Self-wise, Other-wise, Streetwise (SOS) training, an intervention to prevent victimization in dual-diagnosis patients: results from a randomized clinical trial

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ABSTRACT

Background and Aims Patients with co-occurring substance use and other mental disorders are vulnerable to crime victimization, yet no evidence-based preventive interventions exist. Our aim was to test the efficacy of a new intervention, Self-wise, Other-wise, Streetwise training (SOS training), to prevent victimization in these dual-diagnosis patients as an add-on to care as usual. **Design** Multi-site single-blind parallel randomized controlled trial. **Setting** Three sites within one psychiatric service in Amsterdam, the Netherlands. **Participants** Adult in-patients and out-patients with dual diagnosis ($n = 250$), who were predominantly male (70.4%), aged on average 42.1 years, and diagnosed with 3.7 DSM-IV disorders. **Intervention and comparator** Care as usual, consisting of pharmacotherapy combined with individual psychotherapy, group psychotherapy and/or supportive counselling ($n = 125$) was compared with care as usual plus SOS training: a 6-week, 12-session manualized group training focused on enhancing emotion regulation skills, conflict resolution skills and street skills ($n = 125$). **Measurements** Victimization was assessed with the Safety Monitor, the Dutch equivalent of the International Crime Victims Survey, in a face-to-face assessment. The primary outcome measure was treatment response (yes/no), with 'yes' defined as reporting at least a 50% reduction in the number of past-year victimization incidents at the 14-month follow-up compared with baseline. Analyses were performed according to the intention-to-treat principle. **Findings** The proportion of participants achieving treatment response for total victimization was 54.0% in the control group and 67.6% in the experimental group, a significant difference [odds ratio (OR) = 1.78, 95% confidence interval (CI) = 1.02–3.11, $P = 0.042$]. Treatment response for violent victimization was achieved by 68.7% of the control group and 79.3% of the experimental group (OR = 1.75, 95% CI = 0.91–3.34, $P = 0.092$). With a Bayes factor of 2.26, this result was inconclusive. **Conclusions** Among dual-diagnosis patients, care as usual plus Self-wise, Other-wise, Streetwise training was more effective in preventing victimization than care as usual alone.

Keywords Assertiveness, clinical trial, co-occurring disorders, dual diagnosis, prevention, resilience, victimization, violence.

INTRODUCTION

Patients with substance use disorders are at elevated risk of becoming victims of crime, which is associated with psychiatric distress, more drug use, homelessness, offending and worse treatment outcomes [1–4]. Victimization is also prevalent among patients with other mental disorders [5,6]. In the United States, 39.1% of adults with a past-year substance use disorder also met criteria for another mental disorder [7]. These patients with co-occurring substance use and other mental disorders (dual-diagnosis patients) are even more vulnerable to victimization [8,9]. A recent study in the Netherlands showed that dual-diagnosis patients have a highly increased risk to experience physical

or sexual assault compared to the general population [relative risk (RR) = 14.8 and RR = 5.8, respectively] [9].

Although several evidence-based victimization prevention strategies exist, these target mainly domestic violence or (sexual) violence in schools [10,11]. There are no evidence-based interventions available to reduce the vulnerability to victimization of patients with substance use and/or other mental disorders. Self-wise, Other-wise, Streetwise (SOS) training is a novel intervention specifically designed to prevent victimization in the high-risk group of dual-diagnosis patients.

The most widely used criminological approach to explain differences in vulnerability to crime victimization is the routine activity theory [12], stating that crimes are likely to occur when three elements are present: a motivated offender, an attractive target and the absence of capable guardianship. As victimization experiences of dual-diagnosis patients encompass a wide variety of perpetrators (e.g. strangers, partners, acquaintances) and locations (e.g. at home, in public, in care facility) [13], SOS training aims to reduce the 'attractiveness as a target' of a heterogeneous group of patients by targeting potential common underlying vulnerabilities, via improving emotion regulation skills, conflict resolution skills and street skills [14].

In addition to their high risk for victimization, dual-diagnosis patients experience more severe symptoms, increased relapse rates and worse clinical outcomes [15–17]. If patients' risk for victimization could be reduced, this may impact mental health and substance use problems as an indirect effect of the intervention.

This study aimed to (1) test the efficacy of the SOS training as an add-on to care as usual (CAU) in preventing total, violent and property victimization in dual-diagnosis patients; (2) test its efficacy in reducing substance use problems and psychiatric symptom severity; and (3) explore predictors of outcome. We hypothesized that CAU + SOS training would be more effective in preventing total, violent and property victimization and in reducing substance use problems and psychiatric symptom severity compared to CAU. To enhance clinical relevance, the pragmatic trial was designed to closely reflect clinical practice [18]. A representative sample was acquired by applying a minimal set of exclusion criteria, and CAU was not interfered with. Trained therapists were employees with diverse educational backgrounds and duration of working experience.

METHODS

Design

This study is a single-blind randomized controlled trial using a parallel group design to determine the efficacy of adding SOS training to CAU. Participants were assessed at baseline and at 2, 8 and 14 months' follow-up. After baseline assessment, participants were randomly allocated to CAU or CAU + SOS training. Full study details are published in the study protocol [14]. The study was reviewed and approved by the ethics committee of the Academic Medical Centre of the University of Amsterdam, Amsterdam, the Netherlands and was registered at trialregister.nl (NTR4472). The trial was powered to detect a 20% difference in the primary outcome: treatment response for total victimization. With an estimated 30% treatment response in CAU and 50% treatment response in CAU + SOS training, a power of 0.80, an α level of 0.05 and estimated drop-out of 25%, we needed 250 participants.

Participants

Participants were in-patients and out-patients recruited at one of three sites from a psychiatric service in Amsterdam, the Netherlands (Arkin Mental Health Care, division Mentrum), where patients are treated for both substance use disorders and other mental disorders. Inclusion criteria were: (1) 18 years of age or older; (2) substance use dependence or substance abuse (alcohol and/or drugs) according to the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision* (DSM-IV-TR) [19]; and (3) at least one other DSM-IV Axis I or Axis II disorder.

Exclusion criteria were: (1) insufficient understanding of the Dutch language; (2) not eligible for group therapy based on the clinical judgement of the mental health-care provider due to, for instance, severe acute psychotic symptoms or severe antisocial or psychopathic traits that could disturb the group training.

PROCEDURE

Recruitment took place from April 2014 to April 2016, with follow-up to July 2017. Inclusion and exclusion criteria were checked for all patients by their mental health-care provider, using the current DSM-IV diagnoses as determined by a psychiatrist, from the electronic patient file. It was not feasible to conduct an inclusion interview; this would have been too burdensome, as it should have included the full spectrum of DSM-IV Axis I and Axis II disorders. If a patient was indicated to be ineligible for group therapy, their mental health-care provider was asked to specify the reason. All patients who fulfilled the criteria were informed about the study and invited to participate. Participants provided written informed consent and completed a 90-minute face-to-face baseline assessment (T0), conducted at the treatment facility.

After T0, participants were randomly allocated to CAU + SOS training or CAU. Randomization was performed by an independent researcher using a computer-generated block randomization schedule. Randomization was stratified by two prognostic factors: treatment site and any victimization in the year prior to baseline (yes/no). Block size

varied randomly. To prevent bias, the research coordinator and outcome assessors were denied access to the randomization schedule and were blind to block size and order. The research coordinator informed participants and therapists about the treatment allocation.

All follow-up assessments consisted of face-to-face interviews of approximately 75–90 minutes and took place 2 (T1), 8 (T2) and 14 months (T3) after baseline. For participants allocated to CAU + SOS training, this corresponded to immediately, 6 months and 12 months after completion of the SOS training. All participants received a financial compensation of €15 for the first three assessments and €30 for T3.

MEASURES

Assessors were blind to treatment allocation. Assessors explained the importance of blinding to participants after the baseline measurement and reminded participants of this at the beginning of each follow-up measure. In case of unblinding during an intermittent measurement, another assessor would administer the next measurement(s). At T3, 42 incidents of unblinding occurred (35 in CAU + SOS training and seven in CAU).

The primary outcome measure was treatment response (yes/no), with 'yes' defined as either reporting no past-year victimization incidents at T3 or reporting at least a 50% reduction in the number of past-year victimization incidents at T3 compared to the year prior to T0. As described in the study protocol [14], the treatment response criterion was based on expert opinion, as there were no comparable randomized controlled trials available. Mental health-care professionals working with dual-diagnosis patients indicated a 50% reduction of victimization incidents as a clinically relevant and achievable goal. Victimization in the past 12 months was assessed at T0 and T3 with the Safety Monitor, developed by the Dutch Ministry of Security and Justice [20]. The Safety Monitor is a victimization survey that is the Dutch equivalent of the International Crime Victims Survey (ICVS) [21]. The Safety Monitor is used by Statistics Netherlands to measure victimization on a large scale and has previously been used to study victimization in patients with severe mental illness [22,23]. As yet, there are no psychometric properties available. With the Safety Monitor, victimization was assessed in terms of 11 different crimes, subdivided into three categories: (1) violent crimes, consisting of sexual assault, threats and physical abuse; (2) property crimes, consisting of burglary, car theft, theft from car, other motor vehicle theft, bicycle theft, robbery and theft of other property; and (3) vandalism. Sexual assault is defined as being touched or grabbed, with sexual intentions, in an offensive way. Threats is defined as being threatened with being hit, being kicked, a pistol, a knife or something similar without being physically attacked or

physically abused. Physical abuse is defined as being physically attacked or physically abused. Vandalism is defined as intentional damage to or destruction of personal property. For each type of crime, participants reported whether they had been a victim of that particular type of crime in the last 12 months and, if so, how frequently. The total number of victimization incidents reported at T0 and T3 was calculated and used to determine the dichotomous primary outcome measure treatment response (yes/no). Treatment response regarding the subcategories violent victimization and property victimization was calculated in the same manner and evaluated separately.

Secondary outcome measures were alcohol use problems, drug use problems and psychiatric symptom severity. Severity of alcohol use problems in the past year was measured with the Alcohol Use Disorder Identification Test (AUDIT) [24], which has also shown good reliability and validity in people with severe mental illness [25,26]. Severity of drug use problems in the past year was measured with the Drug Use Disorder Identification Test (DUDIT) [27], which has shown good reliability and validity in the substance abuse population in various treatment settings [27,28]. Psychiatric symptom severity during the past month was measured with the Brief Psychiatric Rating Scale–Expanded (BPRS-E) [29], a frequently used outcome measures in psychiatric populations that has also been shown to be reliable and valid [30] in dual-diagnosis populations [31]. The AUDIT and DUDIT were administered at T0, T2 and T3, and the BPRS-E was administered at each time-point. Cost-effectiveness of the intervention and other secondary outcome measures described in the study protocol [14] will be addressed in a subsequent paper. Demographic characteristics such as age, sex, country of birth, education level, employment status and living condition were collected at T0. Baseline DSM-IV diagnoses and type and amount of CAU received were extracted from the electronic patient record. Participants allocated to CAU + SOS training were asked to rate the degree of pleasure and the degree of helpfulness of each training module on a scale of 0–10 via an anonymous evaluation form directly after the last session of each module.

TREATMENT

SOS training is a manualized group training [14] for dual-diagnosis patients, specifically designed for the purpose of the current study. Eight in-patients and six out-patients with dual diagnosis were involved in the development of the treatment programme via participation in a pilot phase. The SOS training was delivered in 12 twice-weekly 90-minute sessions (including a 15-minute break) within a 6-week time-frame. Sessions were delivered by any two of 14 trained therapists, with a maximum of eight participants per session. The programme is designed

to be enjoyable, practical and comprehensible, and sessions generally consist of a combination of group discussions, role-plays and interactive, lively, sometimes game-like exercises. The SOS training comprises three modules, Self-wise, Other-wise and Streetwise, each of which consists of four sessions. The treatment groups are semi-closed: at the first session of each module, new participants can join the group and start with the training. Hence, the order in which participants follow the modules varies. As the group composition changes slightly after each four sessions, each module starts with becoming acquainted with new group members. The module Self-wise involves a newly developed emotion regulation skills training, inspired by the principles of existing emotion regulation skills trainings [32,33]. The module 'Self-wise' comprises various interactive group exercises to practice with recognizing one's own emotions, interpreting emotional expressions of others and coping with feelings of anxiety and feelings of anger, using specifically designed visual materials such as emoticons. The module 'Other-wise' involves a newly developed conflict resolution skills training inspired by social skills training for patients with schizophrenia [34], but specifically focusing on preventing and resolving interpersonal conflicts. In this module, participants jointly compose a list of important conflict resolution skills, which are subsequently practised in role-playing exercises categorized by relevant themes. The specific role-playing exercises are based on input from dual-diagnosis patients who participated in the pilot phase to ensure the exercises are relevant to the population and applicable to real-life situations of dual-diagnosis patients. The module 'Streetwise' involves a newly developed street skills training, which builds upon the idea that teaching patients about behavioural factors that contribute to their risk of victimization may be effective in reducing victimization [35–38]. 'Streetwise' comprises various interactive group exercises and group discussions that aim to make participants reflect on the safety of their activities and environment and their own contribution to safety.

Therapists were six psychologists with a master's level university degree and eight nurses with intermediate or higher vocational education. All therapists received training to deliver the SOS training, which included studying the treatment manual and participating in two 4-hour training sessions (provided by M.d.W.). The first 12 sessions of SOS training per location were supervised (by M.d.W.). Thereafter, supervision was provided at least once a month at each location. Additional supervision by telephone or e-mail was provided on request. In order to increase treatment fidelity, therapists were asked to rate how well they adhered to the treatment protocol on a scale of 0–10 after each session, which resulted in an average of 9.2 [standard deviation (SD) = 1.0].

All participants received CAU, generally consisting of pharmacotherapy combined with individual and/or group psychotherapy and/or supportive counselling, provided by psychologists, case-workers, nurses and/or psychiatrists. The type and amount of mental health-care contacts provided to participants at Arkin mental health care were extracted from the electronic patient file.

Statistical analysis

Analyses were performed according to the intention-to-treat principle. All statistical analyses were performed using R version 3.4.4. All reported P-values are two-tailed and $P < 0.05$ was chosen as the threshold for statistical significance.

The primary outcome treatment response (yes/no), and the subcategories treatment response for violent victimization (yes/no) and treatment response for property victimization (yes/no), were analysed using three separate logistic regression analyses with group allocation as independent variable. There was no evidence of treatment effect heterogeneity across sites. Unblinding was not associated with treatment response. Bayes factors were calculated for non-significant findings [39]. Three additional models were fitted adjusted for predictors of treatment response for total victimization, violent victimization and property victimization. Predictors of treatment response were determined by testing whether baseline characteristics [age, gender, country of birth (the Netherlands/other), education level (lower/middle or high), employment status (unemployed/paid or volunteer), homelessness (yes/no), type of care at baseline (in-patient/out-patient), past-year victimization (yes/no), alcohol use disorder (yes/no), cannabis use disorder (yes/no), cocaine use disorder (yes/no), opioid use disorder (yes/no), psychotic disorder (yes/no), mood disorder (yes/no), post-traumatic stress disorder (PTSD) (yes/no), personality disorder (yes/no), total number of DSM-IV disorders] significantly predicted treatment response for total, violent and property victimization in three separate logistic regression analyses with a backward elimination procedure, with group allocation held in the model. Missing data on victimization at T3 were assumed to be missing-at-random and were imputed using multiple imputation by chained equations. We created 50 multiple imputed data sets with 100 iterations, using the R package mice version 2.46.0 [40]. Missingness was related to younger age and homelessness. There were no other significant differences in baseline characteristics between responders and non-responders at T3. Predictor variables for the imputation model were selected because they were related to missingness or to the imputed variables. As a robustness check, we also performed complete case analyses by repeating the logistic

regression analyses only in participants with complete T3 data.

The continuous secondary outcome measures were analysed with linear mixed models with a two-level structure (repeated measures, patients) in R package lme4 version 1.1–17 [41]. First, the overall intervention effect was evaluated with group allocation as a fixed effect and the baseline value of the particular outcome variable as covariate. Subsequently, we evaluated between-group differences at the separate follow-up time-points by adding time (as a categorical variable represented by dummy variables) and an interaction between group and time to the model. As we used mixed-model analyses for evaluating secondary outcome measures, no imputation of missing data was needed [42].

A table will be presented showing baseline characteristics for each group. For continuous variables with an asymmetrical distribution, the median and interquartile range will be presented.

RESULTS

Participants

Figure 1 shows the participant flow throughout the study. In total, 250 patients were included and randomized. Of these 250 participants, seven were indicated by their mental health provider as dual-diagnosis patients, but only had a formal diagnosis of either substance use disorder ($n = 5$) or psychotic disorder ($n = 2$) at the time of inclusion. As these patients were already randomized when this was detected (CAU + SOS training $n = 3$; CAU $n = 4$), they were included in follow-up assessments and analyses.

Baseline demographic and clinical characteristics (Table 1) and type and dosage of CAU received at Arkin mental health care (Table 2) were well balanced between the two randomized groups. On average, participants in the CAU + SOS training group received 6.2 (SD = 4.2) sessions of SOS training, with 41 participants (32.8%) receiving 10–12 sessions and 35 participants (28.0%) receiving
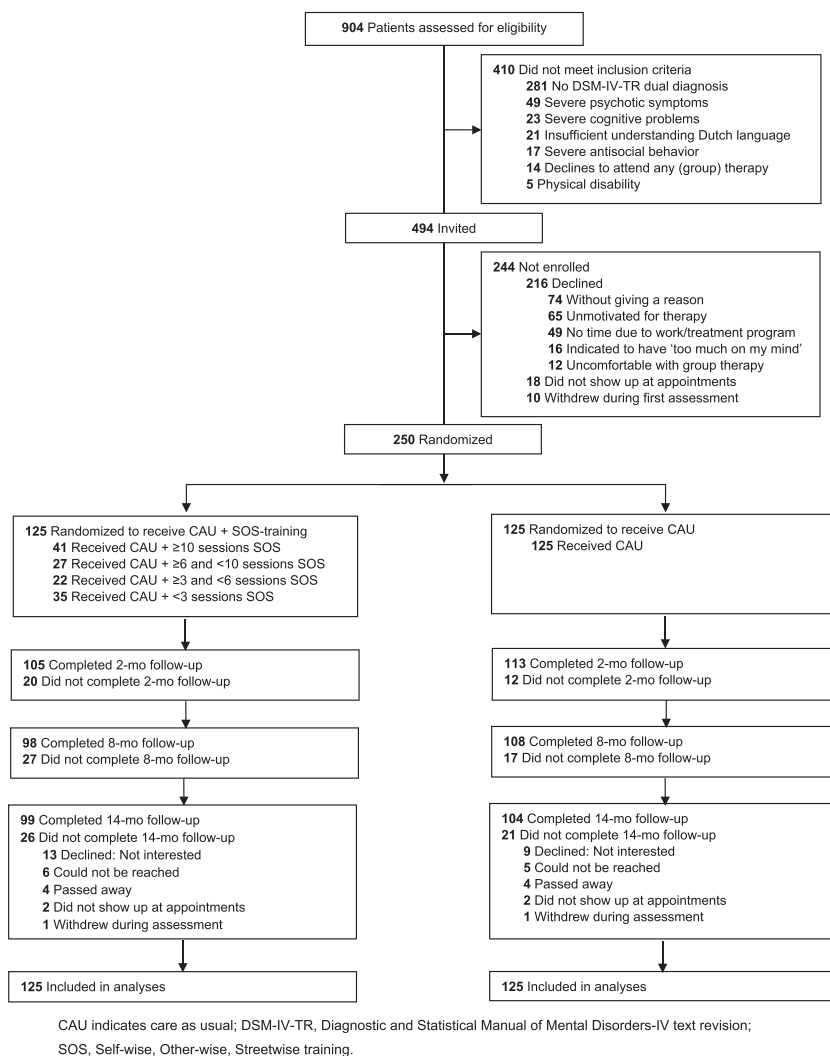

Figure 1 Flow of Participants through the study

CAU indicates care as usual; DSM-IV-TR, Diagnostic and Statistical Manual of Mental Disorders-IV text revision; SOS, Self-wise, Other-wise, Streetwise training.

Table 1 Baseline demographic and clinical characteristics.

Characteristic	CAU + SOS training (n = 125)	CAU (n = 125)	Total sample (n = 250)
Age, mean (SD), years	42.4 (11.2)	41.8 (10.7)	42.1 (11.0)
Sex, no. (%)			
Men	87 (69.6)	89 (71.2)	176 (70.4)
Women	38 (30.4)	36 (28.8)	74 (29.6)
Country of birth, no. (%)			
Netherlands	88 (70.4)	95 (76.0)	183 (73.2)
Europe, other than Netherlands	6 (4.8)	9 (7.2)	15 (6.0)
Suriname	10 (8.0)	6 (4.8)	16 (6.4)
Morocco	8 (6.4)	3 (2.4)	11 (4.4)
Netherlands Antilles	4 (3.2)	2 (1.6)	6 (2.4)
Other	9 (7.2)	10 (8.0)	19 (7.6)
Education level, no. (%)[a]			
Lower	75 (60.0)	66 (52.8)	141 (56.4)
Middle	35 (28.9)	44 (35.2)	79 (31.6)
High	15 (12.0)	15 (12.0)	30 (12.0)
Employment status, no. (%)			
Paid employment	3 (2.4)	15 (12.0)	18 (7.2)
Volunteer work	39 (31.2)	37 (29.6)	76 (30.4)
Unemployed	83 (66.4)	73 (58.4)	156 (62.4)
Living condition, no. (%)			
With others	20 (16.0)	24 (19.2)	44 (17.6)
Alone	51 (40.8)	53 (42.4)	104 (41.6)
Sheltered housing	22 (17.6)	22 (17.6)	44 (17.6)
Homeless	32 (25.6)	26 (20.8)	58 (23.2)
Type of care at baseline, no. (%)			
In-patient care	85 (68.0)	83 (66.4)	168 (67.2)
Out-patient care	40 (32.0)	42 (33.6)	82 (32.8)
Substance use disorder, no. (%)			
Alcohol	77 (61.6)	80 (64.0)	157 (62.8)
Cannabis	65 (52.0)	50 (40.0)	115 (46.0)
Cocaine	57 (45.6)	53 (42.4)	110 (44.0)
Opioid	33 (26.4)	25 (20.0)	58 (23.2)
Sedatives	21 (16.8)	28 (22.4)	49 (19.6)
Amphetamines	15 (12.0)	13 (10.4)	28 (11.2)
Other substances	4 (3.2)	8 (6.4)	12 (4.8)
Mental health disorder, other than SUD, no. (%)			
Psychotic disorder	53 (42.4)	42 (33.6)	95 (38.0)
Mood disorder	26 (20.8)	28 (22.4)	54 (21.6)
Post-traumatic stress disorder	16 (12.8)	17 (13.6)	33 (13.2)
Anxiety disorder, other than PTSD	9 (7.2)	11 (8.8)	20 (8.0)
Attention-deficit/hyperactivity disorder	7 (5.6)	13 (10.4)	20 (8.0)
Personality disorder	46 (36.8)	44 (35.2)	90 (36.0)
Intellectual disability	13 (10.4)	18 (14.4)	31 (12.4)
Other disorder	15 (12.0)	13 (10.4)	28 (11.2)
Total number of DSM-IV disorders, no. (%)	3.7 (1.4)	3.6 (1.4)	3.7 (1.4)
At least one victimization incident in 12 months prior to baseline, no. (%)	97 (77.6)	95 (76.0)	192 (76.8)
Total number of incidents of victimization, median (IQR)	3 (1–9)	3 (1–8)	3 (1–9)
Number of incidents of violent victimization, median (IQR)	1 (0–4)	1 (0–4)	1 (0–4)
Number of incidents of property victimization, median (IQR)	1 (0–2)	1 (0–3)	1 (0–3)
AUDIT score, mean (SD)	15.1 (12.8)	15.0 (12.8)	15.0 (12.8)
DUDIT score, mean (SD)	19.0 (12.8)	17.4 (13.6)	18.2 (13.2)
BPRS-E score, mean (SD)	38.9 (8.8)	37.6 (8.3)	38.2 (8.5)

AUDIT = Alcohol Use Disorder Identification Test; BPRS-E = Brief Psychiatric Rating Scale Expanded; CAU = care as usual; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders-IV; DUDIT = Drug Use Disorder Identification Test; IQR = interquartile range; PTSD = post-traumatic stress disorder; SD = standard deviation; SUD = substance use disorder; SOS = Self-wise, Other-wise, Streetwise. [a]Lower indicates primary education or lower general secondary education; middle, intermediate vocational education of higher high school level; and high, higher vocational education or university.

fewer than three sessions of SOS training. Frequently indicated reasons for being absent from the SOS training were: being discharged from the in-patient clinic and being unmotivated or practically unable to continue SOS training as out-patient, not feeling well physically and/or mentally, having overslept, being transferred to a hospital or (another) mental health ward and a lack of time due to health- or work-related appointments. All randomized participants were included in the analyses regardless of treatment adherence. Participants allocated to CAU + SOS training rated the module Other-wise as most pleasurable (grade 8.4) and most educational (grade 8.4), followed by Self-wise (pleasure grade 8.1; educational grade 8.0) and Streetwise (pleasure grade 7.8; educational grade 7.6).

Victimization

Table 1 shows that 76.8% of the participants reported at least one victimization incident in the 12 months prior to baseline assessment. The median number of victimization incidents in the 12 months prior to baseline was three in both treatment groups, with a similar distribution [CAU + SOS training: interquartile range (IQR) = 1–9; CAU: IQR = 1–8].

As shown in Table 3 and Fig. 2, significantly more participants in the experimental group achieved treatment response for total victimization compared to the control group. Results for treatment response for violent victimization were inconclusive as to whether a difference was present between groups (Bayes factor = 2.26). There were no significant group differences in treatment response for property victimization (Bayes factor = 0.17).

None of the tested baseline characteristics were significant predictors of treatment response for total victimization. Regarding violent victimization, significantly more participants with a middle or high level of education achieved treatment response compared to participants with a lower level of education [82.6% in middle/high versus 67.3% in lower; odds ratio (OR) = 2.46; 95% confidence interval (CI) = 1.26–4.83; $P = 0.009$]. Regarding property victimization, significantly more participants who received in-patient care at baseline achieved treatment response compared to participants who received out-patient care at baseline (74.0% in in-patients versus 56.8% in out-patients, OR = 0.46; 95% CI = 0.25–0.84; $P = 0.012$). As shown in Table 3, the models adjusted for significant predictors of treatment response yielded very similar results to the unadjusted models.

As a robustness check, complete case analyses were performed in participants who completed the 14-month follow-up assessment ($n = 203$). As shown in Table 3, results were very similar to those of the intention-to-treat analyses, thereby underlining the robustness of the findings.

Substance use problems and psychiatric symptom severity

As shown in Table 4, no significant overall or time-specific intervention effects were found for alcohol use problems, drug use problems or psychiatric symptom severity.

DISCUSSION

CAU + SOS training was more effective in preventing victimization compared to CAU alone. More participants allocated to receive the SOS training as an add-on to CAU achieved a positive treatment response for total victimization 12 months after finalizing the SOS training (68 versus 54%). The current study indicates that, at least for this specific goal, providing dual-diagnosis patients with a relatively brief skills training can lead to improvements, which implies that these vulnerable patients are able to acquire new skills and retain them over time.

With regard to the prevention of property victimization, the SOS training was not effective (Bayes factor = 0.17), whereas for violent victimization, findings were

Table 2 Care as usual received at Arkin mental health care between baseline and 14-month follow-up.

	CAU + SOS training (n = 125)	CAU (n = 125)	Total sample (n = 250)
Days of clinical care, no. (%)			
None	34 (27.2)	32 (25.6)	66 (26.4)
1–30 days	22 (17.6)	26 (20.8)	48 (19.2)
31–60 days	21 (16.8)	20 (16.0)	41 (16.4)
61–120 days	25 (20.0)	22 (17.6)	47 (18.8)
121–427 days	23 (18.4)	25 (20.0)	48 (19.2)
Number of sessions, median (IQR)			
Pharmacotherapy	5 (1–15)	5 (2–13)	5 (1–13)
Individual psychotherapy	39 (17–76)	32 (9–69)	36 (14–72)
Group psychotherapy[a]	8 (2–21)	10 (2–20)	9 (2–20)
Supportive counselling	10 (1–25)	9 (3–23)	10 (2–23)

CAU = care as usual; IQR = interquartile range. [a]Other than SOS (Self-wise, Other-wise, Streetwise) training.

Table 3 Observed percentage of participants with treatment response at 14-month follow-up and results of the logistic regression analyses for primary outcome treatment response for total victimization and secondary outcomes treatment response for violent victimization and treatment response for property victimization.

		CAU + SOS		CAU				95% CI	
		% TR	% NV	% TR	% NV	OR	P	Lower	Upper
Total victimization	ITT	67.6	35.8	54.0	28.2	1.78	0.042	1.02	3.11
	ITT-adjusted[a]	NA	NA	NA	NA	NA	NA	NA	NA
	CCA	69.7	39.0	55.8	30.8	1.82	0.041	1.03	3.27
Violent victimization	ITT	79.3	58.8	68.7	52.8	1.75	0.092	0.91	3.34
	ITT-adjusted[b]	79.3	58.8	68.7	52.8	1.90	0.059	0.98	3.68
	CCA	81.8	62.0	70.2	54.8	1.91	0.055	1.00	3.76
Property victimization	ITT	67.7	53.7	68.9	50.9	0.95	0.845	0.51	1.73
	ITT-adjusted[c]	67.7	53.7	68.9	50.9	0.93	0.819	0.50	1.73
	CCA	68.7	54.0	71.2	51.9	0.89	0.702	0.49	1.62

CAU = care as usual; CCA = complete case analysis; ITT = intention-to-treat analysis; NA = not applicable; NV = no victimization incidents at 14-month follow-up; OR = odds ratio; SOS = SOS (Self-wise, Other-wise, Streetwise) training; TR = treatment response. [a]Not applicable as there were no significant predictors of TR for total victimization, other than group allocation; [b]adjusted for education level (lower/middle or high); [c]adjusted for type of care (in-patient/out-patient).
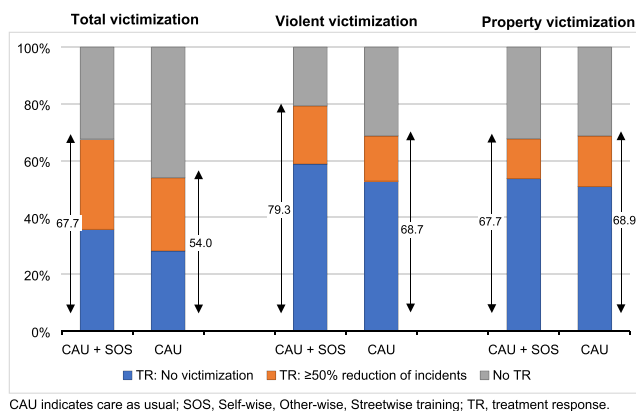

Figure 2 Observed percentage of participants with treatment response (TR) at 14-month follow-up. [Colour figure can be viewed at wileyonlinelibrary.com]

CAU indicates care as usual; SOS, Self-wise, Other-wise, Streetwise training; TR, treatment response.

inconclusive as to whether there was a difference in treatment response (79 versus 69%, Bayes factor = 2.26). These findings suggest that the treatment effect on total victimization may have been due mainly to a reduction in the number of violent victimization incidents. This might be explained by the type of skills addressed in the SOS training: although the module Streetwise is focused on reducing vulnerability to both property and violent victimization, the modules Self-wise and Other-wise target skills that are have been related mainly to violent victimization in previous research, and not to property victimization [43,44].

None of the tested baseline characteristics (demographics, type of care, past-year victimization, type and number of DSM-IV diagnosis) predicted treatment response for total victimization. More participants with a middle or high level of education achieved treatment response for violent victimization compared to those with a lower level of education. Individuals with a middle or high level of education may have benefited more from the treatments offered, and therefore may have acquired more skills that help to

reduce vulnerability for violent victimization. More participants who received in-patient care at baseline achieved treatment response for property victimization compared to those who received out-patient care at baseline. Possibly, those in in-patient care have learned from codes with regard to taking care of personal belongings: for instance, by locking the door of one's room when one is away.

No between-group differences were found regarding alcohol and drug use problems and psychiatric symptom severity between CAU and CAU + SOS training. Although there is evidence for the effectiveness of disorder-specific treatments to reduce symptom severity of PTSD [45] in individuals with co-occurring substance use disorders, our finding is in line with a Cochrane review by Hunt *et al.* [17], indicating that there is no compelling evidence for any psychosocial intervention to reduce substance use or improve mental state in patients with substance use disorders and severe mental illness [12]. Victimization has been linked to substance use and psychiatric symptom severity in both patients with severe mental illness [5,46] and

Table 4 Observed secondary outcome data over time and results of the linear mixed model analyses for secondary outcome measures psychiatric symptom severity, alcohol use problems and drug use problems.

		CAU + SOS	CAU			95% CI	
		mean (SD)	mean (SD)	B	P	Lower	Upper
AUDIT	Overall	NA	NA	−1.03	0.248	−2.76	0.71
	Baseline	15.10 (12.79)	14.95 (12.79)	NA	NA	NA	NA
	8-month follow-up	10.53 (8.80)	12.20 (10.73)	−1.73	0.075	−3.64	0.18
	14-month follow-up	11.43 (9.93)	10.88 (9.66)	−0.28	0.776	−2.20	1.64
DUDIT	Overall	NA	NA	−0.07	0.940	−1.84	1.70
	Baseline	19.02 (12.82)	17.40 (13.64)	NA	NA	NA	NA
	8-month follow-up	11.39 (9.80)	12.26 (10.09)	−0.27	0.791	−2.29	1.74
	14-month follow-up	11.94 (8.72)	11.21 (9.78)	0.17	0.873	−1.86	2.19
BPRS-E	Overall	NA	NA	−0.01	0.923	−1.51	1.49
	Baseline	38.86 (8.79)	37.62 (8.28)	NA	NA	NA	NA
	2-month follow-up	35.86 (8.07)	36.09 (8.66)	−0.69	0.476	−2.57	1.20
	8-month follow-up	36.06 (7.27)	35.19 (8.42)	0.36	0.717	−1.57	2.29
	14-month follow-up	34.59 (7.58)	33.78 (7.25)	0.43	0.661	−1.50	2.37

AUDIT = Alcohol Use Disorder Identification Test; BPRS-E = Brief Psychiatric Rating Scale Expanded; CAU= care as usual; DUDIT = Drug Use Disorder Identification Test; NA = not applicable; SD = standard deviation; SOS = SOS (Self-wise, Other-wise, Streetwise) training.

patients with substance use disorders [1–4], and therefore one would expect a reduction of victimization incidents to be beneficial for the patients' mental health and addiction recovery. However, in a prior study using baseline data from the current study we have shown that substance use problems and psychiatric symptom severity were not independently associated with victimization in dual-diagnosis patients [43]. A study among African Americans reported that victimization in young adulthood predicted greater substance use in mid-life [47]. However, this pathway was not found for those raised in a disadvantaged neighbourhood who lived in impoverished households. The authors suggested that those inured to life's adversities, with lower expectations about one's life chances, may be less negatively affected by victimization. The same could apply to dual-diagnosis patients, and this could explain that, in the current study, the reduction of victimization was not accompanied by a reduction of alcohol and drug use problems. It has consistently been demonstrated that life stressors such as impairment of intimate relations, family relations and vocational functioning can negatively impact substance use problems [48–50]. However, there is a lack of studies examining the short- and long-term impact of victimization on substance use problems and mental state in dual-diagnosis patients. Prospective cohort studies should be conducted to examine the impact of different types of victimization while taking into account other life stressors.

The SOS training was successfully implemented in inpatient as well as out-patient care facilities and positively rated by participants. Reasons for loss to treatment were mainly practical, and unrelated to the content of the SOS training. Although adding the SOS training to CAU is more effective in preventing victimization compared to CAU alone, the majority of participants in the experimental condition still experienced victimization during the follow-up period. Further studies should be conducted that include an active control group and a more extensive assessment of treatment outcome, and examine working mechanisms, long-term effects, outcome predictors and potential gains by intensifying the SOS training with more frequent sessions or with follow-up booster sessions. To further optimize the content of the SOS training, focus groups should be organized with participants who were randomized to receive the SOS training, but were nevertheless victimized during the follow-up period.

SOS training can be implemented as an add-on to CAU for dual-diagnosis patients in order to prevent victimization. However, we would like to emphasize that SOS training is by no means a substitute for trauma treatment, and that patients suffering from post-traumatic stress disorder should always receive evidence-based psychotherapeutic interventions [45].

The strengths of this study are the sample size, the heterogeneity of the sample, the limited loss to follow-up and the generalizability to clinical practice. The study also has several limitations. First, there was a considerable loss to treatment, which is a typical challenge in clinical trials in dual-diagnosis patients [12]. Secondly, the study was powered to detect differences in the primary outcome and may therefore have been underpowered to detect subtle differences in secondary outcomes. Thirdly, the study had a relatively short follow-up period of 14 months. Fourthly, the study did not incorporate independent fidelity ratings

and therefore we are unable to verify whether the intervention was delivered as intended. Finally, there may be substantial variations in CAU between countries [12], which may limit the generalizability of our findings to other countries. In the current study, CAU generally consisted of pharmacotherapy combined with individual psychotherapy, group psychotherapy and/or supportive counselling.

CONCLUSIONS

In dual-diagnosis patients, adding SOS training to CAU is more effective in preventing victimization compared to CAU alone. SOS training can be implemented in addiction–psychiatry services in order to prevent future victimization in these patients.

Trial registration

NTR, trialregister.nl Identifier: NTR4472.

Declaration of interests

None.

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