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A randomized controlled trial of a brief intervention for illicit drugs linked to the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) in clients recruited from primary health-care settings in four countries

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ABSTRACT

Aims This study evaluated the effectiveness of a brief intervention (BI) for illicit drugs (cannabis, cocaine, amphetamine-type stimulants and opioids) linked to the World Health Organization (WHO) Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). The ASSIST screens for problem or risky use of 10 psychoactive substances, producing a score for each substance that falls into either a low-, moderate- or high-risk category. **Design** Prospective, randomized controlled trial in which participants were either assigned to a 3-month waiting-list control condition or received brief motivational counselling lasting an average of 13.8 minutes for the drug receiving the highest ASSIST score. **Setting** Primary health-care settings in four countries: Australia, Brazil, India and the United States. **Participants** A total of 731 males and females scoring within the moderate-risk range of the ASSIST for cannabis, cocaine, amphetamine-type stimulants or opioids. **Measurements** ASSIST-specific substance involvement scores for cannabis, stimulants or opioids and ASSIST total illicit substance involvement score at baseline and 3 months post-randomization. **Findings** Omnibus analyses indicated that those receiving the BI had significantly reduced scores for all measures, compared with control participants. Country-specific analyses showed that, with the exception of the site in the United States, BI participants had significantly lower ASSIST total illicit substance involvement scores at follow-up compared with the control participants. The sites in India and Brazil demonstrated a very strong brief intervention effect for cannabis scores ($P < 0.005$ for both sites), as did the sites in Australia ($P < 0.005$) and Brazil ($P < 0.01$) for stimulant scores and the Indian site for opioid scores ($P < 0.01$). **Conclusions** The Alcohol, Smoking and Substance Involvement Screening Test-linked brief intervention aimed at reducing illicit substance use and related risks is effective, at least in the short term, and the effect generalizes across countries.

Keywords Amphetamine, ASSIST, brief intervention, cannabis, cocaine, illicit drugs, primary health care, opioids, randomized controlled trial, screening.

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INTRODUCTION

There is substantial evidence of the benefits of brief intervention (BI) for tobacco and alcohol problems in primary health care (PHC) settings, particularly when the intervention is linked to the results of a screening test [1,2]. Moreover, brief interventions have been shown to be cost-effective in reducing alcohol consumption and associated problems [3,4]. However, there is only suggestive evidence on the effectiveness of brief interventions for illicit drug use, particularly in primary care settings.

Patients with chronic benzodiazepine problems reduced their benzodiazepine use significantly and showed general health improvement at both 3- and 6-month follow-up in response to brief advice from a general practitioner [5]. In another study, regular amphetamine users, recruited from a variety of health settings, reduced their amphetamine use following a BI comprised of up to four sessions of cognitive–behavioural therapy and a self-help book [6]. A randomized controlled trial conducted in primary health-care clinics found that clients randomized to a brief intervention were more likely to reduce their cocaine and heroin use than controls [7].

There is evidence suggesting that brief treatment interventions may work for drugs such as cannabis [8–11], benzodiazepines [5], opioids [1,12] and cocaine [13], but these studies often include multiple sessions, lasting between 30 and 90 minutes, and the interventions are not necessarily linked to screening for substance use disorders within primary care. In fact, until recently, a culturally neutral screening questionnaire for all psychoactive substances, including illicit drugs, has not been available for use in primary care settings. In addition, the majority of the studies were conducted in either the United States, United Kingdom or Australia, thereby limiting the international generalizability of their findings.

To address the significant burden of disease associated with substance use and the need for comprehensive early intervention programmes on an international level, the World Health Organization (WHO) developed the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) to screen for problem or risky use of tobacco, alcohol and 'a variety of illicit drugs'.

The primary aim of this study was to conduct a randomized controlled trial (RCT) across four countries to evaluate the effectiveness of a BI for illicit drugs [cannabis, cocaine, amphetamine-type stimulants (ATS) and opioids] in PHC clients. Primary health care, in this study, comprised health settings that could be considered to be a first point of contact in the health system. Because primary care is not used typically to treat substance dependence, this study focused on patients who were not dependent but considered to be at elevated risk for experiencing substance-related problems related to their health, and therefore appropriate candidates for a brief intervention.

Multiple psychoactive substances are often used simultaneously, making multiple substance use the norm rather than the exception. Moreover, there is evidence that reduction in one illicit substance, such as heroin, can result in substitution or increased use of another substance [14,15]. A secondary aim of this study was to determine whether a BI targeted at one substance would increase use of another substance. A third aim was to evaluate whether the general severity of substance involvement affects the response to a BI.

METHODS

Assessment (screening) and brief intervention

The ASSIST screens for problem or risky use of tobacco, alcohol, cannabis, cocaine, ATS, sedatives, hallucinogens, inhalants, opioids and 'other drugs'. A risk score is determined for each substance and is categorized as low-, moderate- or high-risk. The ASSIST was developed principally for use in primary care settings to identify patients whose substance use may be classified as moderate-risk (that is, harmful use but not meeting criteria for dependence) and who may otherwise go undetected or become even worse. The ASSIST has undergone significant psychometric evaluation [16,17] to ensure that it is feasible, reliable, valid and cross-culturally relevant. Pilot testing in Australia and Brazil [18,19] of an ASSIST-linked BI demonstrated effectiveness for alcohol and other drugs (cannabis, opioids, cocaine), with the ASSIST scores for these substances reduced by 23% from baseline to follow-up 3 months later.

The ASSIST comprises seven questions for each drug category, and an eighth question on injecting. It identifies the substances used and the substance-related harm over the patient's life-time and over the past 3 months. As described in greater detail in a WHO technical report [20], a risk score is calculated for each substance category and then classified into either low-, moderate- or high-risk, which determines the type of intervention ('none', 'brief intervention' or 'brief intervention plus referral' respectively). All participants recruited to this study scored within the ASSIST moderate-risk range for at least one of the targeted illicit drugs and did not score in the high-risk range for any substance. However, participants were not excluded for scoring in the high-risk range for tobacco.

The BI was designed to be relatively short and easily linked to the results of the ASSIST screening questionnaire score via the use of the ASSIST Feedback Report card. Discussion of the scores and their meaning comprised a major part of the BI, and participants took the card home with them at the termination of the BI.

The BI incorporated motivational interviewing techniques that have been found to reduce client resistance while facilitating behaviour change [21]. Each country developed their own culturally appropriate brief intervention based on these principles (for example, see the Australian site results [22]). The BI also comprised a take-home guide called *Self-help Strategies for Cutting Down or Stopping Substance Use* [23] (now available as part of the revised WHO ASSIST package [24]).

Countries and settings involved

The project was conducted at clinical research units (CRUs) in four countries selected to enhance the cross-national generalizability of the findings, and to represent a broad range of cultural, political and economic systems in which substance-related problems occur. In Australia, participants were recruited at a free, walk-in sexually transmitted disease clinic in metropolitan Adelaide, South Australia. In Brazil, recruitment was conducted at 30 PHC units, two health centres that specialize in sexually transmitted diseases and one out-patient setting linked to a general hospital. These facilities were located in the cities of São Paulo, Diadema, Curitiba and Palmas. In India, participants were recruited from community health centres located at Trilokpuri and the border areas of Delhi and Ghaziabad (Shadipur). In the United States, participants were recruited from a community clinic connected with the University of California, Los Angeles and at a walk-in health clinic. Other participants were recruited from general medicine and dental clinics affiliated with an academic medical centre in the Hartford, Connecticut area.

Procedures varied slightly from country to country. In Australia, India and the United States clinical research interviewers were trained by the study coordinator at each site to administer the ASSIST and brief intervention. Clinical interviewers were recognized as being *de facto* staff of the clinic to ensure that the intervention would be perceived as a routine clinical procedure. All interviewers had some level of tertiary education within the health field. Within the Brazilian PHCs, both clinicians and researchers were used to recruit participants and conduct the study. They were trained by the local study coordinators to administer the test battery, the ASSIST and brief intervention. At all sites the intervention was guided by a detailed intervention manual [25] (now available as part of the revised WHO ASSIST package [26]) and a checklist to maintain consistency across sites.

Ethical approval was obtained from the appropriate regulatory bodies in each country and all relevant ethical safeguards were met in relation to protection of participants.

Participants

Participants who scored between 4 and 26 on the ASSIST (moderate-risk range) for cannabis, cocaine, ATS or opioids were enrolled into the study. Individuals who scored in the high-risk category for any of the substances (excluding tobacco) or who had frequently injected drugs in the last 3 months (more than four times per month on average) were referred to specialist drug and alcohol treatment services.

The primary inclusion/exclusion criteria for recruitment included: age between 16 and 62 years; able to participate in a 3-month follow-up; able to give contact details for at least two to three other people; having a fixed address; not pending incarceration within the next 3 months; absence of cognitive impairment or severe behaviour problems; not intoxicated or going through withdrawal from alcohol or other drugs; and not currently in drug or alcohol treatment (apart from treatment for nicotine dependence).

Trial design and procedure

All participants were administered the ASSIST and a demographic profile questionnaire at baseline. Eligible participants were randomized to either an intervention or wait list control group immediately following the ASSIST baseline interview. Randomization was stratified by gender, substance and level of use (high/low). Participants who were within the moderate-risk range on the ASSIST for cannabis, cocaine, ATS or opioids were classified as 'high-use' if they scored between 16 and 26 or 'low-use' if they scored between 4 and 15. Randomization lists for each drug category and country were prepared by the coordinating centre in Australia using a web-based randomization programme (http://www.randomization.com/). Clinical research staff were not blind to the intervention allocation, as they were responsible for administering the intervention at baseline. In the majority of cases the same clinical researcher performed both the baseline and follow-up interviews.

Intervention participants received a BI for the drug receiving the highest moderate-risk specific substance involvement score on the ASSIST (for cannabis, cocaine, ATS or opioids). If participants scored within the moderate-risk range for two or more of the target drugs, the intervention focused on the highest scoring substance or the substance that was of most concern to the participant. Control participants did not receive an intervention at baseline, but were told that they would be contacted again in 3 months. Control participants were invited to contact the clinical interviewer if they had concerns about their substance use during this time. Both groups were re-interviewed 3 months later and were administered the ASSIST, following which the control

participants received a BI. With the exception of the site in Brazil, participants were compensated for time and travel expenses to participate in the follow-up interview.

The average time between the baseline and follow-up interviews was 104.7 days [standard deviation (SD) = 30.9, median 95 days]. A total of 631 participants were followed-up (86%) with 49 intervention participants and 51 controls lost to follow-up. Site follow-up rates were 94.7% for Australia, 86.7% for Brazil, 87.6% for India and 77.1% for the United States. There were no significant differences between participants followed and those lost to follow-up with regard to age, gender, years of education, employment status, randomization group and previous drug or alcohol treatment. However, participants lost to follow-up had significantly lower total illicit substance involvement scores at baseline than the participants who were re-interviewed at follow-up (mean 32.57, SD = 18.65 versus mean = 36.75, SD = 19.48; $P = 0.03$, respectively).

Sample size and data analyses

A power calculation based on results of a pilot study at the Australian and Brazilian sites was used to estimate the sample size for this study.

ASSIST total illicit substance involvement scores (calculated by the addition of all responses to questions 1–8 excluding alcohol and tobacco) and ASSIST specific substance involvement scores for each substance (calculated by the addition of responses to questions 2–7 within each substance class) were determined. Amphetamine-type stimulants and cocaine-specific substance involvement scores were collapsed into one category called 'stimulant-specific substance involvement' to improve statistical power.

Comparisons between countries were made initially with general linear modelling (GLM) and significant findings were investigated further with Tukey's honestly significant difference (HSD) *post-hoc* comparisons. In all comparisons, an intention-to-treat analysis was conducted, and baseline values were carried forward for participants lost to follow-up.

Two-way repeated-measures analysis of variance (ANOVA) (or GLM) were utilized to assess the effectiveness of the BI. GLM statistics were calculated for the total pooled sample (all countries) and also for each country. Assumptions of normality, homogeneity of variance and sphericity were met.

RESULTS

Participant characteristics

Seven hundred and thirty-one ($n = 731$) drug-using participants (Australia $n = 171$; Brazil $n = 165$; India $n = 177$; United States $n = 218$) were recruited to the study, representing the following primary substances: cannabis ($n = 395$), cocaine ($n = 92$), ATS ($n = 155$) and opioids ($n = 89$). The recruitment and follow-up period varied by country, and generally occurred between September 2003 and December 2006. The participant, intervention and flow details are summarized in the Consolidated Standards of Reporting Trials (CONSORT) flowchart depicted in Fig. 1. More than two-thirds (72.1%) of the sample were male (Australia 62%, Brazil 81%, India 100%, United States 51%) and 72% of participants were employed (Australia 77%, Brazil 60%, India 94%, United States 58%). The mean age of participants was 31.4 years (SD = 9.3) and the average years of education was 9.5 (SD = 5.2). Just over one-half (55.5%) had never been married, with 34.1% either married or cohabiting. The greatest proportion of participants identified themselves as Caucasian (59.6%), followed by Indian (24.4%) or African (7.3%). The remainder identified themselves as Mulatto (3.1%), Hispanic (2.2%), Asian/Pacific Islander (1.2%), Native American (0.4%), Aboriginal/Torres Strait Islander (0.3%) or 'other' (1.5%).

Fifteen per cent (15%) of participants had received previous treatment for drug or alcohol problems, most frequently for cocaine (4.5%) and alcohol (4.0%), followed by cannabis (2.6%), ATS (1.8%) and opioids (1.2%). Most participants (86%) had never injected a substance. The intervention and control groups did not differ significantly at baseline with respect to their total illicit substance involvement scores or specific substance involvement scores.

On average, administration of the ASSIST baseline screening required 7.9 minutes (SD = 3.7) and the BI 13.8 minutes (SD = 8.5). There was a significant difference in the overall time taken to administer the ASSIST ($P < 0.001$) between sites, with India having the shortest mean administration time of 6.6 minutes (SD = 1.9) and United States the longest at 9.3 minutes (SD = 5.0). Similarly, BI delivery times also varied significantly across sites ($P < 0.001$), with the site in Australia having the shortest delivery time (7.7 minutes, SD = 2.1) and Brazil the longest (23.3 minutes, SD = 10.9).

Total illicit substance involvement scores

Table 1 shows total illicit substance involvement scores for each country and for the pooled sample. There was a significant reduction over time ($F_{(1,728)} = 114.7$, $P < 0.001$) for the pooled sample regardless of group, and a significant group × time interaction effect in which the group receiving the BI at baseline (regardless of substance) had significantly lower mean total illicit substance involvement scores at follow-up than the control group. This held true for a two-way repeated-measures

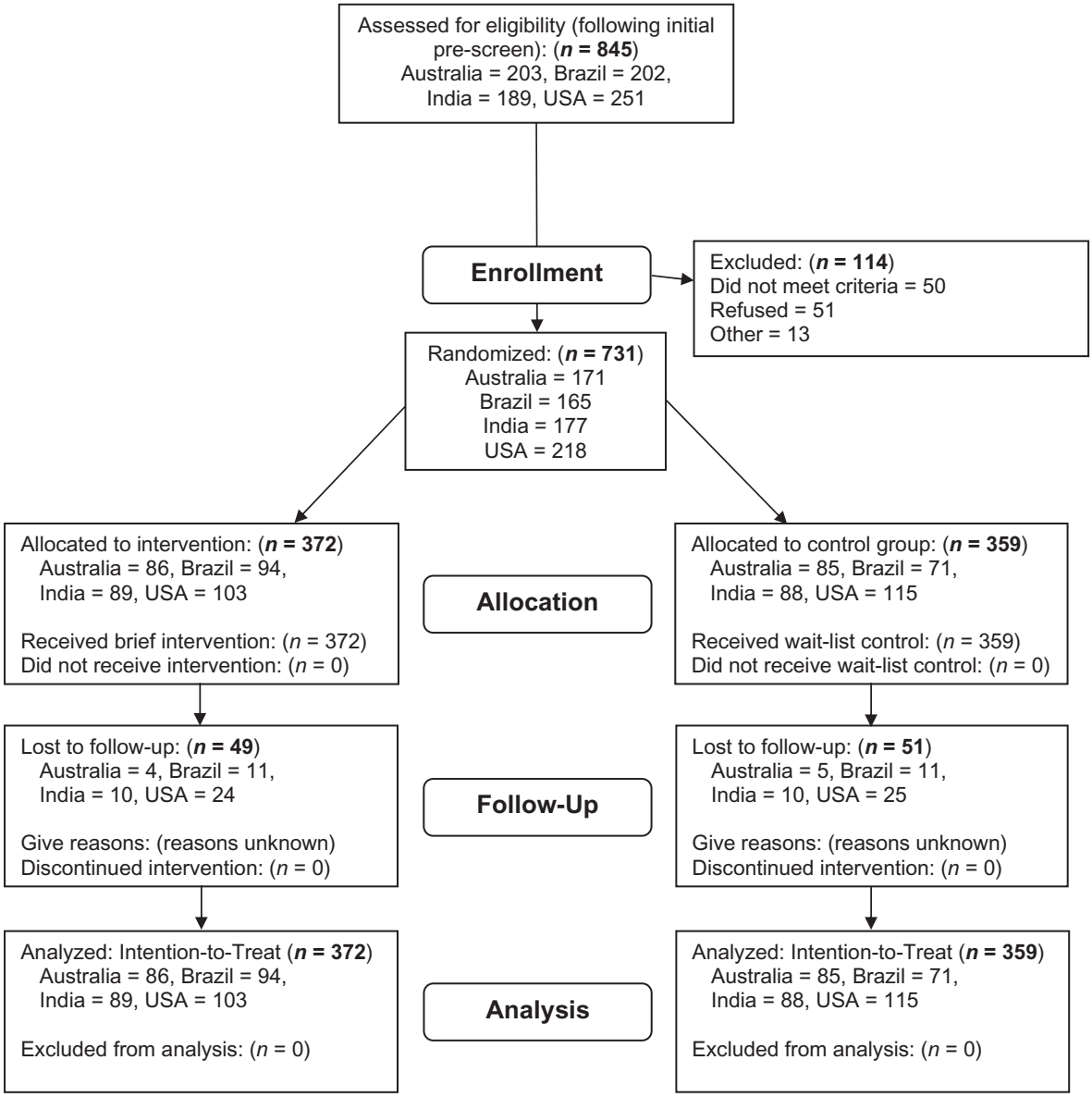

Figure 1 Consolidated Standards of Reporting Trials (CONSORT) flowchart by country

ANOVA controlling for age and education ($F_{(1,726)} = 7.8$, $P = 0.005$, observed power 79.7%).

Two-way repeated-measures ANOVAs found a significant reduction over time for each country, regardless of group (Australia: $F_{(1,168)} = 24.8$, $P < 0.001$; Brazil: $F_{(1,163)} = 29.5$, $P < 0.001$; India: $F_{(1,175)} = 62.7$, $P < 0.001$; United States: $F_{(1,216)} = 22.5$, $P < 0.001$) and a significant interaction effect for each country, with the exception of the United States (see Table 1). That is, participants receiving the BI in Australia, Brazil and India had significantly reduced total illicit substance involvement scores at follow-up compared with control participants. There were also significant differences in interaction effects between the countries (Table 1).

An initial two-way repeated-measures ANOVA analysis comprising experimental condition, level of use (high/low), gender and country was calculated where the latter three factors were included in the analysis as covariates, and a significant interaction effect was observed ($F_{(1,725)} = 6.6$, $P = 0.010$). While gender and country did not have a significant impact on outcome ($P = 1.00$ and $P = 0.65$, respectively), level of use did ($P < 0.01$) and this was investigated in *post-hoc* analyses.

Two-way repeated-measures ANOVA showed a significant reduction in total illicit substance involvement scores over time in both the high-use and low-use analyses, respectively ($F_{(1,451)} = 105.2$, $P < 0.001$) and ($F_{(1,275)} = 14.7$, $P < 0.001$). This reduction was found

Table 1 Total illicit substance involvement scores—brief intervention and control group means at baseline and follow-up by country compared using two-way repeated-measures analysis of variance (ANOVA) (intention-to-treat analysis).

	Intention-to-treat analysis/ANOVA total illicit substance involvement scores					
	n	*Baseline score (SD)*	*Follow-up score (SD)*	*Mean effect size (% decrease)*	*Interaction effect*[a]*, P, power*	*Interaction by country effect, P*
Australia						
BI	86	46.8 (19.3)	39.0 (17.6)	16.7%	$F = 14.9$, $P < 0.001$, power = 97%	
Control	84	43.7 (18.4)	42.7 (20.0)	2.3%		
Brazil						
BI	94	29.2 (14.4)	21.8 (13.9)	25.3%	$F = 9.5$, $P < 0.005$, power = 86%	
Control	71	24.7 (11.9)	22.6 (11.8)	8.5%		$F = 6.5$, $P < 0.001$
India						
BI	89	34.7 (14.0)	26.5 (13.1)	23.6%	$F = 9.4$, $P < 0.005$, power = 86%	
Control	88	34.8 (14.7)	31.2 (13.5)	10.3%		
USA						
BI	103	34.9 (22.3)	31.1 (19.7)	10.9%	$F = 2.5$, $P = 0.11$, power = 35%	
Control	115	39.0 (24.6)	31.3 (18.7)	19.7%		
Pooled						
BI	372	36.1 (18.9)	29.5 (17.5)	18.3%	$F = 7.4$, $P = < 0.01$, power = 77%	
Control	359	36.2 (19.9)	32.2 (17.9)	11.0%		

[a]Interaction of time and experimental condition in predicting total illicit substance involvement score. BI: brief intervention; SD: standard deviation.

regardless of intervention group and the substance targeted in the intervention. When the analyses controlled for intervention allocation (control or BI), both high-use and low-use analyses found the BI group had lower total illicit substance involvement scores than the control group, although neither was statistically significant (high-use $F_{(1,451)} = 3.7$, $P = 0.054$; low-use $F_{(1,275)} = 3.3$, $P = 0.070$).

Specific substance involvement scores

Cannabis

Included were all participants eligible to receive a BI for cannabis at baseline (Table 2). Pooled data, two-way repeated-measures ANOVA showed a significant reduction over time ($F_{(1,393)} = 49.8$, $P < 0.001$) regardless of group and a significant group × time interaction effect. The BI group had significantly lower cannabis-specific substance involvement scores at follow-up compared with the control group. At the country level, two-way repeated-measures ANOVAs showed a significant reduction over time for each country regardless of group (Australia: $F_{(1,29)} = 4.2$, $P = 0.049$; Brazil: $F_{(1,110)} = 9.5$, $P = 0.003$; India: $F_{(1,104)} = 19.1$, $P < 0.001$; United States: $F_{(1,144)} = 19.1$, $P < 0.001$) but significant group × time interaction effects were evident only in Brazil and India.

Stimulants (ATS and cocaine)

This included participants eligible to receive a BI for either cocaine or ATS at baseline (Table 3). Two-way repeated-measures ANOVA showed a significant reduction over time ($F_{(1,245)} = 93.0$, $P < 0.001$) regardless of group and a significant group × time interaction effect, with the BI group having lower scores at follow-up compared with the control group. Two-way repeated-measures ANOVA showed a significant reduction over time for each country (excluding India, which did not recruit stimulant users) regardless of group (Australia: $F_{(1,136)} = 40.4$, $P < 0.001$; Brazil: $F_{(1,51)} = 32.4$, $P < 0.001$; United States: $F_{(1,54)} = 20.7$, $P < 0.001$). There was a significant group × time interaction effect for Australia and Brazil, but not for the United States.

Opioids

Only India was included, because other sites recruited inadequate numbers of opioid users (Australia = 2; Brazil = 0, United States = 16). Two-way repeated-measures ANOVA showed a significant reduction over time regardless of group ($F_{(1,69)} = 50.4$, $P < 0.001$) and a significant group × time interaction effect, with BI participants having reduced scores compared with control participants at follow-up (Table 4).

Effect of the brief intervention on involvement (substitution) with other substances

To evaluate the specificity of the intervention for the four substances targeted for this trial, two-way repeated-measures ANOVAs were conducted to determine whether other substance use changed over time and whether

Table 2 Cannabis-specific substance involvement scores—brief intervention and control group means at baseline and follow-up by country compared using two-way repeated-measures analysis of variance (ANOVA) (intention-to-treat analysis).

	Intention-to-treat analysis—cannabis scores					
	n	*Baseline score (SD)*	*Follow-up score (SD)*	*Mean effect size (% decrease)*	*Interaction effect*[a]*, P, power*	*Interaction by country effect, P*
Australia						
BI	17	20.2 (5.3)	17.2 (6.1)	14.9%	$F = 2.6$, $P = 0.12$, power = 34%	
Control	14	19.4 (7.6)	19.0 (7.6)	2.1%		
Brazil						
BI	67	13.3 (6.5)	9.3 (8.2)	30.0%	$F = 9.5$, $P < 0.005$, power = 86%	
Control	45	12.0 (6.0)	12.0 (7.1)	0.0%		$F = 5.9$, $P < 0.001$
India						
BI	54	22.8 (2.0)	18.9 (6.1)	17.1%	$F = 10.8$, $P < 0.001$, power = 90%	
Control	52	22.3 (2.5)	21.8 (4.9)	2.2%		
USA						
BI	74	16.8 (7.7)	15.1 (9.5)	10.1%	$F = 3.0$, $P = 0.08$, power = 41%	
Control	72	16.2 (6.7)	12.3 (7.0)	24.1%		
Pooled						
BI	212	17.5 (7.1)	14.4 (8.9)	17.7%	$F = 4.0$, $P < 0.05$, power = 52%	
Control	183	17.1 (6.8)	15.4 (7.9)	9.9%		

[a]Interaction of time and experimental condition in predicting cannabis-specific substance involvement score. BI: brief intervention; SD: standard deviation.

Table 3 Stimulant-specific substance involvement scores—brief intervention and control group means at baseline and follow-up by country compared using two-way repeated-measures analysis of variance (ANOVA) (intention-to-treat analysis).

	Intention-to-treat analysis—stimulant scores					
	n	*Baseline score (SD)*	*Follow-up score (SD)*	*Mean effect size (% decrease)*	*Interaction effect*[a]*, P, power*	*Interaction by country effect, P*
Australia						
BI	68	16.8 (7.1)	11.9 (7.3)	29.2%	$F = 8.5$, $P < 0.005$, power = 83%	
Control	70	15.5 (6.8)	13.7 (7.7)	11.6%		
Brazil						
BI	27	15.7 (6.9)	6.5 (5.7)	58.6%	$F = 7.0$, $P < 0.01$, power = 74%	$F = 2.8$, $P = 0.06$
Control	26	11.1 (6.0)	7.7 (6.1)	30.6%		
USA						
BI	23	20.9 (7.9)	16.2 (11.8)	22.5%	$F = 0.08$, $P = 0.8$, power = 6%	
Control	33	18.5 (7.6)	13.2 (10.5)	28.6%		
Pooled						
BI	118	17.3 (7.4)	11.5 (8.6)	33.5%	$F = 9.4$, $P < 0.005$, power = 86%	
Control	129	15.4 (7.2)	12.4 (8.5)	19.5%		

[a]Interaction of time and experimental condition in predicting stimulant-specific substance involvement score. BI: brief intervention; SD: standard deviation.

there were any interaction effects with the experimental condition that would suggest that the brief intervention was affecting all substance use, not just the targeted substance. All participants were included in the analyses which showed no significant group × time interaction effect for tobacco ($F_{(1,729)} = 1.2$, $P = 0.23$), inhalants ($F_{(1,729)} = 2.3$, $P = 0.13$), sedatives ($F_{(1,729)} = 0.1$, $P = 0.8$) or hallucinogens ($F_{(1,729)} = 0.005$, $P = 0.94$). A similar result was found for alcohol ($F_{(1,729)} = 3.5$, $P = 0.06$), although the BI group showed a trend towards decreased alcohol scores at follow-up. Similarly, there was no significant group × time interaction effect for cannabis ($F_{(1,334)} = 0.6$, $P = 0.4$) in participants not receiving the BI for cannabis.

Table 4 Opioid-specific substance involvement scores—brief intervention and control group means at baseline and follow-up by country compared using two-way repeated-measures analysis of variance (ANOVA) (intention-to-treat analysis).

	Intention- to-treat analysis—opioid scores					
	n	*Baseline score (SD)*	*Follow-up score (SD)*	*Mean effect size (% decrease)*	*Interaction effect*[a]*, P, power*	*Interaction by country effect, P*
India						
BI	35	22.7 (2.6)	13.0 (8.6)	42.7%	$F = 7.6$, $P < 0.01$, power = 78%	
Control	36	22.5 (2.2)	18.2 (7.8)	19.1%		

[a]Interaction of time and experimental condition in predicting opioid-specific substance involvement score. BI: brief intervention; SD: standard deviation.

DISCUSSION

This study has demonstrated that an ASSIST-linked brief intervention requiring on average 15 minutes duration reduced illicit substance use and associated risk significantly among clients recruited from a range of primary health-care settings and countries. Regardless of assignment, ASSIST follow-up scores were significantly lower than baseline scores, indicating that there was an overall decrease in substance use and risk over time. However, when group assignment was taken into consideration, participants receiving the brief intervention had significantly lower scores on all measures compared with control participants. These findings indicate that the brief intervention was effective in encouraging participants to reduce their substance use, but that other factors may have also contributed to changes in substance use over time. Previous research has suggested that 'regression towards the mean' is typical in these kinds of studies [27]. However, it may also indicate that administration of the ASSIST questionnaire alone can influence participants to reduce their substance use. The data collected in this study do not allow for further investigation of this effect. Other limitations of this study also include the low power for some of the analyses performed, the focus on only four substances, the short duration of follow-up and the imputation method used in the intention-to-treat analysis. Moreover, in order to standardize the study procedures, clinical research staff conducted the screening, brief interventions and follow-up evaluations, rather than primary care practitioners and clinic staff. It is possible that these procedures limited the internal validity because of interviewer bias and the external validity of the study, because regular staff were not directly involved. Although the imputation method that we employed may have limitations, there were limited options with two time-points and the method used is likely to be conservative.

With the exception of the United States, country-specific analyses demonstrated that participants who had received the brief intervention had significantly lower total illicit substance involvement scores at follow-up compared with control participants. This difference appeared to be greatest among Australian participants. India and Brazil had a strong brief intervention effect for cannabis ($P < 0.005$ for both sites), as did Australia ($P < 0.005$) and Brazil ($P < 0.01$) for stimulants and India for opioids ($P < 0.01$). Although none of the substance-specific interaction effects were significant for the United States, there were significant reductions in both the experimental and control groups at follow-up for all substances. This phenomenon has been attributed to regression to the mean, and is a consistent finding in the brief intervention literature [28].

The reasons for the lack of a differential intervention effect for the sites in the United States is not entirely clear. Within the United States the randomization was successful in balancing the experimental and control groups on key variables, and the follow-up rate was adequate for clinical studies of this kind, with no apparent bias introduced by either the randomization or differential attrition at follow-up. However, there were some protocol and participant differences between the United States and other sites [20], including the introduction of a new ethics/Institutional Review Board (IRB) protocol early in the study in which the attainment of informed consent comprised a lengthy and detailed process lasting 10–15 minutes. This could have had an intervention effect in both groups, and hence reduced the difference between groups. Also, participants from the United States were more likely to have undergone previous treatment for drug or alcohol problems (around 30%), and it is possible that this modified the sensitivity of participants to the ASSIST interview.

Simultaneous psychoactive substance use is common, and it has been shown that when one substance is reduced there is increased use or substitution of another substance [14,15]. Results from this study demonstrate that the reduction in illicit drug use was not associated with substitution of other substances.

A final aim of this study was to determine whether there were differential effects of the brief intervention according to the extent of substance involvement. Both high-use participants ($P = 0.054$) and low-use participants ($P = 0.070$) showed a tendency towards a significant interaction effect with regard to their total illicit substance involvement scores; however, in general it appeared that severity of use within the moderate-risk range did not influence the success of the brief intervention.

CONCLUSION

In both developing and developed countries, there is a compelling need for a comprehensive approach to polysubstance use (including tobacco and alcohol). To the extent that brief interventions for illicit drug use can be applied in a public health context and directed towards at-risk populations, we believe that consideration should be given to incorporating these kinds of programmes into clinical practice. The findings from this project indicate that the ASSIST screening and linked brief intervention have the potential to reduce the burden of disease associated with substance use and substance use disorders in a wide variety of countries and health-care settings.

Disclaimer

The views and conclusions expressed in this paper are solely the responsibility of the named authors and do not necessarily reflect the opinion, decision or stated policy of the WHO.

Declarations of interest

None.

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Supporting information

Additional Supporting Information may be found in the online version of this article:

Appendix S1 Brief intervention. The ASSIST-linked brief intervention for hazardous and harmful substance use. Manual for use in primary care.
Appendix S2 ASSIST. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST). Manual for use in primary care.
Appendix S3 Self-help strategies for cutting down or stopping substance use. A guide.

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