002 and again in a Cochrane review 2006 ([12,42]).

Most (56%) of the reviewed studies reported diagnostic distribution of inhabitants, but only in 15% of these studies the diagnoses were reported according to DSM or ICD-criteria ([31,33,35]). Costs associated with AL were reported only in 40% of the studies and comparisons of different types of cost were rarely done. AL costs were compared to costs of hospitalization only in 16% of the studies ([30,35,36,39]) and 16% of studies compared costs between STAX-SA 1, STAX-SA 2-3 and STAX-SA 4 units ([18,19,23,36]). Majority of the studies focusing on the quality of AL has been studied by reporting outcomes of participants of an ongoing program instead of naturalistic settings ([28-30,39]). Only one structured tool Quality Indicator for Rehabilitative Care**-** Supported Accomodation (QuIRC-SA) for measuring specifically AL quality was found, used mostly in the UK ([17]). Only one of 27 studies was outside the western scope, therefore limiting the information remained only on how AL is arranged outside western countries ([37]).

Inhabitant characteristics

AL inhabitants of the studies reviewed were typically 40-50 years old males with low level of education, unemployed and unmarried. This is in line with previous studies ([19,30,43]) showing that low level of education and single marital status refers to early onset of, as well as disabling and chronic nature of the psychiatric disorders. Great majority of the inhabitants had a psychotic disorder, mainly schizophrenia (SCH) ([19,23,25,27,28,30,31,33,35,39]). Less than half on inhabitants were reported of having previous independent living arrangements ([19,21]), which also indicates poor primary skills in daily living ([23]). This is understandable, because SCH is the most severe psychotic disorder with early onset, especially among men, which may also explain why men represented the majority in the studies. Individuals with psychotic disorders, especially schizophrenia, use mental health services for the most part of their lifespan. In Hobbs' (2002) study the average time spent in hospital was 31% of the individuals' total lifespan, but the average proportion of life spent in hospital since first admission was 65% ([28]). It is notable that relatively young age implicates not only the importance, but also the potential for rehabilitation of inhabitants in AL. This emphasizes the role of AL with active outreach services in attempt to reduce hospital treatments.

Shorter expected length of stay and aim for inhabitant to move was associated with better quality of AL ([20,38]). However, there may be a risk that the inhabitant loses current social relations and is forced to form new social relations when moving onward to less supportive AL or independent housing ([23,31,33-35]). This might clarify that there should be a focus in not only in rehabilitation of different negative symptoms, but also in maintaining and re-establishing past social relations for inhabitant in AL to ensure the continuum in

social relations beyond different AL units. Individual's coping style was reported more important predictor in social inclusion than diagnoses ([25]), which implicates the need for personal rehabilitation programs instead of just focusing on diagnose.

It is also noted that inhabitants in less supportive ALs tend to use more substances ([19,23,25,27]). Reasons behind this is yet to be understood, even though having concomitant substance dependence is one of the obvious reasons, but lack of support may also play a major role. This emphasizes the need of better knowledge to recognize, diagnose and treat substance abuse in AL.

AL characteristics

Globally, AL terminology and classification of AL differs. Thus, the name of AL used in one context does not give a proper insight to the support what this particular AL provides ([44]). Generally, in UK and in some other countries like in Finland, there are three levels of AL for mentally ill, depending on the staff availability ([19,23]). Both staff intensity and number of inhabitants depend on type of AL. However only part of studies reported staff intensity per inhabitant ([20,33,38]), or how many inhabitants there were living in AL ([19-21,31,33,34,38]). Although it is a crucial indicator for how much support and rehabilitative actions can be offered.

It is known by practice, supported by Priebe's (2009), that majority of ALs have been working without proper patient inclusion criteria ([23]). Essential criteria should include individuals' concrete needs in order to succeed in AL. This is assessed by interviews, risk assessment, or trial periods, and some ALs exclude inhabitants based on physical disabilities, forensic history, or substance abuse ([19,23]).

ALs offer wide range of services, firstly the housing, but also support with function with daily living and mental health problems. In STAX-SA 1 and STAX-SA 2-3 category units staff may make great part of cooking's and support with daily activities like cleaning and clothing ([23,28,31]). Only 3 of the studies reported services ALs offered and number of meetings with staff or general practitioners/psychiatrist or other health care professionals ([18,19,23]). Only Sandhu's (2017) reported staff's work experience ([21]). According to our current review, the level of education and work experience of AL staff remains thus unknown.

Living arrangements were rarely described, however in UK 62% of all ALs had own bedrooms without on-suite facilities and 5% shared bedrooms with other inhabitants, rest 33% had own bedrooms and private bathrooms ([23]). Some ALs have shared spaces like kitchen, dining areas or shared accommodation rooms for socializing ([28,34]). Area of apartments and common spaces may vary between different ALs, only Chan's (2007) mentioned minimum requirements for living area for inhabitants in units categorized to be STAX-SA 1. It is unclear how living arrangements should be arranged in order to gain the best quality of life and rehabilitation for inhabitants. However, it seems that small housing units are preferrable, also housing should be affordable and accessible with meaningful activities ([20,38]). Inhabitants living in AL hope supportive attitude from staff and voluntary nature of supportive services ([32,37]). Good crisis services and

possibility to consult mental health professionals are also important ([21,27,31,32]). It also seems that AL and outreach services should be arranged from multiple organizations ([8]). Furthermore, AL should promote independence of the inhabitant through voluntary services and inclusion in the decision making.

We do know through this review, and from practice, that the staff in AL have a significant role in the inhabitant's life. They form a key element in social relations and the inhabitants are dependent on the staff, especially the most vulnerable ones in STAX-SA 1 units. Much is expected from AL units, but they may not have adequate tools and knowledge to address the issues ([18,19]).

Costs

The key finding among ten studies reporting costs was that the costs for hospitalization were reported to be 2-3 times higher compared to STAX-SA 1 units, which were the most expensive type of AL ([18,28,31]). This is reasonable since hospitals have heavy organizations and offers higher support and supervision than AL. Lindström et al. (2007) reported that in Sweden during 5 years of de-hospitalization total costs for psychiatric hospitals and ALs combined were reduced 13% ([35]). Also, while absolute costs were lower, the relative part of hospitalization cost shrank while the proportion of AL costs rose ([35]). We do not know whether this shift of costs caused additional costs or burden for families.

While costs for psychiatric rehabilitation is cheaper in AL, Chan et al's (2007) brought an insight on costs of physical conditions which were 10-fold in the STAX-SA 1 unit when compared to hospital group ([31]). This might indicate that mentally ill have been shifted into cheaper asylums at the expense of physical conditions of the inhabitants. The staff in AL may not have the proper knowledge, education or means to intervene adequately to problems regarding physical conditions. Mean age in Chan's (2007) study was over 60 years, so we do not know what the case for younger individuals is, but considering the mental illnesses' chronic nature, there might be a prolonged lack of proper prevention of physical diseases. This is globally a notable concern, because the life expectancy has risen for people and therefore mentally ill in AL will probably reside longer in ALs and have more physical problems which might be more severe than mental problems per se.

When comparing the costs between different AL types it is important to understand that the costs form from three main aspects: Housing itself, services provided to the inhabitant and the staffing in AL. Housing services make the most of the total costs, up to 87% ([23]), this includes all costs in AL, meaning that services outside AL are rarely used. Priebe (2009) speculated that this might indicate the lack of proper treatment and support since they form such a small proportion of costs ([23]). Out of the housing services the face-to-face contact with AL staff and personal care make the highest costs ([18,19]). The difference of mean costs between STAX-SA 1 units, where staff is around 24/7 and STAX-SA 4 units, where inhabitants live individually and where staff doesn't visit daily, was reported to be 2-8-fold ([18,19,23]).

We do not know yet what type of AL is the most cost-effective and which have the best outcome for individuals, whilst few researchers in the UK have speculated that STAX-SA 2-3 units might be the best alternative when quality of care and life and total costs are taken into consideration ([19,20]). There is also a variation among the same types of ALs, possibly caused by different level of support services and staff intensity. Because in STAX-SA 4 category, the costs were calculated without the knowledge of rental fees or the cost of daily necessities, we speculate that while STAX-SA 4 category was probably the cheapest option, the difference of costs between STAX-SA 1 and STAX-SA 4 categories might be smaller than expected. However, there are cost reductions to be gained with lower AL. Thus, emphasis on moving on to a lower support AL is reasonable also from an economic perspective, the level where living with less support is possible, if individual's functioning has improved.

Costs caused by the loss of productivity, increased sick leaves, early death rates, social isolation and other indirect or intangible costs are difficult to determine. Lindström et al (2007) estimated that productivity losses were 43 % of the costs ([35]). Most likely there is no difference in these costs among different types of AL since unemployment levels among inhabitants is high. Drug costs are only 4% of the total costs ([35,36]). Therefore, there seems to be no reason to put effort to cut medical therapy. On the other hand, the optimized drug treatment might cut total cost if more independent life is achieved. There have been studies comparing oral medicines to long-acting injected antipsychotic drugs and it seems that antipsychotics may reduce the number of hospitalizations and costs ([45,46]).

Quality and Outcome of AL

One study described the development of a measuring tool for AL quality ([17]) (QuIRC-SA) and four studies focused on measuring the quality of AL with QuIRC-SA ([18-20,38]). Quality of care was found to be better if AL was small sized and inhabitants were mixed sex ([19,20]). Quality was reported to be better if AL had shorter length of stay, as well, but the inhabitant should be involved in the decision making when moving ([20,38]). STAX-SA 2-3 units, where staff was around daily but not 24/7 was seen to offer the best quality although research on the subject is scarce ([19,20]). STAX-SA 4 units, where inhabitants live independently had the lowest quality of life ([19]). Studies focusing on AL quality using QuIRC-SA are UK or Europe based and while it seems that STAX-SA 2-3 category has the best quality of care and quality of life, it is unclear what kind of interventions should be made in order to acquire the best care ([19,20]). QuIRC-SA was published in 2016 ([17]) implicating that while there has been ALs for a several decades, assessing specifically the quality of AL is quite a new thing. As far as we know, there are no other specific tools for assessing quality of AL for mentally ill. However, there were also studies assessing outcomes of AL and quality with other regularly used measures like number of hospitalizations, quality of life, psychiatric symptoms, functioning, psychiatric medical therapy, substance use and received support. Studies of AL quality are somewhat limited and there is a need for further studies concerning the matter. The quality of care is highly important from the inhabitant point of view because residing in AL is prolonged. It is assumable that better quality in general results in

better outcomes, but It also remains unknown what interventions are the most important ones from the inhabitant point of view.

The studies in USA and Australia have focused on different supportive projects for mentally ill focusing on costs, function, symptoms and hospitalizations. While these projects have been successful, they may not represent how AL is arranged in practice. Mostly de-hospitalization had positive impacts in these aspects or at least did not worsen the situation, which is a success itself, since support and costs in any type of AL are always lower than in hospital. During follow-up periods, levels of medication and assistance in daily management have reduced, although there have not been significant changes in function for the inhabitants in AL ([27,28,30,31,39]). Number of hospital admissions were lower when AL was combined with other support, and inhabitants who previously were not able to be discharged from hospital, managed to live in AL ([27,29-31]).

In our opinion, the studies focusing on AL lack paying attention to individuals' personal factors. Only inhabitant's function and its impact on AL quality was assessed with mixed results ([19,20]). It is not enough just to assess the quality of AL and changes in support and treatment after de-hospitalization, but impact of inhabitants' personal factors should be taken into consideration as well. It is known that some individuals need more support than others, but we do not know the best interventions for those who do not succeed in gaining more independent way of living. On the other hand, some individuals just can't move from STAX-SA 1 to lower support.

We did not find any studies where same types of ALs were compared, suggesting that this type of study design is lacking globally. Comparing same types of ALs could give an insight to preferable ways to support inhabitants, who need the same level of daily support. In general AL is a preferable option compared to hospitalization for rehabilitation for mentally ill. It remains unclear what are the factors that have the most impact on good outcomes, when considering the inhabitants' demographics, diagnoses and coping strategies.

Implications for further investigation

Several studies emphasized that future studies should focus on effectiveness of different AL, as well as cost effectiveness ([19,20,23,34,38]). Previous researchers have suggested a longitudinal randomized trial ([26]). Also, individual aspects should be taken into consideration while they may be an explanatory factor when considering the different results on inhabitants' function and need for support ([24,27]). Studies also suggested that future studies should pay attention to understanding broader social factors and social support that influence inhabitants' life ([22,25]). In our opinion effectiveness and cost-effectiveness follow the same path. The path should focus in recognizing the inhabitant capable of moving forward in the AL system towards independent living. Therefore, we also suggest a longitudinal research design which should be randomized

and single blinded with a minimum of 24 months. The research outcomes should focus on individual outcomes, AL outcomes and economic data. Measurements for individuals should include function, QoL, service use, inhospitalization, psychopharmacological therapy, misbehavior in AL and death. AL measurements should include type of AL, quality, staff, length of stay, offered support and drop-out. Economic data should include the type of AL, service providers business model, medication, service use and inhospitalization. STAX-SA is a plausible taxonomy for comparison of different types of AL in terms of services and support provided. The strengths of STAX-SA are categorization, addressing quality and function of AL units by type and therefore makes comparison of services globally coherent. However, the STAX-SA is a rather new tool in the field of AL research and needs to be tested furthermore.

Limitations

Included were only studies written in English and therefore some of the studies on AL might have been missed. Although some studies had an English abstract, the main article was in other language, so the data was not useable for this review. However, this subject has not been studied very much and therefore it is unlikely that several significant studies would have been missed. Use of STAX-SA was challenging since the reviewed studies lack of information needed for that classification. Therefore, the results of STAX-SA classification are imprecise This was especially true with between STAX-SA 2 and 3 where the only difference was the level of support. Another challenge was the difference between STAX-SA 1 and 2 since difference was in emphasis on moving on. Furthermore, our search criteria included costs which means that some studies focusing primarily on AL outcomes and AL quality without mentioning costs might have been missed. All the studies were published in peer-reviewed scientific medical publications and that was the main quality standard alongside of the MOOSE principal.

Conclusion

This review of the literature clearly revealed that the AL of mentally ill people from a research perspective is worldwide poorly understood. There are some features which seem to be common and comparable, but differences in societies make comparisons difficult. Different countries provide different types of services and naming of services varies, making categorizing therefore difficult. It's almost impossible to categorize type of AL and quality level in different countries into one system, although mentally ill in need of AL show the same characteristics globally. There is a need of universal naming system for AL and the use of STAX-SA might be a good solution. To reach the best possible quality both from society and individual point of view, AL should be planned according to equity. All the goals should be set respecting the inhabitant needs, wishes and capabilities. Services should be accessible and reachable in a multilevel system and emergencies should be treated immediately. There should be a common consensus on understanding that not all the inhabitants in AL are able to live independently. Therefore, AL has to be able to recognize those

inhabitants who are able to rehabilitate into independent living and focus on them and reduce the humane suffering of those who are not able to live independently, but are expected to do so.

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1. Jaana Suvisaari Jonna Perälä Satu Viertiö Samuli I. Saarni Annamari Tuulio-Henriksson Krista Partti Suoma E. Saarni Jaana Suokas Jouko Lönnqvist. Psykoosien esiintyvyys ja alueellinen vaihtelu suomessa. *Lääkärilehti*. 2012;67:677-683.

2. Berta Moreno-Küstner, Carlos Martín, Loly Pasto, Peter John McKenna. Prevalence of psychotic disorders and its association with methodological issues. A systematic review and meta-analyses. .

3. Jason C. Simeone, Alexandra J. Ward, Philip Rotella, Jenna Collins, Ricarda Windisch. An evaluation of variation in published estimates of schizophrenia prevalence from 1990–2013: A systematic literature review. .

4. World data. https://ourworldindata.org/mental-health#data-sources. Accessed 11.9., 2020.

5. Wahlbeck K, Westman J, Nordentoft M, Gissler M, Laursen TM. Outcomes of nordic mental health systems: Life expectancy of patients with mental disorders. *British journal of psychiatry*. 2011;199(6):453-458. https://dx.doi.org/10.1192/bjp.bp.110.085100. doi: 10.1192/bjp.bp.110.085100.

6. Sadeniemi M, Almeda N, Salinas-Pérez JA, et al. A comparison of mental health care systems in northern and southern europe: A service mapping study. *IJERPH*. 2018;15(6). doi: 10.3390/ijerph15061133.

7. Knapp M, Beecham J, McDaid D, Matosevic T, Smith M. The economic consequences of deinstitutionalisation of mental health services: Lessons from a systematic review of european experience. *Health & social care in the community*. 2011;19(2):113-125. https://api.istex.fr/ark:/67375/WNG-L66SK198-B/fulltext.pdf. doi: 10.1111/j.1365-2524.2010.00969.x.

8. Farkas M, Coe S. From residential care to supportive housing for people with psychiatric disabilities: Past, present, and future. *Frontiers in psychiatry*. 2019;10:862. https://search.datacite.org/works/10.3389/fpsyt.2019.00862. doi: 10.3389/fpsyt.2019.00862.

9. Westman J, Gissler M, Wahlbeck K. Successful deinstitutionalization of mental health care: Increased life expectancy among people with mental disorders in finland. *European journal of public health*. 2012;22(4):604-606. https://www.ncbi.nlm.nih.gov/pubmed/21659387. doi: 10.1093/eurpub/ckr068.

10. HARDING CM, BROOKS GW, ASHIKAGA T, STRAUSS JS, BREIER A. The vermont longitudinal study of persons with severe mental illness, I: Methodology, study sample, and overall status 32 years later. *The American journal of psychiatry*. 1987;144(6):718-726. http://dx.doi.org/10.1176/ajp.144.6.718. doi: 10.1176/ajp.144.6.718.

11. Penelope Turton, Christine Wright, Sarah White, Helen Killaspy. Promoting recovery in long-term institutional mental health care: An international delphi study ph.D. . 2010.

12. Chilvers Rupatharshini, Macdonald Geraldine, Hayes Alex. Supported housing for people with severe mental disorders. . 2006.

13. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: Explanation and elaboration. *BMJ*. 2009;339(2009):e1000097. http://dx.doi.org/10.1136/bmj.b2700. doi: 10.1136/bmj.b2700.

14. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, Moher D, Becker BJ, Sipe TA, Thacker SB. Meta-analysis of observational studies in epidemiology: A proposal for reporting. meta-analysis of observational studies in epidemiology (MOOSE) group. *ournal of the American Medical Association*. 2000. doi: 10.1001/jama.283.15.2008.

15. McPherson P, Krotofil J, Killaspy H. What works? toward a new classification system for mental health supported accommodation services: The simple taxonomy for supported accommodation (STAX-SA). *International journal of environmental research and public health*. 2018;15(2):190. https://www.ncbi.nlm.nih.gov/pubmed/29364171. doi: 10.3390/ijerph15020190.

16. Jouko Miettunen, Johanna Löhönen, Erika Jääskeläinen, et al. Use of psychiatric and psychological instruments in finland - schizophrenia and related psychoses. .

17. Killaspy H, White S, Dowling 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(1):101. https://search.datacite.org/works/10.1186/s12888-016-0799-4. doi: 10.1186/s12888-016-0799-4.

18. Killaspy H, Priebe S, McPherson P, et al. Predictors of moving on from mental health supported accommodation in england: National cohort study. *British journal of psychiatry*. 2019;216(6):1-7. https://search.datacite.org/works/10.1192/bjp.2019.101. doi: 10.1192/bjp.2019.101.

19. Killaspy H, Priebe S, Bremner S, 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(12):1129-1137. https://search.datacite.org/works/10.1016/s2215-0366(16)30327-3. doi: 10.1016/S2215-0366(16)30327-3.

20. Dalton-Locke C, Attard R, Killaspy H, White S. Predictors of quality of care in mental health supported accommodation services in england: A multiple regression modelling study. *BMC psychiatry*. 2018;18(1):344. https://search.datacite.org/works/10.1186/s12888-018-1912-7. doi: 10.1186/s12888-018-1912-7.

21. Sandhu S, Priebe S, Leavey G, 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(1):471. https://www.ncbi.nlm.nih.gov/pubmed/28693490. doi: 10.1186/s12913-017-2411-0.

22. Pevalin DJ, Reeves A, Baker E, Bentley R. The impact of persistent poor housing conditions on mental health: A longitudinal population-based study. *Preventive medicine*. 2017;105:304-310. https://search.datacite.org/works/10.1016/j.ypmed.2017.09.020. doi: 10.1016/j.ypmed.2017.09.020.

23. Priebe S, Saidi M, Want A, Mangalore R, Knapp M. Housing services for people with mental disorders in england: Patient characteristics, care provision and costs. *Social psychiatry and psychiatric epidemiology*. 2009;44(10):805-814. https://www.ncbi.nlm.nih.gov/pubmed/19277440. doi: 10.1007/s00127-009-0001-0.

24. Rog DJ. The evidence on supported housing. *Psychiatric Rehabilitation Journal*. 2004;27(4):334-344. https://www.ncbi.nlm.nih.gov/pubmed/15222146. doi: 10.2975/27.2004.334.344.

25. Yanos PT, Stefancic A, Alexander MJ, Gonzales L, Harney-Delehanty B. Association between housing, personal capacity factors and community participation among persons with psychiatric disabilities. *Psychiatry research*. 2018;260:300-306. http://dx.doi.org/10.1016/j.psychres.2017.11.088. doi: 10.1016/j.psychres.2017.11.088.

26. Sandra J. Newman. Dedicated to evidence- based psychiatry. . ;52.

27. Gilmer TP, Folsom DP, Hawthorne W, et al. Assisted living and use of health services among medicaid beneficiaries with schizophrenia. *The journal of mental health policy and economics*. 2003;6(2):59. https://www.ncbi.nlm.nih.gov/pubmed/14578538.

28. Hobbs C, Newton L, Tennant C, Rosen A, Tribe K. Deinstitutionalization for long-term mental illness: A 6-year evaluation. *Australian and New Zealand Journal of Psychiatry*. 2002;36(1):60-66. http://www.ingentaconnect.com/content/bsc/anp/2002/00000036/00000001/art00007. doi: 10.1046/j.1440-1614.2002.00984.x.

29. McDermott S, Bruce J, Muir K, Ramia I, Fisher KR, Bullen J. Reducing hospitalisation among people living with severe mental illness. *Australian health review*. 2016;40(2):124-128. https://www.ncbi.nlm.nih.gov/pubmed/26342998. doi: 10.1071/AH15073.

30. Dunt DR, Benoy AW, Phillipou A, et al. Evaluation of an integrated housing and recovery model for people with severe and persistent mental illnesses: The doorway program. *Australian health review*. 2017;41(5):573-581. https://www.ncbi.nlm.nih.gov/pubmed/29224600. doi: 10.1071/AH16055.

31. CHAN H, INOUE S, SHIMODERA S, et al. Residential program for long-term hospitalized persons with mental illness in japan: Randomized controlled trial. *Psychiatry and Clinical Neurosciences*. 2007;61(5):515-521. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1440-1819.2007.01701.x. doi: 10.1111/j.1440-1819.2007.01701.x.

32. Browne G, Hemsley M, St John W. Consumer perspectives on recovery: A focus on housing following discharge from hospital. *International Journal of Mental Health Nursing*. 2008;17(6):402-409. http://www.ingentaconnect.com/content/bsc/inm/2008/00000017/00000006/art00004. doi: 10.1111/j.1447-0349.2008.00575.x.

33. Wiker TS, Gjestad R, Mellesdal LS, Johnsen E, Oedegaard KJ, Kroken RA. Supported accommodation for people with schizophrenia. *Nordic journal of psychiatry*. 2019:1. https://www.ncbi.nlm.nih.gov/pubmed/31070510.

34. Roos E, Bjerkeset O, Søndenaa E, Antonsen DØ, Steinsbekk A. A qualitative study of how people with severe mental illness experience living in sheltered housing with a private fully equipped apartment. *BMC psychiatry*. 2016;16(1):186. https://search.datacite.org/works/10.1186/s12888-016-0888-4. doi: 10.1186/s12888-016-0888-4.

35. Lindstrom E, Eberhard J, Neovius M, Levander S. Costs of schizophrenia during 5years. *Acta Psychiatrica Scandinavica*. 2007;116(s435):33-40. http://www.ingentaconnect.com/content/mksg/acp/2007/00000116/A435s435/art00005. doi: 10.1111/j.1600-0447.2007.01086.x.

36. Broulíková HM, Winkler P, Páv M, Kondrátová L. Costs of mental health services in czechia: Facilitating an evidence-based reform of psychiatric care. *Applied Health Economics and Health Policy*. 2019;18(2):287-298. https://search.datacite.org/works/10.1007/s40258-019-00501-7. doi: 10.1007/s40258-019-00501-7.

37. Padmakar A, de Wit EE, Mary S, Regeer E, Bunders-Aelen J, Regeer B. Supported housing as a recovery option for long-stay patients with severe mental illness in a psychiatric hospital in south india: Learning from an innovative de-hospitalization process. *PloS one*. 2020;15(4):e0230074. https://www.ncbi.nlm.nih.gov/pubmed/32271784. doi: 10.1371/journal.pone.0230074.

38. Killaspy H, Cardoso G, White S, et al. Quality of care and its determinants in longer term mental health facilities across europe; a cross-sectional analysis. *BMC psychiatry*. 2016;16(31):31.

https://www.narcis.nl/publication/RecordID/oai:pure.rug.nl:publications%2Fc383c62e-3db7-4c7a-b890-a5721c758380. doi: 10.1186/s12888-016-0737-5.

39. Meehan T, Stedman T, Robertson S, Drake S, King R. Does supported accommodation improve the clinical and social outcomes for people with severe psychiatric disability? the project 300 experience. *Australian and New Zealand Journal of Psychiatry*. 2011;45(7):586-592. https://journals.sagepub.com/doi/full/10.3109/00048674.2011.559634. doi: 10.3109/00048674.2011.559634.

40. Peace R, Kell S. Mental health and housing research : Housing needs and sustainable independent living. *Social policy journal of New Zealand*. 2001(17):101-123. https://natlib-primo.hosted.exlibrisgroup.com/primo-explore/search?query=any,contains,993679403602837&tab=innz&search_scope=INNZ&vid=NLNZ&offset=0.

41. St Dennis C, Hendryx M, Henriksen A, Setter SM, Singer B. Postdischarge treatment costs following closure of a state geropsychiatric ward: Comparison of 2 levels of community care. *Primary care companion to the Journal of clinical psychiatry*. 2006;8(5):279-284. https://www.ncbi.nlm.nih.gov/pubmed/17235384. doi: 10.4088/PCC.v08n0504.

42. Fakhoury WK, Murray A, Shepherd G, Priebe S. Research in supported housing. *Social Psychiatry and Psychiatric Epidemiology*. 2002. doi: 10.1007/s00127-002-0549-4.

43. Rapisarda F, Felx A, Gagnon S, et al. Housing orientations and needs of above-average length of stay hospitalized psychiatric patients. *Frontiers in psychiatry*. 2020;11:231. https://www.ncbi.nlm.nih.gov/pubmed/32317990. doi: 10.3389/fpsyt.2020.00231.

44. Siskind D, Psychiatrist C, Harris M, et al. A domains-based taxonomy of supported accommodation for people with severe and persistent mental illness for submission to: Social psychiatry and psychiatric epidemiology. . 2011.

45. Yan T, Greene M, Chang E, Hartry A, Touya M, Broder MS. All-cause hospitalization and associated costs in patients with schizophrenia or bipolar disorder initiating long-acting injectable antipsychotics. *Curr Med Res Opin*. 2018;34(1):41-47. doi: 10.1080/03007995.2017.1395733 [doi].

46. Munday J, Greene M, Chang E, Hartry A, Yan T, Broder MS. Early initiation of long-acting injectable antipsychotic treatment is associated with lower hospitalization rates and healthcare costs in patients with schizophrenia: Real-world evidence from US claims data. *Curr Med Res Opin*. 2019;35(7):1231-1239. doi: 10.1080/03007995.2019.1571295 [doi].

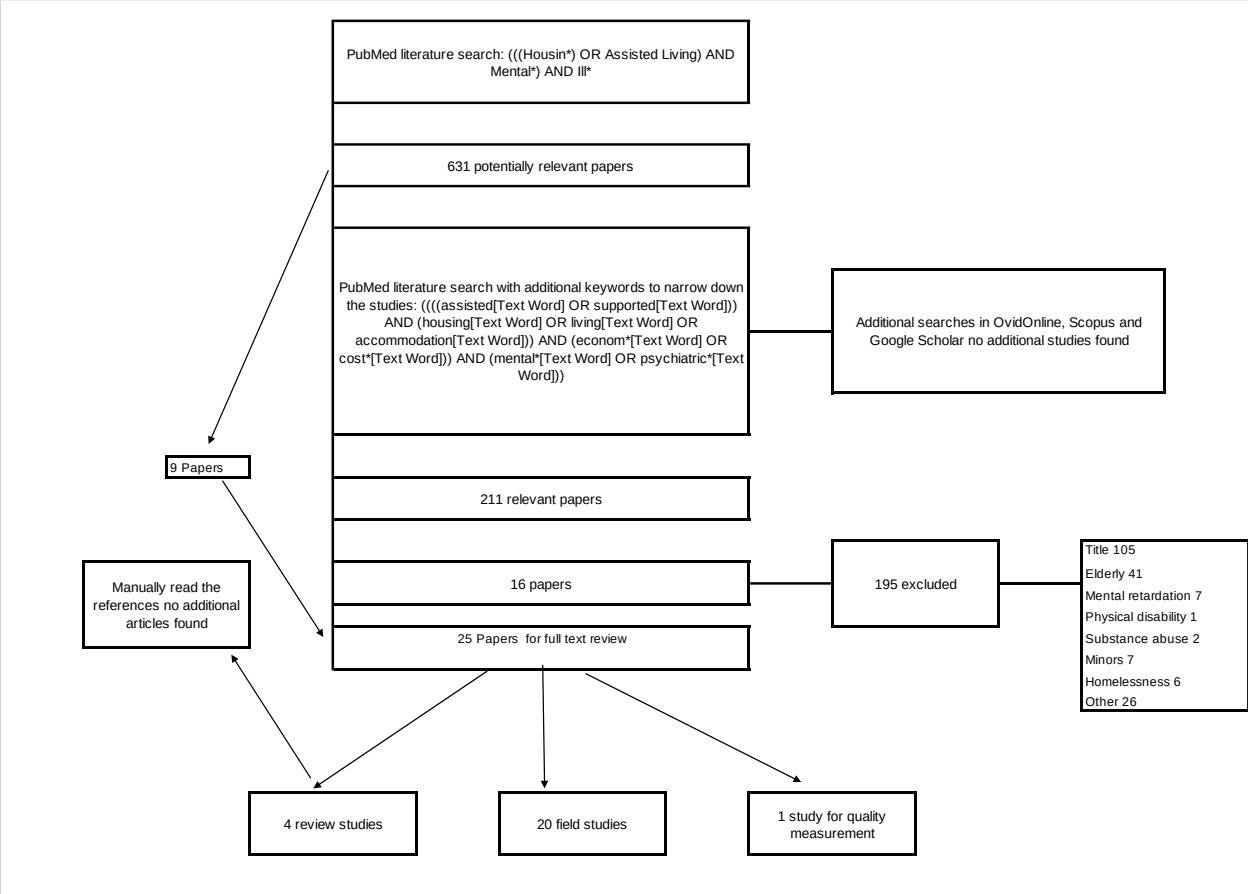
PubMed literature search: (((Housin*) OR Assisted Living) AND Mental*) AND Ill*
631 potentially relevant papers
PubMed literature search with additional keywords to narrow down the studies: ((((assisted[Text Word] OR supported[Text Word])) AND (housing[Text Word] OR living[Text Word] OR accommodation[Text Word])) AND (econom*[Text Word] OR cost*[Text Word])) AND (mental*[Text Word] OR psychiatric*[Text Word]))
Additional searches in OvidOnline, Scopus and Google Scholar no additional studies found
9 Papers
211 relevant papers
Manually read the references no additional articles found
16 papers
195 excluded
Title 105
Elderly 41
Mental retardation 7
Physical disability 1
Substance abuse 2
Minors 7
Homelessness 6
Other 26
25 Papers for full text review
4 review studies
20 field studies
1 study for quality measurement

Figure 1.

Table 1: Study characteristics and key findings of the reviewed articles.						
Author (year) country	Aims	Study design/ Data collection period /Follow-up time	Methodology	Measurements for inhabitants	Measurements for AL	Key findings
Broulikova et al. (2020) Czech Republic [36]	To evaluate the unit costs of inpatient and community mental health services in Czechia.	Cross-sectional / 2015-2017	Survey for AL providers.		AL and hospital costs.	The annual costs for STAX-SA 2-3 and STAX-SA 4 was 1625.7€ and 5460.5€ respectively while annual cost for hospital treatment was 21535€. 75% of the total cost in hospital were formed by housing services itself.
Browne G (2008) Australia [32]	To investigate inhabitants' perspectives on the recovery needs of people who have experienced an episode of acute mental illness during reintegration into the community, with a particular focus on housing needs.	Cross-sectional / - / -	Three group interviews with inhabitants concerning their recommendations for the recovery needs of people on return to the community after hospital admission. Interviews were recorded and analyzed afterwards to recognize main themes that emerged from the interviews.		The interviews were analyzed for the following topics: 1) money or finance, 2) what having a mental illness can mean, 3) recovery 4) housing.	A psychiatric disorder reduces self-esteem and ending up in AL even more. For the recovery process it is crucial to have not only AL-services but also professionals in the AL. Some inhabitants reported negative attitudes of the professionals in AL. Furthermore, the social relations of the inhabitant should be maintained to reduce loneliness which was found to be a big problem for the inhabitants in AL.
Chan H et al. (2007) Japan [31]	To investigate the effects of STAX-SA 4 on long-term hospitalized patients, and to compare the psychiatric/medical cost between hospital and STAX-SA 4.	Cohort study / - /2 years	Long-term patients categorized to STAX-SA 4 and hospital groups, repeated assessment every 6 months for 2 years.	PANSS, KAS, WHO-QoL and GHQ-12	Costs	Individuals in STAX-SA 4 had less positive symptoms, had better quality of life and performed better in social activities than hospital group. Total costs were lower in STAX-SA 4 group, but treatment of physical cost was higher in STAX-SA 4 group.
Chilvers R et al. (2006) England [12]	To determine the effects of AL schemes versus outreach support schemes for people with SMI. To determine the effects of AL schemes versus 'standard care' for people with SMI.	Systematic review of studies published April 2006 or before.	Literature searches using the Cochrane Schizophrenia Group Trials Register and the Cochrane Central Register of Controlled Trials added with general unstructured internet search.		Outcomes of service utilization, mental state, satisfaction with care, social functioning, quality of life and economic data.	No studies met the inclusion criteria.

Dalton L-C et al. (2018) England [20]	To identify potential service characteristics that were associated with quality of care in specialist mental health AL services across England.	Cross-sectional interview study / 10/2013 - 1/2017 / -	150 mental health AL services across England were assessed with QuIRC-SA	-	AL service characteristics, QuIRC-SA	STAX-SA 2-3 had best quality and was seen as cost-effective option. The Local Authority index had the most influence on domain scores. Increasing service size and expected length of stay was negatively associated with service quality. A negative association was found between the percentage of male inhabitants and AL quality. No association between service user ability and quality of care.
Dunt DR et al. (2017) Australia [30]	To determine the effects of the Doorway program on participants' well-being (health, access to housing, employment and social inclusion), as well as to perform an appraisal of the costs of participants' health services and housing use (in the presence and absence of Doorway).	Longitudinal / 7/2011-11/2013 / 2 years	The Doorway pilot with evaluation period. Baseline measurements were performed at entry to the program and then at 6-monthly intervals	Sociodemographics and clinical characteristics, BA-SIS-32, HoNOS, Outcomes Star, ASSIST,	AL service characteristics and costs	Reduction in the costs and use of mental and general health services, as well as in the costs of housing were found.
Gilmer TP. (2003) USA [27]	To compare the use of mental and physical health services among inhabitants with schizophrenia who were residing in AL facilities compared to those received by patients living independently and those who were homeless.	Cross-sectional / 1998-2000 / -	Comparison of individuals with Schizophrenia living in AL, independently, or who were homelessness.	Sociodemographics, GAF, number of hospitalizations	Offered support, costs	Inhabitants of STAX-SA 2-3 received substantially more case management, therapy, and medication supervision and day treatment than persons living independently or homeless. Inhabitants living in STAX-SA 2-3 were less likely to be hospitalized for psychiatric or physical reasons although physical health outpatient costs were similar. Pharmacy costs and total costs were highest for inhabitants of STAX-SA 2-3.

Hobbs C (2002) Australia [28]	1) to determine the accommodation style and level of care required by inhabitants, 2) to evaluate clinical changes over time and 3) to gain the inhabitants perspectives of their lives.	Cohort study / 1994-2000 / 6 years	Quantitative and qualitative (semi structured interviews) evaluation. Details of accommodation, level of care, readmissions, incidents and medication were also documented.	Sociodemographics and clinical characteristics, LSP, SBS, MADRS, QoL	AL service characteristics	People with long-term serious mental illness can achieve improved life satisfaction, remain clinically stable with less medication and maintain community tenure when supported by a mental health system with adequate community resources and continuity of care. Social integration can be further improved by consumer networking and public education
Killaspy et al. (2019) England [18]	To study the proportion of participants who moved to more independent accommodation without placement breakdown or managing with fewer hours of weekly support over follow-up period. Also sustaining accommodation without hospitalizations was noticed.	Prospective cohort study/ 30 months	Random sampling, multilevel modelling, contact with inhabitants every 3 months	Sociodemographics and clinical characteristics, ability to move to less supported AL, CANSAS, CADS, LSP, MANSA, RCS, CAT	AL service characteristics and costs, QuIRC-SA	42% of participants successfully moved on (2/3 in STAX-SA 1, 1/3 in STAX-SA 2-3 and 1/10 in STAX-SA 4). Of those who moved on only a few of had any hospital admissions. Costs were lower for individuals who managed to move on.
Killaspy H (A) (2016) England [19]	To describe the provision, quality, and costs of mental health AL in England. Also, to assess the characteristics of service users and their and quality of life and satisfaction with care.	Cross-sectional / 10/2013-10/2014 / -	Face-to-face interviews with staff and service users and questionnaires for staff members with 195 completed QuIRC-SAs	Sociodemographics, clinical characteristics, CANSAS, SPRS, CADS, RCS, CAT, LSP, MANSA	AL service characteristics and costs, QuIRC-SA	Service quality was highest in STAX-SA 2-3. Social inclusion decreased with decreasing support. Costs in STAX-SA 1 were lowest, but so was QoL.
Killaspy H (B) (2016) Bulgaria, Czech Republic, Germany, Greece, Italy, Netherlands, Poland, Portugal, Spain and the UK [38]	The QuIRC was used to investigate associations between characteristics of longer-term mental health facilities across Europe and the quality of care they deliver to service patients.	Cross-sectional / 2007-2009 / -	Face to face interviews with unit managers	-	AL service characteristics, QuIRC-SA	Large, single sex units, and units with a higher proportion of poorer functioning patients had lower AL quality. A maximum length of stay was positively associated with AL quality. The location of the unit and staffing intensity or turnover did not have a major influence on quality. Only 25 % of units scored less than 50 % on individual QuIRC domain scores. Units situated in the community had considerably better quality scores for their living environment, compared to hospital based units.

Killaspy H (C) (2016) England [17]	To create a tool for assessing AL service quality.	Cross-sectional interview study / - / -	QuIRC was used as a base and it was modified over several interviews and expert panels.	-	QuIRC	Development of the QuIRC-SA tool that has acceptable item response spread, inter-rater reliability and discriminant validity.
Lindström E (2007) Sweden [35]	To explore the direct and indirect costs of AL.	Register based study/ - / 5 years	Register study of 225 risperidone-treated patients with schizophrenia	Sociodemographics and clinical factors concerning medication, hospital days, AL, living independently or with parents, working／studying, frequency of sick leave and sick pension.	Costs of medication, AL and hospitalization	The main part of direct costs was caused by hospitalization and STAX-SA 2-3 and/or STAX-SA 4. Indirect costs were 43%. Medication made 4% of the total costs. 15-26% of inhabitants had no social contacts except staff. A majority of individuals had no meaningful daily activities AL.
Marianne Farkas and Steve Coe (2019) USA [8]	To present the history, current state and future of AL for people with significant mental health conditions in the USA. Particular focus on challenges in the AL.	Literature review	Not reported		Focus on AL's history, present and future and the challenges individuals in AL encounter.	3 Main challenges include housing affordability, AL's capacity to offer recovery-oriented support and the effects of race and discrimination. Writers promote ideal model for AL that should be integrated, permanent and affordable. Also, inhabitants should have the authority to choose AL of their choise. AL should offer voluntary and functionally separate flexible support.
McDermott et al. (2016) Australia [29]	To examine the role that permanent housing and recovery-oriented support can play in reducing the number and length of psychiatric hospital admissions for people with SMI.	Longitudinal / 7-9/2009 / 4 years	Data on people with SMI covering 2 years before entry and 2 years within the HASI program.	Sociodemographics	Number of hospitalizations, LOS	The number of hospital in-patient admissions and LOS decreased in the first 2 years since joining HASI. On average, men and younger individuals (under 45 year old) experienced a greatest decrease in the number of admissions and LOS.
Meehan T (2011) Australia [39]	To investigate the clinical and social outcomes for a group of individuals discharged into AL from three long-stay facilities in Queensland	Longitudinal / 1996-2006 / 7 years	Clients were discharged into the Program 300 during 1996-1999. Data was collected 6 weeks prior to discharge and during follow-up.	Sociodemographics and clinical characteristics, LSP, HoNOS, quality of life using a 10-point visual analogue scale, satisfaction of life domains on a 7-point scale ranging from - 3 to + 3.	-	Even after 7 years of community living, few clients were employed, and a large proportion had no structured activity outside of the home. Function did not get better or worsen.

Newman SJ (2001) USA [26]	To review studies of the relationship between AL attributes and serious mental illness, highlight important gaps in the research, generate hypotheses to be tested, and suggests a research agenda.	Systematic Literature review of 32 studies published during 1975-March 2000	Literature searches of studies using MEDLINE and PsycINFO, an examination of published literature reviews, consultations with experts in mental health and in housing research.		Housing as input, outcome or both	There is no consistency in the methods among studies. AL should be combined with other services such as case management in order to gain better satisfaction. Inadequate housing was found to be linked to maladaptive behavior in spite of support services. Small units and units with individuals with similar symptoms were seen as better choice. Individuals who lived in STAX-SA 1 in a good neighborhood and received outreach services had better satisfaction towards housing.
Padmakar et al. (2020) India [39]	To assess how the transition from a hospital setting to a community-based recovery model for individuals with SMI can be facilitated. I	Cohort study / - / 6 months	Interview of staff and inhabitants.	BPRS, WHOQOL, own questionnaire, vocabular assessment		A structured process is important for implementing inhabitant to AL. There are three phases: 1) Pre-implementation, 2) Confrontation vs Adaptation, 3) Stabilization. Stabilization is the most time taking and important phase, although Pre-implantation was found difficult as well especially in obtaining housing and selecting the proper inhabitant. The more the inhabitant was included in the society the less they had misbehavior and emotional stress. Although all the inhabitants in AL in this study had better outcomes than others.
Pevalin et al. (2017) England [22]	To investigate if persistence of poor housing affects mental health over and above the effect of current housing conditions	Cross-sectional, 13 annual waves during 1996 to 2008	Participants of the BHPS survey	GHQ, Questionnaire including 6 subtypes of housing problems.		Present mental health problems are associated with living with housing problems in the past. There was an association with poorer mental health if new housing problems appeared in the residence.

Priebe S (2009) England [23]	To assess patient characteristics, care provision and costs in different types of housing services in England.	Cross-sectional / 5-10/2007 / -	An exploratory study of 250 randomly selected AL in 12 representative local areas	Sociodemographic and clinical characteristics, occupational and social activities and received support in the AL, CANSAS.	AL service characteristics and costs.	Housing services should implicate quality standards that would improve the quality of care and transparency among the AL providers. Only a few had any inclusion criteria and staffed mental health professionals. There is an unfortunate trend of "forgetting" the mentally ill in AL
Rog DJ (2004) USA [24]	To review the evidence, base for AL and the gaps in knowledge that remain and what can be done to add knowledge about the subject.	Literary review of fifteen studies published during 1988 to 2002	Methodology of searches were not mentioned. The reviewed studies were categorized into five levels based on scientific evidence of studies.		Impact of Housing Overall on Resident Stability and Hospitalization, Costs of AL, Principles of AL.	AL with support for individuals with SMI reduces hospitalization and homelessness, drop-outs take place in the first 4 months. Young individuals who have mood-disorders and do not have a substance abuse problem have best success in AL. Any forms of support improve AL stability and increase LOS.
Roos E et al. (2016) Norway [34]	To explore how people with SMI experience living in AL consisting of only private fully equipped apartments including shared accommodation room.	Cross-sectional / 7-11/2014	Individual and group interviews of inhabitants.		Semi structured interview focusing on Housing and municipality services	All inhabitants emphasized the importance of access to the AL and skills in observing symptoms at an early stage. Shared accommodation room was seen as important enabler to form a relationship with other inhabitants. Costs for apartments are greater than single rooms but might promote advantages for the inhabitants. Having a short tenancy agreement and the continuity of the AL caused stress for some inhabitants.
Sandhu et al. (2017) England [21]	To gain an understanding of the AL inhabitants' and staff's view on the purpose of AL services and what are the most helpful components of care.	Cross-sectional / 10/ 2013 - 7/2014 / -	Interview of staff and inhabitants in STAX-SA 1, STAX-SA 2-3 and STAX-SA 4	-	1) purpose and aims of the service, 2) positive aspects of the service, 3) negative aspects of the service, 4) facilitators and barriers to progressing towards more independent living.	The interviews revealed a mutual understanding among staff and inhabitants: 1) building independence and confidence 2) supporting people with their mental health 3) providing safety and stability. Continuity of housing and care beyond current AL was important as well.

Wiker & Gejstad et al. (2019) Norway [33]	To prospectively investigate the clinical and demographic factors associated with allocation to AL for people with schizophrenia.	Cohort study/ 2005 - 2010/ -	Prospective study of patients admitted to Haukeland university Hospital and their allocation into supported accomodation	Sociodemographics and clinical characteristics S-GAF, HoNOS, AUS, DUS	-	The allocated group to STAX-SA 2-3 had lower education levels and received more disability pensions than the non-allocated group. Very few in either group had paid jobs.
Yanos PT et al. (2018) USA [25]	To understand which housing and personal capacity factors facilitate and hinder maximum community participation among people with psychiatric disabilities.	Cross-sectional / 3/2014 - 12/2015 / -	Face-to-face interviews with inhabitants	Sociodemographics, BPRS, ASI, UPSA-Brief, WCQ, GSE, ECI-19, QLS, SCI-12		Participants living in STAX-SA 1 demonstrated greater independent living-skill and used more alcohol and drugs. They also had higher scores in physical community integration and QLS. The most consistent predictors of community participation were negative symptoms and active coping style.

AL=assisted living, STAX-SA:Simple Taxonomy of Supported Accomodation, CANSAS=Camberwell Assessment of Needs Short Assessment Scale, QuIRC-SA=Quality Indicator for Rehabilitative Care - Supported Accommodation version, SPRS=Special Problems Rating Scale, CADS=Clinician Alcohol and Drug Scale, LSP=Life Skills Profile, MANSA=Manchester Short Assessment of Quality of Life, Resident Choice Scale, CAT=Client Assessment of Treatment Scale, CADS=Clinician Alcohol and Drug Scale, RCS=Resident Choice Scale, BPRS=Brief Psychiatric Rating Scale, ASI=Addiction Severity Index, UPSA-Brief=UCSD Performance-Based Skills Assessment-Brief, WCQ=Ways of Coping Questionnaire, GSE=Generalized Perceived Self-efficacy Scale, ECI-19=External Community Integration Scale, QLS=Quality of Life Scale, SCI-12=Social community integration, S-GAF=Global Assessment of Functioning, Split Version, HoNOS=Health of the Nation Outcome Scales, AUS=Alcohol use Scale, DUS=Drug use Scale, SBS=Social Behaviour Scale, MADRS=Montgomery Asberg Depression Rating Scale, BA-SIS-32=The Behaviour and Symptom Identification Scale 32, ASSIST=Alcohol, Smoking and Substance Involvement Screening Test, MRN=Medical record number, ASP=Accommodation support providers, NSW=New South Wales, B&C=Board & Care, AMHS=San Diego County's Adult Mental Health Services, HUD-VASH=Housing and Urban Development–Veterans Affairs Supported Housing, QoL-I=Quality of Life Interview, ICM=Integrated Case Management, GHQ=General health Questionnaire, BHPS=British Household Panel Survey, TDMHMR=Texas Department of Mental Health and Mental Retardation's, ECRC= Emergency Care and Recovery Center, ECS=Expanded Community Services, SMAA = state Medical Assistance Administration, HASI=New South Wales Mental Health Housing and Accommodation Support Initiative, Lenght of Stay=LOS						

Table 2: Inhabitant sociodemographic, STAX-SA classification (categorized for this review) and previous living arrangements								
Authors	Sample size (% men) / mean (sd) age	Diagnoses	Substance abuse	Previous hospitalization and AL / Immediate previous living arrangements	Forensic history	Education / employment / marital status	STAX-SA and number of units	Staff intensity, available mental health professionals
Broulikova et al. [36]	-	-	-	-	-	-	STAX-SA 1= NA STAX-SA 2-3= NA STAX-SA 4= NA	-
Browne G [32]	N=8 (Men 87,5%) / 31,7 (-)	-	-	Admissions (88%) Hospitalized in the last 2 years (63%)	-	-	-	-
Chan H et al. [31]	N = 28 (Men 57%) AL=63.01 (7.95), Hospital=61 (9.41)	Schizophrenia (97%) Psychoses (3%)	-	Mean time in psychiatric hospital 24 years / -	-	-	STAX-SA 1=1	-
Dalton-Locke-C et al. [20]	N= - (men 68 %) / -	Less than 50% of STAX-SA 4 inhabitants were diagnosed with psychosis compared to STAX-SA 1 and STAX-SA 2-3, in which majority had a diagnosis of psychoses.	-	-	-	-	STAX-SA 1= 28 STAX-SA 2-3= 87 STAX-SA 4= 35	Mean staff intensity per inhabitant 0.43 (0.17-0,72)
Dunt DR et al. [30]	N=77 (Men 68%) / 39 (-)	Schizophrenia (49%) Mood Disorders (25%) More than 1/3 of participants had multiple mental health diagnoses	Alcohol (67%) Tobacco (80%)	-	-	-	STAX-SA 1=77	-
Gilmer TP [27]	N=1981 (Men 53,9%) / 40.4 (10.7)	Schizophrenia (100%)	Current substance use disorder (38%) STAX-SA 1 (26%) independent living (37.1%) homeless (62%)	Medi-Cal eligible months 10.5 (9.7 – 11.5) / -	-	-	STAX-SA 2-3=NA living independently=NA homeless=NA	-
Hobbs C* [28]	N = 47 (Men 53%) / 41 (-)	Schizophrenia (98%) Other psychiatric disorder (2%)	No major substance abuse problems, drug or alcohol problem in the past (47%)	The mean number of admissions11.6 .	Forensic history (17%)	Secondary education (47%) No previous employment (17%) Single (75%) Divorced, de facto or in a long-term relationship (25%)	STAX-SA 2-3=NA STAX-SA 4=NA	-

Killaspy H [19]	N = 619 (men 66%) / 46 (13.5)	Schizophrenia (62%) Mood Disorders (27%) Other (11%)	Problematic alcohol use (16%) Problematic substance use (12%)	The mean number of admission 2. STAX-SA 1 (42%), STAX-SA 2-3 (27%) STAX-SA 1 (10%) Hospital (18%) No fixed abode (3%)	Committed act >2 years ago (29%), committed act within previous 2 years (10%), victim of crime in previous 12 months (19%)	Unemployed (82%) retired (11%) paid employment (3%) Training/education/voluntary work (4%) Never married or cohabited (66%)	STAX-SA 1=22 STAX-SA 2-3=35 STAX-SA 4=30	Meeting times within previous 3 months: doctor (2.6-3.1), psychologist (3.3-5.3), psychiatrist (1.3-1.5)
Killaspy H [38]	-	-	-	-	-	-	STAX-SA 1=213	Mean staff intensity per inhabitants 0,7 (0.1-9.1). 63% of units had psychiatrist, 2% had no psychiatrist input, 49% had clinical psychologist and 56% social worker
Killaspy H et al. [18]	-	-	-	Admissions (20%)	Been in prison (2,7%)	-	STAX-SA 1=22 STAX-SA 2-3=35 STAX-SA 4=30	Meeting times within previous 3 months: doctor (2.7-3.1), psychologist (1.8-3.3), psychiatrist (1.2-1.3), psychiatric nurse (2.7-5.1).
Lindström E [35]	N = 225 (Men 59%) / 38,5 (11.6)	Schizophrenia (70%) Psychoses (30%)	-	Mean age at first admission 26.7 years / -	-	Meaningful employment (under 25%) Full-time employment (12%)	STAX-SA 2-3 living independently or with parents	-
McDermott et al. [29]	N=197 (Men 59%) / 38 (-)	All had a mental health diagnosis	-	Admission on average (2.0)	-	-	STAX-SA 2-3=NA STAX-SA 4=NA	-
Meehan T [39]	N = 181 (Men 80%) / 43,6 (-)	Schizophrenia (80%) Mood Disorders (5%) Other psychiatric disorder (15%)	-	Mean time in hospital 15.6 years / -	Forensic history (22.1%)	Primary education (55.%) Employed (1%) Single/never married (80%) Married (1%) Separated/divorced/widowed (19%)	STAX-SA 4=NA	-
Padmakar et al. [39]	N=11 (men 0%) / 55 (-)	Schizophrenia (64%) Psychosis (36%)	-	Hospitalized (100%)	-	No education (9%) Primary education (27%) Secondary education (64%) Married/in a relationship (73%) Separated/divorced/ widowed (18%) Unknown (9%)	STAX-SA 2-3=NA	-
Pevalin DJ [22]	N=16.234 (Men 45%) / 49,57 (17.18)	-	-	-	-	Married/in a relationship (70%) Separated/divorced/ widowed (16%) Never married (14%)		-
Priebe S [23]	N = 414 (men 71%) / 44 (11.7)	Schizophrenia (60%) Mood Disorders (20%) Other psychiatric Disorders (18%)	Current substance abuse (25%) History of substance abuse (48%) Smokers (56%)	Involuntary admissions (50%) First time AL (32%)	Criminal convictions (13%)	Open employment (3%) Sheltered/voluntary work (8%) Student (2%) Not married (94%) Married (6%)	STAX-SA 1=57 STAX-SA 2-3=61 STAX-SA 4=30	Inhabitants meet staff on daily basis, except in STAX-SA 4 (mean 3,7 times a week), mean meeting times within previous 3 months GP (2.42), psychologist (0.47), psychiatrist (1.23), psychiatric nurse (1.98).

Roos E et al. [34]	N = 14 (Men 57%) / 48,8 (10.4)	All were diagnosed with SMI	-	-	-	Retired (100%)	STAX-SA 4=NA	-
Sandhu et al. [21]	N = 30 (men 57 %) / 39,7 (13.7)	-	-	Inpatient Rehabilitation Unit (7%) Community Rehabilitation Unit (7%), STAX-SA 1 (7%) STAX-SA 2-3 (30%) Temporary accommodation (7%) Rented Property (13%), Family Home (30%)	-	-	STAX-SA 1=10 STAX-SA 2-3=10 STAX-SA 4=10	Mean number of staff 10.6, staff mean age 45 years, mean work experience 6.5 years (range 3 months-22 years).
Wiker & Gejstadt [33]	334 (Men 65%) / 42 (14.25)	Schizophrenia (100%)	-	-	-	Primary education (61%) Secondary education (24%) Higher education (16 %) Employed, student (0%) Temporary benefits (11%) Disability pension, retired (83%) Social Security (4 %) Other (2%)	STAX-SA 1=NA STAX-SA 2-3=NA STAX-SA 4=NA	-
Yanos PT et al. [25]	N = 343 (Men 61,5% Other 0,5%) / 47.9 (11.4)	Schizophrenia (50%) Mood Disorders (25%) Other psychiatric disorders (11%), Missing (16%)	Past 30 Day Alcohol and Drug Use (Range = 0–60): STAX-SA 4: 3.77 STAX-SA 2-3: 1.63	Mean age at First Hospitalization 24, mean number of hospitalizations 8.6 / -	-	Unemployed (68%)	STAX-SA 2-3=NA STAX-SA 4=NA	-

-=Information not available, * part of the data gained from previous 2 year study from same sample, N=number of individuals, F=Female, M=Male, O=Other, AL=Assisted Living, Medi-Cal: California Medical Assistance Program , IPS=Individual placement and support, STW=social therapeutic workshops, NGO=Non-government, B&C=Board and care homes, ECS=Specific Expanded Community Services, HASI=New South Wales Mental Health Housing and Accommodation Support Initiative,								

Table 3: Weekly costs reported by service

	Psychiatric costs (per week)			Physical costs (per week)		AL-costs (per week)		
Title	Hospitalization	Medication	Outreach	Outreach	Hospitalization	STAX-SA 1	STAX-SA 2-3	STAX-SA 4
Broulikova et al [36]	413*	25	-	-	-	105	31	8
Chan H et al [31]	858	-	-	-	-	-	-	-
Dunt DR et al [30]	2584*	-	-	-	-	-	-	126*
Gilmer TP [27]	-	76*	63*	24*	-	190*	-	-
Killaspy et al [18]	-	-		-	9	139	70	62
Killaspy H (a) [19]	-	-	20	-	20	674	303	77
Lindström E [35]	4046	43	-	-	-	2023	-	-
Meehan T [39]	3061*	-	542*	-	-	1653*	-	98*
Priebe S [23]	-	-	-	-	-	550	326	171

Table 4: Individual Outcomes of inhabitants in AL and quality of care of AL (QuIRC-SA)

Writer	Psychiatric hospitalization	Psychiatric symptoms	Quality of life and care	Function	Substance abuse
Chan H et al. [31]	21% in the STAX-SA 1 were readmitted to hospital and the durations of re-hospitalization of the three patients varied from 0.5 to 4.9 months.	PANNS improved 24% STAX-SA 1 and 5% in the hospital group. Hospital group's negative symptoms got worse by 10%. No significant difference in medication levels.	WHO-QOL score of the hospital group significantly declined 14% in the physical domain. No differences were found in other domains.	Measured with the KAS the individual's and staffs' rating of level of performance of socially expected activities increased more in STAX-SA 1. Also, in the STAX-SA 1 the expectations for performance of social activities and performance of free-time activities assessed by the staff also improved more than in the Hospital group.	-
Dalton_Locke C et al [20]	-	-	STAX-SA 2-3 had the best service quality. The Local Authority index (location) had the most influence on domain scores, having a negative association in four of the QuIRC-SA domains. Increasing service size, long length of stay and the proportion of male inhabitants were negatively associated with service quality. No association between service user ability and quality of care was found. Staffing intensity was positively associated with therapeutic Environment and treatments and Interventions but negatively associated with Human Rights.	-	-
Dunt DR et al. [30]	Admission to bed-based mental health services (clinical and community) decreased (annual mean admissions from 1.2 to 0.5). Also, a decrease in mean total length of stay in bed- based mental health services from 20.0 to 7.4 days. Contact with ambulatory mental health professionals decreased from a mean of 39.4 to 33.5 h per year per participant.	-	-	Total mean BASIS-32 scores improved significantly 0.5 points. All five subscales improved three showing statistically significantly improvements (Relation to self/others, Depression/anxiety, Daily living/role function). Four of the Homelessness Star's scores improved statistically significantly: motivation and taking responsibility (16.4% improvement) Managing money (23% improvement), Emotional and mental health (14.3% improvement) and Meaningful use of time (21.4% improvement). No statistically significant improvements in employment levels. Significant improvement in individuals' support networks: contacts with 'Others', such as neighbors, work colleagues and local shop and café owners, rose from 14% to 59%.	-
Gilmer TP [27]	Over 1 year timeframe the inhabitants in STAX-SA 2-3 had less hospital admissions (22.7%) when compared to independent living (29.3%) and homeless individuals (32.1%). In STAX-SA 2-3 inhabitants received more case management, therapy, medication supervision and day treatment than individuals living independently. Persons who were homeless received the lowest amount of support.	-	-	No significant difference in GAF between STAX-SA 2-3, independently living and homeless.	STAX-SA 2-3 inhabitants (26%) were less likely to be diagnosed with a substance use disorder than independently living (37%) or homeless (62%).

Hobbs C [28]	-	STAX-SA 2-3 and STAX-SA 4 remained clinically stable over the 6-years without significant change in BPRS, LSP, SBS and MADRS total or factor scores while decreasing psychopharmacology (35% decline in daily chlorpromazine equivalents and shift to atypical antipsychotic medication) and in the level of case manager supervision at the same time.	A significant overall improvement in life satisfaction over the 6-years of living in the community, QOL measures increased 20%	64% of inhabitants required some form of daily support, 28% of the residents required a daily visit, 36% of the residents were living semi-independently and needed only a weekly visit while three inhabitants managed well with only a monthly visit.	No major substance abuse problem arose during study, no alcohol-related problems. 75% of the inhabitants smoked cigarettes and 58% were classified as heavy smokers.
Killaspy H (A) [19]	-	-	STAX-SA 2-3 had the highest service quality. STAX-SA 4 had the lowest quality of life (MANSA). No difference between service type and satisfaction with the received care. Contacts with outreach services were the most frequent in STAX-SA 1.	Inhabitants in STAX-SA 1 had the greatest needs but no significant difference in social functioning (LSP) between groups.	In all STAX-SA types 16% had problematic alcohol use, and 12% had substance use. Inhabitants in STAX-SA 2-3 had the highest level of substance abuse being 19%.
Killaspy H (B) [38]	-	-	Large, single sex units, and units with a higher proportion of poorer functioning patients had lower AL quality. A maximum length of stay was positively associated with AL quality. The location of the unit did not have a major influence on quality. Staffing intensity or staffing turnover were not associated with AL quality.	-	-
Killaspy H [18]	In all STAX-SA types 19% had a hospital admission during follow-up. STAX-SA 2-3 service users had the most psychiatric hospitalizations, twice as likely as STAX-SA 4 service users. STAX-SA 1 users had the highest number of inpatient days of those who had a psychiatric admission.	-	Ability to promote inhabitants' human rights and recovery-based practice (QuIRC-SA) were positively associated with inhabitants' ability to successfully move on. There were a negative association between social interface (QuIRC-SA) and moving on.	-	-
McDermott et al. [29]	There were reductions in the number of psychiatric hospital admissions while residing in STAX-SA 2-3 or STAX-SA 4 as well as LOS.	-	-	-	-

Meehan T [39]	STAX-SA 4 5% were readmitted to long-term care over the 7-year study. 60% had spent time in acute inpatient unit for 7 years and half of those in the first six months. Number of admissions varied from 1 to 13 and 76% required only one admission.	-	STAX-SA 4 3% improvement in self assessed quality of life between 6 months and 36 months, and 1% improvement between 36 and 84 months. Overall, the group was satisfied.	STAX-SA 4 the number of hours of direct support provided each week decreased 18% at 7 years.	-
Padmakar et al. [37]	-	STAX-SA 2-3 after five months BPRS scores decreased significantly to an average of 24.7 while most individuals had scores over 50 at the beginning.	STAX-SA 2-3 WHOQOL subscales physical health (44%) and social relations (55%) improved significantly during 6 months but there was a decline at the first month.	-	-
Yanos PT et al. [25]	-	STAX-SA 4 had 15% higher affect scale than STAX-SA 2-3, no other differences in the BPRS subscales. No difference in self-efficacy or WCQ between STAX-SA 4 or STAX-SA 2-3.	STAX-SA 4 had 19% higher scores in QLS Common Objects and Activities than individuals in STAX-SA 2-3.	Inhabitants in STAX-SA 4 had 24% higher points in independent living-skills and higher scores in physical community integration. No difference in social or vocational community participation between STAX-SA 2-3 and STAX-SA 4 . Best predictors for community participation were negative symptoms and active coping style.	Inhabitants in STAX-SA 4 used more alcohol and drugs (131% higher points). No relation between positive symptoms and substance use or community participation.