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Effect of Assertive Community Treatment for Patients with Substance Use Disorder: A Systematic Review

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Keywords
Addiction · Assertive community treatment · Out-patient treatment · Recovery · Substance use disorders

Abstract
Purpose: Substance use disorders (SUD) are an important health issue internationally. Traditional outpatient programmes often do not adequately address the substantial medical and social needs and in addition many patients have difficulties accessing the care needed. The assertive community treatment (ACT) model was originally developed for patients with a severe mental illness but has been adapted for patients with SUD by integrating specific SUD treatments into the traditional ACT model. This paper aims to assess the effectiveness of ACT for patients with SUD on a number of measures. ***Methods:*** We performed a systematic review of ACT interventions for patients with SUD by analyzing randomized controlled studies published before June 2017 found on the electronic databases PsychINFO, MEDLINE, PsychARTICLES. Eleven publications using 5 datasets were included in the analysis. Quality of studies was analyzed using the JADAD scale or Oxford quality scoring system. Outcome measures used were substance use, treatment engagement, hospitalization rates, quality of life, housing status, medication compliance and legal problems. Patients included in the studies had a diagnosis of SUD. Two datasets included homeless patients and 2 datasets included patients with high service use. ***Results and Conclusions:*** The results of the very few existing randomized control studies are mixed. Treatment engagement was higher for ACT in 4 datasets. One dataset reported higher service contact rates for the ACT group than for controls. In 2 datasets a positive effect on hospitalization rates was found. Higher fidelity to the ACT model appears to improve outcomes. Substance use reduced only in half of the datasets, of which only one showed a significant reduction in the ACT group. Overall, ACT is a promising approach that may be useful for promoting treatment engagement for patients with SUD. According to earlier studies on patients with severe mental illness, patients

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with high inpatient service use benefit most from this assertive approach. We hypothesize that a similar high need user group among patients with SUD might benefit most from ACT. Further research is needed to examine which types of clinical interventions might help difficult-to-engage patients with addictions.

Introduction

Substance use disorders (SUD) are an important health and societal issue across all cultures [1]. The need to improve treatments and outcomes is increasingly recognized and they rank highly in global estimates of burden of disease. Compared to the general population, individuals with psychiatric disorders have an increased risk for co-morbid SUD [2–8]. The US National Comorbidity Survey found that 50.9% of respondents with a lifetime mental disorder had a history of drug or alcohol addiction, while 51.4% of respondents with a lifetime drug or alcohol addiction had a history of mental disorder [9]. These dually diagnosed patients represent a heterogeneous population with many subtypes highlighting the complex relationship between the 2 disorders [10]. Patients with dual diagnosis experience higher rates of physical health problems, violent behaviour and suicidal behaviour [11] and a more chronic course of illness [12, 13]. They may also be more treatment-resistant than patients with single diagnosis according to observations of clinical samples [14, 15]. This can also be seen in the intensity of service use, for example, in emergency department (ED) visits and rates of hospitalization. Patients who have both SUD and a co-morbid psychiatric disorder use the ED more frequently than those with a single diagnosis [16–18]. ED visits are associated with higher hospitalization rates [19, 20]. Frequent ED visits are an inefficient use of limited health resources [21]. Despite this objectively high service use, co-morbid patients often perceive that their needs are unmet or only partially met [22]. In general, high ED visits indicate poor continuity of care [18]. Studies have shown that continuity of care has been associated with has less frequent readmissions to hospital units [23].

Evidence-based treatments for SUD include psychological interventions such as motivational enhancement treatment [24] and relapse prevention strategies [25]. In addition to treatment of withdrawal symptoms, pharmacotherapy may include substitution such as opioid agonist treatment [26, 27] and other options for alcohol use disorder [28].

For patients with dual diagnosis the treatment plan should include biological, psychological, and social interventions that target both the specific psychiatric and the SUD symptoms [10]. Integrated SUD and psychiatric treatments have shown improved patient outcomes [29].

As mentioned earlier some patients with SUD find it hard to access or maintain treatment in traditional treatment programs [30, 31]. Typically, patients with dual diagnosis are among this high need user group that has high intensity use of services such as hospitalizations and ED visits without being able to benefit sufficiently from existing outpatient programs. Traditional outpatient programmes often cannot fully address the needs of this group of high need users [32]. Studies have shown that patients with co-morbid mental health problems have lower treatment rates. This could be due to low perceived need and barriers to care [33]. In addition, Salyers and Tsemberis [34] state that the attitude with which the treatment is given is as important as the treatment itself. They underline the importance of working in full partnership with the patient to allow them to reach the recovery. The recovery process is loosely defined as being able to "live, work, learn and participate fully in community" [35].

For this reason, the need for alternative treatment programs has stimulated increased development of novel services and their evaluation. One of the most commonly used interventions for this group of patients is the "assertive community treatment" (ACT) model, originally developed by Stein and Test in the 1970s for people with psychotic illnesses [36].

ACT was originally developed for patients with severe mental illness and provides personalized community care by multidisciplinary teams [37]. The key elements of the ACT model are assertive engagement, delivery of services in the community, high intensity of services, holistic and integrated services by multidisciplinary teams, and continuity of care [38]. In order to provide a high intensity of care, the case loads are small and in the original model a 24 h service is provided. This last element has been adapted in some models [36, 37, 39, 40].

Its effectiveness has been demonstrated in several American studies [39]. In Switzerland, Bonsack et al. [41] showed that ACT can help reactivate a person's network and improve treatment adherence. They also reported reduced symptoms and improved relationships after the intervention. The ACT model has effectively reduced admissions and kept patients with severe mental health problems in contact with services [42]. The principal aims of ACT are to restore mental health care for people who are difficult to access by collaborating with relatives and

the wider network of an individual. It also aims to promote community involvement. Finally it promotes treatment adherence and partnership with families [36].

ACT has been used to treat patients with SUD and patients with dual diagnosis. As the model is designed to treat patients who have difficulties accessing treatment, it should be a useful approach for a high need user group of patients with SUD.

Some studies not dedicated to patients with SUD have already included patients with substance use (not necessarily SUD). For instance, a long-term ACT study on patients with schizophrenia [43] included participants (more than half) who were using substances several times a week for a long duration. Reviews on ACT for severe mental illness have shown that this treatment can reduce costs and reduce hospital use for patients with high use of in-patient care [44].

ACT has also demonstrated effectiveness in the management of people with first episode psychosis [45, 46].

The aim of this study is to review the studies designed to assess the effectiveness of ACT for patients with SUD.

Method

A systematic literature review was undertaken in accordance with guidelines outlined by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses [47].

Search Strategy

The electronic databases PsychINFO, MEDLINE and PsychARTICLES were searched for empirical studies published before June 2017. The following keywords were used: ("ACT" OR "assertive outreach treatment") AND ("addiction" OR "SUD" OR "substance abuse" OR "alcohol use disorder" OR "cannabis use disorder" OR "cocaine use disorder" OR "opioid use disorder").

Screen for Eligibility

Titles and abstracts of the initial search results were screened by 2 reviewers (L.P. and C.S.) independently. Articles that were dismissed only by 1 of the reviewers were downloaded together with articles deemed relevant by both reviewers. Two reviewers (L.P. and C.S.) screened the full texts independently to determine eligibility. The eligibility criteria were as follows: (1) randomized controlled trial, (2) adult participants over the age of 18 years, (3) SUD or dual disorder (SUD + another psychiatric disorder), (4) an ACT intervention compared to treatment as usual or compared to another treatment. Any doubts concerning inclusion eligibility that could not be resolved between the 2 reviewers (L.P. and C.S.) were discussed with a third reviewer (Y.K.).

Data Extraction and Summary

Data from the selected studies were tabulated in the following format: author and publication year, country, target population, number of subjects, Control intervention type, ACT intervention type, follow-up duration, specific outcome measures, and results. The extracted data were summarized using a narrative approach (Table 1).

Results

Study Selection

The initial search yielded 284 papers. After excluding duplicates 203 publications were initially screened. Only 25 studies were retained, and full texts were downloaded and after applying the eligibility criteria, a total of 11 papers were retained in the final review. The most common reasons for exclusion was SUD not being an inclusion criterion for the ACT intervention (Fig. 1).

Characteristics of Included Studies

Data extracted from the 11 publications is summarized in Table 1. Sample sizes varied considerably and ranged from $n = 87$ to $n = 203$. The 11 publications consisted of several sub-studies. We found several articles using the same study population looking at different outcome measures. Essock et al. [48], Frisman et al. [49] and Manuel et al. [50] use the same database. Another group consisting of Morse et al. [51], Calsyn et al. [52], and Lemming et al. [53] also worked on 1 study population. A third group is Drake et al. [54], McHugo et al. [55], and Clark et al. [56]. Therefore, in total we have 5 datasets including 741 patients in total.

The inclusion criteria varied between the studies. All patients had a diagnosis of SUD. Two datasets included homeless patients [48–53] and 2 datasets included patients with high service use [48–50, 57].

Most of the studies originate from the United States and one from the United Kingdom [58].

The services in the included studies all used the principals of ACT in their approach, with services provided in the community, assertive engagement, high intensity of services, small caseloads, 24 h responsibility (except Bond et al. [57] and Drummond et al. [58]), a team approach, and multidisciplinary working.

Quality of Analysis

We also measured the quality of the analysis according to the JADAD Scale [59], which is a rating system taking into account possible biases and methodological problems of studies (Table 2). This is also known as the Oxford quality scoring system. It evaluates randomization, blinding and description of the study population. Points can be subtracted for incorrect randomization or blinding. RCTs

Table 1. Characteristics of the included studies

Reference, country	Target population	Number of subjects	Control intervention	ACT interventions/ dose of ACT	Follow-up	Outcome measures	Results
Drummond et al. [58] 2017, UK	Adults with alcohol dependency and history of previous unsuccessful alcohol treatment attending	*n* = 94 ACT = 45 CG = 49	TAU in alcohol treatment service	ACT: manual-based, case load 15:1, multidisciplinary team (including SUD specialist and psychiatrist), Assertive engagement, focus on health and social needs, flexible approach focusing on patients' goal even if not OH, Regular contact (min. 1x/week) with 50% of contact outside service, preference short frequent contacts. 12 months of treatment.	6 and 12 months	Substance use (self-report), health utility, health related QOL, motivation to change, social network, health service utilization	Reduction in mean drinks per drinking day in both groups at 12 months, no statistical difference. Higher percentage of abstinence days in ACT group. At 6 months CG had significantly fewer alcohol related problems and health utility was significantly better for CG at 6 and 12 months. Higher use of alcohol day care services and outpatient services (12 months) in ACT group. At 6 months ACT group had fewer inpatient days, outpatient visits to non-alcohol-related services and significantly more GP visits. No difference at 12 months
Bond et al. [57], 1991, US	Adults with severe mental illness (70% schizophrenia) and SUD, age 18–45. Extensive use of hospital or crisis services over the previous year.	*n* = 97 ACT = 31 RG = 23 CG = 43	Standard aftercare provided by community mental health centers	ACT with home and community visits Reference group (focus on group intervention). 18 months of treatment.	6, 12, and 18 months	Number of hospital admissions and days in hospital, substance use (self-report), life satisfaction	After 12 and 18 months engagement significantly higher for ACT and RG clients. Hospitalizations were significantly lower for RG than ACT or CG at 6 months. At 12 months hospitalizations were lower for RG and CG than ACT. No differences in number of days in hospital. No change in alcohol use. Life satisfaction was higher in ACT and RG group.
Morse et al. [51], 2006, US	Homeless adults with severe mental illness and SUD.	*n* = 149 IACT = 46 ACTO = 54 CG = 49	Standard care: list of community agencies that provided mental health and substance abuse treatment	IACT: SUD treatment provided by specialist directly as part of the ACT team. ACTO: clients referred to other community providers for outpatient or individual SUD treatment. 24 months of treatment	Participants were interviewed monthly for 24 months, although not every variable was measured monthly	Treatment fidelity, frequency and quantity, client satisfaction, stable housing, psychiatric symptoms, substance use (self-report), service use, cost variables	IACT and ACTO participants were more satisfied with their treatment program and also reported more days in stable housing than CG participants. No significant differences in psychiatric symptoms and substance use. IACT and CG average total costs were significantly less than for the ACTO.
Calsyn et al. [52], 2005, US (from Morse 2006)	Homeless adults with severe mental illness and SUD.	*n* = 144 ACTO = ? IACT = ? CG = ? (Exact numbers of participants per group not clear.)	Standard care: list of community agencies that provided mental health and substance abuse treatment	ACT (ACTO) or Integrated Care (IACT) (ACT + SUD treatment by same team). 24 months of treatment	Data used from interviews at 6, 12, 18, and 24 months	Substance Use (self-report), substance-use-related offences, minor offences, major offences (criminal justice system data), days incarcerated, days in stable housing, psychiatric symptoms	Higher client satisfaction and stable housing, mental health for IACT and ACTO. No influence of treatment type on criminal behavior.

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Table 1. (continued)

Reference, country	Target population	Number of subjects	Control intervention	ACT interventions/ dose of ACT	Follow-up	Outcome measures	Results
Lemming et al. [53], 2004, US (from Morse 2006)	Homeless adults with severe mental illness and SUD.	*n* = 98 IACT = ? ACTO = ? (Exact numbers of participants per group not clear.)	This study compares IACT and ACTO. The control group was eliminated from this study, but the original study (Morse 2006) is RCT.	ACT (ACTO) or Integrated Care (IACT) (ACT + SUD treatment by same team). 24 months of treatment	Participants were interviewed monthly for 24 months, although not every variable was measured monthly. WAI assessed at 3 and 15 months	WAI (Working Alliance), client satisfaction, stable housing, psychiatric distress, psychiatric symptoms, substance use	Only little relationship between the strength of the working alliance and client outcome.
Essock et al. [48], 2006, US	Homeless or unstably housed adults with severe mental illness and SUD, who had high service use (2 or more of the following: psychiatric hospitalizations, stays in psy crisis program, ER visits, incarcerations) in the past 2 years.	*n* = 198 IG: *n* = 99 CG: *n* = 99	Standard clinical CM: comprehensive assessment, individual MI, group treatments, and stage-wise interventions	Three years of community-based ACT: direct substance abuse treatment by case managers and comprehensive assessment, individual MI, group treatments, and stage-wise interventions. Clinicians had half the patient load that they had for CG	3 years (every 6 months)	Substance use (self-report, clinician rating and toxicology screens), hospitalization rates, quality of life, dosage: contacts per month with clinician	Participants in both treatment conditions improved over time in multiple outcome domains, and few differences were found between the 2 models.
Frisman et al. [49] 2009, US (from Essock 2006)	Study participants were drawn from Essock et al., 2006, This analysis included 36 individuals with ASPD and 88 individuals without ASPD.	*n* = 124 36 individuals with ASPD and 88 individuals without ASPD.	Standard clinical CM, as Essock	Three years of community-based ACT: direct substance abuse treatment by case managers and comprehensive assessment, individual MI, group treatments, and stage-wise interventions. Clinicians had half the patient load that they had for CG	3 years (every 6 months)	Structured Clinical Interview for DSM-IIIR, Axis II personality, substance use (self-report, clinician rating and toxicology screens); hospitalization rates; QOL Interview; Dosage: contacts per month with clinician	Decreases in substance use were greater than would be expected given time alone. Integrated treatment can be successfully delivered either by assertive community treatment or by standard clinical CM.
Manuel et al. [50], 2011, US (from Essock 2006)	As Essock 2006.	*n* = 198	Standard clinical CM, as Essock	ACT: direct SUD treatment by case managers and comprehensive assessment, individual MI, group treatments, and stage-wise interventions. Clinicians had half the patient load that they had for CG. 3 years of treatment.	3 years (every 6 months)	Medication compliance (self-report), substance use (self-report, clinician rating and toxicology screens), hospitalization rates, QOL, dosage: contacts per month with clinician	ACT participants reported significant improvement in medication adherence compared to standard clinical CM participants.

Table 1. (continued)

Reference, country	Target population	Number of subjects	Control intervention	ACT interventions/ dose of ACT	Follow-up	Outcome measures	Results
Drake et al. [54], 1998, US	Adults with severe mental illness and SUD, absence of additional medical conditions.	*n* = 203 SMC = 98 ACT = 105	Standard CM (caseload:1:25). Multidisciplinary teams, similar approach as ACT but more brokerage.	ACT with integrated mental health and substance abuse treatment (caseload:12:1). 14.8% of participants received for less than 12 months, the rest received treatment for 3 years.	3 years (every 6 months)	Substance use (self-report and clinician ratings, urine toxicology screens), assessment of housing history and institutional stays (self-report calendar), QOL, psychiatric symptoms, service utilization (interview)	For some measures of substance use and quality of life the improvements of ACT participants were greater. Both groups have excellent outcomes on treatment retention, stable community days, hospital days, psychiatric symptoms and also for the remission of substance use disorder.
McHugo et al. [55] 1999, US (from Drake 1998)	Adults with severe mental illness and SUD, absence of additional medical conditions. Of the 240 eligible referrals to the New Hampshire dual disorders study, 223 completed intake assessments and entered the clinical trial.	*n* = 87 High fidelity ACT= 61 Llow fidelity ACT = 26	Low fidelity ACT	ACT with integrated mental health and substance abuse treatment (caseload:12:1). 14.8% of participants received for less than 12 months, the rest received treatment for 3 years.	3 years (every 6 months)	Assessment of model fidelity, substance use (self-report and clinician ratings, urine toxicology screens), assessment of housing history and institutional stays (self-report calendar), QOL, psychiatric symptoms, service utilization (interview)	Clients in the high-fidelity ACT programs showed greater reductions in alcohol and drug use and attained higher rates of remission from substance use disorders than clients in the low-fidelity programs. Clients in high-fidelity programs had higher rates of retention in treatment and fewer hospital admissions than those in low-fidelity programs.
Clark et al. [56], 1998, US (from Drake 1998)	Adults with severe mental illness and SUD, absence of additional medical conditions.	*n* = 193 ACT = 100 CG = 93	Standard CM (caseload:25:1). Multidisciplinary teams, similar approach as ACT but more brokerage.	ACT with integrated mental health and substance abuse treatment (caseload:12:1). 14.8% of participants received for less than 12 months, the rest received treatment for 3 years.	3 years (every 6 months)	Substance use (self-report and clinician ratings, urine toxicology screens), assessment of housing history and institutional stays (self-report calendar), QOL, psychiatric symptoms, service utilization (interview). Consumption of mental health treatment, general healthcare, legal services, community services, administrative cost of transfer payments, informal caregiving by family members	Substance use reduces in both groups significantly, QOL increased for both groups (slightly higher for ACT) SCM more efficient during first 2 years, ACT significantly more efficient in final year. ACT is not more cost-effective than SCM.

ACT, assertive community treatment; ACTO, assertive community treatment only; ASPD, antisocial personality disorder; CG, control group; CM, case management; GP, general practitioner; IACT, integrated assertive community treatment; MI, motivational interviewing; QOL, quality of life; RG, reference group; SCM, standard case management; SUD, substance use disorder; TAU, treatment as usual; WAI, working alliance inventory.

with 2 or less points are considered "low-quality" RCT. None of the described studies achieved high scores on this measure. The group of Essock et al. [48], Frisman et al. [49], and Manuel et al. [50] received 3 out of 5 points and can therefore be considered "high-quality" RCTs according to the rating scale. Drummond et al. [58] and also Clark et al. [56], Drake et al. [54] and McHugo et al. [55] had 2 out of 5 points.. Others had 1 [51, 57, 60] or even 0 points [52]. This leaves uncertainty as to how reliable the results are (further details can be found in Table 2).

Control Interventions

The control interventions varied in the different studies; however, they were always the standard addiction treatment available in the centre/region. These interventions were community based and when case management (CM) was provided, the case load was larger than in the ACT intervention. The publications did not give specific information on the intensity of control interventions.

Drummond et al. [58] provided treatment as usual for alcohol use disorder in community addictions services or general practices with multidisciplinary teams. The patients were allocated a keyworker who offered a full assessment of needs and a risk assessment. Within 12 weeks, the majority of participants were discharged to primary care from this specialist service. Bond [57] used standard aftercare for addictions, which was provided by community mental health centres. Morse et al. [51], Calsyn et al. [52], and Lemming et al. [53] provided the participants of the control group (CG) with a list of community agencies providing mental health and substance abuse treatment. Essock et al. [48], Frisman et al. [49] and Manuel et al. [50] provided standard clinical CM including a comprehensive assessment, motivational interviewing, group treatments and stage-wise interventions. Drake et al. [54] and Clark et al. [56] also used standard CM as a control intervention. Their multidisciplinary teams used a similar approach as the ACT team but had a higher case load and did not provide all services themselves but delegated these to other agencies. McHugo et al. [55] on the other hand compared high and low fidelity ACT, the CG using low fidelity ACT.

Outcome Measures

The outcome measures used in the different studies were substance use, treatment engagement, hospitalization rates, quality of life, housing status, medication compliance and criminal justice problems. Only 1 recent study [58] specifically reported change in substance use as a primary outcome, measured by self-report of mean

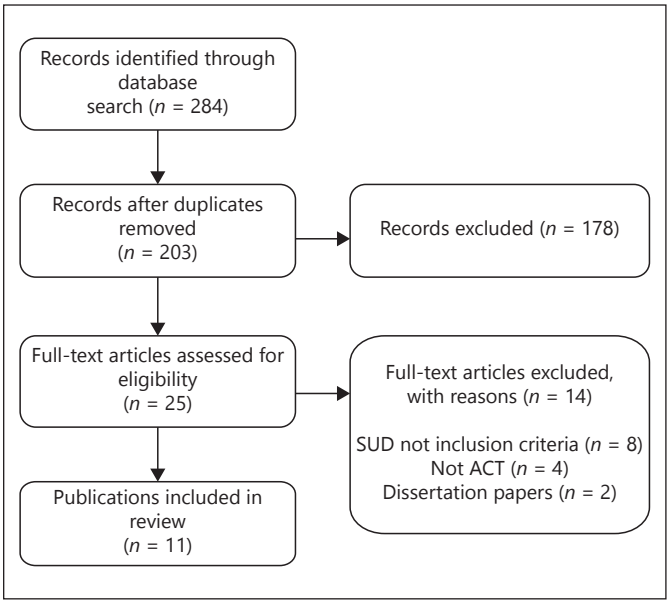

Fig. 1. Search strategy. SUD, substance use disorders; ACT, assertive community treatment.

drinks per drinking day and per cent days abstinent substance use with a Time Line Follow Back form 90 (TLFB) [61] at 12 months. All the other studies used a variety of outcome measures.

Bond et al. [57] measured engagement in treatment, number of hospital admissions and days in hospital, substance use using the self-report Drug and Alcohol Problem Scale using items from scales by Skinner and Allen [62], Svanum and Schladenhauffen [63], and Wanberg et al. [64] and life satisfaction with a modification of the Life Satisfaction Checklist [65].

Morse et al. [51], Caslyn et al. [52] and Lemming et al. [53] reported client satisfaction, treatment fidelity, frequency and quantity, housing stability, psychiatric symptoms using the Brief Psychiatric Rating Scale (BPRS) [66], and substance use using the self-report TLFB. Additionally every 3 months, the research interviewers assessed substance use severity. They also measured service use and cost variables. Calsyn et al. [52] added criminal justice measures including offences and days incarcerated, Lemming et al. [53] also measured the working alliance using a 12-item version of the Working Alliance Inventory [67] at 3 and 15 months.

Essock et al. [48], Frisman et al. [49], and Manuel et al. [50] measured substance use with the self-report TLFB and sections from the Addiction Severity Index [68]. Additionally they used clinician ratings for substance use with the alcohol use scale the drug use scale [69], and the

substance abuse treatment scale [70] as well as toxicology screens. Residential status, hospitalization rates, quality of life using the QOL-Interview [71], dosage of the intervention and psychiatric symptoms using the BPRS. Frisman et al. [49] added incarceration rates and Manuel et al. [50] self-reported medication compliance.

Drake et al. [54], McHugo et al. [55] and Clark et al. [56] measured substance use with self-reported TLFB and ASI as well as clinician-rated alcohol use scale, Drug Use Scale and Substance Abuse Treatment Scale and urine toxicology screens, they assessed housing history and institutional stays with a self-report calendar, quality of life using the QOL-Interview, psychiatric symptoms using the BPRS and service utilization. McHugo et al. [55] specifically measured model fidelity and Clark et al. [56] social costs.

Results

Essock et al. [48], Drummond et al. [51] and Morse et al. [58] found a decrease in substance use in both the ACT and CGs, but no significant difference between the groups. Frisman et al. [49], Drake et al. [54], McHugo et al. [55], and Clark et al. [56] found greater reductions of substance use in the ACT group. McHugo et al. [55] found that groups with higher treatment fidelity to ACT had higher reductions of substance use during treatment. Bond et al. [57] found no difference in alcohol use between the groups.

Four publications from 4 different datasets found higher engagement levels with treatment. Bond et al. [57] and McHugo et al. [55] found higher treatment retention. Drummond et al. [58] found higher use of outpatient day care facilities and higher use of other healthcare offers like general practitioners for the ACT group the CG. Manuel et al. [50], found greater medication compliance in patients with psychosis receiving ACT. One dataset did not give any information on treatment engagement but stated that contacts with patients were significantly higher in the ACT and integrated ACT (IACT) group compared to controls [51].

Two datasets [55, 58] found a positive effect on hospitalization rates. However, Bond et al. [57] found significantly lower hospitalization rates in the CG and no differences in the number of days in hospital and alcohol use between groups.

Drake et al. [54] reported higher quality of life after ACT intervention. Morse et al. [51] and Calsyn et al. [52] who used the same dataset also found higher satisfaction with treatment and more stable housing in the ACT outcomes.

Table 2. Quality of analysis according to JADAD scale

	Drummond et al. [58], 2017	Bond et al. [57], 1991	Clark et al. [56], 1998	Morse et al. [51], 2006	Calsyn et al. [52], 2005	Lemming et al. [53], 2004	Essock et al. [48], 2006	Frisman et al. [49], 2009	Manuel et al. [50], 2011	Drake et al. [54], 1998	McHugo et al. [55], 1999
Randomization (absent: 0; present: 1)	1	0	1	1	1	1	1	1	1	1	1
Randomization (appropriate: 11 + 1; inappropriate: –1)	1	NA	NA	NA	–1	NA	1	1	1	NA	NA
Double blinding (absent: 0; present: 1)	0	0	0	0	0	0	0	0	0	0	0
Double blinding (appropriate: + 1; inappropriate: –1)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Account of all patients (0–1) (withdrawals and dropouts are explained)	0	1	1	1	0	0	1	1	1	1	1
Total (0–5)	2	1	2	2	0	1	3	3	3	2	2

NA, non applicable.

Frisman et al. [49] found that those who received an ACT intervention were less likely to be in jail at follow-up. Calsyn et al. [52] however did not find any difference of the treatment type on the criminal behaviour including offences and days incarcerated of the participants.

McHugo et al. [55] found that the group with higher treatment fidelity to the ACT model improved all outcome measures and differences in outcomes between ACT and CG were higher compared to the ACT group with lower fidelity to the model.

Concerning cost effectiveness, Clark et al. [56] found that ACT was not more cost-effective than standard CM. Morse et al. [51] found that IACT and CG had significantly less average total costs than the group receiving only ACT. The total costs included in- and out-patient treatment, emergency shelter costs as well as the costs of benefits paid for the patients (social security, food stamps, etc.).

Discussion

The results of the few existing randomized control studies vary significantly. Most report a reduction in substance use overall but no significant effect of ACT over control interventions. Other outcomes measures are more difficult to compare, as the studies did not always use the same measures. Treatment engagement was higher in ACT than CGs in 4 [50, 55, 57, 58] of the 5 datasets. ACT intervention often showed equal but not superior improvement as in the CGs. The methodical quality of the included studies is rather low, which makes it difficult to draw clear conclusions concerning the effectiveness of ACT for SUD.

The heterogeneous results may be due to various factors such as differences in the CGs. Essock et al. [48], Manuel et al. [50], Frisman et al. [49], Drake et al. [54], and Clark et al. [56], use standard clinical CM as control intervention. CM uses ACT principles and may have small caseloads. The CM groups could get extra support from other agencies, so treatment was more intensive and closer to ACT in terms of dosage. Calsyn et al. [52], Lemming et al. [53] and Morse et al. [51] compare an IACT approach including SUD treatment with standard ACT only. The interpretation of these results is difficult, as we did not have information on treatment intensity.

Furthermore, fidelity to ACT model was not systematically reported. Previous studies suggested that higher fidelity to the ACT model improved outcomes [33]. This has also been reported by Latimer et al. [72] who saw a larger reduction of hospital days in higher-fidelity ACT programmes. Substance use reduced only in half of the datasets, of which only 1 [54–56] showed a significant reduction in the ACT group. Often the intervention groups showed little difference with the ACT groups in terms of treatment outcome.

However, the populations studied were very heterogeneous. For example, Drummond et al. [58] excluded homeless and psychotic patients, whereas all the other publications included only patients with severe psychiatric co-morbidity and some only included homeless or unstably housed patients [48–53].

Including only homeless populations might change the usefulness of hospital use as an outcome measure as this population could be more demanding for hospital stays due to lack of shelter.

Some authors only included psychotic or other major psychiatric disorder dual-diagnosis patients in their studies. These very ill patients are frequently chronically ill and difficult to treat with higher drop-out rates and more hospitalizations. The fact that the outcomes were similar to the CGs is perhaps due to the fact that it is hard to help this group make changes. The differences are perhaps smaller and therefore not statistically significant.

Outcome measures vary between studies. Calsyn et al. [52] measure criminal justice outcomes. Clark et al. [56] focus mainly on costs as outcome, so it is difficult to separate out any effects of treatment on a patient level. Some outcome measures seem more relevant than others. It is well known that SUD is a chronic disease with high rates of psycho-social and health-related problems. Abstinence is not always achievable or necessary to improve patient well-being and quality of life. Substance use measures were used in all studies; however, as the measures used varied they could not be compared in detail. Measures such as hospitalization rates, psychiatric symptoms, stable housing and quality of life seem more relevant but need to be analyzed over a longer period.

Discrepancies related to the effect of ACT on substance use may distract from the positive results repeatedly reported on some of the other outcomes such as the improvements on the service use profile and on the reduction of the hospital use costs [37, 72]. Longer treatment duration and possibly the adding of further components in the ACT treatments models for SUD should be considered in future studies. The results on substance use should be also considered in the light of some recent studies and comments showing the limited value of substance use outcomes based on the count of the amounts of substance consumed [73, 74]. It was shown that such out-

comes do not predict functional, symptomatic or substance use-related improvement at 1 year follow-up. So additional outcomes, possibly related to change on the negative consequences of substance use [75], should be considered in future studies to better capture possible improvements and change processes.

Such studies are still needed to improve ACT models for patients with SUD and determine who may benefit most.

This review is not able to answer such questions, as the included papers do not include analyses comparing specific subgroups. However, most studies included patients with severe mental illness, and about half included patients with a history of high service use and/or homelessness. According to earlier studies on patients with severe mental illness without diagnosed SUD, patients with high inpatient service use where among the ones who benefit most from this assertive approach [40]. This phenomenon needs to be examined in patients with severe mental illness and diagnosed SUD also.

One of the strengths of the included studies was their long follow-up periods in what are chronic conditions. The quality of studies was variable. In order to further assess the effect of ACT on service use and symptoms other methodically improved studies are mandatory. In future studies, it will be important that control interventions are described in detail to allow fuller comparison. Components of the ACT model should be accurately defined and fidelity determined and a single, clear primary outcome should be defined. Secondary outcomes should not focus only on substance use but also on other measures such as change in the consequences of substance use, service use and other measures of user satisfaction, empowerment and recovery. User involvement in the design of future studies is crucial. Long-term (more than 2 years) studies are needed.

Limitations

This review followed a strict systematic search protocol but is not without limitations. Strict eligibility criteria were applied in selecting relevant treatment studies and they represent only a sample of published studies on ACT as a result. Consequently, the studies reviewed may not include the full spectrum of research in this field. A large proportion of screened studies were excluded from the final review due to non-randomization.

The results of the included studies are varied and present several limitations. In some cases, different treatment sites have been put together for analysis, despite their variation in treatment policies and type of patients (severity of disorder at baseline). Some of the papers are also sub-analyses of other studies in our sample. Furthermore, a lot of the studies had low evaluation scores for the quality of their study design, as measured by the JADAD scale. Given the low JADAD scoring and the small number of studies, our results should be interpreted with caution.

Conclusion

SUD is an important healthcare issue globally and is generally linked to wider social and health problems, both physical and psychological. Treatment barriers are an important reason for many patients not receiving the care they need. Different models have been suggested to rectify this. The research base is variable concerning the usefulness of ACT in the field of addictions. Higher fidelity to the ACT model appears to improve results and studies often found at least one outcome measure improved. According to earlier studies on patients with severe mental illness, patients with high inpatient service use benefit most from this assertive approach. We hypothesize that a similar high-need user group among patients with SUD might benefit most from ACT. However, this needs to be studied more in depth. Future research should investigate the effective "ingredients" of ACT. This would help to conceptualize a specific ACT model that may be more effective [76]. Further research is needed to examine which type of clinical interventions might help difficult-to-engage patients with addictions in order to innovate treatment approaches and reach out to patients.

Disclosure Statement

On behalf of all authors, the corresponding author states, that there are no conflicts of interest to disclose.

References

1 Degenhardt L, Hall W: Extent of illicit drug use and dependence, and their contribution to the global burden of disease. Lancet 2012; 379:55–70.

2 Cuffel BJ: Comorbid substance use disorder: prevalence, patterns of use, and course. New Dir Ment Health Serv 1996;70:93–105.

3 Regier DA, Farmer ME, Rae DS, Locke BZ, Keith SJ, Judd LL, Goodwin FK: Comorbidity of mental disorders with alcohol and other drug abuse. Results from the epidemiologic catchment area (ECA) study. JAMA 1990; 264:2511–2518.

4 Kessler RC, Nelson CB, McGonagle KA, Edlund MJ, Frank RG, Leaf PJ: The epidemiology of co-occurring addictive and mental disorders: implications for prevention and service utilization. Am J Orthopsychiatry 1996; 66:17–31.
5 Kessler RC, Crum RM, Warner LA, Nelson CB, Schulenberg J, Anthony JC: Lifetime co-occurrence of DSM-III-R alcohol abuse and dependence with other psychiatric disorders in the national comorbidity survey. Arch Gen Psychiatry 1997;54:313–321.
6 Warner LA, Kessler RC, Hughes M, Anthony JC, Nelson CB: Prevalence and correlates of drug use and dependence in the United States. Results from the national comorbidity survey. Arch Gen Psychiatr 1995; 52:219–229.
7 Slade T, McEvoy PM, Chapman C, Grove R, Teesson M: Onset and temporal sequencing of lifetime anxiety, mood and substance use disorders in the general population. Epidemiol Psychiatr Sci 2015;24:45–53.
8 Young JT, Heffernan E, Borschmann R, Ogloff JRP, Spittal MJ, Kouyoumdjian FG, Preen DB, Butler A, Brophy L, Crilly J, Kinner SA: Dual diagnosis of mental illness and substance use disorder and injury in adults recently released from prison: a prospective cohort study. Lancet Public Health 2018;5:e237–e248.
9 Kessler RC: The epidemiology of dual diagnosis. Biol Psychiatry 2004;56:730–737.
10 Ziedonis D, Brady K: Dual diagnosis in primary care. Detecting and treating both the addiction and mental illness. Med Clin North Am 1997;81:1017–1036.
11 Thornton LK, Baker AL, Lewin TJ, Kay-Lambkin FJ, Kavanagh D, Richmond R, Kelly B, Johnson MP: Reasons for substance use among people with mental disorders. Addict Behav 2012;37:427–434.
12 Hagnell O, Gräsbeck A: Comorbidity of anxiety and depression in the Lundby 25-year prospective study: the pattern of subsequent episodes, 1990.
13 Murphy JM: Diagnostic Comorbidity and Symptom Co-Occurrence: The Stirling County Study, 1990.
14 Margolese HC, Malchy L, Negrete JC, Tempier R, Gill K: Drug and alcohol use among patients with schizophrenia and related psychoses: levels and consequences. Schizophr Res 2004;67:157–166.
15 Brady TM, Krebs CP, Laird G: Psychiatric comorbidity and not completing jail-based substance abuse treatment. Am J Addict 2004;13: 83–101.
16 Curran GM, Sullivan G, Williams K, Han X, Allee E, Kotrla KJ: The association of psychiatric comorbidity and use of the emergency department among persons with substance use disorders: an observational cohort study. BMC Emerg Med 2008;8:17.
17 Curran GM, Sullivan G, Williams K, Han X, Collins K, Keys J, Kotrla KJ: Emergency department use of persons with comorbid psychiatric and substance abuse disorders. Ann Emerg Med 2003;41:659–667.
18 Ngamini-Ngui A, Fleury MJ, Moisan J, Grégoire JP, Lesage A, Vanasse A: High users of emergency departments in Quebec among patients with both schizophrenia and a substance use disorder. Psychiatr Serv 2014;65:1389–1391.
19 Gindi RM, Cohen RA, Kirzinger WK: Emergency room use among adults aged 18–64: Early release of estimates from the National Health Interview Survey, January–June 2011. National Center for Health Statistics. May 2012. Available from: http://www.cdc.gov/nchs/nhis/releases.htm.
20 Bhalla IP, Stefanovics EA, Rosenheck RA: Clinical epidemiology of single versus multiple substance use disorders: polysubstance use disorder. Med Care 2017;55:S24–S32.
21 Pines JM, Asplin BR, Kaji AH, Lowe RA, Magid DJ, Raven M, Weber EJ, Yealy DM: Frequent users of emergency department services: gaps in knowledge and a proposed research agenda. Acad Emerg Med 2011;18.
22 Khan S: Concurrent mental and substance use disorders in Canada. Health Rep 2017;28:3–8.
23 Raven MC, Carrier ER, Lee J, Billings JC, Marr M, Gourevitch MN: Substance use treatment barriers for patients with frequent hospital admissions. J Subst Abuse Treat 2010;38:22–30.
24 Miller W, Rollnick S: Motivational Interviewing: Preparing People to Change Addictive Behavior, New York, Guilford press google scholar, 1991.
25 Marlatt GA, Gordon JR: Relapse Prevention: Maintenance Strategies in the Treatment of Addictive Behaviors, New York, Guilford press, 1985.
26 Khan R, Khazaal Y, Thorens G, Zullino D, Uchtenhagen A: Understanding swiss drug policy change and the introduction of heroin maintenance treatment. Eur Addict Res 2014; 20:200–207.
27 Nordt C, Vogel M, Dey M, Moldovanyi A, Beck T, Berthel T, Walter M, Seifritz E, Dürsteler KM, Herdener M: One size does not fit all-evolution of opioid agonist treatments in a naturalistic setting over 23 years. Addiction 2019;114:103–111.
28 Jonas DE, Amick HR, Feltner C, Bobashev G, Thomas K, Wines R, Kim MM, Shanahan E, Gass CE, Rowe CJ, Garbutt JC: Pharmacotherapy for adults with alcohol use disorders in outpatient settings: a systematic review and meta-analysis. JAMA 2014;311:1889–1900.
29 McGovern MP, Lambert-Harris C, Gotham HJ, Claus RE, Xie H: Dual diagnosis capability in mental health and addiction treatment services: an assessment of programs across multiple state systems. Adm Policy Ment Health 2014;41:205–214.
30 Andersson HW, Steinsbekk A, Walderhaug E, Otterholt E, Nordfjærn T: Predictors of drop-out from inpatient substance use treatment: a prospective cohort study. Subst Abuse 2018;12.
31 Brorson HH, Arnevik EA, Rand-Hendriksen K, Duckert F: Drop-out from addiction treatment: a systematic review of risk factors. Clin Psychol Rev 2013;33:1010–1024.
32 Pringle JL, Emptage NP, Hubbard RL: Unmet needs for comprehensive services in outpatient addiction treatment. J Subst Abuse Treat 2006;30:183–189.
33 Han B, Compton WM, Blanco C, Colpe LJ: Prevalence, treatment, and unmet treatment needs Of US adults with mental health and substance use disorders. Health Aff (Millwood) 2017;36:1739–1747.
34 Salyers MP, Tsemberis S: ACT and recovery: Integrating evidence-based practice and recovery orientation on assertive community treatment teams. Community Ment Health J 2007;43:619–641.
35 Hogan MF: The president's new freedom commission: recommendations to transform mental health care in America. Psychiatr Serv 2003;54:1467–1474.
36 Stein LI, Test MA: Alternative to mental hospital treatment. I. Conceptual model, treatment program, and clinical evaluation. Arch Gen Psychiatry 1980;37:392–397.
37 Bond GR, Drake RE, Mueser KT, and Latimer E: Assertive community treatment for people with severe mental illness. Dis Manag Health Outcomes 2001;9:141–159.
38 Bond GR, Drake RE: The critical ingredients of assertive community treatment. World Psychiatry 2015;14:240–242.
39 Burns BJ, Santos AB: Assertive community treatment: an update of randomized trials. Psychiatr Serv 1995;46:669–675.
40 Burns T, CattyJ, Dash M, Roberts C, Lockwood A, Marshall M: Use of intensive case management to reduce time in hospital in people with severe mental illness: systematic review and meta-regression. BMJ 2007;335:336.
41 Bonsack C, Adam L, Haefliger T, Besson J, Conus P: Difficult-to-engage patients: a specific target for time-limited assertive outreach in a Swiss setting. Can J Psychiatry 2005;50: 845–850.
42 Lambert M, Bock T, Schöttle D, Golks D, Meister K, Rietschel L, Bussopulos A, Frieling M, Schödlbauer M, Burlon M: Assertive community treatment as part of integrated care versus standard care: a 12-month trial in patients with first-and multiple-episode schizophrenia spectrum disorders treated with quetiapine immediate release (ACCESS trial). J Clin Psychiatry 2010;71:1313–1323.
43 Test MA, Wallisch LS, Allness DJ, Ripp K: Substance use in young adults with schizophrenic disorders. Schizophr Bull 1989;15: 465–476.
44 Marshall M, Lockwood A: Assertive community treatment for people with severe mental disorders. Cochrane Database Syst Rev 2000: CD001089.
45 Bertelsen M, Jeppesen P, Petersen L, Thorup A, Øhlenschlæger J, le Quach P, Christensen TØ, Krarup G, Jørgensen P, Nordentoft M: Five-year follow-up of a randomized multicenter trial of intensive early intervention vs standard treatment for patients with a first episode of psychotic illness: the OPUS trial. Arch Gen Psychiatry.2008:65:762–771.

46 Nordentoft M, Rasmussen JØ, Melau M, Hjorthøj CR, Thorup A: How successful are first episode programs? A review of the evidence for specialized assertive early intervention. Curr Opin Psychiatry. 2014;27:167–172.
47 http://www.prisma-statement.org/documents/PRISMA%20IPD%20checklist.pdf.
48 Essock SM, Mueser KT, Drake RE, Covell NH, McHugo GJ, Frisman LK, Kontos NJ, Jackson CT, Townsend F, Swain K: Comparison of ACT and standard case management for delivering integrated treatment for co-occurring disorders. Psychiatr Serv 2006;57:185–196.
49 Frisman LK, Mueser KT, Covell NH, Lin HJ, Crocker A, Drake RE, Essock SM: Use of integrated dual disorder treatment via assertive community treatment versus clinical case management for persons with co-occurring disorders and antisocial personality disorder. J Nerv Ment Dis 2009;197:822–828.
50 Manuel JI, Covell NH, Jackson CT, Essock SM: Does assertive community treatment increase medication adherence for people with co-occurring psychotic and substance use disorders? J Am Psychiatri Nurses Assoc 2011;17:51–56.
51 Morse GA, Calsyn RJ, Klinkenberg WD, Helminiak TW, Wolff N, Drake RE, Yonker RD, Lama G, Lemming MR, McCudden S: Treating homeless clients with severe mental illness and substance use disorders: costs and outcomes. Community Ment Health J 2006;42:377–404.
52 Calsyn RJ, Yonker RD, Lemming MR, Morse GA, Klinkenberg WD: Impact of assertive community treatment and client characteristics on criminal justice outcomes in dual disorder homeless individuals. Crim Behav Ment Health 2005;15:236–248.
53 Lemming MR: Client outcomes and the working alliance in assertive community treatment programs. Care Manag J 2004;5:199–202.
54 Drake RE, McHugo GJ, Clark RE, Teague GB, Xie H, Miles K, Ackerson TH: Assertive community treatment for patients with co-occurring severe mental illness and substance use disorder: a clinical trial. Am J Orthopsychiatry 1998;68:201–215.
55 McHugo GJ, Drake RE, Teague GB, Xie H: Fidelity to assertive community treatment and client outcomes in the New Hampshire dual disorders study. Psychiatr Serv 1999;50:818–824.
56 Clark RE, Teague GB, Ricketts SK, Bush PW, Xie H, McGuire TG, Drake RE, McHugo GJ, Keller AM, Zubkoff M: Cost-effectiveness of assertive community treatment versus standard case management for persons with co-occurring severe mental illness and substance use disorders. Health Serv Res 1998;33:1285–1308.
57 Bond GR, McDonel EC, Miller LD, Pensec M: Assertive community treatment and reference groups: an evaluation of their effectiveness for young adults with serious mental illness and substance abuse problems. Psychiatr Rehabil J 1991;15:31–43.
58 Drummond C, Gilburt H, Burns T, Copello A, Crawford M, Day E, Deluca P, Godfrey C, Parrott S, Rose A: Assertive community treatment for people with alcohol dependence: a pilot randomized controlled trial. Alcohol Alcohol.2017;52:234–241.
59 Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ, McQuay HJ: Assessing the quality of reports of randomized clinical trials: is blinding necessary?. Control Clin Trials 1996;17:1–2.
60 Cunningham J, Calsyn RJ, Burger GK, Morse GA, Klinkenberg WD: Client outcomes and the working alliance in the client-case manager relationship: a causal analysis. Care Manag J 2007;8:106–112.
61 Miller W: National Institutes of Health, National Institute on Alcohol Abuse, and Alcoholism, Form 90: A Structured Assessment Interview for Drinking and Related Behaviors: Test Manual: US Department of Health and Human Services, 1996.
62 Skinner HA, Allen BA: Alcohol dependence syndrome: measurement and validation. 1982;91:199–209.
63 Svanum S, Schladenhauffen J: Lifetime and recent alcohol consumption among male alcoholics. Neuropsychological implications. J Nerv Ment Dis 1986;174:214–220.
64 Wanberg KW, Horn JL, Foster FM: A differential assessment model for alcoholism. The scales of the alcohol use inventory. J Stud Alcohol 1977;38:512–543.
65 Bond GR, Miller LD, Krumwied RD, Ward RS: Assertive case management in three CMHCs: a controlled study. Hosp Community Psychiatry 1988;39:411–418.
66 Lukoff D, Nuechterlein K, Ventura J: Manual for the expanded brief psychiatric rating scale. Schizophr Bull 1986;12:594–602.
67 Tracey TJ, Kokotovic AM: Factor structure of the working alliance inventory. J Consult Clin Psychol 1989;1:207–210.
68 McLellan AT, Luborsky L, Woody GE, O'Brien CP: An improved diagnostic evaluation instrument for substance abuse patients. The addiction severity index. J Nerv Ment Dis 1980;168:26–33.
69 Drake RE, Mercer-McFadden C: Assessment of Substance Use among Persons with Chronic Mental Illnesses, 1995.
70 McHugo GJ, Drake RE, Burton HL, Ackerson TH: A scale for assessing the stage of substance abuse treatment in persons with severe mental illness. J Nerv Ment Dis 1995;183:762–777.
71 Lehman AF: A quality of life interview for the chronically mentally ill. Eval Program Plann 1988;11:51–62.
72 Latimer EA: Economic impacts of assertive community treatment: a review of the literature. Can J Psychiatry 1999;44:443–454.
73 DiClemente CC, Crisafulli MA: Alcohol relapse and change needs a broader view than counting drinks. Alcohol Clin Exp Res 2017;41:266–269.
74 Maisto SA, Roos CR, Hallgren KA, Moskal D, Wilson AD, Witkiewitz K: Do alcohol relapse episodes during treatment predict long-term outcomes? Investigating the validity of existing definitions of alcohol use disorder relapse. Alcohol Clin Exp Res 2016;40:2180–2189.
75 Kiluk BD, Fitzmaurice GM, Strain EC, Weiss RD: What defines a clinically meaningful outcome in the treatment of substance use disorders: reductions in direct consequences of drug use or improvement in overall functioning? Addiction 2019;114:9–15.
76 Nef F, Philippot P, Verhofstadt L: L'approche processuelle en évaluation et intervention cliniques : une approche psychologique intégrée. Revue Francophone de Clinique Cognitive et Comportementale 2012;17:23.