Trials

STUDY PROTOCOL

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ALCOhol use, Norms, Identities and Motivations-based (ALCONIM) prevention program for binge drinking among college students: a study protocol for a parallel-group randomized controlled trial

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Abstract

Background Binge drinking (BD) refers to repeated switches between intense and short intoxication as well as periods of abstinence. Subjective norms, drinking identity and social and enhancement motives are found to be the most dominant determinants of BD in college students. Targeting these psychosocial factors could be of public health interest in this population, in which up to one out of five students would practice BD. The purpose of our study is to evaluate the efficacy of brief BD determinants-focused procedures, namely, hypocrisy induction (HI), social identity mapping (SIM) and motivational modeling (MM) as add-on interventions to motivational interviewing (MI), compared to MI alone, in preventing BD in college students.

Methods Two hundred and forty healthy college students (University of Caen Normandy, France) will be randomized in one of three one-meeting intervention experimental arms (*i.e.*, MI combined with HI, SIM or MM) or in one control arm (*i.e.*, MI alone). BD scores will be collected through ecological momentary assessment (EMA) and will be used to assess the primary outcome, *i.e.*, the decrease of self-reported BD intensity at one-month post-intervention. Secondary endpoints include self-reported alcohol drinking norms, identity, motives, frequency and craving, as well as readiness to change one's alcohol-related behaviors. Assessments are scheduled at pre-intervention as well as at one and six-month follow-up.

Discussion The purpose of this study is to evaluate the complementary efficacy of HI, SIM or MM-based intervention combined with MI in an innovative prevention program aiming to target BD specific determinants and subsequently lower BD in college students.

Trial registration ClinicalTrials.gov NCT06447350. Registered on June 3rd, 2024.

Keywords Binge drinking, Prevention, Drinking identity, Subjective norms, Motives, College students

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Title {1}	ALCOhol use Norms, Identities and Motivations-based (ALCONIM) prevention program for binge drinking among college students: a study protocol for a parallel-group randomized controlled trial
Trial registration {2a and 2b}	NCT06447350 [clinicaltrials.gov]. Retrospectively registered on June 3rd, 2024
Protocol version {3}	Version 01 of 04–03–2024
Funding {4}	This study is supported by the Regional Council of Normandy (Conseil Régional de Normandie; # RIN19E00906) as well as the French Public Health Research Institute (IReSP; # IRESP-19-ADDICTIONS-03)
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Role of sponsor {5c}	The study sponsor (*i.e.*, University of Caen Normandy) and funders play no role in designing design the study, collecting, analyzing and interpretating data, as well as writing the manuscript

Introduction

Background and rationale {6a}

Alcohol is the most widely used psychoactive substance in Europe [1]. In France, 7% of the 18–75 year old general population reported daily alcohol use in 2023 [2]. More importantly, alcohol use was associated to a tremendous annual social cost of 120 G € in France in 2010 [3]. Recently, data collected from a French university site (University of Caen Normandy) by the Alcohol and Drugs at the University of Caen Normandie (ADUC) project team suggested that 58.8% of college students would use alcohol [4]. More particularly, more than 1/3 of these students would practice binge drinking (BD), which can be characterized by repeated switches between intense and short alcohol intakes as well as periods of abstinence [5]. Consequently, given numerous evidence of academic, cognitive and cerebral impacts that are associated to BD among young drinkers and college students, BD-focused policies are supposed to be of public health interest for this population [6–9].

Among individual-focused brief interventions (*i.e.*, 1–5 sessions) that were showed to be cost-effective in preventing alcohol-related problems, motivational interviewing (MI) is proposed as "a client-centered method for enhancing intrinsic motivation to change by exploring and resolving ambivalence" [10]. Interestingly, a meta-analysis suggested that in heavy or abusive drinkers, 53 to 87-min MI would be more efficacious in reducing alcohol use as compared to no-intervention or a diverse set of other interventions, which suggests its potential in preventing BD [11]. However, clinical benefits significance of MI can be discussed. First, in Vasilaki et al. [11], superiority of MI efficacy over no-treatment or other treatments showed only low to moderate effect sizes ($d_s = 0.18–0.43$). Secondly, when compared to no-treatment, MI efficacy superiority was shown no more significant after three or less-month follow-up, indicating that MI's effects would diminish across time. Hence, it could be argued that MI, as a stand-alone intervention, might not be effective enough to be used as a viable BD-focused preventive and brief strategy towards college students.

Interestingly, in a dominance analysis performed in 2851 college students, Mange and al. [12] observed that subjective norms, drinking identity and motives might be ones of the strongest determinants of BD in this population. More precisely, enhancement motives, drinking identity, alcohol subjective norms and social motives (ΔR^2 *extent* = 21.93 to 12.59%) were found to be the strongest psychosocial determinants associated with BD intensity, as compared to a set of ten other significant factors (ΔR^2 *extent* = 5.02 to 1.40%). Consequently, it could be supposed that potential BD-focused preventive strategies in college students, such as MI, may benefit from interventions aimed to target these critical BD determinants in this population. We therefore propose, in a BD-focused brief intervention approach in college students, to experimentally evaluate the interest of combining MI with techniques that are expected to target these critical BD determinants (subjective norms, drinking identity and motives), namely, respectively, hypocrisy induction (HI), social identity mapping (SIM) and motivational modeling (MM).

Subjective norms through hypocrisy induction

Hypocrisy induction (HI) is a well-established cognitive dissonance-based paradigm that has been shown to promote socially desirable behaviors across a range of domains, including environmental sustainability, health promotion, and risk prevention [13, 14]. The procedure typically involves two sequential steps: first, individuals advocate for a prosocial behavior (*i.e.*, making the social norms associated to the behavior salient), and second, they are asked to recall instances in which they have personally failed to adhere to that norm (*i.e.*, transgression salience). This juxtaposition reveals a discrepancy between one's behaviors and social norms which elicits cognitive dissonance and thereby motivates efforts to reduce this gap, most often through behavior change in line with the advocated norm [15]. This phenomenon is referred to as the *hypocrisy effect*. Studies of this cognitive dissonance-related discomfort suggested that the negative emotional state induced (*e.g.*, guilt or shame) could be moderate but momentary and acceptable [16]. Importantly, the effectiveness of HI appears to depend on the salience and specificity of the norm that is activated. Recent research suggests that the procedure is more impactful when it highlights strong social norms condemning the target behavior (*e.g.*, heavy episodic drinking is disapproved by society; [15, 17]), and particularly when it emphasizes *subjective norms*—that is, norms perceived as shared and valued by one's proximal reference group (*e.g.*, fellow students)—rather than abstract or distal societal norms [18]. Since subjective norms are among the most robust psychological determinants of BD [12], targeting them through HI offers a theoretically grounded and potentially powerful strategy for prevention efforts in this population.

Nevertheless, despite promising meta-analytic findings [13, 17], evidence for HI's impact in the field of alcohol use prevention remains limited. To date, most of studies have focused on promoting intentions rather than reducing consumption per se [19]. One study found no hypocrisy effect on BD behavior among college students [20], underscoring the need to enhance the paradigm's behavioral efficacy. In this regard, several authors have advocated for combining HI with complementary approaches that better support behavior change processes [14, 21]. Considering the potential of MI in supporting behavioral change [11], combining the cognitive dissonance elicited by HI with the motivational support provided by MI could offer a promising avenue for addressing BD, by simultaneously activating relevant subjective norms, perceived individuals' norm-behavior gap, and empowering individuals to engage in meaningful change. Consequently, we hypothesize that HI could be of complementary interest for MI in preventing BD in college students.

Drinking identity through social identity mapping

Besides, another main BD determinant observed by Mange et al. [12] in college students, close but complementary to alcohol use norm, is substance use identity. Interestingly, the Social Identity Model of Recovery (SIMOR; [22]) posits that changes in substance use identity would be key into the substance use recovery process. Specifically, changes in drinking identity would be underpinned by changes in the substance use network composition. Aimed to better picture these processes, the Social Identity Mapping in Addiction Recovery (SIM-AR) is a method allowing a co-constructed visual representation of one's substance use-related group memberships, relationships, status and norms [23]. More particularly, the SIM-AR allows to identify multiple group memberships (*i.e.*, group number), importance (*i.e.*, group size), positivity (*i.e.*, self-rated positive feelings towards the group) as well as compatibility (*i.e.*, extent of value conflicts or similarity between and towards groups). Plus, the SIM-AR allows to co-identify the groups shared identity's normative content (*i.e.*, the extent of substance use or recovery) that is supposed to be at risk of influence for continued problematic alcohol use. In line with the SIMOR, low to moderate relationships were observed between changes in substance-using identities, changes in network composition and alcohol drinking at 6-month follow-up, when pictured using the SIM-AR (Spearman's $\rho = 0.224$ to 0.425; [24]). Moreover, acceptability studies suggest high satisfaction levels in individuals enrolled in this procedure [25]. However, although the SIM-AR interest for assessing substance use identity processes or resources is well supported, the potential effects of administrating the tool in a BD prevention context is, to the extent of our knowledge, unexplored at the empirical level. Given the utility of SIM-AR to co-identify drinking social identity processes and the potential of MI in supporting behavioral change [11, 24], we hypothesize that combining SIM-AR with MI could be of interest to prevent BD in college students driving the MI focus on social network-related changes that would be key for improving substance use identity and subsequently reducing problematic alcohol use.

Enhancement and social motives through motivational modeling

In addition to subjective norms and drinking identity, enhancement and social motives are the most dominant

BD determinants observed by Mange et al. [12] in college students and are conceptualized as, respectively, motives to reach a desired internal motivational state or to improve social gatherings through BD [26]. In line with this, major cognitive, motivational and psychobiological models in addictology posit that motivation to use substance would be tied to expectancies regarding substance use outcomes, such as enhancement or social effects (for a review: [27]). Hence, it is supposed that substitution strategies allowing to fulfill these expectancies (*e.g.*, social skills) without drinking alcohol could be effective in diminishing the associated drinking motives and, thus, BD. On another plan, strategies allowing to prevent such BD high-risk situations, such as behavioral avoidance, could, *in fine*, be effective in preventing BD. In that way, one suggested way to promote motivational and behavioral change, *e.g.* in adopting such strategies, is role modeling (RM; [28]). Upon their unifying Motivational Theory of Role Modeling, Morgenroth and al. (2015) proposed that role models could influence "role aspirants' achievements, motivation, and goals by acting as behavioral models, representations of the possible, and/or inspirations". Accordingly, Collins and Quigley [29] suggested in their meta-analysis that being exposed to a low or no-drinking model reduces one's alcohol drinking propensity (Cohen's $d=0.97$; *95% CI:* 0.81–1.14) and that this large RM effect would be increased when participants are exposed to a friendly model. In addition, role modeling-based programs were suggested to be highly acceptable to adult participants [30]. Consequently, we propose that driving MI focus on inspirational BD-prevention models in college students could be of interest for motivating and reducing BD.

To sum-up, our three-arm experimental design aims to evaluate in college students, as compared to MI alone, the efficacy of providing MI combined with, respectively, 1) hypocrisy induction, 2) social identity mapping and 3) motivational modeling to address subjective norms, drinking identity and motives, and subsequently, to prevent BD.

Objectives {7}

The primary aim of our parallel randomized controlled trial is to evaluate the efficacy of three one-session interventions combining MI with either HI (HI+), SIM (SIM+) or MM (MM+), in reducing BD in college students, by comparing their effect at one-month follow-up to the one of MI alone.

The secondary and exploratory objectives of our trial will be to evaluate, as compared to MI alone, the efficacy of the three aforementioned interventions (*i.e.*, HI+, SIM+ and MM+) in:

- Reducing self-reported:
  - ➢ Alcohol drinking frequency
  - ➢ BD-related subjective norm
  - ➢ Alcohol drinking identity
  - ➢ Enhancement drinking motive
  - ➢ Social drinking motive
  - ➢ Alcohol craving frequency
- Increasing self-reported readiness to solve one's alcohol-related problems

BD-related and secondary assessments are scheduled prior to delivering interventions as well as at one and six-month follow-ups.

Trial design {8}

This project is a randomized, controlled, superiority trial, with four one-meeting intervention arms: three experimental arms combining MI with HI (HI+), SIM (SIM+) or MM (MM+), and one MI alone-based active control arm. The allocation ratio is 1:1:1:1.

Methods: participants, interventions and outcomes

Study setting {9}

College students who will participate to the ALCONIM study are recruited only from the University of Caen Normandy (Caen, France) in which the monocentric trial will be conducted. The University of Caen Normandy is a french university campus welcoming more than 33 000 college students a year. The ALCONIM study is carried out by the Laboratory of Psychology Caen Normandy (LPCN; University of Caen Normandy) and is part of a larger study, *i.e.*, the ADUC project, which aims to better understand and prevent problematic substance use in college students. More broadly, the ALCONIM project involves a wide French academic partners network, including the Caen University Hospital Center, Paris Nanterre University, Paris Cité University and the University of Marie and Louis Pasteur. All study-related meetings will take place in LPCN facilities, which provide five experimental rooms.

Eligibility criteria {10}

Inclusion criteria

Participants must meet the following criteria to be eligible for the study:

- Studying at the University of Caen Normandy
- Binge drinking (BD) score > 1. Following Townshend and al.'s formula [31], the binge score is here derived on a one-month recall period and calculated in the following way: [4×Q1 (*i.e.*, the average drinks per

hour) + Q2 (*i.e.*, number of times being drunk in the past month) + 0.2 × Q3 (*i.e.*, the percentage of times getting drunk when drinking)].
- Participant age ≥ 18 and ≤ 30 years of age
- Native French speaking
- Affiliation to a social health insurance plan
- Informed consent

Exclusion criteria

If participants meet any of the following criteria at the screening visit, they will not be eligible for the study:

- Pregnancy or breastfeeding
- Self-reported history of neurological, neurosurgical, psychiatric, endocrinal or infectious disease

Inclusion criteria for individuals who will perform the interventions

The facilitators of experimental (*i.e.*, HI+, SIM+or MM+) and control (*i.e.*, MI) intervention arms will be graduate professionals in psychology specifically trained to deliver the compared interventions.

Who will take informed consent? {26a}

Students from the University of Caen Normandy will be invited by email to participate to the study and screened for eligibility through a LimeSurvey © online platform. Students willing to participate will be invited for an inclusion visit in which their paper-signed informed consent will be collected by one research psychologist.

Additional consent provisions for collection and use of participant data and biological specimens {26b}

This trial does not aim to collect and use participant data and biological specimens in ancillary studies.

Interventions

Explanation for the choice of comparators {6b}

The intervention control arm will consist of one MI meeting. Hence, comparing the complementary effects of HI (HI+), SIM (SIM+) or MM (MM+) to MI, to the ones of a stand-alone MI intervention, we will control for non-specific and/or treatment-specific processes known to affect target outcomes (*e.g.*, research involvement, time, placebo, attention, information, and the effects of a competing treatment [32]). On an ethical plan, this control arm is also expected to be active and at the least beneficial for students that will receive the intervention, given low to moderate efficacy superiority observed in brief MI, over no or other treatments delivery, in reducing alcohol use [11].

Intervention description {11a}

The experimental arms will consist of three psychosocial interventions labelled HI+, SIM+and MM+combining motivational interviewing (MI) with, respectively, hypocrisy induction (HI), social identity mapping (SIM) and motivational modeling (MM) techniques in order to prevent BD. The control arm will in turn only consist of MI that will be delivered as a stand-alone psychosocial intervention. MI delivered in experimental arms will cohere with the one delivered in the control arm. Both experimental and control intervention arms will be delivered on an in-person, one-meeting basis (*i.e.*, T-INT) up to 30 days after the inclusion meeting (*i.e.*, T0). These intervention meetings will last between 30 and 60 min in average and will be delivered by the same study investigator (*i.e.*, research psychologist) in charge of all other meetings at the participant scale. All intervention meetings will begin with a session setting and will end with a session resume.

Control arm (MI)

As proposed by Miller & Rollnick [10], MI can be defined as "a client-centered method for enhancing intrinsic motivation to change by exploring and resolving ambivalence". In accordance to Miller and Rollnick's guidelines, MI offered to the control arm will follow the four main MI principles, that is, *Engaging*, *Focusing*, *Evoking* and *Planning*.

At first (*i.e.*, "*Engaging*"), efforts will be made to support the participant engagement and build a trust relationship. For instance, the confidential nature of the interview will be highlighted and the interview setting will be clarified. Plus, note-taking will be allowed and introduced as employed to facilitate the interview only. What does the participant know about the study and his motives to participate will also be questioned to understand the participant perspective.

Then, focusing (*i.e.*, "*Focusing*") on participant's expectancies in changing alcohol drinking habits, drinking-related, notably, and non-related participant motives for participating will be discussed more in depth. For instance, participant's research-related motives as well as drinking habits and concerns could be specified.

Next (*i.e.*, "*Evoking*"), particular attention will be paid to guide the participant ambivalence through *change talk*, *i.e.*, participant statements favoring the participant expected change, rather than *sustain talk*, *i.e.*, statements favoring participant movement opposed to the expected change. More particularly, participant motives for change will be evoked more in depth with regards to boundaries of change and status quo (*e.g.*, "*if you decide to diminish/stop drinking alcohol, what would be the greatest benefits*?"), possible futures (*e.g.*, "*if your alcohol drinking*

doesn't change, how will be your life in 5 years?") as well as to participant values (*e.g.*, "*how could you conjugate pleasure to drink with remaining in control of yourself?*"). To do so, quantitative (*e.g.*, "*from 0 to 10, how much is stopping drinking important to you?*"; "*why 7 and not 5?*") and elaborative questions, as well as reflective statements and summaries will be employed.

Finally (*i.e.*, "*Planning*"), efforts will be made to make the participant step from the change talk to planning the change, if and only if the participant seems ready for it (*e.g.*, significant increase of change talk and decrease of sustain talk). To do so, summaries merging participant ambivalence and evoked change talk will be employed, as well as elaborative questions about next actions to make towards the expected change.

Experimental arms (HI +, SIM + and MM +)

Hypocrisy Induction (HI +) The HI-based interview will be semi-structured in three following parts: 1) making alcohol use social norms salient, 2) arguing in favor to the socially adopted and approved behavior and 3) inducing cognitive dissonance in participants to regulate their alcohol use. The first two correspond to the first step of the induced-hypocrisy paradigm (*i.e.*, the behavioral standard salience step) and the third part corresponds to the second step of the paradigm (*i.e.*, the transgression salience step; [17]).

In the first part, based on Mauduy et al.'s [15] hypocrisy procedure, subjective norms regarding BD will be made salient to participants by presenting to them problematic alcohol drinking and approval prevalence in University of Caen Normandy students. To do so, a one-page support document will be employed (available on request). Mean age and female rate in respondents will be specified. Participants will be thus invited to resume and discuss about key results to remember, that is, problematic alcohol drinking is lowly prevalent and highly disapproved in surveyed college students. To conclude this step, participants will be invited to rate down the document and discuss their accordance regarding these two points.

In the second part, as is customary in an induced-hypocrisy procedure [15, 17], participants are invited to argue against problematic alcohol drinking for the benefit of college students. To do so, a one-page support document will also be employed (available on request). Participants will be invited to write down the document three main reasons for discouraging problematic alcohol drinking in students. Moreover, as recommended in the induced-hypocrisy literature [14, 17] participants will be advised that their arguments will be made public to secondary students in a health promotion action context.

In the third part, following the researchers' recommendations on hypocrisy procedure [14, 33], the interview will focus on the participants own alcohol drinking patterns that were prone to be at risk within the past 12 months. For instance, participants will be invited to tell whether or not they experienced hangover symptoms (*e.g.*, stomachaches, tiredness) after drinking alcohol. Also, participants will be invited to remember and detail their last drinking episode in which they reached drunkenness following predetermined questions (*e.g.*, "*were you alone or with other people?*" or "*which were the purposes?*"). An one-page document will be employed to support this part (available on request). At this stage, it will be expected that participants practicing BD experience cognitive dissonance that is thought to be due to the perceived gap between their own pattern of drinking and the one approved in college students. Hence, the rest of the interview will be drived to participants intended ways to regulate their own problematic alcohol use, whose the implementation at the participant scale is thought to be motivated by diminishing the experienced dissonance.

Social Identity Mapping (SIM +) The SIM structure in this meeting will be embedded into the MI according to the following order [24]. Importantly, each participant's reaction to one particular group when co-building his social network map will be discussed in accordance with the above-mentioned MI guidelines (see *Control arm (MI)* section).

Firstly, social groups will be defined to participants who will be invited to resume social groups from which they are part in order to further detail their characteristics. To do so, participants will stick one colored post-it per group on a paper sheet and will be minded that the chosen post-it color will indicate how significant is the group to the participant (Fig. 2). Participants will thus be invited to organize post-its on the sheet according to how close to each other they are to the participant. It will be expected to provide a first social map draft at the participant-level that will be further developed (for a visual example, see [24]). Next, participants will be invited to write down how supportive and similar is the group to the participant (from 0 to 10), as well as how many days per month do the participant and the group interact together. Importantly, if everyone from the participant social group is drinking alcohol, participant will be invited to establish at least one relationship with someone that does not use alcohol [34]. On a plan relative to alcohol drinking-related norms, participants will be invited to report, according to them, how problematic is the group alcohol use (descriptive norms), how much does the group expect from participants to drink alcohol (subjective norms), as well as to which extent the group alcohol use is improving (*i.e.*,

decreasing; dynamic norms). Using drawn lines with different shapes, participants will also indicate how good are the terms (*i.e.*, *compatibility*) between the participant and his social groups, as well between groups themselves. Finally, to sum up the SIM component, participants will be invited to discuss how did they experience the exercise as well as what went through their mind doing so. A copy of the participant social map will be offered to the participant. To note, psychosocial variables that could be derived from this SIM exercise relate to participants network features such as size (*i.e.*, how many groups), quality (*i.e.*, how many significant groups, network compatibility, supportiveness), membership (*i.e.*, similarity and interactions frequency) as well as social norms (*i.e.*, descriptive, subjective and dynamic).

Motivational Modeling (MM+) This Motivational Modeling procedure is aimed to meet three role model (RM) functions that are thought to be central to role modeling process [28]: acting like a behavioral RM (*i.e.*, showing how to do achieve a goal), representing the possible (*i.e.*, showing that a goal is achievable) and being inspirational (*i.e.*, make a goal desirable and worth striving for). Applied to BD prevention, this role modeling-based interview will be semi-structured into three following parts: 1) introducing the participant to the main four alcohol drinking motives (cf. DMQ-R model), 2) exposing the participant to RM in preventing BD and 3) strengthening the participant's motives to do so.

At first, participants will be invited to list any general reasons that they think to be prone to motivate students into problematic alcohol use. To do so, a one-page support document will be employed (available on request). Thus, participants will be introduced to the Drinking Motive Questionnaire – Revised (DMQ-R; [26]) model, in which problematic alcohol drinking is proposed according four distinct drinking motivations, that is: enhancement (*e.g.*, to enjoy internal effects), social (*e.g.*, to optimize social gatherings), coping (*e.g.*, to relieve from internal uncomfortable states) and conformity (*e.g.*, under group-related pressure) motives. In addition, participants will be invited to discuss in which way the general alcohol use reasons they listed could be categorized into these four drinking motives.

Secondly, participants will be invited to watch 2 *France TV* podcasts that are expected to feature BD prevention RM. The two videos (available on request) will last five mins each and will be displayed on a computer. More particularly, these videos will put light on French college students sharing their alcohol drinking experiences and motives, including abstinence strategies employed to satisfy these motives and regulate their own problematic alcohol use.

In the final part, participants will be invited to exchange views about videos they watched in a way that reinforces key factors for meeting RM functions, that is, social identifying to RM, inducing desire for the model behavior and stating steps to do so [28]. For instance, participants will be asked to discuss testimony they appreciated the most, or the one that they think to be prone to be used in a health promoting context. Also, DMQ-R motives, BD substitution and prevention strategies they identified will be discussed in terms of efficacy, feasibility and acceptability in college students as well as their own social network level. More particularly, participants will be invited to potential limits to apply such strategies in their own alcohol drinking or social habits, and available resources that could be used to overcome these limits.

Criteria for discontinuing or modifying allocated interventions {11b}

Participants will be able to discontinue their participation any time during the protocol. The principal investigator will oversee documenting reasons of early cessations thoroughly. Also, the study principal investigator and sponsor will be allowed to permanently end any participation in the study, for any reason putting at significant risk participant safety or compliance to the protocol. Reasons for discontinuing the participation could be:

- Participant's refusal to continue participation
- Participant's withdrawal of consent

In case of discontinuation, the data collected will be excluded from analysis if consent withdrawn for data use, and the participant will not be substituted.

Strategies to improve adherence to interventions {11c}

Standardized training and scripted intervention handbooks (available on request) will be provided to the facilitators to ensure reliable delivery of the experimental and control interventions, as well as to make further replication possible. To ensure participants attend or engage, participants enrolled in the study will be reminded by email and telephone of their participation to data collects and to visits once before the due date. Adherence will be monitored through systematic participants ID check when participating to the study, and will be numerically stored from the Unicloud © secure web application.

Relevant concomitant care permitted or prohibited during the trial {11d}

Participants will be invited to discontinue or postpone any other clinical trial participation aiming to prevent

alcohol use in order to prevent any interference with the present study intervention effect.

Provisions for post-trial care {30}

The Caen University Hospital Center, this trial's sponsor, has contracted an insurance cover upon the RYELENS insurance company (ID: 150,213) for its public liability as well as that of any person involved in the trial, which is in accordance with the French public health code. If needed, any participant suffering harm from trial participation will be offered psychological or medical support from the student health service at the University of Caen Normandy (involving psychologists and physicians).

Outcomes {12}

Our primary outcome will consist, post-intervention (T1; at one month), of assessing the effects of the experimental over the control interventions (*i.e.*, HI+, SIM+or MM+vs. MI) on self-reported BD scores within the past month. Thus, differences of mean total scores changes from T0 to T1 between arms will be analyzed. To do so, means of BD scores will be derived from BD self-reports collected on a weekly basis using a free ecological momentary assessment (EMA) smartphone application (*ASC – Agenda ©; see* https://urlr.me/XSxcte*;* [35]). This application has shown better acceptability and accuracy levels, as compared with paper diary, in measuring substance use in a French clinical sample of teenagers with addictive behaviors [36]. BD scores will be calculated using the following Townshend and Duka's formula [31]: [4×Q1 (*i.e.*, the average drinks per hour)+Q2 (*i.e.*, number of times being drunk in the past month)+0.2×Q3 (*i.e.*, the percentage of times getting drunk when drinking)]. "*BD*" score (≥24; within the past 6 months) derived from Townshend and Duka's formula is considered of interest for measuring BD as it was significantly associated, as compared with "*non-BD*" score (≤16), with greater self-reported alcohol units per week (mean=33 vs. 20) as well as lower age starting drinking, positive mood and cognitive performance in a sample of young social drinkers [31]. BD intensity within the past month will be also computed 15 days before (T0) and 6 months (T6) after delivering the experimental or control intervention (Table 1; Fig. 1).

Secondary outcomes will consist of assessing the effects of the experimental over the control interventions one month (T1) and six months (T6) after on alcohol use, subjective BD-related norm, social identity, drinking motives, alcohol craving as well as readiness to solve one's drinking-related problems as measured with EMA (Table 1; Fig. 1). Differences of mean total scores changes from T0 to T1 and to T6 between arms will be analyzed. All of these questionnaire measures are embedded into and performed using online self-reported survey platform (Lime Survey ©, see https://urlr.me/CwvgHP), except for alcohol use which will be assessed using self-reported EMA (*ASC – Agenda ©; see* https://urlr.me/XSxcte*;* [35]; see as aforementioned for BD). All items derived from English items were translated in French for the study purpose and are available on request. More particularly:

- Regarding alcohol use frequency, mean number of alcohol units drunk per week, as retrospectively measured with EMA, will be used to subjectively assess the decrease of self-reported alcohol drinking over the last week [37], ranging from 0 ("*none*").
- Regarding BD-related subjective norms, mean total scores of six Likert-type items derived from the Theory of Planned Behavior [38] will be used to subjectively assess the decrease of the degree to which participants approve and adopt BD, ranging from 6 ("*strongly disagree*") to 43 ("*strongly agree*").
- Regarding BD-related social identity, mean total scores of five Likert-type items derived from the Alcohol Self-Concept Scale (ASCS; [39]) will be used to subjectively assess the decrease of the degree to which alcohol drinking plays a part in the individual's life and personality, as well as others' perceptions of the role of alcohol in one's life (*e.g.*, "*Drinking is a part of who I am*"), ranging from 5 ("*strongly disagree*") to 35 ("*strongly agree*").
- Regarding drinking motives, two means' total scores of three Likert-type items derived from the Drinking Motives Questionnaire – Revised (DMQ-R; [26]) will be used to subjectively assess the decrease of the degree to which, respectively, enhancement (3 items; *e.g.*, "*Because I like the feeling*?") and social motives (3 items; *e.g.*, "*Because it makes social gatherings more fun?*") drive participant's alcohol drinking, ranging from 3 ("*Never*") to 15 ("*Always*").
- Regarding alcohol craving frequency, mean total scores of one item (*i.e.*, "*How often did you experience craving within the past month*?") will be used to subjectively and retrospectively assess the decrease of the frequency to which participants experienced alcohol craving (*i.e.*, the irrepressible desire to use alcohol) within the past month, ranging from 0 ("Never") to 200 ("Always").
- Regarding readiness to change one's alcohol related problems, mean total scores of the 12 items of the Readiness to Change – Alcohol questionnaire (RTC-A; [40]) will be used to subjectively assess the increase participant's motivation along a three-stages process of change in resolving one's alcohol-

Table 1 Schedule for the ALCONIM study

	STUDY PERIOD			
	Enrolment and allocation	Interventions	1-month follow-up	6-month follow-up
TIMEPOINT	T0	T-INT	T1	T6
	Up to 30 days before T-INT		1 month after T-INT	6 months after T-INT
ENROLMENT:				
Eligibility screen	X			
Informed consent	X			
Allocation	X			
INTERVENTIONS:				
Experimental group (HI + or SIM + or MM +)		X		
Active control group (MI)		X		
ASSESSMENTS:				
Socio-demographics and Neuropsychological impairments (BEARNI)	X			
EMA (BD and alcohol use frequency)	X		X	X
Online questionnaire: BD-related subjective norm, social identity (ASCS), alcohol drinking motives (DMQ-R), craving frequency, impulsivity (UPPS)*, depression (BDI)*, anxiety trait and state (STAI)*, alcohol misuse severity (AUDIT)*, readiness to change one's alcohol-related problems (RTC-A); Other substances use*	X		X	X

MI Motivational Interviewing, *HI* + Hypocrisy Induction combined with MI, *SIM* + Social Identity Mapping combined with MI, *MM* + Motivational Modeling combined with MI, *BEARNI* Brief Evaluation of Alcohol-Related Impairments, *EMA* Ecological Momentary Assessment, *BD* Binge Drinking, *ASCS* Alcohol Self Concept Scale, *DMQ-R* Drinking Motives Questionnaire – Revised, *UPPS* Urgency Premeditation Perseverance Sensation Seeking Scale

* = measured only at T0; BDI, Beck Depression Inventory; STAI, State Trait Anxiety Inventory; AUDIT, Alcohol Use Disorder Test; RCT-A, Readiness to Change – Alcohol questionnaire

related problems, ranging from −24 ("*Precontemplation*"; *i.e.*, not intending to quit drinking next year) to 0 ("*Contemplation*", *i.e.*, seriously thinking about quitting next year) and 24 ("*Action*", *i.e.*, having quitted drinking within the past six months).

Only during the Inclusion visit (*i.e.*, T0), neuropsychological impairments (BEARNI) will be screened out. Additional measures relative to anxiety trait and state (STAI; [41]), depression (BDI; [42]), impulsivity (UPPS; [43]) and alcohol misuse severity (AUDIT; [44]) will be performed at T0, T1 and T6 for secondary and exploratory research purposes. Differences of mean total scores changes from T0 to T1 and to T6 between arms will be analyzed (Fig. 2).

Participant timeline {13}

All visits from the study protocol (*i.e.*, T0 and T-INT) will last 90 to 120 min and will be delivered in a 1:1 format at the Laboratory of Psychology Caen Normandy (University of Caen Normandy, France). The facilitator in charge of the visits (*i.e.*, a research social psychologist) may differ between participants, but each participant will have only one facilitator.

T-1: pre-inclusion

An email will be sent to all University of Caen Normandy students to inform them about the ALCONIM study's objectives, protocol implications, and expected potential benefits. Students interested to participate will be invited to complete an online self-reported questionnaire in order to assess their study eligibility according to defined inclusion and exclusion criteria (*e.g.*, BD score over the past month > 1; absence of history of neurological, neurosurgical, psychiatric, endocrinal or infectious disease). Students study eligibility will then be overseen by one psychologist.

T0: inclusion visit

Eligible students to participate will be invited to an inclusion visit (*i.e.*, T0) within the weeks following pre-inclusion (*i.e.*, T-1). During this visit, all the necessary information for giving informed consent to participate will be provided to the participant. Primary and secondary research outcomes will be measured. Only during

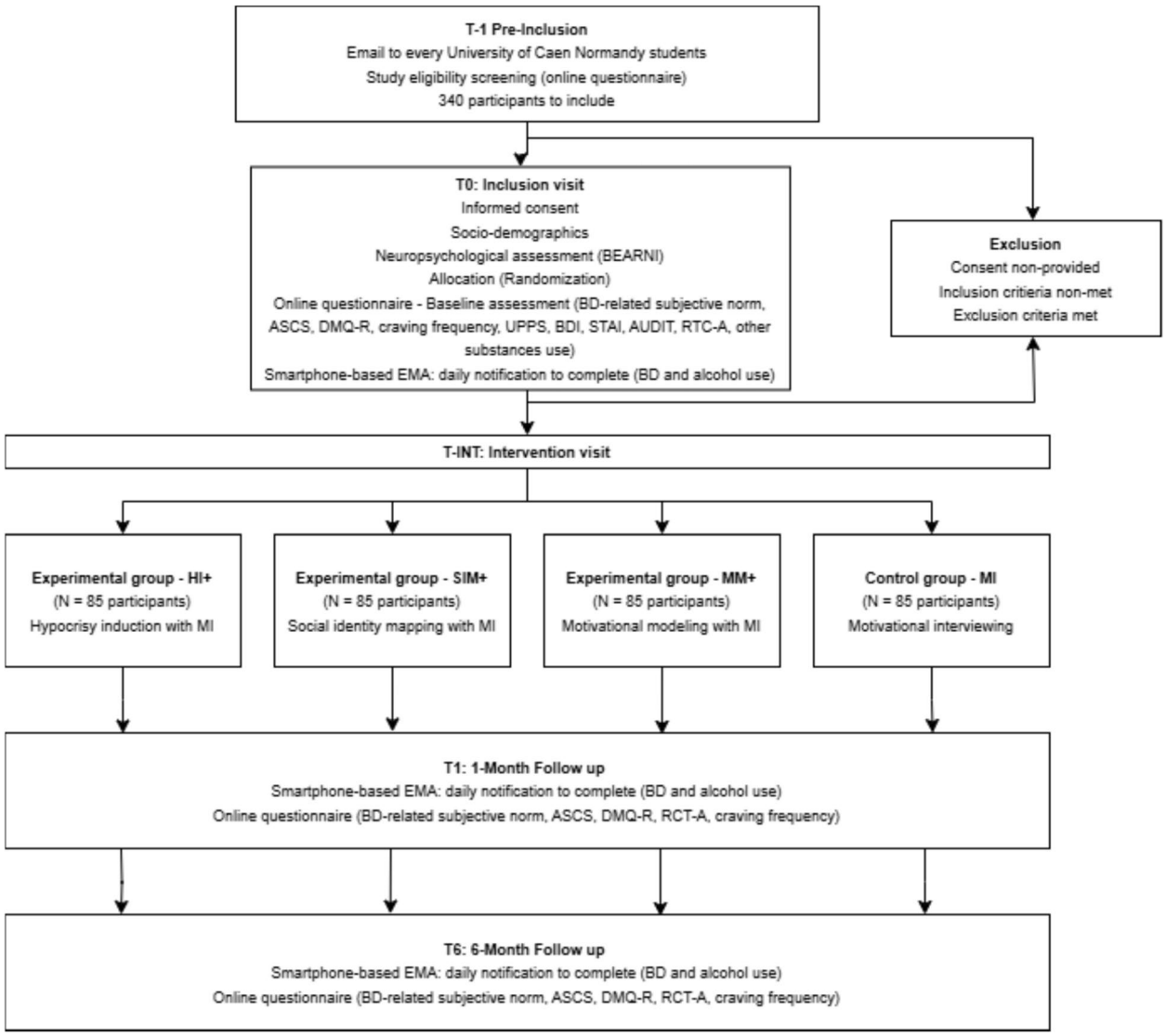

Fig. 1 Flux diagram for the ALCONIM study

the Inclusion visit, neuropsychological impairments (BEARNI) will be screened out for secondary research purposes.

T-INT: randomization and intervention visit

Up to 30 days following the Inclusion visit (*i.e.*, T0), eligible participants will be invited to the Intervention visit (*i.e.*, T-INT) for receiving an experimental or control study intervention. Participants' allocation to experimental (*i.e.*, HI+, SIM+or MM+) or control interventions (*i.e.*, MI) will be randomized by a University of Caen Normandy research engineer using a simple drawing lots randomization method. For the visit (*i.e.*, T-INT), each participant's allocation will be provided by a laboratory research engineer to the investigator in charge of conducting the visit and the intervention (*i.e.*, a research psychologist) within sealed opaque envelope.

Intervention received by participants allocated to one experimental intervention arm, *i.e.*, HI+, SIM+or MM+, consist of MI combined with, respectively, one hypocrisy induction (HI+), social identity mapping (SIM+) or motivational modeling (MM+) procedure. Intervention received by participants allocated to the control intervention arm (*i.e.*, MI) will consist of motivational interviewing (MI). All of the experimental or control interventions received are expected to promote motivational and behavioral change in BD prevention

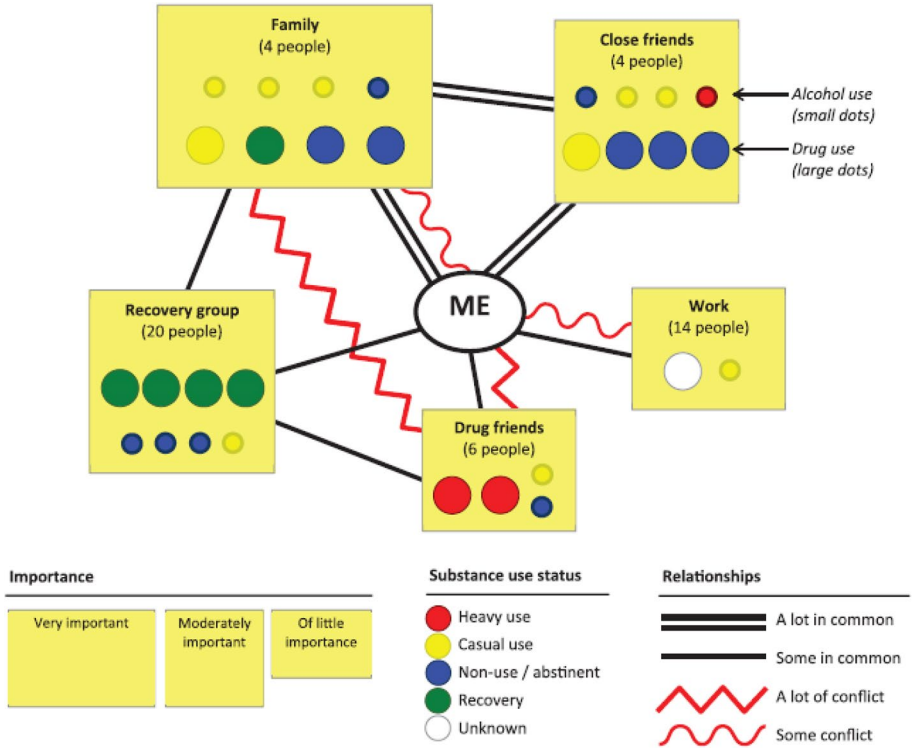

Fig. 2 Example of a typical map created using the SIM-AR process (© Beckwith and al., 2019)

at the participant-level. In addition in the experimental arms, experimental interventions received are also expected to target key BD determinants [12], that is, subjective norms (HI+), social identity (SIM+) or motives (MM+), which is expected to be of complementary interest for MI in a BD prevention perspective. See section Intervention description {11a} for further details regarding the intervention procedures.

Primary and secondary research measuring times will occur up to 30 days before (*i.e.*, in T0) as well as 1 month (*i.e.*, T1) and 6 months (*i.e.*, T6) after receiving the experimental or control condition (*i.e.*, T-INT). Additional measures relative to anxiety trait and state (STAI; [41]), depression (BDI; [42]), impulsivity (UPPS; [43]) and alcohol misuse severity (AUDIT; [44]) will be performed for secondary research purposes. See section Outcomes {12} for further details regarding subjective self-reported measures performed for primary and secondary research objectives (Fig. 1).

Sample size {14}

Given a 0.05 statistical significance threshold, a 0.80 statistical power, and accounting for a 30% potential dropouts rate among our included participants, a sample size of 340 participants to include was estimated (R Statistical software [45]) necessary to reach a required sample size of 240 participants to randomize. This estimation is based on a 3000 iterations Monte-Carlo simulation performed with Gamma-shaped data collected in 2021 ($N=1917$) from a similar study population (*i.e.*, University of Caen Normandy college students; [4]). A 10% decrease of BD score in control intervention arm is expected contrary to a 20% decrease in experimental intervention arms, whose the intra-participants variability (*SD*) would linearly depend on individual baselines (*i.e.*, ¼ of the initial score + 0.5).

Recruitment {15}

An email will be sent to all University of Caen Normandy students to inform them about the ALCONIM study's objectives, protocol implications, and expected potential benefits. Students interested to participate will be invited to complete an online study eligibility questionnaire and will be invited, upon study eligibility, to an inclusion visit within the 10 following days. Hence, the study will benefit from a significant network of French college students to steer any participant volunteering to participate in the study. To date, the University of Caen Normandy students network provides access up to 27 000 potential participants per year.

Assignment of interventions: allocation

Sequence generation {16a}

The randomization will be performed by a University of Caen Normandy laboratory research engineer using a simple drawing lots randomization method with an allocation ratio of 1:1:1:1 to the 3 experimental and the control intervention arms. Each participant's allocation will be provided to the investigator in charge of conducting the visit and the intervention (*i.e.*, a research psychologist) within sealed opaque envelope.

Concealment mechanism {16b}

The research psychologist in charge of the meetings (*i.e.*, T0 and T-INT) will be informed of the participant allocation code only at the start of the intervention phase, through a sealed opaque envelope priorly made by the research engineer in charge of the randomization process. Each code generated will include the participant intervention assignment (experimental or control intervention arm, *e.g.*, HI+, SIM+, MM+or MI), and the inclusion number (*e.g.*, 001), following a chronologic sequence. Only the research engineer will oversee the confidentiality of the data using the Unicloud © secure web application in which participant authentication data (first name, family name, and date of birth) will be related to their identification code. Hence, the psychologist in charge of the interviews will be blind of the participant allocation until the opening of the envelope at the beginning of T-INT.

Implementation {16c}

The allocation sequence will be generated by the research engineer from the University of Caen Normandy before starting the intervention phase and following a confidential handbook document. Each participant enrolment will be assumed by a single research psychologist in charge of the participant study meetings along the protocol.

Assignment of interventions: blinding

Who will be blinded {17a}

Participants and research psychologist will not be blinded after allocation to experimental or control interventions (*i.e.*, at T-INT) given significant delivery modalities between studied intervention arms. Outcome assessors and data analysts will not be blinded regarding participants allocation due to limited human resources for realizing the research.

Procedure for unblinding if needed {17b}

No unblinding procedure will occur given our trial design open-label nature.

Data collection and management

Plans for assessment and collection of outcomes {18a}

Study outcomes will be mostly assessed and collected using online or paper-based self-report questionnaires. Reliability or medical certification of these psychometrically validated self-report instruments are detailed in the "Outcomes {12}". The study assessors will be trained for assessing and collecting outcomes prior to the research. Participant individual data will be recorded on an online Caen Normandy University server using the Unicloud © secure web application, and data entry checks will be systematically performed to ensure data quality. Incomplete questionnaire data or EMA gaps will be left blanked and further treated, if applicable, as missing data (see Sect. 20c for details).

Plans to promote participant retention and complete follow-up {18b}

Prior to each measurement time (*i.e.*, T0, T1 and T6), participants will be reminded of the therapeutic and scientific importance of dully completing each intervention and assessment phase. For the follow-up assessment, participants will be contacted by email to complete online self-reported questionnaires and collect study outcomes. Participants will be reminded that they may discontinue their consent to participate at any time during protocol, without justifying any reason. Data collected in participants who withdraw their consent will not be analyzed. To ensure participants attend to follow-ups, participants will be reminded by email and telephone of their expected participation to data collect once before and after the due date. Adherence to follow-ups will be monitored through systematic participants ID check when participating to the study, and will be numerically stored from the Unicloud © secure web application. In case of discontinuation, the data collected will be excluded from analysis if consent withdrawn for data use.

Data management {19}

For each participant included on the trial, an electronical outcome report will be generated, dully completed with collected participants' individual data and stored using the Unicloud © secure web application. Access to this report will be granted with rights (*e.g.*, data visualization and modification), identification, and password sequences specific to each study member. For any study outcome, data coding will be in accordance with the one recommended by the respective original study authors (see Sect. 12 for references). If any, coded data derived from raw collected data will be reviewed by the investigator and specified along study published results method. Data entry will be secured directly on internet navigator and recorded (data provider, data provided, and date of

data entry) following an audit trail system. To promote data quality, entry checks will be systematically performed to promote data quality.

Confidentiality {27}

Any study professional member (*e.g.*, research psychologist, or data manager) having access to participants' individual data will be bound to professional secrecy, which is in accordance with the French public health code. The use of participants' individual data collected will be systematically anonymized following a codification participant identification procedure. To do so, each code generated for each participant will include the intervention assignment (experimental or control intervention arm, *e.g.*, HI+, SIM+, MM+or MI), and the inclusion number (*e.g.*, 001), following a chronologic sequence. Each principal investigator will oversee the confidentiality of the data using a sealed paper-based record in which participant authentication data (first name, family name, and date of birth) will be related to their identification code.

Plans for collection, laboratory evaluation and storage of biological specimens for genetic or molecular analysis in this trial/future use {33}

N/A: no collection, laboratory evaluation, and storage of any biological specimens for genetic or molecular analysis in this trial/future use.

Statistical methods

Statistical methods for primary and secondary outcomes {20a}

Statistical analyses for principal (*i.e.*, BD scores at T1) and secondary outcomes (*i.e.*, alcohol use, subjective BD-related norm, social identity, drinking motives, alcohol craving as well as readiness to solve one's drinking-related problems at T1 and T6) will be performed from self-report scales raw total scores using R Statistical software [45]. Our comprehensive data working R code, including R packages and inferential statistical hypothesis testing assumptions (Gaussian distribution, homoscedasticity, etc.), will be made available.

BD, Alcohol units drunk per week and Craving scores are expected to be Gamma-distributed (continuous, non-negative, with a higher density around 0 but potentially large values as well). Other variables are expected to be normally distributed. Hence, GLM with Gamma family and log link function for the first three DVs will be employed, contrary to a linear model for the others.

Seven similar general linear analyses will be conducted, with the following parameters: Dependent variable: evolution scores (T0→T1) of BD, alcohol use, subjective BD-related norm, social identity, drinking motives, alcohol craving as well as readiness to solve one's drinking-related problems); Factors: Condition, Sex, Condition*Sex; Covariates: AUDIT score, baseline of the DV at hand. Simple effects of Condition (Control Condition as reference) and Sex will be investigated. All these analyses will be repeated using the evolution scores T0→T6 as well. Interaction effects (factor*covariate or covariate*covariate) will be added in the main analyses, only one at a time given the small sample size. All tests of statistical significance will be frequentist, bilateral, with an alpha threshold of 5%.

Three correlation matrices (one for each time of measurement) will be computed between five numerical variables considered as dependent variables in the study (*i.e.*, BD, Alcohol units drunk per week, Craving, Impulsivity, Readiness to change one's alcohol-related problems) as well as age and AUDIT score. Two other correlation matrices will be computed between the evolution scores of these five dependent variables (for T0→T1 as well as T0→T6). Finally, one last correlation matrix will be computed between our two measures of BD behavior at T1: one is self-reported in a questionnaire at T1, the other uses the data transmitted by the participant on a daily basis through the app during the month between T0 and T1.

For each outlier, that is, any observed value inferior or superior to 3 SDs around the mean, we will check for consistency across the participant's data, and investigate the possibility of a human error. True outliers will be left as such. Khi^2 tests of independence and Student t-tests will be performed to check that randomization did result in experimental and control groups initially matched in terms of age, sex, AUDIT score, trait anxiety level, and depression level. Otherwise, culprit variables will be controlled as additional factors/covariates in all subsequent analyses (although sex and AUDIT score will be part of the model in any case).

For each primary or secondary variable of interest, descriptive statistics (*n, min, max, median, q1, q3, iqr, mean, sd, se, and mean ci*) will be computed using the *rstatix R* package. For variables measured on multiple occasions (T0, T1, T6), raincloud plots and histograms of evolution scores (T0→T1 and T0→T6) will be performed to visually picture how the within-subject intervention effect may be partly moderated by baseline scores. Cohen's *d* effect sizes for score changes across intervention arms ("negligible," "small," "medium," and "large" effect for Cohen's *d* inferior to 0.2, 0.5, 0.8, and superior to 0.8; [46]) with 95% CIs will be computed using *effsize R* packages.

Interim analyses {21b}

N/A: Although of relevant interest for decision making in interventional trial [47], this trial committee failed to

consider such analyses when planning the study. Hence, no interim analyses are planned.

Methods for additional analyses (e.g. subgroup analyses) {20b}

N/A: No subgroup analyses are planned.

Methods in analysis to handle protocol non-adherence and any statistical methods to handle missing data {20c}

An intention-to-treat (ITT) analysis will be computed to minimize attrition bias. Also, specific techniques for handling missing data will be performed. To do so, missing data proportion will be described for every variable of interest. Thus, an univariate and bivariate description will be provided. Monotone patterns will be looked for and missing data mechanism (*i.e.*, completely at random, at random, or not at random) will be suggested. Missing data will be handled according to their amount for a single analysis. Simple deletion will be performed if the proportion of missing data is smaller than 5%. Between 5 and 20% of missing data, multiple imputations will be performed using the *Amelia R* package [48, 49]. For further proportions of missing data, the relevance of each analysis will be considered and, if applicable, specific models will be used. Our comprehensive imputation *R* code will be made available.

Plans to give access to the full protocol, participant level-data and statistical code {31c}

Any full-protocol-related information or material (*e.g.*, consent form or intervention handbook), statistical code, and participant-level dataset will be made available on request.

Oversight and monitoring

Composition of the coordinating centre and trial steering committee {5d}

Two investigators will oversee the supervision of the overall research trial in the investigation center. A steering committee, composed of each research investigator, the research scientific committee, the research methodologist and a promoter agent designed the research, wrote the protocol and will be in charge of deciding about the trial update and continuity. These committees will meet on a bi-monthly basis and steering decisions will be communicated by emails to any person or institution involved in the trial. If needed, any trial-related register will be updated.

Composition of the data monitoring committee, its role and reporting structure {21a}

Given our trial design open-label nature, no data monitoring committee will be required to protect blinding of the research psychologists. Two research engineers, independent of the study sponsor, will be in charge of managing, assessing data entry quality, and providing access to the Unicloud © secure web application. Data issues will be escalated to the steering committee and any relevant handling decision will be referred to the ethics committee (*Comité de Protection des Personnes – Ouest I;* N°2024T2-03).

Adverse event reporting and harms {22}

According to the article L1123-10 of the French code of public health, any adverse event (*i.e.*, unwanted and undesirable event related to protocol compliance) will be immediately reported through the Ministry of health's adverse health event reporting portal (www.signalement-sante.gouv.fr). No serious adverse events (*i.e.*, which led to death, disability or other health threats) related to the protocol are anticipated. Minor adverse events such as subtle fatigue may be anticipated due to the length of interventional visit attendance (*i.e.*, about 90 min). Relatedness to the protocol compliance will be discussed with the steering committee. As soon as the participant consent form is collected and until its participation ending, the trial principal investigator will immediately take note (Unicloud © secure web application) and inform the promoter as well as the participant of any spontaneous significant adverse health event encountered and deemed potentially related to the research protocol.

Frequency and plans for auditing trial conduct {23}

At any stage of the trial, an independent research associate, designed by the study promoter, will be allowed to audit, and inspect any study member, document, procedure, or data related to the trial conduct in order to guarantee the well respect of participant safety, rights, and data integrity. This inspection can also be solicited from another competent authority. In any case, the investigators will comply with the inquiries from the research sponsor or any other competent authority conducting the audit or the inspection.

Plans for communicating important protocol amendments to relevant parties (e.g. trial participants, ethical committees) {25}

Any substantial modification brought to the protocol, *i.e.*, at significant risk for participant safety, research result validity, adherence to the planned intervention arms, will be addressed under written form to the research sponsor, upon approbation from the French research ethics committee (*Comité de Protection des Personnes – Ouest I;* N°2024T2-03). Other non-substantial modifications will be noticed to the research ethic committee for information purpose. Any modification, including those at risk of

plausible incidence on participant benefits or constraints, will be updated to the trial register (*i.e.*, clinicaltrials.gov: NCT06447350).

Dissemination plans {31a}

Findings of this trial will be disseminated to social psychology and addictology-related international and national conferences, as well as manuscript publications to peer-reviewed journals. A results summary will be made accessible to study participants upon request and updated to the trial register.

Discussion

Our project aims to conduct a randomized and controlled trial of brief psychosocial preventive interventions for BD in college students, primarily assessing the specific efficacy of hypocrisy induction (HI+), social identity mapping (SIM+) and motivational modeling (MM+) procedure as intervention add-ons (*i.e.*, combined with motivational interviewing) to reduce BD at one-month (*i.e.*, T1) and six-month follow-ups (*i.e.*, T6) post-intervention, as compared with an active control intervention arm (motivational interviewing; MI).

More than 1/3 of these students would practice BD [4], to which numerous evidence suggest associated academic cognitive and cerebral impacts among young drinkers and college students [6–9, 50]. Moreover, meta-analytic evidences suggest that brief psychosocial interventions, such as MI, might not be effective enough, as a stand-alone intervention, to be used as a viable BD-focused preventive and brief strategy towards college students [11]. Our project aims to fill these gaps in the literature in two ways. First, it proposes to experimentally evaluate the interest of combining MI with three complementary psychosocial interventions, namely, hypocrisy induction (HI+), social identity mapping (SIM+) and motivational modeling (MM+). These interventions are expected to optimize the MI efficacy in preventing BD as they are specifically designed to target critical BD determinants identified in college students, that is, BD-related subjective norm, social identity and motives [12]. Secondly, our project proposes to assess the combined effect of these three psychosocial interventions in preventing BD up to one and six months post-intervention. This temporal window is considered as adequate in a perspective to empirically overcome the limited evidence of MI efficacy, as a stand-alone intervention, after thee or less-month follow-up.

One current limit of our trial could lie in our choice that its protocol does not allow to assess the specific effect of the three proposed psychosocial interventions, *i.e.*, as stand-alone interventions, in preventing BD, but rather to assess their complementary effect, as add-on interventions, when combined with MI in a brief intervention context. Nevertheless, this project is expected to provide new perspectives regarding BD-determinants focused approaches, at the interventional level. For instance, only one doctoral dissertation assessed the potential benefits of hypocrisy induction-based intervention in preventing BD in college students [20], showing no evidence of significant induced change on alcohol use-related behaviors, including BD. Regarding SIM, although the interest of the method in assessing substance use identity processes or resources is well supported [24], the effects of administrating the tool in a clinical interview context are, to the extent of our knowledge, unexplored at the empirical level. Finally, there is, according to our knowledge, no published study on the potential benefits of embedding role modeling into a MI context, through exposures to optimized BD prevention role models, in preventing problematic alcohol use in college students [28]. More particularly, HI+, SIM+and MM+intervention arms-related effects will be discussed according to, respectively, suggested predictors of self-others discrepancies (*i.e.*, type of norm assessed, gender, proximity, proximity of the reference group, questionnaire salience and campus size; [51]), participants social network features (*i.e.*, size, quality and membership; [24]) as well as role aspirant and model shared attributes (*i.e.*, shared group membership and similarity; [28]).

Taken all together, given his focus on cost-effective BD-preventive interventions, the ALCONIM project is aimed to be of public health interest for college students. More particularly, this study will corroborate the need to further empirically test the efficacy of specific psychosocial and brief procedures, namely, hypocrisy induction, social identity mapping and motivational modeling, for complementing MI in BD prevention.

Trial status

Study recruitment began in April (05th) 2024. Recruitment is estimated to be completed in June 2026 (30th). This version is the first of the protocol.

Abbreviations

BD	Binge drinking
EMA	Ecological Momentary Assessment
HI	Hypocrisy induction
HI+	Hypocrisy induction-based intervention arm (i.e., HI combined with motivational interviewing)
MI	Motivational interviewing
MM	Motivational modeling
MM+	Motivational modeling-based intervention arm (i.e., MM combined with motivational interviewing)
RM	Role model
SIM	Social identity mapping
SIM+	Social identity mapping-based intervention arm (i.e., SIM combined with motivational interviewing)

Acknowledgements
The authors acknowledge all University of Caen Normandy students participants who will participate to the ALCONIM trial.

Authors' contributions {31b}
TL: methodology, visualization, writing—original draft, writing—editing and reviewing; NC: conceptualization, methodology, writing—review and editing; MAD: investigation, project administration; MF: conceptualization, methodology, writing—review and editing. TH: conceptualization, methodology, writing—review and editing; ML: conceptualization, methodology, writing—review and editing; MM: conceptualization, methodology, writing—review and editing; NM: conceptualization, methodology, writing – review and editing. CM: investigation; AM: software, formal analysis, data curation; CS: conceptualization, methodology, writing—review and editing; JM: conceptualization, supervision, methodology, writing—review and editing, funding acquisition. All authors red and approved the final version of the manuscript.

Funding {4}
This study is supported by the Regional Council of Normandy (Conseil Régional de Normandie; # RIN19E00906) as well the French Public Health Research Institute (IReSP; # IRESP-19-ADDICTIONS-03).

Data availability {29}
This study protocol has been reported according to the Standard Protocol Items: Recommendations for Clinical Interventional Trials (SPIRIT) guidelines. Any protocol related information or material, statistical code and dataset will be made available upon request.

Declarations

Ethics approval and consent to participate {24}
Ethical approval was assigned by the French ethics committee (*Comité de Protection des Personnes – Ouest I;* N°2024T2-03). Written and informed consent to participate will be obtained from all participants.

Consent for publication {32}
The participant information materials and informed consent form are available from the authors upon request on *Open Science Framework*: (DOI:10.17605/OSF.IO/HC8XD).

Competing interests {28}
The authors declare that they have no competing interests.

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Received: 6 June 2025 Accepted: 27 October 2025
Published online: 05 December 2025

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