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The effectiveness of residential treatment services for individuals with substance use disorders: A systematic review

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ABSTRACT

Background: Residential treatment is a standard treatment for individuals with severe and complex substance use problems. However, there is limited evidence on best practice approaches to treatment in these settings. This review provides a comprehensive update on the evidence base for residential treatment, and directions for future research and clinical practice.

Method: A systematic review of all studies published between January 2013 and December 2018 was conducted. Public health and psychology databases (Medline, CINAHL, PsycARTICLES and PsycINFO) were systematically searched, and forward and backward snowballing were used to identify additional studies. Studies were included if they were quantitative, assessed the effectiveness of residential substance treatment programs for adults, were published in the English language and in peer-reviewed journals. The Effective Public Health Practice Project's Quality Assessment Tool for Quantitative Studies was used to assess methodological quality.

Results: Our search identified 23 studies. Eight were rated as methodologically strong, five as moderate and ten rated as weak. Quality ratings were impacted by attrition at follow-up and research design. Despite limitations, results provide moderate quality evidence for the effectiveness of residential treatment in improving outcomes across a number of substance use and life domains.

Conclusion: With caution, results suggest that best practice rehabilitation treatment integrates mental health treatment and provides continuity of care post-discharge. Future research and practice should focus on better collection of outcome data and conducting data linkage of key health, welfare and justice agency administrative data to enhance understanding of risk and recovery trajectories.

1. Introduction

Substance use disorders are a major contributor to disability and death worldwide (Institute for Health Metrics and Evaluation, 2016). In the United States, an estimated 8% of the population (over 12 years old) had a substance use disorder in the past 12-months (Substance Abuse and Mental Health Services Administration, 2016). Similar figures have been reported in Australia, where an estimated 5.1% of the population aged 16–85 years had a substance use disorder in the previous 12-months (Australian Bureau of Statistics (ABS), 2008).

Residential substance use treatment services provide intensive care and support for individuals with severe and complex substance use disorders within an alcohol and drug-free, and 24 -h residential community setting (Reif et al., 2014). While treatment interventions vary, residential therapeutic programs generally include Alcohol and Other Drug (AOD) withdrawal or maintenance management in a hospital or supervised residential facility, individual and group psychological support, mutual self-help and peer therapeutic communities, and supported reintegration into the community. Length of stay in residential treatment can be relatively short, to longer-term (four weeks up to 12-months). One example of a short-term residential treatment model is the 28-day Minnesota Model (Borkman et al., 2007). Typically based on the 12-step Alcoholics Anonymous (AA) program, it incorporates addiction education, small group meetings, and individual interviews (Borkman et al., 2007). Longer-term residential treatment models ranging from 6 to 12-months can include therapeutic communities (De Leon, 2000). In this model, responsibility for recovery rests on the individual as well as the residential community. Patients and staff are

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considered the primary change agents, through social learning processes and the community support of peers. This structured model, generally involves community meetings, facilitation of self-help and mutual self-help, encounter groups, stage progression and/or a hierarchical structure (Magor-Blatch et al., 2014; Reif et al., 2014).

A significant amount of research has evaluated the effectiveness of residential substance use treatment services. Since 2000, there have been seven reviews of residential drug treatment studies that predominantly focused on community-based residential services (i.e. not based in hospital or prisons), and collectively examined 68 studies published between 1981 and 2013. Three reviews focused on the effectiveness of integrated residential treatment for co-existing mental health and substance use disorders (Brunette et al., 2004; Cleary et al., 2009; Drake et al., 2008), two focused on therapeutic communities (Malivert et al., 2011; Vanderplasschen et al., 2013), and two reviews compared therapeutic communities to (i) non-therapeutic community residential treatment (e.g. Minnesota Model) (Smith et al., 2006) and (ii) other treatment types (e.g. day programs) (Reif et al., 2014).

Findings from these reviews generally provide limited quality evidence for the effectiveness of residential treatment for AOD problems. Contributing to the difficulty in comparing different studies in this field is the variation in measures of substance use outcomes, with some studies measuring abstinence while others measured reductions in use. Relatively few RCTs have been conducted, and the results of RCTs reviewed prior to 2013 found therapeutic communities had a negligible treatment effect (e.g. Malivert et al., 2012), or provided insufficient evidence to determine which treatment model was superior (when compared to other treatment modalities) (Smith et al., 2006). More recent reviews have found some limited support for the effectiveness of therapeutic communities for substance use, and a range of outcomes across other life domains (Reif et al., 2014; Vanderplasschen et al., 2013). Reviews of integrated mental and substance use residential treatment have also found inconclusive evidence of effectiveness (Brunette et al., 2004; Cleary et al., 2009; Drake et al., 2004).

While prior reviews provide some support for long-term residential treatment, the quality of studies reviewed have been predominantly poor, with a number of significant limitations remaining an obstacle to determining effectiveness. These limitations include: heterogeneity across studies regarding design, participant characteristics, treatment setting, measures of substance use, and timing of follow-ups (Cutcliffe et al., 2016). Further, while length of treatment has frequently been identified as essential in predicting the likelihood of recovery (i.e. longer treatment time related to better outcomes), high attrition at follow-up presents a significant limitation when interpreting study results. Those that are followed-up are likely to have better outcomes, as they are contactable (i.e. not in prison, hospitalized, deceased or simply uncontactable) which introduces attrition bias. Multicomponent treatment models and the varying descriptions reported in previous studies have also contributed to gaps in knowledge of the key components driving the therapeutic effect. These limitations impact on the ability to determine if residential treatment services are effective (and cost-effective), and if so, under what conditions (King et al., 2016).

This systematic review aims to provide an update on the evidence base for the residential treatment of substance use disorders in order to identify the most effective models of care, their core components, and promising directions for future research and clinical practice. Studies published between 2013 and 2018 reporting substance use, mental health, mortality, crime, and/or social outcomes were included. The methodological quality of studies was assessed.

2. Method

2.1. Search strategy

To identify published studies reporting on the effectiveness of residential treatment for substance use disorders, a systematic literature search of public health and psychology databases was conducted. Databases included Medline, CINAHL, PsycARTICLES and PsycINFO. Search strings did not place any restriction on study design. Two search strings were used—one for the title, and one for the abstract—using truncation, and Boolean and proximity operators. The search was limited to title and abstract, and did not include grey literature. Date of publication was between 1 January 2013 and 31 December 2018.

The search string was: TI (residential OR therapeutic communit*) AND TI (intervent* OR treat* OR rehabilitat* OR *therap* OR counsel*) AND ((substance OR drug OR alcohol OR illicit*) W3 (addict* OR abuse OR depend* OR disorder OR us* OR misuse OR treat*)) AND TI (effect* OR impact* OR outcome*) NOT TI (child* OR adolescent* OR teen* OR juvenile* OR meta* OR review) OR AB (residential OR therapeutic communit*) AND AB (intervent* OR treat* OR rehabilitat* OR *therap* OR counsel*) AND AB ((substance OR drug OR alcohol OR illicit*) W3 (addict* OR abuse OR depend* OR disorder OR us* OR misuse OR treat*)) AND AB (effect* OR impact* OR outcome*) NOT AB (child* OR adolescent* OR teen* OR juvenile* OR meta OR review). Forward and backward snowballing was conducted to identify any additional studies not captured by the search.

2.2. Inclusion and exclusion criteria

Studies were included if they assessed the effectiveness of residential AOD treatment programs for adults (aged 18 years and over), and were published in the English language, during the specified time period in peer-reviewed journals. Studies were excluded if they were qualitative, the treatment setting was not community-based (e.g. prison or psychiatric hospitals), and if the population were under 18 years old.

2.3. Methodological quality assessment

The Effective Public Health Practice Project's (EPHPP) Quality Assessment Tool for Quantitative Studies (Thomas et al., 2004) was used by two independent raters (DD, RE) to assess the methodological quality of studies. Discrepancies were discussed to meet an agreed rating. This tool has high construct validity, content validity and inter-rater reliability (Thomas et al., 2004). Each study received a 'strong,' 'moderate' or 'weak' rating for each of the following six criteria: selection bias, study design, confounders, blinding, data collection method, and withdrawals. An overall rating was then assigned based on set rating criteria (Thomas et al., 2004). To be considered 'strong' overall, a study could not have a weak rating for any criteria. A 'moderate' study could have only one weak rating. A 'weak' study could have two or more weak ratings. A 'not applicable' rating was assigned for criteria that did not apply to the study design (e.g. blinding in studies using data linkage; confounders for observational cohort studies). A meta-analysis was not possible due to few high-quality studies and heterogeneity in treatment and outcomes reported (Valentine et al., 2010).

3. Results

3.1. Search results and quality assessment

An initial search of literature published between 1 January 2013 and 31 December 2018 located 830 publications through database searching that met keyword search criteria, and a further four using snowballing techniques. Of these 834, 415 were duplicates. Of the remaining 419, 364 were excluded based on the abstract review, resulting in 55 publications for full-text review. An additional 31 were excluded as the population, intervention, or outcomes did not meet inclusion criteria, or they did not report study results (i.e. protocol paper). A final 23 studies (reported in 24 publications) were included in the review. The publication retrieval process is detailed in Fig. 1, following PRISMA guidelines (Moher et al., 2009) (Supplementary Table 1).

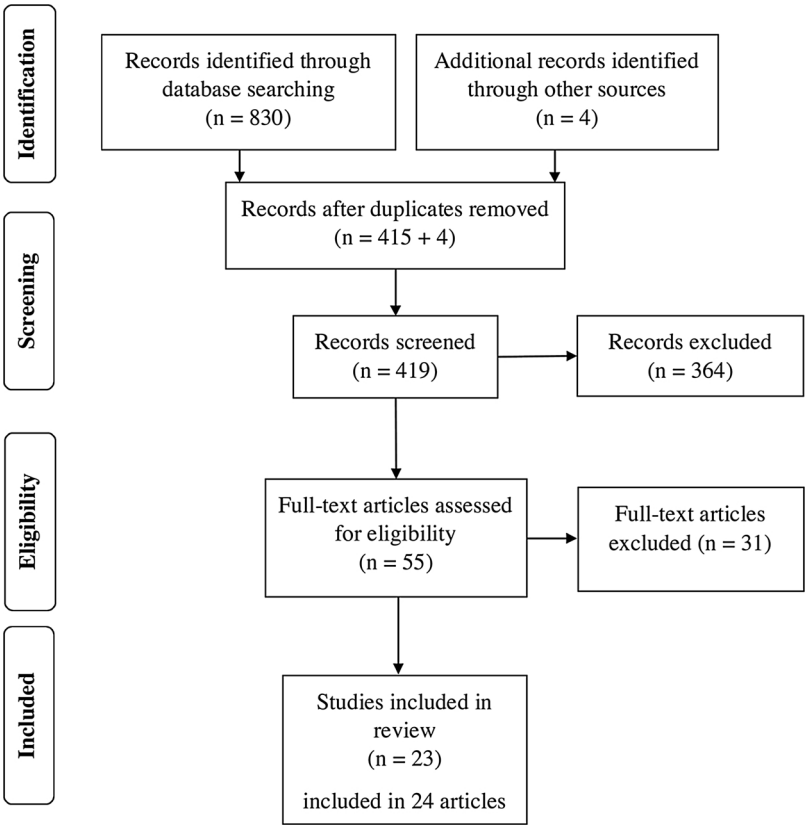

Fig. 1. PRISMA diagram of study retrieval process.

The 23 included studies are summarized in detail in Supplementary Table 2. Of the 23 studies, five were conducted in Australia, with the remaining conducted in the USA (9), New Zealand (2), England (2), South Africa (1), Brazil (1), Czech Republic (1), Scotland (1), and Iran (1). Twenty-one of the 23 studies included both male and female participants, with the remaining two studies including only male participants. Three studies focused on treatment for young adults (18–24 years) (Bergman et al., 2014; Morse and MacMaster, 2015; Schuman-Olivier et al., 2014). Three studies focused on treatment of alcohol dependence (Lookatch et al., 2017; Schoenthaler et al., 2017; Willey et al., 2016) and three studies on treatment of opioid dependence (Morse and MacMaster, 2015; Schuman-Olivier et al., 2014; Teesson et al., 2017). The core treatment components of the residential programs are summarized in Supplementary Table 3, based on the information extracted from articles and emails to all authors requesting additional information.

Four of the 23 studies compared residential treatment or therapeutic communities to other types of treatment including pharmacotherapy (Babaie and Razeghi, 2013; Lloyd et al., 2017; Teesson et al., 2017; Willey et al., 2016), two compared residential treatment to either inpatient withdrawal (Eastwood et al., 2018) or outpatient treatment (Myers et al., 2018), three compared residential treatment to residential treatment with adjunctive therapies (Daughters et al., 2018; Davis et al., 2018; Roos et al., 2018), five examined the effectiveness of integrated residential treatment (Bergman et al., 2014; McGuire et al., 2018; Morse and MacMaster et al., 2015; Rome et al., 2017; Schoenthaler et al., 2017), and the remaining nine studies followed a cohort through residential treatment (do Carmo et al., 2018; Lookatch et al., 2017; Patterson et al., 2018; Schuman-Olivier et al., 2014) or treatment as part of a therapeutic community (Deane et al., 2013; Harley et al., 2018; King et al., 2016; Šefránek and Miovský, 2017, 2018; Turner and Deane, 2016).

The 23 studies were assessed for quality (see Table 1). Eight were rated methodologically weak (Babaie and Razeghi, 2013; do Carmo et al., 2018; Lookatch et al., 2017; Morse and McMaster, 2015; Myers et al., 2018; Patterson et al., 2018; Schoenthaler et al., 2017; Šefránek and Miovský, 2017, 2018), five were moderate (Deane et al., 2013; King at al., 2016; McGuire et al., 2018; Roos et al., 2018; Turner and Deane, 2016), and ten were rated as strong (Bergman et al., 2014; Daughters et al. 2018; Davis et al., 2018; Eastwood et al., 2018; Harley et al., 2018; Lloyd et al., 2017; Rome et al., 2017; Schuman-Olivier et al., 2014; Teesson et al., 2017; Wiley et al., 2016).

3.2. Effectiveness of residential treatment

Results in Table 2 suggest that recent studies provide consistent support for residential treatment (including therapeutic communities and integrated mental health treatment) across various outcomes. However, many of these studies suffer from a range of methodological flaws and high attrition at follow-up. Two strong quality studies (RCT and cohort analytic) found no significant effect on at least one outcome, or one outcome for the control arm (residential treatment).

Turner and Deane (2016) identified clinical and reliable change on a range of psychological recovery and wellbeing outcomes for those participants that stayed on average 37.37 days longer than those who experienced no change. Furthermore, a significant change in wellbeing and recovery was between 1.5 and 2.5 times more likely to occur by 90 days, with each 90-day period beyond this time further increasing the probability of reliable change (Turner and Deane, 2016). However, only 34% of 380 participants completed the three-month follow-up.

3.3. Treatment model comparison

Eight studies compared the effectiveness of different types of treatments across a number of outcomes (Babaie and Razeghi, 2013; Daughters et al., 2018; Davis et al., 2017; Eastwood et al., 2018; Lloyd

Table 1
Study ratings using EPHPP criteria.

Study	Selection bias	Study design	Confounders	Blinding	Data Collection	Withdrawals	Global rating
Babaie and Razeghi (2013) Iran	M	M	W	M	S	W	W
Bergman et al., 2014 USA	M	M	S	N/A	S	M	S
Daughters et al. (2018) USA	S	S	S	S	S	S	S
Davis et al., 2018 USA	S	S	S	M	S	M	S
Deane et al., 2013 Australia	M	M	N/A	N/A	S	W	M
do Carmo et al., 2018 Brazil	M	M	N/A	N/A	W	N/A	M
Eastwood et al., 2018 UK	S	M	S	N/A	S	S	S
Harley et al., 2018 Australia	M	M	N/A	N/A	S	S	S
King et al., 2016 New Zealand	S	M	N/A	N/A	S	W	M
Lloyd et al. (2018) Australia	S	M	S	N/A	S	N/A	S
Lookatch et al. (2017) USA	W	M	N/A	N/A	S	W	W
McGuire et al., 2018 USA	W	M	N/A	N/A	S	S	M
Morse and MacMaster, 2015 USA	W	M	W	N/A	S	W	W
Myers et al., 2018 South Africa	W	M	N/A	N/A	W	N/A	W
Patterson et al., 2018 New Zealand	W	M	N/A	M	S	W	W
Rome et al., 2017 Scotland	M	M	N/A	N/A	S	M	S
Roos et al., 2018 USA	W	M	N/A	N/A	S	S	M
Schoenthaler et al., 2017 USA	W	M	N/A	N/A	S	W	W
Šefránek and Miovský (2017), 2018 Czech Republic	W	M	N/A	W	S	M	W
Shuman-Olivier et al. (2014) USA	M	M	S	N/A	S	M	S
Teesson et al., 2017 Australia	M	M	N/A	N/A	S	M	S
Turner and Deane (2016) Australia	M	M	N/A	N/A	S	W	M
Willey et al., 2016 UK	S	M	S	N/A	S	N/A	S

Abbreviations S – Strong; M – Moderate; W – Weak; NA – Not applicable.

et al., 2017; Myers et al., 2018; Roos et al., 2018; Teesson et al., 2017; Willey et al., 2016). Overall, residential rehabilitation was found to be an effective treatment for substance dependence.

Two studies compared three types of treatment: residential treatment, pharmacotherapy and detoxification. The first was a strong quality longitudinal Australian study that focused on heroin dependence (Teesson et al., 2017). Residential treatment was found to be associated with significant improvements in heroin abstinence in the month prior to follow-up over the 11 years (OR = 1.68; 95% CI = 1.31, 2.15). Significant improvements were also observed across other outcomes, including criminal activity, mental health, and physical health. Residential treatment was the only treatment modality related to improved physical health. These results were in contrast to the findings of a strong study by Willey et al. (2016), which used data linkage to examine offending behavior in a large cohort at two years post-discharge from treatment for alcohol dependence. Results showed residential treatment was the only treatment type that had no significant impact (pre-post) on number of offences committed (Willey et al., 2016). One other strong study utilized retrospective data linkage to compare the effectiveness of different treatment modalities (Lloyd et al., 2017). Service users that engaged in residential withdrawal as their last type of treatment recorded presented the highest risk of death in the first-year post-discharge, followed by residential rehabilitation.

In the only study to compare therapeutic communities to residential treatment (with pharmacotherapy as a third group), Babaie and Razeghi, 2013 weak quality study found long-term treatment (> 6-months) outcomes of the therapeutic community to be superior to other treatment. One study compared outpatient treatment to residential treatment (Myers et al., 2018), examining treatment completion and abstinence rates at discharge (as judged by clinicians). Participants that received residential treatment were more likely than outpatients to complete treatment (*AOR* = 17.84; 95% CI = 8.91, 35.73), and be considered abstinent (*AOR* = 10.55; 95% CI = 5.84, 19.06). In Eastwood and colleague's (2018) strong study they compared outcomes of inpatient withdrawal treatment, residential treatment and the combination of both using English national administrative data. Results showed that the combination of inpatient withdrawal and residential rehabilitation significantly increased the likelihood of no re-presentation to AOD treatment services within 6-months of index treatment completion. Odds of successful completion and no-representation were further improved for clients who received structured outpatient care following residential treatment.

Table 2
Summary of Study Outcomes.

Rating	Study	Intervention	Outcomes				
			Substance use	*Social*	*Criminal activity*	*Mental health*	*Mortality*
W	Babaie and Razeghi (2013) Iran	TC (ref) vs. RT vs. MMT		+		+	
S	Bergman et al., 2014 USA	IRT: SUD vs COD	+			+	
S	Daughters et al. (2018) USA	RT + LETS ACT vs RT + SC	+	+		=	
S	Davis et al., 2018 USA	RT + MBRP vs TAU (RT + ANA)	+			+	
M	Deane et al., 2013 Australia	Modified TC	+	+	+	+	
M	do Carmo et al., 2018 Brazil	RT	?	?			
S	Eastwood et al., 2018 England	IW vs RT vs IW + RT	+				
S	Harley et al., 2018 Australia	TC		+		+	
M	King et al., 2016 NZ	Modified TC	+	+		+	
S	Lloyd et al., 2017 Australia	RT vs other treatments					–
W	Lookatch et al. (2017) USA	RT – 12 step based				+	
M	McGuire et al., 2018 USA	IRT (day program with housing)	+			+	
W	Morse and MacMaster, 2015 USA	IRT	+	+	+	+	
W	Myers et al., 2018 South Africa	RT vs outpatient	+				
W	Patterson et al., 2018 NZ	RT	+	+	+	+	
S	Rome et al., 2017 Scotland	Integrated TC	+	+	+	+	
M	Roos et al., 2018 USA	Rolling MBRP in RT				+	
W	Schoenthaler et al., 2017 USA	IRT	+	+	+	+	
W	Šefránek and Miovský (2017), 2018 Czech Republic	TC	+		+		
S	Schuman-Olivier et al., 2014 USA	RT	+			+	
S	Teesson et al., 2017 Australia	RT vs. MT vs. detox vs. MT with detox	+		+	+	
M	Turner and Deane (2016) Australia	Modified TC	+	+	+	+	
S	Willey et al., 2016 UK	RT vs. IW vs. Community Setting Psychological therapy vs. CBP			=		

Abbreviations: RTResidential Treatment; IWInpatient withdrawal; MTMaintenance therapies; detoxdetoxification; TCTherapeutic community; IRTIntegrated Residential Treatment; LETS ACTLife enhancement treatment for substance use; SCSupportive counselling; MBRPMindfulness-based relapse prevention; ANA Alcoholic and Narcotics Anonymous; Wweak; Mmoderate; Sstrong; +significant positive effect; -significant negative effect; =no significant effect; CBPCommunity-based pharmacotherapy;? statistical significance of findings unknown.

Three studies examined the outcomes of residential treatment with and without adjunctive therapy – life enhancement treatment for substance use (Daughters et al., 2018) or mindfulness-based relapse prevention (Davis et al., 2018; Roos et al., 2018). Studies by Daughters et al. (2018) and Davis et al. (2018) were strong quality RCTs with extensive follow-up (and low attrition) and reported significant improvements across all treatment groups in multiple life domains. The cohort analytic study by Roos et al. (2018) was of strong quality, reporting significant improvements (for those who attended two or more sessions of mindfulness-based relapse prevention) relating to substance cravings, and across a range of mental health outcomes.

3.4. Core treatment components

Of the ten studies that were rated as strong, four examined specific residential treatment service models that included withdrawal and/or medication management (Bergman et al., 2014; Eastwood et al., 2018; Rome et al., 2017; Schuman-Olivier et al., 2014). Two of the five studies rated as moderate provided medical services (McGuire et al., 2018; Roos et al., 2018). The majority rated as strong or moderate quality studies (n = 11/15 studies) examined specific models that incorporated psychological treatment (individual and/or group), consisting of motivational interviewing, CBT, and/or mindfulness-based techniques. Sessions were generally 1–2 times/week, with a total of approximately 8–12 sessions delivered; however, longer therapy and possibly more intensive models were described in the moderately rated studies (up to 10 months). Three studies also included family therapy/support (King et al., 2016; Rome et al., 2017; Schuman-Olivier et al., 2014). Auxiliary services (provided in 7/15 studies) primarily included providing spiritual guidance and a range of social, employment, and sexual health supports.

3.5. Substance use outcomes

Seventeen of the 23 studies reviewed reported substance use outcomes. Most showed improvements in substance use over time following residential treatment. Three studies examined substance use outcomes for programs targeting co-existing mental illness (Bergman et al., 2014; McGuire et al., 2018; Schoenthaler et al., 2017). In Bergman et al., 2014 strong cohort analytic study of young adults with co-existing mental illness and substance use disorder only, results showed significant improvements for both groups, and no significant between group differences. Percentage of days abstinent at the 3-month follow-up (81% retention) was 94% and 92% respectively; and by the 12-month follow-up (71% retention), was 78% and 86% respectively. In Schoenthaler et al. (2017) weak cohort study on adults with co-existing alcohol dependence and mental illness, abstinence rates at the 6 and 12-month follow-ups were 68% and 65% respectively, with 78% of participants completing at least one follow-up. McGuire et al.'s (2018) moderate quality cohort study on male veterans reported 100% abstinence at discharge.

An 18-week therapeutic community program also reported a high abstinence rate at 12-months of 80% but had a much lower follow-up rate of 47% (King et al., 2016). Furthermore, 82% of those followed-up at 12-months were treatment completers (completion rate including leaving with staff approval or transfer was 45% of the sample). Another cohort study within a therapeutic community setting (Šefránek and Miovský, 2017, 2018) reported abstinence rates of 88% or more across a range of illicit drugs at their 12-month follow-up (with a 78% participant retention rate).

Abstinence rates (over past 90 days) in a youth residential treatment study were much lower, with rates of 43%, 31% and 42% at the 6-month follow-up (73% retention) for opioid dependence, opioid misuse and non-opioid use respectively (Schuman-Olivier et al., 2014). By the 12-month follow-up (71% retention), abstinence rates (over the past 180 days) were 29%, 22% and 32% respectively. Results were significantly better for those that received social support such as a 12-step sponsor (Schuman-Olivier et al., 2014).

Two high quality RCT studies which enhanced the effects of resident treatment through adjunctive therapy found improvements in substance use outcomes in both the treatment and controls groups, but the initial improvements in the control group (residential treatment as usual) were not sustained over follow-up (Daughters et al., 2018; Davis et al., 2018). In two weak quality cohort studies (Myers et al., 2018; Patterson et al., 2018) significant improvements in abstinence were either: 1) reported by participants at the end of treatment and at 3-month follow-up (Patterson et al., 2018); or, 2) were perceived improvements made by clinicians at discharge (Myers et al., 2018). In the latter large South African study, clients of residential treatment services were significantly more likely to be considered abstinent at discharge than those attending outpatient services (Myers et al., 2018). One further Brazilian study of weak quality (do Carmo et al., 2018) only measured post-treatment substance use at discharge, testing urine samples of the 69 participants twice weekly, resulting in 43/1283 positive tests. Relapse rates were much higher than studies using self-report data, with 49% of participants relapsing at least once during treatment.

Five studies reporting substance use outcomes utilized the Addiction Severity Index (ASI) to measure substance use at baseline and follow-up. The ASI is a highly utilized semi-structure interview that aims to evaluate the severity of an individual's health across seven life domains: medical status, employment/support status, substance use, legal status, family/social relationships and psychiatric status (McLellan et al., 1992). All studies found a significant reduction ($p < .05$) on both substance use outcomes at follow-up, regardless of the treatment model, population or follow-up length used. Moreover, significant reductions ($p < .05$) in substance use were evident across multiple studies between baseline and 1-month follow-up (Schoenthaler et al., 2017); 3-month follow-up (Deane et al., 2013; Turner and Deane, 2016), 6-month follow-up (Morse and MacMaster, 2015; Rome et al., 2017; Schoenthaler et al., 2017) and 12-month follow-up (Rome et al., 2017; Schoenthaler et al., 2017).

3.6. Mental health outcomes

Seventeen of the 23 reviewed studies reported on mental health outcomes such as psychological distress, post-traumatic stress disorder (PTSD), depression, anxiety, stress and general mental health. Four studies (two studies of weak and two moderate quality) reported statistically significant improvements in ASI (or ASI-X or ASI-MV) composite scores for mental health ($p = < .05$) at follow-ups (Deane et al., 2013; Patterson et al., 2018; Schoenthaler et al., 2017; Turner and Deane, 2016).

One weak quality US-based study on a 28-day program for alcohol dependence found significant improvements in client cognitive and psychological functioning (emotion, thinking, feeling and self-regulation) at discharge (Lookatch et al., 2017). Results also indicated that improvements in feeling and self-regulation was greatest for those with more severe dependence. One strong Australian study of a therapeutic community with significantly longer median length of stay (16 weeks), showed reductions ($p < .001$) in depression, anxiety and stress to levels considered to be within normal ranges by discharge for program completers (Harley et al., 2018).

Five studies which focused on integrated mental health treatment reported significant improvements regarding the mental health of clients post-discharge. The first study reported significant and maintained declines in psychiatric symptoms for participants with co-existing mental and substance use disorders, with high retention across follow-ups at 3-months (81%), 6-months (73%) and 12-months (71%) post-discharge (Bergman et al., 2014). The second study reported a reduction in the rates of co-existing mood disorder and substance dependence at each follow-up (1, 6 and 12-months post-discharge) for individuals with alcohol dependence (Schoenthaler et al., 2017). The third study examined outcomes of male veterans receiving integrated mental health treatment for comorbid PTSD and substance use disorder. All 29 participants stayed in the 6-week day program (with organized housing) and were found to have significant ($p = < 001$) improvements in resilience and PTSD symptoms at discharge (McGuire et al., 2018). Two further studies (Morse and MacMaster, 2015; Rome et al., 2017) reported statistically significant improvements in ASI and ASI-X composite scores for mental health ($p = < .05$) at follow-ups.

Three studies investigated the effectiveness of adjunctive therapies in residential drug treatment settings. The first was an RCT comparing two adjunctive therapies – life enhancement treatment for substance use and supportive counselling (control). Results showed no change in depression symptoms in either groups pre-post (Daughter et al., 2018). The other two studies tested mindfulness-based relapse prevention in a two-arm RCT (Davis et al., 2018), and a cohort analytic study (Roos et al., 2018). Both studies identified statistically significant reductions in cravings, and improvements in other mental health outcomes in the treatment arm (Davis et al., 2018; Roos et al., 2018).

3.7. Social outcomes

Social outcomes were measured in eleven studies, all reporting positive outcomes. In one study of Iranian males, a minimum stay of six months in a therapeutic community was associated with improved quality of life compared to standard residential treatment and pharmacotherapy (Babaie and Razeghi, 2013). However, this study suffered from high attrition at follow-up particularly in the therapeutic community (44% retention) and pharmacotherapy (29% retention) groups. A much shorter program (18-weeks, with 12-week average length of stay) delivered in a New Zealand-based therapeutic community was also found to result in significant improvements on a range of social

indicators at three-month follow-up (King et al., 2016). One Australian study on a therapeutic community with a similar average length of stay (16 weeks) found significant improvements in satisfaction with finances at discharge (Harley et al., 2018). In a Brazilian study of a residential treatment facility treating crack cocaine dependence (do Carmos et al., 2018), 97% of the 69 clients were unemployed on admission, while 80% of treatment completers (28/69) were employed following discharge.

Six studies (three studies of weak, two moderate and one strong quality) reported statistically significant improvements in Addiction Severity Index (including ASI-X and ASI-MV) composite scores for family and social relationships ($p = < .05$) (Deane et al., 2013; Morse and MacMaster, 2015; Patterson et al., 2018; Rome et al., 2017; Schoenthaler et al., 2017; Turner and Deane, 2016). However, only Turner and Deane (2016) and Patterson et al. (2018) found significant improvements in participants' employment composite score.

3.8. Criminal activity outcomes

Nine studies reported criminal activity as an outcome – four of weak, three of moderate and two of strong quality. Six of these studies measured clinically and statistically significant changes in Addiction Severity Index (including ASI-X and ASI-MV) legal domain scores between baseline and follow-up, indicating a significant reduction in criminal activity (Deane et al., 2013; Morse and MacMaster, 2015; Patterson et al., 2018; Rome et al., 2017; Schoenthaler et al., 2017; Turner and Deane, 2016).

The three other studies had a significant focus on criminal activity as an outcome. One strong Australian study on heroin users found commencing residential treatment during the 11-year follow-up was related to not engaging in criminal activity (Teesson et al., 2017). Approximately 96% of participants in this study completed at least one follow-up. In a weak Czech Republic study (Šefránek and Miovský, 2017, 2018) that focused on the effectiveness of the therapeutic community model, participants reported significant reductions in criminal activity at 12-month follow-up, specifically for acquisitive crime ($p < .0005$) and drug-related crime ($p < .0005$). A reported 78% of participants responded to the follow-up.

Finally, in a strong quality study by Willey et al. (2016) with conflicting results, more than 53,000 alcohol dependent individuals in treatment (residential treatment, inpatient detoxification, community-based pharmacotherapy) were followed-up for two years post-discharge. Records were linked to national police data and showed significant reductions in recorded offences following inpatient detoxification and community-based pharmacotherapy programs but not residential treatment.

3.9. Mortality outcomes

One study examined mortality as an outcome. The strong Australian study utilized retrospective data linkage to compare the effectiveness of different treatment modalities. Results showed that service users that engaged in residential services as their last type of treatment recorded had an increased risk of death in the first-year post-discharge (Lloyd et al., 2017). Residential withdrawal (detoxification) presented the highest risk of death, followed by residential rehabilitation.

4. Discussion

Twenty-three studies evaluating the effectiveness of residential treatment services (published between 1 January 2013 and 31 December 2018) were identified and reviewed. Overall, some evidence that residential treatment (including therapeutic communities) improves substance use and mental health was found. There were less studies reporting on offending and social outcomes (i.e. social engagement, employment). Results largely suggested that residential treatment is associated with significant social improvements. Only one study focused on mortality as an outcome. Most studies were of moderate or strong quality, however, only three RCTs were identified (two strong and one weak quality).

Prior reviews which compared the effectiveness of residential treatment models (including therapeutic communities) found conflicting results (Reif et al., 2014; Smith et al., 2006). The results of this review suggest that most types of residential treatment have some positive impact. A number of prior reviews on integrated treatment models for comorbid mental illness and substance dependence found improvements in substance use, mental health, social functioning, and perceived quality of life outcomes (Brunette et al., 2004; Cleary et al., 2009; Drake et al., 2008; Smith et al., 2006; Vanderplasschen et al., 2013). The five studies included in this review which trialled and evaluated integrated treatment models also found positive effects (Bergman et al., 2014; McGuire et al., 2018; Morse and McMaster et al., 2015; Rome et al., 2017; Schoenthaler et al., 2017), providing further evidence of the effectiveness of an integrated treatment approach for high needs and comorbid populations.

There was significant variance in treatment components across the studies. Treatment length of programs varied from 28 days to 12 months. For example, three studies reported significant reductions in substance use at follow-up after approximately four weeks of residential treatment (Bergman et al., 2014; Morse and McMaster et al., 2015; Shuman-Olivier et al., 2014), while four studies reported improvements following average treatment periods of at least three times that length (Deane et al., 2013; Eastwood et al., 2018; King et al., 2016; Rome et al., 2017). Further, the limited evidence available on adjunctive therapy in these settings suggests it may enhance these positive effects. Only half of the studies included information on medical management. The majority of these studies incorporated psychological therapy including CBT, mindfulness, and/or motivational interviewing components of up to 12 sessions, suggesting that psychological support (individuals and/or group) is an important component of residential treatment. While the availability of a range of treatment approaches may provide services with more options, standardization of treatment components in future research could help strengthen the evidence base and guide development of more targeted treatments. Future studies should also examine the cost-effectiveness of various treatments.

Several indicators of improvements in the methodological quality of recent research were identified. A growing number of studies used the Addiction Severity Index to measure change in substance use. This not only improved the comparability of substance use outcomes across studies but enabled the examination of treatment impacts on a range of life domains. An increase in the number of studies reporting mental health outcomes was also observed. Despite this, the effectiveness of residential treatment on some social outcomes such as housing remain under-researched. While there has been some improvement in the quality of published studies over time, studies in this field continue to suffer from methodological shortcomings which limit study conclusions and translation of the evidence base into practice.

4.1. Limitations

Across the 23 studies, attrition was high in seven studies, and particularly evident in two studies (Deane et al., 2013; Turner and Deane, 2016). While many studies reported methodological shortcomings (see PRISMA] 1), specific limitations included small sample sizes (e.g. Babaie and Razeghi, 2013; McGuire et al., 2018) and the use of self-report data only. Further, 20 of the 23 studies reviewed were conducted in developed countries, impacting the generalizability of the findings. The three studies conducted in developing countries (Babaie and Razeghi, 2013; do Carmo et al., 2018; Myers et al., 2018) were of weak quality. While we also examined the core treatment components in the high and moderate quality studies, there were significant gaps in the level of detail provided on the treatment content, the number and

length of sessions, or how the various components were delivered. These limitations impact on the generalizability and replicability of results, and translation to practice.

4.2. Implications for best practice

4.2.1 Length of Treatment and Continuing Care. Prior studies and reviews were cautious about suggesting the optimal length of stay in treatment, particularly considering the diverse populations accessing residential treatment. One study included in this review concluded that 90 days results in significant benefits. However, this study had high attrition rates at follow-up (Turner and Deane, 2016). Further, three studies included in this review found significant treatment effects with 28-day programs, suggesting that residential treatment can have a significant and lasting impact on substance use behavior in a relatively short amount of time.

Treatment retention, completion and continuing care post-discharge have been found to be significant predictors of recovery (Eastwood et al., 2018; King et al., 2016; Malivert et al., 2012; Rome et al., 2017; Vanderplasschen et al., 2013) However, little is known about what variables increase treatment retention or completion and very few studies have tested the effects of continuing care. More rigorous studies using designs tailored to clinical research (e.g. multi-site RCTs) are required to determine the ideal type and length of continuing care required to maintain the benefits of residential treatment.

4.2.2 Integrated Mental Health Treatment. The results of both the current and previous reviews found integrated mental health and substance use residential treatment models (including therapeutic communities) had positive substance use and mental health outcomes for individuals with comorbid disorders. There is a clear need for integrated mental health treatment. For example, in Australia, an estimated 64%–71% of people in residential treatment for a substance disorder are diagnosed with a mental illness (Mortlock et al., 2011). Although there is good evidence that integrated mental health treatment is effective, it is estimated that only 12% of residential substance abuse services across three major Australian states and territories have the capacity to provide it (Matthews et al., 2011).

4.2.3 Holistic Approach. Recent studies in the field have expanded beyond substance use to examine a much broader range of outcomes related to the complex needs of those with substance dependence (e.g. addiction, social relationships, criminal activity, mental health, housing, employment). Results of this review suggest that residential substance use treatment presents an important opportunity to improve the physical and mental health, criminal justice, and social functioning outcomes of people with substance dependence. Coupled with the emerging empirical support for integrated mental health and substance use treatment, findings point to the need for a holistic approach to practice. In addition to aftercare, pre-care may be beneficial, and is an area that requires further investigation.

4.3. Implications for research

A number of studies provide good evidence that tracking client outcomes over time post-discharge through use of validated assessment measures can provide important insights into recovery trajectories (e.g. Bergman et al., 2014; King et al., 2016; Schoenthaler et al., 2017). However, attrition from research follow-ups was a major methodological limitation for many studies. In addition, five studies only measured post-treatment outcomes at discharge, with no follow-up in the community.

In this review, the two strong quality data linkage studies comparing various treatment modalities to measure mortality (Lloyd et al., 2018) and offending behavior (Willey et al., 2016) both found residential services resulted in poorer outcomes than other treatment modalities – possibly related to severity of substance dependence (Lloyd et al., 2018).

To date, no studies have combined the linkage of administrative data in conjunction with research follow-ups to explain and control for a (very important) proportion of attrition (such as loss at follow-up due to hospitalization, incarceration or death). Future studies should utilize administrative data from health, justice and social service agencies which presents a passive method of obtaining a new and reliable set of outcome measures related to client recovery. Specifically, these measures can be used to examine risk factors and patterns of service contact for health and offending behaviors, improve the quality of cost-effectiveness analyses, and highlight opportunities over the life course for early intervention.

5. Conclusion

Despite the growing need for effective residential substance use treatment internationally, the field continues to lack consensus-based best practice treatment guidelines. In line with previous reviews, this review on the most recent studies in the field (2013–2018) provides moderate quality evidence that residential treatment may be effective in reducing substance use and improving mental health. There is also some evidence that treatment may have a positive effect on social and offending outcomes. However, there remains a compelling need to conduct more research in this field that can address significant methodological flaws (particularly attrition) and test multicomponent service models. The challenges of conducting research in this setting may be partially overcome by the use of data linkage practices to monitor outcomes. With caution, current results point to a best practice approach to residential treatment that integrates mental health treatment, takes a holistic approach to improving the overall health and wellbeing of the individual (beyond substance dependence), and provides continuity of care post-discharge. While there is some evidence of improved quality of studies in the field, there continues to be a strong need for investment in high quality research in residential drug treatment settings (particularly in developing countries) that translates to meaningful change in policy and practice.

6. Contributors

Dominique de Andrade designed and conducted the search strategy, assessed full-text papers for eligibility, rated the methodological quality of included studies, conducted data extraction, and drafted the paper. Rachel Elphinston assisted with the drafting of the introduction and abstract, screening studies eligible for final inclusion (second study rater), contacted authors for program details and provided edits on the drafts and final manuscript. Catherine Quinn and Julaine Allan assisted with the design of the study and provided feedback and edits on the drafts and final manuscript. Leanne Hides oversaw the review, providing advice on the design of the review, and eligibility of papers, and made significant edits to draft copies of the review and final manuscript. All authors approved the final manuscript prior to submission.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.drugalcdep.2019.03.031.

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