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Two-year outcome of alcohol interventions in Swedish university halls of residence. A cluster randomised trial of a brief skills training programme, twelve-step influenced intervention and controls.

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Abstract

Background: High-risk alcohol consumption among university students is well documented. Several types of intervention have proved effective in reducing alcohol consumption. This study examines the two-year outcome of two different alcohol intervention programmes at university halls of residence.

Methods: 98 university halls of residence (with 556 students) were cluster randomised to two different intervention groups: a brief skills training programme (BSTP) with interactive lectures and discussions, a twelve-step influenced programme (TSI) with didactic lectures by therapists trained in the twelve-step approach, and a control group. All students completing the baseline assessment received personalized feedback by mail. Students responded to mailed follow-up questionnaires after 1, 2 and 3 years, including AUDIT (years 2 and 3), Short Index of Problems (SIP) and estimated blood alcohol concentration (eBAC).

Results: All groups significantly reduced their AUDIT scores from baseline to the second year follow-up, with no significant differences between the groups. Seventy-seven percent of the students belonged to a population with high-risk consumption, using the AUDIT cut-off scores of 8 and 4 for men and women respectively. Students with high-risk alcohol consumption showed significant differences in AUDIT score reduction in favour of the BSTP compared to controls, and had a tendency to show better results than the TSI intervention ($p=0.06$). Similar trends could be seen using SIP and eBAC. The TSI did not differ significantly from the control group within the group of students with high-risk alcohol consumption.

Conclusions: This study suggests a brief skills training programme is effective as intervention in students with high-risk alcohol consumption.

Key words: cluster randomised controlled trial, alcohol intervention, university students in residence halls, brief skills training programme, twelve-step influenced programme

Introduction

The 18-29 age group consumes large amounts of alcohol compared to other age groups (Grant, 1997), and college students more so than their non-college peers (Slutske, 2005).

Dawson et al. (Dawson *et al.* 2004) showed that 42.6% of the college students reported heavy episodic drinking in the past year, compared to 38.1% of the non-college students. Slutske (2005) showed that 18% of US college students suffered from clinically significant alcohol problems in the previous year, compared to 15% of peers not attending college. The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC, Grant, 1997) showed that the one-year prevalence of alcohol abuse in this age group in the US is 7.0%, and alcohol dependence 9.2%.

High alcohol consumption causes both immediate and long-term problems. The immediate problems range from deteriorating academic performance to increased violence, self-inflicted injury, and suicides (CORE 2004; NIAAA, 2002; Slutske, 2005). Excessive drinking also increases the risk of long-term alcohol dependence (Jefferis *et al.*, 2005).

Different intervention methods have been shown to be effective for college student populations (NIAAA, 2002). The Alcohol Skills Training Programme (ASTP), developed by Marlatt et al in the 1980s, is a cognitive behavioural approach based on harm reduction principles. The strength of the programme is that it combines cognitive behavioural skills with norm clarification, student feedback and motivational enhancement interventions. BASICS (Brief Alcohol Screening and Intervention for College Students, Dimeff *et al.*, 1999) is based on the ASTP and consists of two 50-minute intervention sessions with cognitive behavioural principles. In its original form, BASICS is an indicated prevention, aimed at high-risk students. Studies have shown that BASICS significantly reduces drinking rates and harmful consequences in comparison to a control group in a student population (Marlatt et al, 1998). Murphy et al (2001) found larger effect sizes in alcohol consumption and heavy episodic

drinking amongst heavier drinkers in a BASICS programme than in a control group and in an educational intervention. BASICS intervention seem to give good results in short-term follow-ups (Borsari et al (2000) showed significant reductions among heavy episodic drinking students at a six week follow-up regarding drinking volumes and drinking occasions, compared to both a control group and a brief intervention group), as well as in long-term follow-ups (Baer et al (2001) showed greater reductions in negative consequences amongst high-risk drinkers in a BASICS group compared to a control group, with a four year follow-up).

Other interventions have been tested in this population. Motivational interviewing has been proven superior to control groups in several studies (Vasilaki *et al.*, 2006). Multi-session expectancy challenges dealing with students' expectations of alcohol have been found effective in groups of men (Darkes and Goldman, 1993) and mixed genders (Wiers and Kummeling, 2004) in young adults – although those studies are small with short follow-up time periods.

Personalised feedback has proved effective in changing alcohol consumption, both with short-term and long-term follow-up data (Collins *et al.*, 2002; Kypri *et al.*, 2002; Neighbors *et al.*, 2004). Johnsson and Berglund (2006) found no differences in AUDIT reductions between a ten-hour cognitive alcohol skills training intervention programme and personalised feedback among students with high alcohol consumption, with a follow-up period of one year.

Traditional education programmes, providing only information, have not proved effective in this population, and no studies have considered twelve-step influenced programmes in this context, though twelve-step principles are used as alcohol intervention and prevention in many Swedish schools.

University accommodation is an important influencing factor on alcohol consumption.

Dawson et al. (2004) showed that college students living on campus have a higher prevalence

of alcohol abuse or dependence than both college students living off campus or with parents, and non-college students living independently or with parents (22.8% versus 20.9%, 12.4%, 14.6% and 15.9% respectively). Students in Greek houses are known to have the highest alcohol consumption levels of college students (NIAAA, 2002).

It has been shown that a wide array of normative and peer-influence factors within this Greek house community maintains and promotes high alcohol consumption, which suggests a harm reduction and norm clarification approach might yield good results. (Larimer *et al.*, 2001)

In the Greek 2000 project, freshmen in fraternities were targeted for intervention or normal treatment. The intervention was based on BASICS, using both motivational interviewing interventions as well as feedback. The intervention group showed greater reductions in weekly alcohol consumption and typical peak blood alcohol level concentrations (Larimer *et al.*, 2001).

Greek houses may not be so common outside the US. In Sweden, halls of residence are the type of student accommodation most resembling Greek houses. It has been shown that the alcohol consumption levels in halls of residence in New Zealand are very similar to those in American fraternities and sororities (Kypri *et al.*, 2002).

Consequently, a study of how well a BASICS-derived intervention work in residence hall setting is very interesting.

Objectives and hypothesis

This analysis presents the two-year outcome (the first follow-up including AUDIT) of a study where a brief skills training programme and a twelve-step influenced programme are compared to a control group.

The primary hypothesis is that the brief skills training programme group would be more successful than the control group, as well as the twelve-step programme, in reducing AUDIT scores and level of intoxication.

A cluster randomised design was used due to the accommodation of this specific student group.

Material and method

Setting

The initial part of the study was conducted in 2000, in the university town of Lund, Sweden. A student-owned foundation, Akademiska Föreningen, supplies rooms in halls of residence, a total of 2,888 rooms in 271 corridors in halls of residence. Those halls are scattered throughout the town, in special buildings. There is no specific university campus area. The halls of residence were of mixed gender.

A mean of 10.6 students live in each residence hall. The use of special student supervisors in the halls had been removed prior to the study. Residence halls have traditionally been places with high alcohol consumption at Swedish universities, but no studies have previously been carried out to validate this.

Students living in residence halls are usually freshmen, moving out after one or a couple of years, when they have gotten to know the town better and found other places to live. At the time of this study, there was no upper limit as to how long one is allowed to live in a residence hall, as long as you study at least 50% of full time. Thus older persons can be found living there as well. All residence halls in this study are of mixed gender, although there exist some residence hall which are purely male or female. This is the exception rather than the rule, and usually, those are privately owned.

In this university town, in 2005, 20% of the students lived in residence halls, 28% with their parents, 30% in an apartment of their own, and 22% had other living arrangements (Studentboende, 2005).

Enrolment and inclusion

The enrolment procedure for the study involved visiting the corridors in halls of residence in Lund in the evenings (in no particular order other than geographical convenience), within a four week period in the autumn of 2000. The student opening the door was given a brief explanation and was asked to schedule a time for an initial visit. Posters were put up in the hall with this information. In these initial visits to the halls of residence, led by the research project leader or a research assistant, written and oral information about the study was given to the students, a consent form was signed, and then each student completed an eight-page baseline questionnaire. The research assistants, eight in total, were found by advertising in the local student newspaper, and through personal recommendation. All of them were students, mostly within the field of sociology. They were all trained in the different aspects of the questionnaires, and introduced to the general intervention technique. They all exercised professional secrecy.

Design

-----insert figure 1 here-----

The halls where over half of the inhabitants attended the information meeting were eligible for randomisation. Exchange students were excluded since they were only studying at the university a year or less, thus not being able to complete the three year follow-up. Non-drinkers were included in the study, since they live in the same halls of residence as drinkers and do interact closely. The Lund University ethics committee approved the study.

Measures

AUDIT (Alcohol Use Disorders Identification Test) was developed by the World Health Organization (WHO) in the 1980s, as an international test for early identification of hazardous and harmful alcohol use. The maximal total score is 40 points. *AUDIT* scores of the total student sample as well as of those with high-risk consumption are analysed. The instrument can be divided into three subscales: alcohol consumption, dependence and harm.

The Swedish version of the test was used (translation by Bergman et al., 1998). One standard drink was defined as the average equivalent volume of 12 grams of alcohol. The instrument has been tested on a general population sample (n=997), giving an internal consistency of Cronbach's alpha 0.81 (Bergman and Källmén, 2000). In this study, Cronbach's alpha is 0.77 on standardised items.

In 1995 Miller & Tonigan developed the *SIP* (Short Index of Problems) in the MATCH project, as a brief version of the Drinker Inventory of Consequences (DrInC). It was designed to provide a sample of possible alcohol problems, from five alcohol-related problem areas: physical, intrapersonal, social responsibility, interpersonal and impulse control. The brief version was used, translated to Swedish by the Clinical Alcohol Research group at Lund University, and has previously been used in Swedish alcohol prevention studies (Hansson et al, 2006). It has 15 questions and a maximum score of 45. Miller & Tonigan obtained an internal consistency of 0.81, and in a psychometric testing of 153 problem drinkers, Feinn et al. (2003) obtained an internal consistency of 0.79. In this study, Cronbach's alpha is 0.78 on standardised items.

Retrospective *estimated blood alcohol concentration* (eBAC) is a self-assessment questionnaire where the student provides data about the most recent pleasant drinking occasion (number of drinks, amount of time drinking those, gender and weight). The use of the word pleasant was chosen to avoid negative social reactions, and has been used in previous Swedish alcohol prevention studies (Hansson et al, 2006). Based on those data, the

BAC was estimated as a percentage (Dimeff *et al.*, 1999), adjusted for Swedish weight units and drink volume alcohol content.

Randomisation and feedback

The randomisation was made at residence hall corridor level, using a computerised randomisation performed by the Lund University Computing Centre, and was stratified for gender, AUDIT scores and hall of residence size. It was performed after completion of the baseline assessment. Thus all students in the same corridor of a residence hall were randomised to the same condition. All students completing the baseline questionnaire were informed about the randomisation result and received minimal feedback by post. The feedback gave the student's results based on three of the baseline questionnaire instruments (AUDIT, SIP and eBAC), compared with the results of the whole group. Students belonging to the upper quartile of either AUDIT or SIP were advised to consider a reduction in their alcohol consumption. No further advice was given. This was also repeated after the follow-ups each year for the students participating.

A follow-up questionnaire containing AUDIT (excluded year 1), SIP, eBAC and academic achievement was mailed to all students once a year for three years, excluding those who refused further participation or had moved without providing a forwarding address.

Reminders were given as phone calls and mails, up to six times.

Intervention

Students were randomised to one of three conditions: brief skills training programme (BSTP), twelve-step oriented intervention (TSI) or control.

Meetings

Both programmes included a one-session, three-hour evening group meeting at the Student Health Care clinic, located in the centre of the town. Group interventions were used because of practical and economical reasons. The students in the BSTP and TSI groups received a written invitation, with several alternative dates to choose from. No consideration was taken as to the hall of residence in which the students lived. The groups consisted of three to eight students of mixed gender, and refreshments were served at the meetings. The meetings were conducted parallel to each other in both interventions.

If they accepted the written invitation but did not show up at the meeting, they were contacted by phone and were invited again verbally.

No questions were asked to what extent the students made use of what they learned at the meeting in the actual drinking occasion.

Brief skills training programme

This brief skills training programme is based on BASICS (Dimeff *et al.*, 1999) and was prepared by the Department of Clinical Alcohol Research, Malmö, Sweden.

Its aim is to reduce the harm caused by alcohol, through reducing alcohol consumption. Strict abstinence is not the objective but rather a moderate, lower-risk drinking.

A member of our research team, K O Johnson, led the meeting, with the aim of creating an interactive, group discussion.

Basic information about alcohol was given first, such as how alcohol habits are formed and how the brain reacts to alcohol. The facts and myths of alcohol and intoxication were discussed. The students learned their own expectancy profile by using a modified Alcohol Expectancy Questionnaire, and the expectancies were challenged by the discussion leader.

The students were given hands-on information about how to plan a party that limits intoxication by learning how to estimate your blood alcohol concentration (eBAC), and about

the factors influencing this. The students were also encouraged to discuss potential good and bad party situations in reference to alcohol consumption, and how to deal with those. As a hands-on help in this, the students were given drinking calendars.

The students unable to attend the lecture were mailed a 22-page printed manual containing the same material as described above.

Twelve-step influenced intervention

The twelve-step influenced intervention (TSI) was a three-hour formal lecture, given by therapists trained in the twelve-step method (working at *Nämndemansgården*, a well-known Swedish twelve-step institution), and who had done part of their training course at Hazelden, Minnesota, USA. The lecture dealt with basic alcohol information, risks and dangers with alcohol, risks of alcohol dependence, information about chemical dependence, and treatments for alcoholism. The students unable to attend received a CD ROM called “Give Life a Chance”. It contained information about alcoholism and chemical dependence, treatment and results, help to rehabilitation, the Minnesota model, and information about *Nämndemansgården*. The lecture as well as the CD also featured people talking about their life stories, and how they benefited from the twelve-step programme.

Outcomes and sample size

The primary outcome measure was absolute changes in AUDIT scores. Secondary outcome measures were changes in SIP and eBAC. The BSTP was assumed to influence the alcohol consumption with a standardised effect size of 0.37, and heavy episodic drinking with a standardised effect size of 0.33. The figures were based on a meta-analysis by Berglund et al. (Alkoholinförelsetredningen, 2005). With a p of 0.05 and a power of 80%, 250 subjects needed to be included in order to document effect sizes of BSTP compared to a control group

in a randomised trial (Altman, 1990). There is a power loss because of the cluster randomisation, which was difficult to estimate. A sample size of 400 was regarded as a reasonable estimation. No figures were available for TSI, but 200 subjects was estimated as reasonable. The total sample size would therefore amount to 600. Ninety-nine halls of residence would satisfy this, assuming that at least seven persons were included from each hall.

The analysis included all students who completed the second year follow-up.

Statistical method

Differences in baseline results were calculated as t-tests and Chi-squares, using 0.05 as the level of significance.

Differences in treatment outcome were calculated as ANOVAs according to Altman (Altman, 1990). The two-year outcome was the dependent outcome, type of intervention was regarded as the fixed variable and the baseline score was the covariate. All analyses were made at individual rather than residence hall level. The influence of the cluster randomisation was adjusted according to Wears 2002 (Wears, 2002). The variance inflation factor (VIF) was calculated by the following formula: $VIF = 1 + (m' - 1)ICC$, where m' is the mean cluster size, and ICC the intraclass correlation coefficient; the proportion of the total variance in the data that is due to the clusters.

$ICC = (BMS - WMS) / (BMS + (m' - 1)WMS)$. BMS is the mean square between clusters and WMS is the mean square within clusters.

Our data gave a BMS of 18.4, WMS 14.6 and m' 3.98. ICC was then calculated to 0.06 and consequently, VIF is 1.184, and was used to correct all confidence intervals for differences in treatment outcomes. The influence of the cluster randomisation was thus somewhat lower than estimated in the power calculations described above.

The Statistical Package for Social Sciences (SPSS) 13.0 was used for the statistical calculations. Scale reliability was tested with Cronbach alpha. All tests were 2-tailed, and the level of significance was set at $p < 0.05$.

In addition to analyzing all students, sub-analyses have been made of those students who, according to NIAAA (2005), have a high-risk alcohol consumption – AUDIT scores of eight or above for men and four or above for women. The same analyses as described above have been performed on this subgroup (who did not receive treatment any different from the other students).

Results

Baseline data

Two hundred forty halls of residence accepted the invitation and agreed to participate in the study. Of these, 141 were excluded before randomisation because they did not fulfil the inclusion criteria.

Subjects in halls of residence that were randomised did not differ in baseline variables from those in halls of residence that were not randomised. The students declining participation but agreeing to fill out the rating scales did not differ from those students who accepted participation, whether they were randomised or not.

Five hundred fifty-six students (98 halls) were included in the study. One hundred seventy-eight students (33 halls) were randomised to the BSTP group, 172 students (33 halls) to the TSI group and 206 students (32 halls) to the control group. The mean age was 23.3 years (sd = 3.3, range = 20-53) at baseline, and 64.2% were male. There were no baseline differences between the three randomised groups, comparing gender, age, AUDIT, SIP or eBAC (Table 1).

The mean baseline AUDIT score was 9.8 ± 5.0 (mean \pm sd), with a total of 77% of the population reaching AUDIT scores equal to or above the limits set by NIAAA (2005) to define high-risk alcohol consumption (eight for males, four for females). Only 0.9% of the included students were non-drinkers.

-----insert table 1 here -----

Participation in lectures

In total, 113/178 individuals (63%) attended the BSTP gathering, and 43/172 individuals (25%) attended the TSI gathering (difference in attendance between groups $p < 0.001$). There was no difference between genders amongst the attending students. Within the whole

population, AUDIT, SIP and eBAC did not differ significantly between the attending and non-attending students.

An ANOVA-analysis showed no differences between the groups with regard to the different instrument scores. However, there is a trend towards those attending the BSTP gathering having greater SIP values than those attending the TSI gathering ($p=0.053$).

Outcome

Sixty-seven percent of the students completed the two-year follow-up.

All groups had significantly reduced their scores in all three instruments at the two-year follow-up, with no significant differences between the groups (Table 2). An analysis of those with high-risk alcohol consumption at baseline showed a significant difference in reduction in AUDIT scores between the BSTP group (reduction of 3.85 ± 3.83 points, mean \pm sd) and the control group at two-year follow-up (reduction of 2.82 ± 3.74 points, mean \pm sd), $p<0.05$, 95% CI -1.94, -0.07. There was a tendency for the BSTP group to have greater reductions in AUDIT scores than the TSI group, 95% CI -2.08, 0.05 ($p=0.06$).

In the two-year follow-up, 38.1% of those with high-risk alcohol consumption at baseline remained above risk level (BSTP 30.9%, TSI 40.1% and control group 42.7%). Among those below high-risk level at baseline, 4.5% had AUDIT scores above high-risk level at the two-year follow-up (BSTP 5.6%, TSI 4.7% and control group 3.4%).

Differences by gender were analysed, but no significant differences were found.

There were no significant differences in the primary or secondary outcomes between those in the BSTP and TSI programmes who attended the programme meetings and those who did not attend the meetings but received a written manual or CD.

-----insert table 2 here-----

Discussion

Main findings

For the main outcome measure, absolute changes in AUDIT scores between baseline assessment and the second year assessment, the BSTP programme proved to be significantly better than the control group in the high-risk consumption group, but not in the total sample. Although not significant, the same tendency is evident in a comparison between the BSTP group and the TSI group.

Looking at the other outcome measures, SIP and eBAC, the tendency for the BSTP group to yield better results can be seen in those instruments as well, but there are no significant differences.

This is consistent with Larimer et al (2001), who found a significantly greater decrease in drinking patterns amongst the intervention student group than amongst the control student group in the Greek 2000 project – but no such differences could be seen in RAPI, Rutgers Alcohol Problem Index. An explanation for this is that the problems are not solely dependent on alcohol consumption, but on other environmental factors. The problem indexes may not be sensitive enough to pick up decreases in negative consequences (Larimer *et al.*, 2001).

In this study, intervention was applied to all students, regardless of their baseline alcohol consumption. However, the only significant differences could be seen in the group with AUDIT scores above high-risk alcohol consumption. Higher cut-off values have previously been suggested. Johnsson and Berglund (2006) showed a general reduction in AUDIT scores amongst those with high initial scores (11 and 8 respectively in men and women), regardless of the intervention (cognitive alcohol skills programme vs. post-mailed personalized feedback). Those below these scores did not receive intervention of any kind, and did not reduce their AUDIT scores. Our study shows that those scores can be reduced even further, by

giving intervention to students with lower AUDIT scores. AUDIT scores of six for both genders have been suggested by Aertgeers et al (2000), and cut-off scores of five by Adewuya (2005), but neither of those have been tested in a clinical setting, with the exception of validation studies. This is one of the first studies performed giving a BASICS-derived intervention to a general student sample, showing that the intervention indeed has a greater effect among the high-risk student group, compared to a low-risk student group. Based on this, concentrating on the high-risk student group seems sensible. By high-risk group, in this study, it is referring to the NIAAA recommended cut-offs of AUDIT ≥ 8 (for men) and ≥ 4 (for women).

The mean AUDIT score decreased from baseline to year two. One of the reasons might be that the students drink less as they get older, start working and form families of their own (Galanter, 2006).

All students answering the baseline questionnaire received a personalized feedback form. It cannot be excluded that this is part of the reason for the general decrease in AUDIT scores amongst the groups, since personalized feedback has been shown effective in previous studies. It should be noted, however, that the significant difference in AUDIT scores in the risk consumer population, as discussed above, persists despite this general intervention.

The number needed to treat for the BSTP group is 8.5 compared to the control group, which shows that the intervention has a good effect, similar to the number needed to treat looking at problem drinkers and brief intervention within the health care system (Mikko Salaspuro, 2003).

Lecture participation

It proved possible to interest students in participating in the study. Of the students attending the information meeting, only 14% did not accept inclusion in the study. A major problem was to get the students to attend the lectures, despite several attempts from the research group. The acceptance among the students towards the BSTP is significantly higher (63%) than towards the more conventional TSI (25%). Similar results have been found in previous studies. Larimer et al. (Larimer *et al.*, 2001) achieved an attendance rate of 78%. Kivlahan et al. (Kivlahan *et al.*, 1990) had participation rates of 97% and 100% in the individualised feedback group (two cohorts), 65% and 72% in the classroom group (two cohorts), and 37% in the self-help manual group. In the invitation to the lectures, the students were told which group they had been allocated to. This might have influenced the students as to whether or not to attend the lecture. Twelve-step orientated interventions have had a strong influence on prevention in the alcohol field, but little data is available that specifically applies to university students. However, BSTP and TSI had effects rather similar to our study in a study of treatment-refusing abusers, where skills training of concerned significant others (corresponding to our BSTP group) gave an attendance rate of 63% of the abusers compared with an Al-Anon/Nar-Anon or Johnson Institute approach (corresponding to our TSI), which only encouraged 22% of the abusers to enter treatment (Meyers *et al.*, 2002; Miller *et al.*, 1999).

This difference might in part be due to an amongst the students presumed knowledge of the twelve step influenced programme, in contrast to a brief skills training programme which was new to the students. No valuation of the programmes was transmitted to the students from the research group, and there was no attempt to find out if such valuations indeed existed amongst the students.

Strengths

Strengths of the study include the randomised design, the use of peers as research assistants and the use of manual-based interventions and trained twelve-step therapists. In addition, this is one of the few studies concentrating on European university students, making it possible to apply the results found in previous American studies to other countries. Gender-separate analysis were performed.

Limitations

The study has several limitations, the most important being the lack of a pure control group. Exclusive reliance on self-reporting to assess alcohol use is another. Not all hall of residence students participated in the study, which would have been desirable. However, no baseline differences could be seen between those who chose to participate, and those who chose not to.

Conclusion

A brief skills training programme showed significant reductions in AUDIT scores compared to a control group, within the student population with risk alcohol consumption. No significant differences could be seen between a twelve-step influenced programme and the brief skills training programme or the control group within the high risk group. There were no significant differences between the groups on the residence hall population level.

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Figure 1: Study design. Number of students in italics, number of corridors in halls of residence in bold.

Table 1. Baseline values in the brief skills training programme (BSTP), twelve-step influenced programme (TSI) and control groups, and by gender.

Table 2. Two year outcome values in BSTP, TSI and control. ANCOVA statistics adjusted according to variation influencing factor.

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Table 1. Baseline values in the brief skills training programme (BSTP), twelve-step influenced programme (TSI) and control groups, and by gender.

	<i>BSTP</i>	<i>TSI</i>	<i>Control</i>	<i>Men</i>	<i>Women</i>	<i>All included</i>
Number of students	178	172	206	357	199	556
Gender (% male)	64.6	62.2	65.5	100	0	64.2
Age (years)	23.3 ± 3.3	23.3 ± 2.4	23.1 ± 2.6	23.4 ± 2.8	22.9 ± 2.2	23.2 ± 2.6
AUDIT (mean ± sd)	9.8 ± 5.0	9.6 ± 4.5	10.0 ± 5.3	10.8 ± 5.0	8.0 ± 4.4	9.8 ± 5.0
Non-drinkers (no.)	0	1	4	2	3	5
high risk group (no., %)	137 (77%)	131 (76%)	160 (78%)	258 (72%)	170 (85%)	428 (77%)
SIP (mean ± sd)	3.4 ± 2.6	3.3 ± 2.6	3.7 ± 2.6	3.8 ± 3.0	2.9 ± 2.6	3.5 ± 2.9
eBAC (mean ± sd)	0.11 ± 0.08	0.11 ± 0.06	0.11 ± 0.07	0.11 ± 0.07	0.11 ± 0.07	0.11 ± 0.07
Attending intervention meetings (%)	63.5%	25.0%	n/a	44.6%	44.5%	44.6%

	<i>Completed second year follow-up</i>	<i>Did not complete second year follow-up</i>	<i>BSTP - completed</i>	<i>BSTP did not complete</i>	<i>TSI completed</i>	<i>TSI did not complete</i>	<i>Control complete</i>	<i>Control Did not complete</i>
Number of students	371	185	113	65	111	61	147	59
Gender (% male)	62.8	67.0	63.7%	66.2%	63.1%	60.7%	61.9%	74.6%
Age (years)	23.2 ± 2.3	23.3 ± 3.2	23.3 ± 2.4	23.5 ± 4.5	23.4 ± 2.5	23.1 ± 2.3	23.0 ± 2.2	23.4 ± 2.1
AUDIT (mean ± sd)	9.8 ± 4.8	9.8 ± 5.3	9.9 ± 5.0	9.6 ± 5.1	10.0 ± 4.5	8.8 ± 4.5	9.5 ± 5.0	11.1 ± 6.0
								(p<0.05!)
Non-drinkers (no.)	5	0	0	0	0	1	0	4
high risk group (no., %)	286 (77%)	142 (77%)	77%	77%	78.4%	72.1%	76.2%	81.4%
SIP (mean ± sd)	3.5 ± 2.9	3.5 ± 3.0	3.5 ± 2.7	3.2 ± 2.6	3.4 ± 2.6	3.0 ± 2.7	3.5 ± 3.2	4.3 ± 3.7
eBAC (mean ± sd)	0.11 ± 0.07	0.11 ± 0.08	0.11 ± 0.07	0.10 ± 0.10	0.11 ± 0.06	0.10 ± 0.07	0.11 ± 0.06	0.11 ± 0.07
Attending intervention meetings (%)	20.0%	32.1%	73.5%	46.2%	32.4%	11.5%	n/a	n/a
	p=0.00		p=0.00		p=0.00			

Table 2. Two year outcome values in BSTP, TSI and control. ANCOVA statistics adjusted according to variation influencing factor. Changes between the years are marked in italics.

	<i>Statistics</i>					
	<i>BSTP</i> (<i>mean ± sd</i>)	<i>TSI</i> (<i>mean ± sd</i>)	<i>Control</i> (<i>mean ± sd</i>)	<i>Treatment contrasts time (B, 95% CI)</i>		
				<i>BSTP</i> – <i>TSI</i>	<i>BSTP</i> – <i>control</i>	<i>TSI</i> – <i>control</i>
AUDIT						
Initial	9.9 ± 5.0	10.0 ± 4.5	9.5 ± 5.0	-0.75	-0.51	.23
Follow-up	7.1 ± 3.8	7.9 ± 3.9	7.4 ± 3.8	[-1.66, .15]	[-1.31, .29]	[-.63, 1.09]
Change	-2.7 ± 4.1	-2.1 ± 3.9	-2.1 ± 3.7			
Number of students (n)	113	111	147			
AUDIT high risk group						
Initial	11.5 ± 4.6	11.4 ± 4.0	11.1 ± 4.4	-1.02	-1.01	.01
Follow-up	7.5 ± 3.9	8.5 ± 3.9	8.3 ± 3.5	[-2.08, .05]	[-1.94, -.07]	[-.98, .99]
Change	-3.9 ± 3.8	-3.0 ± 3.8	-2.8 ± 3.7			
Number of students (n)	87	87	112			
SIP						
Initial	3.5 ± 2.7	3.4 ± 2.6	3.5 ± 3.2	-0.13	0.02	0.15
Follow-up	2.1 ± 2.3	2.2 ± 2.8	2.1 ± 2.2	[-.79, .54]	[-.52, .57]	[-.45, .75]
Change	-1.3 ± 2.7	-1.2 ± 2.9	-1.4 ± 2.9			
Number of students (n)	113	111	147			
SIP high risk group						
Initial	4.0 ± 2.6	4.0 ± 2.6	4.0 ± 2.9	-0.28	-0.23	0.05
Follow-up	2.3 ± 2.4	2.6 ± 2.9	2.5 ± 2.2	[-1.08, .53]	[-.86, .41]	[-.66, .76]
Change	-1.7 ± 2.8	-1.4 ± 3.1	-1.4 ± 2.7			
Number of students (n)	87	87	112			
eBAC						
Initial	0.11 ± 0.07	0.11 ± 0.06	0.11 ± 0.07	-0.01	-0.00	0.01
Follow-up	0.08 ± 0.05	0.09 ± 0.06	0.08 ± 0.06	[-.26, .05]	[-.14, .13]	[-.03, .25]
Change	-.04 ± .08	-.02 ± .06	-.04 ± .07			
Number of students (n)	112	109	145			
eBAC high risk group						
Initial	0.12 ± 0.07	0.13 ± 0.06	0.13 ± 0.06	-0.02	-0.01	0.01
Follow-up	0.08 ± 0.05	0.10 ± 0.06	0.09 ± 0.06	[-0.34, .02]	[-.23, .10]	[-.07, .26]
Change	-.04 ± .08	-.03 ± .06	-.04 ± .07			
Number of students (n)	87	85	110			

Figure 1: Study design. Number of students in *italics*, number of corridors in halls of residence in **bold**.

