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**Internet-based brief intervention for young men with unhealthy alcohol use:
a randomized controlled trial in a general population sample**

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Declarations of interest

Nicolas Bertholet:

Nicolas Bertholet is salaried by by Lausanne University Hospital, a public institution; he has received grants from the Swiss National Science Foundation, the Swiss Foundation for Alcohol Research, and the Department of Community Medicine and Health from the Lausanne University Hospital. He has received no personal support from industry sources such as pharmaceutical, alcohol and tobacco companies and holds no personal stock. He has collaborated with colleagues receiving honorarium from pharmaceutical industry sources and is senior author of two publications using data from a study sponsored by Lundbeck SAS.

John A Cunningham:

Dr Cunningham has no conflict of interest to report

Mohamed Faouzi:

Dr Faouzi has no conflict of interest to report

Jacques Gaume:

Dr Gaume has collaborated to a study funded by Lundbeck SAS.

Gerhard Gmel:

Over the past five years, Gerhard Gmel has received grants from various governmental and quasi-governmental sources, the Swiss National Science Foundation and the Swiss Foundation for Alcohol Research, and the World Health Organization. He is currently employed at Addiction Switzerland, a NGO that receives donations from the Swiss general population. He is also employed at the Alcohol Treatment Center of the Lausanne University Hospital. He has received fees from his institutes, WHO, and the Swiss government for attending international meetings. He has received no personal support from industry sources such as pharmaceutical, alcohol and tobacco companies and holds no personal stock. He may have collaborated with colleagues receiving funds from such sources, and may have participated at conferences which were co-sponsored by the pharmaceutical industry.

Bernard Burnand:

Dr Burnand is salaried by Lausanne University Hospital, a public institution; he is the Director of Cochrane Switzerland, a branch of Cochrane

Jean-Bernard Daeppen:

Dr Daeppen received honorarium from Lundbeck SAS for conferences and advisory board meetings

ABSTRACT

Aim: To test the efficacy of an internet-based brief intervention (IBI) in decreasing alcohol use among young Swiss men aged 21 year on average.

Design: 2 parallel-group randomized controlled trial with a 1:1 allocation ratio containing follow-up assessments at 1 and 6 months post-randomization

Setting: internet-based study in a general population sample.

Participants: 21 years old men from Switzerland with unhealthy alcohol use (>14 drinks/week or >=6 drinks/occasion at least monthly or Alcohol Use Disorders Identification Test (AUDIT) scores >=8)

Intervention: IBI consisting of 1) normative feedback 2) feedback on consequences of alcohol use 3) calorific value of reported consumption 4) computed blood alcohol concentration for reported consumption, 5) indication of risk 6) information on alcohol and health and 7) recommendations indicating low-risk drinking limits. Control condition: no intervention (assessment only).

Measurements: at 1 and 6 months: quantity/frequency questions on alcohol use (primary outcome: number of drinks/week) and binge drinking prevalence; at 6 months: AUDIT score, consequences of drinking (range: 0-12).

Findings: Follow-up rates were 92% at 1 month and 91% at 6 months. At 6 months, participants in the intervention group (n=367) reported greater reductions in the number of drinks/week than participants in the control group (n=370) (treatment by time interaction, IRR[95% CI] 0.86[0.78; 0.96]), but no significant differences were observed on binge drinking prevalence. There was a favorable intervention effect on AUDIT scores (IRR[95%CI] 0.93[0.88; 0.98]), but not on the number of consequences (IRR[95%CI] 0.93[0.84; 1.03]).

Conclusions: An internet-based brief intervention directed at harmful alcohol use among young men led to a reduction in self-reported alcohol consumption and AUDIT scores compared with a no intervention control condition (assessment only).

INTRODUCTION

Unhealthy use, i.e., alcohol consumption that increases the risk of health consequences and includes alcohol use disorder, is one of the leading causes of morbidity and mortality in high-income countries (1-4). This is especially true among young adults (about 18-25 years old), where the burden of alcohol is mostly explained by deaths by accident and violence associated with binge drinking, and has become a highly prevalent drinking pattern (5, 6). From a public health perspective, reducing unhealthy alcohol use is of great interest because of associated damaging consequences, including the risk of developing alcohol use disorders (7).

Brief interventions have been recommended as an effective way of reducing unhealthy alcohol use in primary care settings by the National Institute for Health and Clinical Excellence (NICE) in the UK (8), and by the US Preventive Services Task Force (9). Numerous studies have shown that screening and brief intervention can lead to significant decreases in alcohol use in primary care populations (10, 11).

Over the past decade, there has been a large increase in the development of electronic (i.e., computer or internet-based) brief interventions for unhealthy consumption. These interventions have been fashioned with the goal of reaching a broad population of users who do not necessarily seek treatment (14), and allow experts to overcome some implementation barriers. Electronic availability comes at a low cost, is no burden on primary care providers, presents no need for extensive

training, can be used 24/7 at home, has no geographical restrictions and lessens the fear of stigma since interventions can be anonymous (15). Recent systematic reviews conclude that electronic screening and brief intervention is potentially effective to reduce weekly alcohol use among people with unhealthy alcohol use, but that few studies investigated non-student populations, and that electronic interventions show promise for adolescent and young adults and should be the focus of more research (16-20).

A recent study was conducted at multiple universities in New Zealand and tested a personalized feedback intervention on alcohol use and its health risks. It had the strength of testing intervention effects across different drinking cultures, and showed modest intervention effects on frequency of drinking, number of drinks/occasion, average number of drinks/week and academic problems (21) and on number of drinks/occasion(22). It would be valuable to evaluate intervention effects at multiple non-student sites. We conducted a randomized controlled trial to examine the effectiveness of an internet-based brief intervention among 21 year-old men with unhealthy alcohol use 1 and 6 months after the intervention, with the hypothesis that the intervention would primarily reduce the mean number of alcoholic drinks consumed per week. Secondary outcomes were the prevalence of binge drinking, the Alcohol Use Disorders Identification Test (AUDIT) score, and the number of alcohol-related consequences.

METHODS

We conducted a parallel-group randomized controlled trial with a 1:1 allocation ratio among young males from the general population, geographically spread over two of the main linguistic regions of Switzerland. We enrolled participants who reported

unhealthy alcohol use defined as >14 drinks/week over the past 12 months OR at least one episode of binge drinking (6 or more drinks/occasion) per month over the past 12 months OR AUDIT scores >=8 (23, 24) . Participants were randomized at baseline to an intervention group (internet-based brief intervention) or to a control group (no intervention).

This trial has been approved by the Ethics Committee for Clinical Research in the Canton of Vaud (Protocol No. 260/2011). It consisted of a primary prevention study (for participants with no unhealthy alcohol use) described elsewhere, and a secondary prevention study (for participants with unhealthy alcohol use) presented herein.

Sample and inclusion procedures:

The trial took advantage of an ongoing Cohort study on Substance Use Risk Factors (C-SURF)(25, 26). Switzerland has mandatory 2-day army conscription for all 19-year-old Swiss males, therefore its recruitment centers offer an opportunity to access a large and representative sample of the general population. Between August 2010 and July 2011, C-SURF research staff recruited cohort members from three of the six centers, which encompass 21 of the 26 Swiss cantons. Some conscripts have the option of presenting at a younger or older age than others, thus explaining minor age range variations seen in other studies conducted by our group at the army centers (27) as well as in the current study. Army recruitment centers were used to recruit cohort members but the study was independent of army influence. Participants completed study assessments confidentially after the army conscription was over. C-SURF study participants were asked to provide their cell phone numbers and email addresses if they agreed to be contacted to participate in other C-SURF-

connected studies. From June 2012 to February 2013, C-SURF cohort participants were invited by email to participate in the brief intervention trial, regardless of their drinking status. There were no exclusion criteria for this segment. Cohort participants were selected according to the recruitment calendar of the cohort study (i.e. invited in the order that they completed the cohort study assessments). The email invitation was coupled with a simultaneous short text message (to those with phones) announcing the study and encouraging them to look in their email inboxes. The invitation email offered an opportunity to participate in an "internet study on alcohol use among young people" (Swiss study on Young People and Alcohol). If they agreed to take part they would to be asked to complete three online questionnaires and possibly receive information about alcohol use. Participants were offered a 15CHF (the equivalent of 10£, 13€, or 17USD) gift certificate for downloading online music upon completion of the study, which concluded after the 6-months follow-up. Invitations were stopped once the target number of participants for the internet trial was reached. Reminders were emailed one week and one month after the first invitation, which contained a description of the study, a consent form and a personalized link to the study website. Upon clicking the link, participants were directed to the site where they had to confirm their willingness to participate, which then gave them access to the baseline assessment. Their participation was officially active once they finished this initial assessment. Only invited participants could participate and the personalized link could be used only once, preventing multiple participations from a single individual.

Assessments:

Electronic assessments were at baseline (before randomization) and at 1 and 6 months. . Participants received a personal email link for online access. Reminders were sent if assessments were not completed within 3 days. If still not completed after another 3 days, research assistants (blinded to group allocation) tried to contact participants by phone and/or short text messages and encouraged them to do the assessment, providing again links to assessment if requested. The baseline assessment was kept to a minimum to decrease the risk of assessment reactivity and to have a study website similar to what participants could find on the internet outside of a research setting.

The assessment contained questions on the typical frequency of drinking and amount consumed per typical drinking day, as well as frequency of drinking episodes with six or more drinks. The quantity/frequency measures have been validated (28) and been used in this population group in internet studies (29) (30). The number of drinks per week was obtained by multiplying the number of drinking days per week by the number of standard drinks per drinking days. The time frame was adapted to avoid overlapping of follow-up measures with the baseline measures (i.e. by using the indications: "thinking of the past month/past 6 months or since the last time we asked you about your drinking").

Additionally, the baseline assessment contained the AUDIT (23, 24) and a list of 12 possible alcohol-related consequences adapted from Wechsler et al. (31) (i.e. was injured or injured someone else, had a hangover, missed a class or work, performed poorly at work, got into an argument or fight with friends, had unplanned sex, had unprotected sex, damaged property, had problems with the police, received medical treatment, observed negative impact on physical health and observed negative

impact on mental health Both instruments covered the past 12 months. The 6-month assessment also contained the AUDIT and the list of consequences, adapted to cover a 6 months period.

Intervention:

The study intervention was adapted from www.alcooquizz.ch (32). Alcooquizz has been developed based on interventions with demonstrated efficacy (33, 34) and adapted for Switzerland. Its acceptability has been assessed and showed a high user's satisfaction (32). It consisted of 1) normative feedback, indicating the percentage of people of the same age drinking as much as the participant and less than the participant (for weekly drinking and binge drinking frequency), 2) feedback on four categories of consequences ("me, my body and my mind"; "me and the others"; "me and my professional activities"; and "me, violence and accidents") with a gradation of impact for each category between low and high according to the number of reported consequences), 3) calorific value of reported consumption and equivalents depicted as hamburgers and chocolate bars, 4) computed blood alcohol concentration for reported maximum number of drinks per occasion, 5) indication of risk (according to the presence of weekly risky drinking, binge drinking and AUDIT score), 6) information on alcohol and health, and 7) recommendations indicating low-risk drinking limits (i.e., no more than 14 drinks per week and no more than 5 drinks per occasion). Participants received personalized feedback online immediately displayed on the screen upon completing their baseline assessment, along with an email thanking them for finishing the questionnaire and containing a copy of the feedback. Therefore they could keep a copy of the feedback, but could not access the intervention website more than once. Participants in the control group completed

the baseline assessment and then were shown a screen that thanked them for their participation. They also received an email thanking them for finishing the questionnaire, but did not get any feedback.

Outcomes:

The primary outcome was the number of drinks per week. It was evaluated at 1 and 6 months. Secondary outcomes were binge drinking prevalence, evaluated at 1 and 6 months, AUDIT score at 6 months and number of alcohol-related consequences at 6 months. Of note, binge drinking was recorded as a second primary outcome in the registered protocol.

Sample size:

Data from a previous study conducted in the same setting within the same population were used to approximate alcohol consumption (35), while data from publications in the field gave approximate response and attrition rates (34, 36). Sample size calculations were based on the primary outcome variable comparing the mean number of drinks per week in the intervention group with the mean number of drinks per week in the control group. Considering 80% power to detect a three drinks per week difference in the mean number of drinks per week at the 6 month follow-up (alpha level 0.05), 295 participants were needed in each group to reject the null hypothesis. We expected a 20% loss to follow-up at 6 months. The sample size (n=295 per group) was adjusted accordingly (n=354 per group, total 708). No interim analyses were conducted.

Randomization:

Randomization was at the individual level and was completely automated with no experimenter involvement. Randomization was embedded in the website code. Randomization took place immediately following completion of the baseline assessment and was unknown to the participants (i.e. by clicking a "next" button those in the intervention group were presented personalized feedback while controls were thanked for participation). The concealment of allocation was total and has been used successfully in other large internet trials (22).

Blinding:

Researchers were blind to group allocation. Participants were partially blind, since details presented about the study mentioned the possibility of receiving information on alcohol use, but the main emphasis was on the interest in evaluating drinking among young people. In order to mask some of the study aims and to investigate the interest of this age group in internet-based information on substance use and health, all participants were asked for their opinion of online health questionnaires and other health information. We did no assessment of the extent to which masking was successful.

Statistical analyses:

Wilcoxon rank-sum tests and Pearson Chi-square tests were used to investigate the occurrence of potential selection and attrition biases. Intervention impacts were assessed with a random-effects negative binomial model for mean number of drinks/week, and with a random-effects logit model for binge drinking prevalence. Both models specified subject as random effects and treatment and time as fixed

effects. A treatment by time interaction was included in the models to display the effect of the intervention over time with respect to each outcome. In addition to these longitudinal analyses specified in the trial protocol, data on outcomes measured at 1 and 6 months were re-analyzed in separate non-repeated measures regressions with baseline adjustment at each follow-up time point (negative binomial regression for number of drinks and logistic regression for binge drinking prevalence).   AUDIT scores and number of alcohol-related consequences, measured only at baseline and 6 months, were tested using negative binomial regressions adjusted for the baseline measures.. Negative binomial regression models were chosen for all count outcomes because they best fitted the count distribution in the sample. All models were adjusted for baseline AUDIT score, age and linguistic region. All analyses were based on an intention-to-treat approach (i.e., individuals were analyzed according to their initial group allocation) Among participants lost to follow-up, missing data at 1 or 6 months were replaced with the last observation carried forward. All analyses were done with Stata (StataCorp. 2013. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP).

RESULTS

During the C-SURF recruitment period 15,074 young males attended the recruitment centers; 13,245 of them were approached by the study team and 5,990 agreed to participate in that project. These recruitment details are available on *www.c-surf.ch* and elsewhere (26). Of the 4,365 C-SURF participants invited to participate in the internet trial, 37.4% agreed and completed the baseline assessment. 737 (45.1%) reported unhealthy alcohol use and were randomized into an intervention (n=367) or a control (n=370) group. The follow up rate was 92% at 1 month and 91% at 6

months. Details of the study flow are presented in Figure 1. Baseline characteristics of participants are presented in Table 1. Participants reported a mean (SD) number of drinks per week of 9.8 (7.9), monthly binge drinking prevalence was 85%, and the mean (SD) AUDIT score 10.6 (4.2); 52% of the sample had an AUDIT score >=10, the cut-point with optimal sensitivity/specificity among young males aged 18-35 for the presence of a DSM-5 alcohol use disorder (38); 24.6% had a score >=13, a score with 92% specificity for DSM-5 alcohol use disorder (38). The intervention and the control groups were similar at baseline, except for the higher proportion of participants in the control group who were from the French-speaking linguistic region.

Attrition analyses:

59 participants were lost to follow-up at 1 month, and 70 at 6 months (of those, 18 were missing at both times). No significant differences were observed at baseline for number of drinks per week, binge drinking prevalence, AUDIT score, number of consequences, and age between those with and those without available follow up data at 1 month and/or 6 months. Participants without available data were more likely to be from the German speaking region of the country (10.4% of loss to follow-up among participants from the German speaking region vs 6.1% among those from the French speaking region at 1 month, p=0.03; at 6 months, 14.3% vs 5.6%, p=0.0001).

Assessment of intervention effects:

Baseline, 1 month and 6 months outcomes measures are presented in Table 2.

Mean number of drinks per week: in the longitudinal analysis presented in Table 3, a significant decrease in drinking was observed over time. There was a significant intervention by time interaction at 6 months, with participants in the intervention group reporting less drinking. The intervention effect was confirmed in the non-repeated measures regression model presented in Table 4. Participants who received the intervention reported 10% less drinking at 6 months compared to participants who did not receive the intervention.

In the longitudinal analysis (Table 3) a significant decrease in binge drinking prevalence was observed over time. There was no intervention effect over time. The absence of effect was confirmed in non-longitudinal analyses (Table 4). At 6 months, we observed a significant intervention effect on AUDIT score but not on the number of consequences (Table 4).

DISCUSSION:

We conducted a randomized trial of an alcohol internet-based prevention intervention in a sample of young men with unhealthy alcohol use from the general population. There were significant reductions in alcohol use over time in the intervention and the control group; these changes are consistent with regression to the mean, due to selection operating at inclusion. The internet-based brief intervention was effective in reducing the self-reported number of drinks per week and in influencing the AUDIT scores at 6 months, but had no impact on binge drinking prevalence or number of alcohol consequences. Intervention effects were independent of severity.

One limitation of existing research is that most of these studies have been conducted in selective populations (e.g. of college students). The study herein adds to the evidence supporting IBI by showing effects in a broader sample of young men. It was conducted within a more diverse population than has previously been studied, and encompasses some cultural differences, such as linguistic regions, drinking practices, etc. It provides some insight to the potential effects of large-scale internet-based interventions in an age group where alcohol-related consequences are one of the major factors of morbidity and mortality.

The present study also demonstrates the feasibility of efficient recruitment procedures (i.e., inviting young individuals to participate in research using an existing database of email addresses and implementing follow-up procedures involving no face-to-face contact with the participants). Even though this study was imbedded within a larger cohort design and individuals were already committed to other research demands, more than a third of those invited were willing to participate in this segment. This participation rate is similar to those obtained in college settings (21, 22, 39).

There are limitations to the current study. Because of its "all-electronic" characteristic, it was not feasible to include an objective measure of alcohol use, thus the results are based on self-report alone. It is possible that results may have been influenced by social desirability effects. Participants were recruited within an existing cohort (which is one strength of the study) since they could be recruited electronically from the general population using a current email database that is kept up-to-date. At the same time, this could possibly affect alcohol use self-reports, since participants were asked to complete assessments in both the cohort study and in the current segment. Being exposed to frequent assessments of their substance use

(e.g., twice before the internet trial enrollment) and being participants in a cohort study on substance use risk factors may have sensitized them to their own consumption. The literature suggests that assessment effects are likely and could bias the effect estimates towards the null (40) . For this trial, assessment was kept to a minimum. It had the advantage of not asking participants to spend too much time on the study questionnaires, which likely limited the assessment reactivity. In addition, the assessment was not different from what participants would have to complete assuming the intervention would be implemented. As such, it was close to a real-life situation, but at the cost of having limited information on participants at baseline. The sample consisted of males only and the results may not generalize to females. Selection of the current study sample based on simultaneous participation in C-SURF research may have introduced some selection bias and may not be truly representative of the source population (i.e., Swiss males, aged 21). Nevertheless, the study sample consisted of a broad cross-section of young persons, and we think that our results can generalize to young males who are willing to access a website on substance use following a personal and confidential invitation.

Conclusion:

Because of the potential for websites to provide screening and brief interventions to large numbers of individuals efficiently, we believe the modest effects seen in the current study are worth noting, especially because of the brevity of the intervention. Gains can be obtained for the minimal cost of developing a website, even though diffusion strategies may be more complex and require some additional resources. It is also important to recognize that, given that the beneficial effects were modest, additional measures are needed to address unhealthy alcohol use of a more severe

nature among young males. Future endeavors should include the development of interventions preferentially targeting binge drinking. Additionally, in evaluating the impact of hazardous alcohol consumption on society, it is essential to recognize that brief interventions are only one option among a number of evidence-based public health interventions to mitigate alcohol consumption. Contextual measures (such as restricting access to alcohol, pricing policies, banning on advertisements, etc.) are known to produce larger effects than do brief interventions on alcohol consumption, at least at a general population level (41). IBI should not be seen as alternatives or replacements for those contextual measures, but rather as possible additions or complements to an integrated initiative targeting hazardous alcohol consumption at individual, community and societal levels.

Ethics approval:

The study was approved by the Ethics Committee for Clinical Research of the Lausanne University Medical School. C-SURF was approved by the Ethics Committee for Clinical Research of the Lausanne University Medical School.

Randomized trial registration:

The trial was registered at current controlled trials: ISRCTN55991918

Authorship/contributorship:

NB, JBD, JC, BB and GG designed the study. NB, JBD, BB, JG, and JC designed the study intervention based on previous work by JC and NB. NB, JBD and BB conducted the study. NB, JG and MF designed the analyses. MF and NB conducted the analyses. All authors interpreted the study results. NB, JBD, JC, GG and BB secured funding for the study. NB wrote the first draft of the manuscript. All authors edited the paper and contributed significant intellectual content to the manuscript.

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Table 1: Participants baseline characteristics

	Full sample (n=737)	Intervention group (n=367)	Control group (n=370)
Age	20.75 (1.13)	20.69 (1.17)	20.81 (1.07)
Linguistic region:			
French speaking	409 (55.5%)	189 (51.5%)	220 (59.5%)
German speaking	328 (44.5%)	178 (48.5%)	150 (40.5%)
Number of drinks/week, mean(SD)	9.82 (7.86)	10.12 (7.88)	9.53 (7.83)
Binge drinking prevalence, n (%)	626 (84.9%)	314 (85.6%)	312 (84.3%)
AUDIT score , mean (SD)	10.57 (4.15)	10.66 (4.30)	10.47 (4.00)
AUDIT score >=10, n (%)	383 (52.0%)	199 (54.2%)	184 (49.7%)
Number of alcohol consequences (0-12)*	2.83 (1.96)	2.82 (2.03)	2.84 (1.89)

*: The 12 assessed consequences were: was injured or injured someone else, had a hangover, missed a class or work, performed poorly at work, got into an argument or fight with friends, had unplanned sex, had unprotected sex, damaged property, had problems with the police, received medical treatment, observed negative impact on physical health, observed negative impact on mental health. Most frequently reported were: hangover (95%), observed a negative impact on physical health (29%), had unplanned sex (26%), damaged property (24%), missed a class or work (23%), and performed poorly at work (20%).

Table 2: Drinking outcomes at baseline, 1 and 6 months, and mean differences.

	Baseline	1 month	6 months	Mean difference [95%CI], baseline to 1 month	Adjusted mean difference [95%CI]*, baseline to 1 month	Mean difference [95%CI], baseline to 6 months	Adjusted mean difference [95%CI]*, baseline to 6 months
Number of drinks per week, mean (SD)							
Intervention	10.12 (7.88)	9.51 (10.76)	8.44 (8.31)	-0.61 [-1.68; 0.47]	-0.61 [-1.55; 0.33]	-1.68 [-2.47; -0.89]	-1.59 [-2.42; -0.76]
Control	9.53 (7.83)	9.10 (7.82)	9.15 (8.80)	-0.43 [-1.24; 0.37]	-0.43 [-1.37; -0.51]	-0.39 [-1.27; 0.50]	-0.47 [-1.30; 0.35]
Binge drinking prevalence, n (%)							
Intervention	314 (85.6%)	280 (76.3%)	257 (70.0%)	-9.3%[-15.0; -3.7]	-9.3%[-14.9; -3.6]	-15.6%[-21.5; -9.7]	-15.5%[-21.4; -9.6]
Control	312 (84.3%)	282 (76.2%)	262 (70.8%)	-8.1%[-13.8; -2.4]	-8.1%[-13.8; -2.3]	-13.5%[-19.4; -7.5]	-13.4%[-19.4; -7.6]
AUDIT score, mean (SD)							
Intervention	10.66 (4.30)	-	8.95 (4.29)	-	-	-1.71[-2.1; -1.32]	-1.70 [-2.08; -1.32]
Control	10.47 (4.00)	-	9.55 (4.61)	-	-	-0.93 [-1.29; -0.56]	-0.94[-1.31; -0.56]
Number of alcohol consequences, mean (SD)							
Intervention	2.82 (2.03)	-	2.11 (1.82)	-	-	-0.71 [-0.91; -0.50]	-0.69 [-0.88; -0.51]
Control	2.84 (1.89)	-	2.26 (1.71)	-	-	-0.58 [-0.75; -0.41]	-0.59 [-0.77; -0.41]

*: adjusted for baseline AUDIT score, age and linguistic region

Table 3: longitudinal analysis for the number of drinks per week and prevalence of binge drinking, baseline to 6 months

	Number of drinks per week* IRR (95%CI)	Binge drinking prevalence** OR (95%CI)
Treatment		
Intervention	1.03 (0.93; 1.14)	1.09 (0.58; 2.05)
Time (reference=baseline)		
1 month	0.90 (0.84; 0.97)	0.42 (0.26; 0.69)
6 months	0.91 (0.84; 0.98)	0.26 (0.16; 0.42)
Treatment x Time		
1 month x intervention	0.93 (0.84; 1.04)	0.87 (0.44; 1.72)
6 months x intervention	0.86 (0.78; 0.96)	0.81 (0.42; 1.59)

* Random-effects negative binomial regression model.
**Random-effects logit regression model.
All models are adjusted for baseline AUDIT score, age and linguistic region.
OR: Odds Ratio, CI: Confidence interval, IRR: Incidence Rate Ratio.

Table 4: non-repeated measures regressions assessing the intervention effects on number of drinks per week and binge drinking prevalence

Intervention effect	1 month	6 months
Number of drinks per week, IRR (95%CI)	1.00 (0.89; 1.12)	0.90 (0.81; 0.99)
Binge drinking prevalence, OR (95%CI)	0.96 (0.66; 1.40)	0.93 (0.66; 1.31)
AUDIT score, IRR (95%CI)	-	0.93 (0.88; 0.98)
Number of alcohol consequences, IRR (95%CI)	-	0.93 (0.84; 1.03)

Note: All models were adjusted for baseline AUDIT score, age, linguistic region and baseline outcome measure. Negative binomial regression models were used for the count outcomes (number of drinks per week, AUDIT score, number of alcohol consequences) and logistic regression models for the binary outcome (binge drinking prevalence)
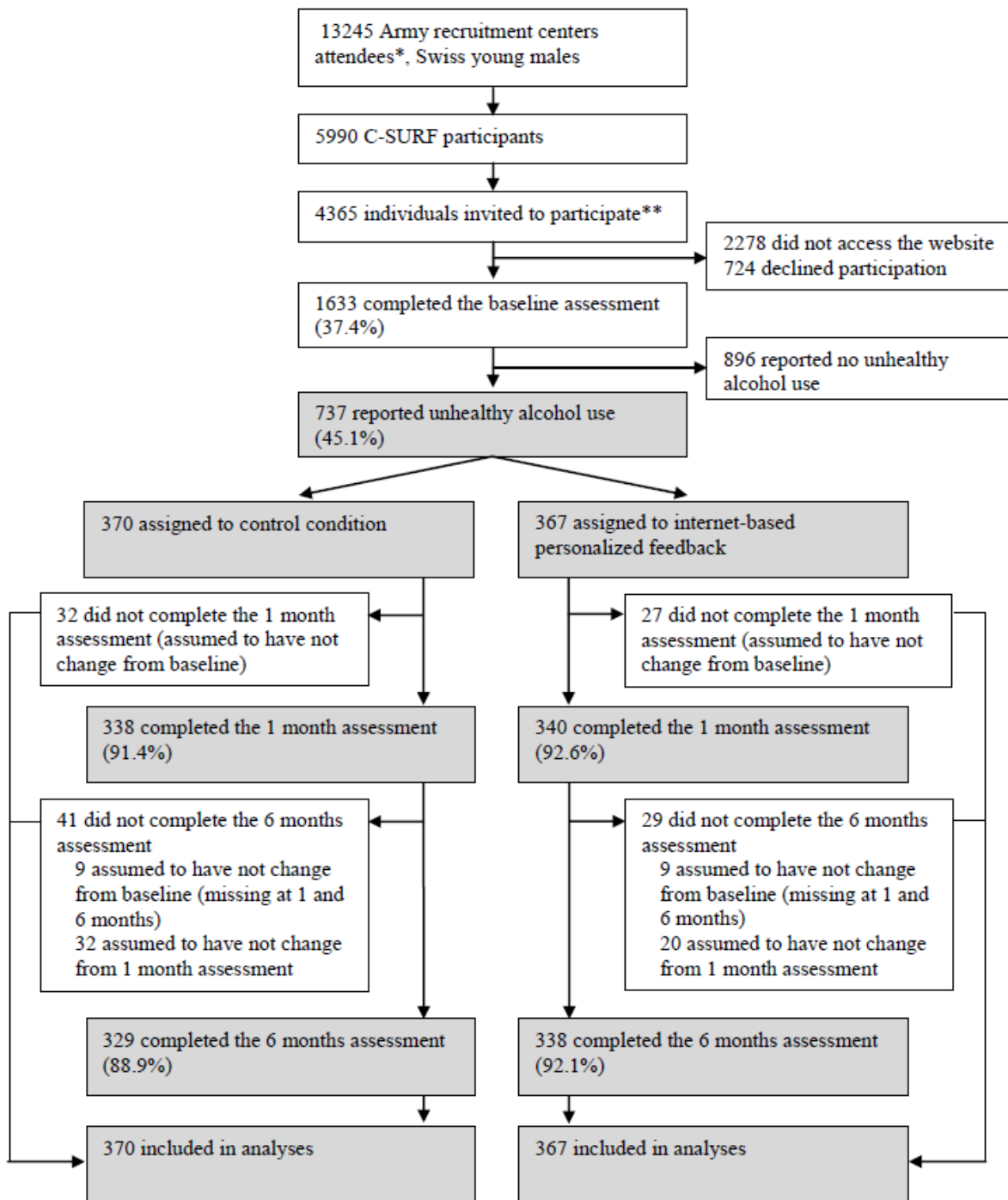
* at the 3/6 army recruitment centers at which 19 year-old men were offered participation in C-SURF.

** invitations were sent according to the C-SURF calendar and up until the planned number of participants were included (i.e. 708 participants with unhealthy alcohol use). Invitations were sent when C-SURF participants were 21 on average.

Figure 1: study participant flow diagram