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# Influence of counselor characteristics and behaviors on the efficacy of a brief motivational intervention for heavy drinking in young men - A randomized controlled trial

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## ABSTRACT

**Background:** Brief motivational intervention (BMI) has shown promising results to reduce alcohol use in young adults. Knowledge on mechanisms that predict BMI efficacy could potentially improve treatment effect sizes through data that optimizes clinical training and implementation. Particularly, little attention has been given to counselor influence on treatment mechanisms.

**Methods:** We investigated the influence of counselors on BMI efficacy in reducing alcohol use among non-treatment seeking young men (age 20) screened as hazardous drinkers. Participants were randomly allocated to a) a group receiving a single BMI from one of eighteen counselors selected to maximize differences in several of their characteristics (gender, professional status, clinical and MI experience), or b) a control group receiving assessment only. Drinking at 3-month follow-up was first compared between the BMI and control groups to assess efficacy. Then, the influence of counselors' characteristics (i.e., gender, professional status, clinical experience, motivational interviewing (MI) experience, BMI attitudes and expectancies) and within-session behaviors (i.e., measured by the Motivational Interviewing Skill Code) on outcome was tested in regression analyses.

**Results:** There was a significant ( $p=0.02$ ) decrease in alcohol use among the BMI group compared to the control group. Counselors that were male, more experienced, that had more favorable BMI attitudes and expectancies, higher MI skills, but surprisingly less MI-consistent behaviors, had significantly better outcomes than the control group while their counterparts did not.

**Conclusions:** The current study demonstrated BMI efficacy on alcohol use reduction within a sample of non-treatment seeking young adult males. Moreover, BMI effect was related to inter-individual differences among counselors, and results therefore provide recommendations for BMI training and implementation with similar populations.

**Keywords:** Brief motivational intervention, therapist effect, alcohol, young adult, motivational interviewing skills.

## INTRODUCTION

Brief motivational intervention (BMI), an adaptation of motivational interviewing (Miller and Rollnick, 2012), has potential to reach adolescents and young adults because it includes acceptance of individual autonomy, avoidance of argumentation and hostile confrontation, and eschews giving lectures or ultimatums (Tevyaw and Monti, 2004). BMI research with young adults has shown promising results (Grenard et al., 2006; Tevyaw and Monti, 2004; Toumbourou et al., 2007). There has been considerable movement toward early intervention with individuals with at risk drinking patterns, but who are not seeking treatment (e.g. Emmen et al., 2004; Kaner et al., 2009; Patton et al., 2014). This class of alcohol interventions has been labeled “opportunistic” because it may capture these individuals as they encounter other services such as vocational training programs, medical settings, or college campuses. Another opportunity to address young male substance use is during army conscription procedures in countries where it is mandatory. In Switzerland, virtually all non-institutionalized men are called for conscription at age 20. Assessing this kind of representative sample will also minimize social status bias, sample selectivity, and issues of differential access to intervention. An initial investigation targeting this population showed a roughly 20% drinking reduction at 6 month follow-up in the BMI condition compared to a control group receiving no intervention (Daeppen et al., 2011). Also of importance is knowledge on mechanisms that predict BMI efficacy, which can improve treatment effect sizes through data that optimizes clinical training and implementation (Magill and Longabaugh, 2013).

Many studies on behavioral alcohol treatments propose a theoretical model of the treatment and subsequently test treatment efficacy, but rarely provide an actual test of underlying mechanisms (Longabaugh et al., 2013). Even less attention has been given to therapist influence on treatment mechanisms, even if therapist behaviors are the vehicle through which the treatment is expressed and delivered to the client. The studies that have investigated the influence of the therapist have demonstrated considerable variability in outcome across the caseloads of individual therapists (Gaume et al., 2009; Najavits et al., 2000; Project MATCH Research Group, 1998). However, research has not consistently probed the nature of therapist effects, including deriving knowledge on characteristics common across therapists that may account for individual therapist effects.

Therapist personal characteristics (e.g. clinical experience, age, gender, etc.) have been inconsistent predictors of actual alcohol use outcomes. In Project MATCH (1998), only 0-3% of variance in client outcomes during and after treatment was related to therapist gender or age. Therapist education and years of experience predicted very little (<3%) variance in motivational enhancement therapy and CBT outcomes, but were negatively related to outcome in twelve step facilitation (up to 11.6% of the variance). In a study by Miller and colleagues (1980), the number of years of prior experience (ranging from 1 to 7 years) was unrelated to client outcome. In another study, the experienced therapists (about 15 years vs. inexperienced therapists concurrently trained) had significantly better outcomes (Sanchez-Craig et al., 1991). Together, these findings show no clear evidence of therapist characteristics accounting for

alcohol outcomes, except when comparing very different therapists or when observing differential effects across different treatment modalities.

Within the MI literature, there is accumulating evidence that therapist within-session behaviors are linked to favorable within-session client behaviors (Boardman et al., 2006; Catley et al., 2006; Gaume et al., 2010; Gaume et al., 2008b; Gibbons et al., 2010; Magill et al., 2010; Martino et al., 2008; Moyers and Martin, 2006; Moyers et al., 2009), but again their link to an actual change in alcohol use has not been consistently observed (Feldstein and Forchimes, 2007; Gaume et al., 2008a; Miller and Baca, 1983; Miller et al., 1980; Valle, 1981). Gaume and colleagues (2009) tested the potential influence of counselors on BMI efficacy in secondary analyses of a randomized controlled trial. Although all five counselors had similar backgrounds and experience, and encountered patients with comparable alcohol use and socio-demographic characteristics at baseline, their use of MI skills during BMI differed widely and resulted in consistent wide variation in alcohol outcomes. This was a first step toward showing counselor influence on BMI efficacy, but analyses and conclusions were limited as there were only five counselors, with few patients in each of their caseloads. Moreover, as in most research on MI/BMI mechanisms to date, this study was a secondary analysis of an intervention trial and the data were not intended to show differences between counselors.

The present study is one of the first prospective studies of BMI therapist effects and mechanisms as the main research objective. It aimed at better understanding BMI mechanisms by investigating the influence of counselors on BMI efficacy in reducing alcohol use among non-treatment seeking young men screened as hazardous drinkers. These young men were randomly allocated to receive a single BMI from one of eighteen counselors selected to maximize differences in several of their characteristics (gender, professional status, clinical and MI experience) or to a control group receiving the assessment only. Our hypotheses were that certain counselor characteristics would predict alcohol outcomes. Specifically, greater drinking reductions would be associated with higher levels of clinical experience, particularly in MI, as well as to feeling effective when delivering BMI and believing in BMI's potential to reduce alcohol use in the target population. We did not expect general counselor characteristics, such as professional status (psychologist vs. medical doctor) or gender to influence outcomes. We also hypothesized that counselor within-session behaviors would predict outcome. Specifically, better outcomes would be related to counselors showing more MI proficiency, as measured by the Motivational Interviewing Skill Code (MISC).

## **MATERIALS AND METHODS**

### *Sample and inclusion procedures*

Switzerland has a mandatory two-day army conscription process for all males at age 20, and virtually all conscripts complete the physical, medical and cognitive assessments to determine eligibility for service in the Swiss military. Women are allowed to join military service on a voluntary basis, but were

not included in the present study due to their scarcity and resulting non-representativeness. This study was a sub-study of a larger prospective study with almost 6000 participants (Cohort Study on Substance Use Risk Factors, see [www.c-surf.ch](http://www.c-surf.ch)). This study took place at the Recruitment Center of Lausanne, which serves the French-speaking part of Switzerland. At all research stages, participants were reminded that the research staff had no connection with the army and that all information would be kept confidential. Study procedures were approved by the Ethics Committee for Clinical Research of the Lausanne University Medical School (Protocol 15/07) and registered on [www.controlled-trials.com](http://www.controlled-trials.com) (<http://www.controlled-trials.com/ISRCTN92486583>).

All conscripts were eligible for participation unless they had a priority army assessment (i.e. additional physical, cognitive, or psychological evaluation) during the study inclusion period (N=192, 18.8%, see Figure 1). We were not able to collect any drinking and other characteristic data on those conscripts. A sub-group of conscripts who had been randomly selected *a priori* to participate in the study were asked to read an information sheet and to sign a consent form. Consenting conscripts (N=637, 76.7%) were then asked to fill out a self-administrated assessment questionnaire; the research staff provided assistance if needed. The assessment questionnaire included the Alcohol Use Disorders Identification Test–Consumption (AUDIT-C, Bush et al., 1998), which was used to screen hazardous drinkers (4 points or more, Reinert and Allen, 2007). Non-hazardous drinkers were excluded (n=196, 30.8%). Hazardous drinkers were randomized to a BMI condition (n=217) and a control condition (n=224) receiving no intervention.

Follow-up procedures took place 3 months after baseline and were conducted by telephone interviewers blinded to group allocation. A follow-up strategy was used to call at different times in the day and different days in the week. Young men's mobile phones were called first, then landline phones, then parents' phones when those were given in young men's consent forms. Email reminders were sent when the phone strategy failed (10 unanswered calls). Participants were not financially compensated. In total, 362 participants (82.1%) were followed-up.

### *Intervention*

The intervention was a 20 to 30-minute BMI addressing alcohol use, its related consequences, and per client agreement, eventual change perspectives. Because a purpose of the study was to examine counselor within-session behaviors, no specific guidelines were provided regarding the content of individual interventions.

### *Counselors selection*

Counselors were 18 physicians and psychologists from the Alcohol Treatment Center at Lausanne University Hospital, Switzerland, selected to provide heterogeneity in gender, professional

status as well as a range of clinical experience (from new residents/psychologists to faculty members) and MI experience (from beginners to recognized experts). All clinicians were familiar with the brief intervention format to be delivered, having received a four half-day MI workshop when they assumed their positions. The training introduced specific MI techniques, and further details about the MI spirit, and the principles and tools of MI, combining short lectures, practical exercises, and role-plays, as described elsewhere (Baer et al., 2004). Training was given by senior physicians and psychologists experienced in teaching MI, most of them were members of the Motivational Interviewing Network of Trainers (MINT).

Of the 20 counselors asked to participate, two (both part-time physician residents) had no availability in their schedule to allow participation in our study. The remaining 18 counselors signed an informed consent form prior to entering the study, acknowledging their acceptance of being audio-recorded during their BMI and the use of anonymous information about them collected in a short baseline questionnaire (see below).

### *Measures*

*Client self-report measures.* The assessment questionnaire of the participants was a 15- to 20-minute battery. It included basic demographic information such as age, education, professional status, and living environment (urban vs. rural area). Drinking variables were: usual number of drinking days per week, usual number of drinks (defined as 10 grams of alcohol) per drinking day, and frequency of binge drinking episodes (6 drinks or more) over the last year (measured on a 0-4 scale with 0=never, 1=less than monthly, 2=monthly, 3=weekly, and 4=almost daily). Additional measures were: a 9 item questionnaire assessing the occurrence of a series of alcohol-related consequences experienced over the last 12-months (e.g., argue with friends, miss a class, engage in unplanned sexual activity, get into trouble with police) (Wechsler et al., 1994); the Alcohol Use Disorder Identification Test (AUDIT, Babor et al., 2001) with a cut-off of 12 for probable dependence (Gache et al., 2005); and the University of Rhode Island Change Assessment Scale - DELTA Project Reduced Drinking Version (Soderstrom et al., 2007).

Measures were the same for the 3-month follow-up except that they were framed within a 3-month window instead of a 12-month window. As an outcome measure, we created a drinking composite score computed from the mean of the z scores for usual drinking days per week, usual drinks per drinking day, and frequency of binge drinking (used as the continuous scale from 0 to 4).

*Counselors' self-report measures.* The counselors filled out a short baseline questionnaire assessing their gender and professional status (psychologist vs. physician), as well as their number of years of clinical experience and experience in MI. In addition, two questions addressed their views of BMI (i.e. viewing themselves as effective when conducting BMI, thinking that BMI might help reduce alcohol use) using 1-10 Likert scales.

*Counselors' behavioral measures and coding procedure.* Counselors' behaviors within the BMI sessions were measured using the Motivational Interviewing Skill Code (MISC), version 2.1 (Miller et al., 2008). Briefly, two passes were made through each session. The first, uninterrupted pass assessed global ratings intended to capture the rater's overall impression of counselor performance during the interview. The level of Acceptance, Empathy and MI spirit were assessed on 7-point Likert scales: During the second pass through the session, the coder categorized each counselor and patient utterance using one of the 19 counselor and 8 client codes (not used in the present report). Audio-recordings were exported to Dartfish Team Pro 4.0 (Dartfish, 2006), where utterances were parsed by one coder and coded by another.

Several summary scores of counselor behaviors can be derived as indicators of the quality of MI (Miller et al., 2008). In the present report, we used: 1) the mean of the 3 counselor Global ratings (as those were highly correlated), 2) the frequency of MI-consistent behaviors (Advise with permission, Affirm, Emphasize control, Open question, Simple and Complex Reflections, Reframe, and Support); 3) the frequency of MI-inconsistent behaviors (Advise without permission, Confront, Direct, Raise Concern without permission, and Warn); and 4) the percentage of Complex reflections over all reflections ( $\text{Complex reflections} / (\text{Complex reflections} + \text{Simple reflections})$ ) to approximate MI proficiency, as reflective listening is among the most crucial skills in MI (Miller and Rollnick, 2012). Simple reflections correspond to repeating or rephrasing what the client has said and adding little or no meaning or emphasis. In contrast, complex reflections add substantial meaning or emphasis to what the client has said.

Four master-level students were trained and then independently parsed and coded BMI while blinded to assessment and follow-up data. One additional person did only parsing. Each coder received about 60 total hours of training. Discrepancies and challenges were addressed in weekly joint trainer-coder meetings, which lasted throughout the entire coding period. A random subsample of 42 BMI sessions (20.2%) was double-coded to assess inter-rater reliability. Cohen's kappa was used to address inter-rater reliability at the utterance level (i.e. pooling all sessions together) and intra-class correlation (ICC) to address inter-rater for each individual code and global rating. Both indices were interpreted according to the categorization by Cicchetti (1994). Agreement was excellent at the utterance level ( $\text{Kappa}=0.87$ ) and for the behavior summary scores (ICC ranging between 0.83 and 0.99) and was good for global ratings (ICC ranging between 0.61 and 0.78).

### *Data analysis*

The BMI and the control group were compared at baseline using non-parametric procedures (Pearson Chi Square test for categorical variables and Wilcoxon rank-sum test for continuous variables) since the variables were not normally distributed. Attrition patterns were evaluated using the same procedures.



BMI efficacy was examined by fitting an OLS regression predicting the drinking composite score at 3-month follow-up and adjusting for the drinking composite score at baseline. Attrition analyses were carried out using both the last value carried forward technique and the multiple imputation technique (see 'Supporting information' for details).

The influence of counselors' characteristics and behaviors on drinking outcome was tested in a series of regression models. Each model predicted the drinking composite score at 3-month, adjusting for the drinking composite score at baseline, and had the specific characteristic or behavior as a categorical independent variable. To create the categorical variables, we first dichotomized the continuous variables (i.e., clinical experience, MI experience, the 2 scales on counselors' views on BMI, and the 4 MI behaviors indicators) into 'high score' and 'low score' sub-groups using the median as a cut-point. For each variable, we recoded the control group (no intervention) as 0. The resulting variables were thus coded as 0 (no intervention), 1 (BMI 'low score'), and 2 (BMI 'high score') for the continuous variables; 0 (no intervention), 1 (BMI with a male counselor), and 2 (BMI with a female counselor) for counselor gender; and 0 (no intervention), 1 (BMI with a psychologist), and 2 (BMI with a physician) for the professional status.

## RESULTS

### *Young men baseline questionnaire*

At baseline (Table 1), the young men on average drank about 2 days per week and about 5 drinks per drinking day. Roughly, one third had binge drinking episodes monthly and one third weekly. Overall, they encountered between 2 to 3 of the 9 proposed alcohol-related consequences during the last year, and about one third had severe alcohol use patterns with probable dependence according to the AUDIT using a cut-off of 12 points (Gache et al., 2005). Readiness to change was low with a mean and standard deviation indicating mostly the pre-contemplation level of motivation. There were no significant differences between BMI and the control group at baseline.

### *BMI efficacy*

The regression model for the main outcome provided evidence of a significant ( $p=0.02$ ) decrease in alcohol use among the BMI group compared to the control group (Table 2). Regarding the composite sub-dimensions (usual drinking days per week, usual drinks per drinking day, and binge drinking frequency), all three variables indicated higher decrease in the BMI group compared to the control group, but only the decrease in usual drinking days per week was significant ( $p<0.001$ ). Comparison of alcohol use at follow-up showed consistent patterns with usual drinking days per week being significantly lower in the BMI group (Table 1).

Attrition analyses showed similar results (see 'Supporting information').

#### *Counselors' baseline characteristics and within-session behaviors*

Counselors were selected to be equally distributed with regard to their gender, and professional status (Table 3). Clinical experience was 8.3 years on average, with a range between 4 months and 28 years. Experience with MI was 3.8 years on average, with a range between 0 months (included right after MI training) and 14 years. Counselors globally felt they could be effective in conducting BMI (5.7 on the 10-point scale) and thought that BMI might help reduce alcohol use among young men (6.8).

Regarding counselor within-session behaviors derived from the MISC, descriptive statistics indicated high overall global ratings (mean of acceptance, empathy and MI spirit). There were about 50 MI-consistent behaviors per session, and in most sessions, there were no MI-inconsistent behaviors (median=0, mean=1.0). About 10% of reflections were complex. On all these variables, there were wide standard deviations, indicating ample dispersion to conduct our analyses.

Analysis of association between counselors' variables (second part of Table 3) showed that despite having selected counselors to be equally distributed with regard to gender and professional status, these two characteristics were confounded. Only 1 out of 9 psychologists was male and 2 out of 9 physicians were female. Physicians were also more clinically experienced than psychologists. Clinical experience was correlated with experience in MI and also with viewing themselves as effective when conducting BMI. Several counselors' characteristics were also associated with within-session MI skills. Overall counselors that were psychologists that were more experienced in MI and that thought BMI might help reduce alcohol use, tended to show higher MI skills (i.e. higher global ratings, more MI-consistent behaviors, less MI-inconsistent behaviors, and higher percentage of complex reflections). On the other hand, more general clinical experience was associated with lower global ratings and with more MI-inconsistent behaviors.

#### *Counselors' characteristics and within-session behaviors influence on outcome*

Regarding the influence of counselor characteristics on outcome, all of our indicators were significant predictors of alcohol outcome except for professional status (Table 4). Consistent with our hypotheses, young men with more experienced counselors had significantly better outcomes than young men having had no intervention (i.e. the control group), whereas outcomes for young men with less experienced counselors did not significantly differ from those having had no intervention. Young men having met counselors viewing themselves as more effective in delivering BMI, and having a higher belief in BMI efficacy also had better outcomes than men receiving no intervention, whereas those having had counselors scoring lower on these scales did not significantly differ in outcome from those in the control group. Contrary to our expectations, young men with male counselors had better outcomes than those

having had no intervention, whereas those with female counselors did not significantly differ from those in the control group.

Regarding the influence of BMI within-session behaviors on the outcome, all variables were significant predictors of alcohol outcome (Table 5). Young men having counselors high on MI global ratings, who enacted no MI-inconsistent behaviors and who had a higher percentage of complex reflections had better outcomes than those having had no intervention, whereas those with lower scores on these dimensions did not significantly differ from those in the control group. Surprisingly, young men receiving BMIs with counselors exhibiting a high number of MI-consistent behaviors did not significantly differ in outcome from those in the control group, while those having a lower number of MI-consistent behaviors had significantly better outcomes.

In order to disentangle the effects of different variables reported above, we tested for interactions among counselor baseline characteristics, among within-session behaviors, and between counselor baseline characteristics and within-session behaviors. These analyses are reported in 'Supporting information'.

## **DISCUSSION**

The current study demonstrated BMI efficacy on alcohol use reduction within a sample of non-treatment seeking young adult males undergoing the army conscription process in Switzerland. Moreover, this was the first prospective examination of BMI counselor general characteristics, treatment experience and expectancies, as well as MI proficiency as putative predictors of alcohol outcomes within BMI and in contrast to assessment only. The brief, unmanualized BMI resulted in an overall reduction in alcohol use and resulted in an overall effect size of  $d = .22$ . While this translates to a 'small' effect (Cohen, 1988), the effect magnitude is consistent with the young adult BMI literature. Among college student alcohol users, meta-analytic review shows in person brief intervention effects of  $d = .16$  on average for use frequency and  $d = .17$  for quantity (Carey et al., 2012). In previous studies intervening with Swiss male conscripts, effects have varied by help-seeking status. For non-treatment seeking binge alcohol users, 20% drinking reductions were demonstrated at 6 month follow-up (Daepfen et al., 2011). In contrast, BMI effects on heavy drinking were non-significant among a sample of young male conscripts who voluntarily took part in a BMI (Gaume et al., 2011). Therefore, the present study supports previous work with young men who have not identified a desire to change their heavy episodic alcohol use. From a secondary prevention perspective, the capacity to attain drinking reductions at the magnitude observed here, with a sample of young, precontemplative heavy drinkers, reflects an important public health impact. As such, the present study adds to an emerging literature supporting an additional setting type where universal screening and brief intervention methods may be beneficial.

This study was unique in its prospective participant assignment not only to experimental treatment condition, but also to study counselors, whom were selected to maximize inter-individual differences across key characteristics and attitudes. Consistent with our expectations, counselor professional status was not significantly associated with differential drinking reductions in contrast to assessment only control. However, contrary to that hypothesized, male counselors showed client changes in alcohol use that were significantly better than those receiving no treatment while female counselors did not. Post-hoc interactions analyses showed that this gender effect prevailed over counselor professional status, but was synergistic with clinical experience, young men having had experienced male counselors had significantly better outcomes than the control group while the other combinations did not. Unfortunately, the present work cannot disentangle the counselor effects of being male from being male matched with a male client (as the study sample was comprised of young men only). The psychotherapy literature has explored possible advantages of matching counselors and clients on specific characteristics. Among young populations, the effects of gender match have been mixed. For example, those receiving community college counseling services did not show a psychotherapy duration effect by therapy dyad gender match (Hatchett and Park, 2004), but among adolescent substance users, gender match was associated with greater treatment alliance and retention than gender miss-match (Wintersteen et al., 2005). Considering this is an understudied area in addictions treatment, further research should consider gender match and mismatch among young adult male heavy drinkers receiving BMI.

Results on the effects of counselor experience and clinical expectancies provide preliminary support for the importance of considering these factors when selecting and training BMI counselors. First, both overall clinical experience (five years or more) and MI experience (two and a half years or more) were associated with greater alcohol use reductions while outcomes for clients with counselors with lower levels of experience were not better than observed in the control group. Correlations also showed that counselors higher on MI experience had better MI skills overall. This is consistent with the position that MI is an approach that requires ongoing practice experience to demonstrate the level of skill needed for intervention efficacy (Miller and Mount, 2001). Moreover, it is possible that a high level of skill is even more critical to establishing alliance and building motivation when the patient population is non-treatment seeking (Tollison et al., 2008). On the other hand, interaction analyses showed that MI skills prevailed over experience in MI, with higher skills being significant both in experienced and non-experienced counselors. Clinicians having intrinsic competence for MI techniques and spirit, or those acquiring it rapidly might be as efficacious as more experienced ones. Counselors' training and supervision might lead in this direction (de Roten et al., 2013; Miller et al., 2004; Smith et al., 2012). Second, the present study supports the importance of counselor expectancy in relation to outcome within this young male sample. Here, counselors viewing themselves as greater than moderately effective in delivering BMI and greater than moderately believing in BMI's capacity to effectively treat substance use had clients with better outcomes than those reporting lower ratings on these indices and those who received assessment

only. Counselor clinical self-efficacy was correlated with counselor experience but significant effects for MI experience and attitudes toward BMI were synergistic (i.e. stronger effects in experienced counselors with more positive attitudes). This highlights the potentially important roles of counselor clinical self-efficacy as well as allegiance to the modality being delivered.

Our results on MI global ratings and behaviors add to a growing literature as to how counselor intervention implementation is associated with BMI efficacy, and highlights the importance of MI proficiency in this regard. The composite measure of global MI ratings across Acceptance, Empathy, and MI Spirit showed that only a score corresponding to above average or higher was associated with drinking reductions better than found in assessment only. Moreover, while generally low in occurrence in MI process studies (Apodaca and Longabaugh, 2009), the present findings show that even one behavior inconsistent with MI, such as unsolicited advising or confrontation, can be particularly damaging to intervention efficacy.

Our results on the impact of high MI-consistent behaviors were puzzling and contrary to that predicted. One explanation may be that the quality and the exact combination of skills matters more than the quantity. Certain kinds of MI-consistent behaviors such as affirming young men' strengths and values, emphasizing their control over their behaviors, or offering complex reflections that communicate in depth understanding of their situation might have an important and positive impact, but the present study cannot identify which, or which combination of skills are most critical. Research on within-session behavioral transitions during BMI sessions showed that complex reflections (Gaume et al., 2010) and affirmations (Apodaca et al., 2013) were among the only MI-consistent behaviors more likely to produce a desired positive client behavior (i.e. change talk). On the other hand, using a high number of open questions and simple reflections without eventually showing support or in-depth understanding might not be sufficient to change alcohol-related belief systems (Tollison et al., 2008; Tollison et al., 2013). This explanation would be consistent with our finding that counselors exhibiting higher percent complex reflections produced better drinking reduction outcomes than counselors with lower levels of this MI skill, even if this percentage remained relatively low (about 10%). Therefore, this represents an important therapeutic behavior for target in BMI clinical training.

This study provides support for BMI efficacy with heavy drinking Swiss young adult males, but generalizability is limited to similar young male populations with similar patterns of alcohol use. Because young adult males are a high risk population internationally, we feel this work provides an important contribution and points to a promising opportunistic setting for universal screening and brief intervention. Another limitation comes from the analytical framework. There is a possible confound in linking MI behaviors with outcomes when the predictor is measured in the actual treatment sessions that generate the outcome. For example, some clients might have entered the session with higher levels of defensiveness and would have been more likely to elicit more MI inconsistent behavior from therapists. With the relatively small number of sessions completed by each therapist, this may have, in part,

accounted for the effects of MI skill on outcomes. Our study could not address this effect, but future research should take it into account. Finally, the lack of a standardized, or at least semi-structured, BMI model might also be seen as a concern. The intervention applied in the active condition group varied greatly, thus affecting the internal validity of the study. On the other hand, this variety was precisely a main focus of this study and would not have been observable if a more structured treatment was enforced.

We believe that randomization to a heterogeneous selection of counselors is a clear strength of this study in that systematic effects of counselor characteristics in contrast to an assessment only control could be examined. This level of contrast provided valuable information as to how BMI interventions are optimally implemented, and can therefore inform counselor selection and training guidelines with similar young men populations. Future studies should test the relative magnitude of the promising counselor predictors observed here. In this study, male counselor gender, seasoned clinical experience, sense of clinical efficacy and allegiance to MI were counselor factors associated with intervention efficacy in contrast to assessment only. Moreover, our results on MI skills similarly underscore the importance of a high level of MI proficiency in producing intervention efficacy, as demonstrated here in relation to average global ratings, percent complex reflections, and an absence of MI inconsistent behaviors.

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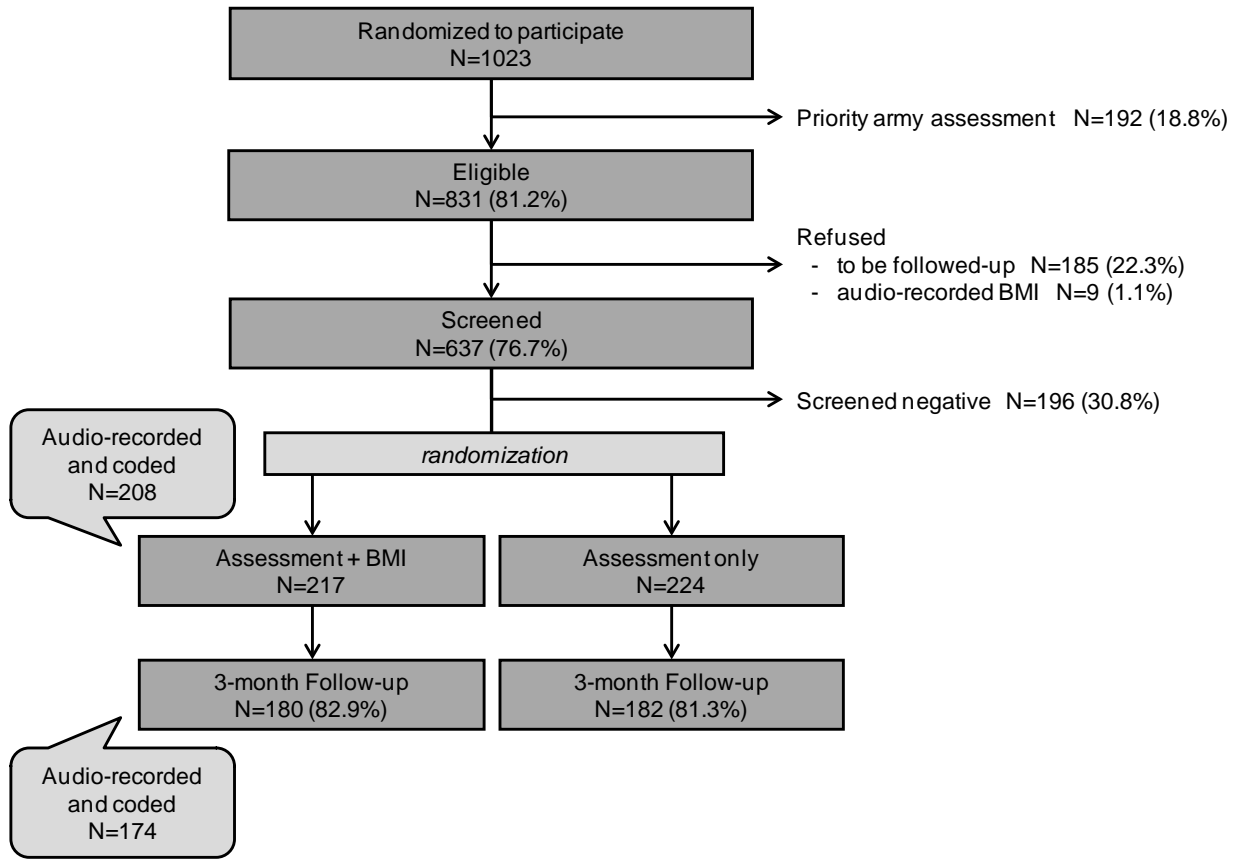


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**Fig. 1.** Trial flow-chart. BMI, brief motivational intervention.



**Table 1.** Young men descriptive statistics and comparison between BMI and control groups

	BMI			Control			p
	Mean / N	SD / %	Median	Mean / N	SD / %	Median	
Baseline descriptive statistics	N=217			N=224			
<i>Socio-demographics</i>							
Age <sup>a</sup>	19.9	1.1	19.6	20.0	1.1	19.7	0.19
Education: > 12-year obligatory school <sup>b</sup>	109	50.2		129	57.6		0.12
Professional status <sup>b</sup>							
- in training	137	63.1		157	70.1		0.09
- employed	57	26.3		55	24.6		
- inactive	23	10.6		12	5.4		
Living environment : urban <sup>b</sup>	98	45.2		94	42.0		0.50
<i>Alcohol use</i>							
Usual drinking days per week <sup>a</sup>	2.3	1.6	2	2.2	1.4	2	0.93
Usual drinks per drinking days <sup>a</sup>	4.9	4.4	4	5.0	3.7	4	0.28
Binge drinking frequency <sup>b</sup>							
- never	3	1.4		3	1.3		0.76
- less than monthly	72	33.2		70	31.3		
- monthly	66	30.4		79	35.3		
- weekly	76	35.0		72	32.1		
Drinking composite score <sup>a</sup>	0.4	0.7	0.3	0.3	0.7	0.2	0.81
Number of alcohol-related consequences [0 to 9] <sup>a</sup>	2.2	1.9	2	2.2	2.1	2	0.75
AUDIT score <sup>a</sup>	10.2	4.3	10	10.6	5.0	9	0.73
AUDIT 12+ <sup>b</sup>	72	33.2		79	35.3		0.64
Readiness to change [-5 to +15] <sup>a</sup>	1.7	2.7	1.3	1.7	2.9	1	0.89
<i>3-month follow-up alcohol outcomes</i>							
		N=180			N=182		
Drinking composite score b	-0.1	0.7		0.1	0.7		0.08
Usual drinking days per week b	1.9	1.1		2.2	1.2		0.008
Usual drinks per drinking days b	5.0	3.6		5.1	3.4		0.53
Binge drinking frequency (scale from 0-4) b	2.0	0.8		2.0	0.9		0.45

<sup>a</sup> Continuous variable: descriptives are mean, standard deviation (SD), and median; p value derived from Wilcoxon rank-sum test.

<sup>b</sup> Categorical variable: descriptives are frequency and percent; p value derived from Pearson's Chi square test.

**Table 2.** BMI efficacy on the main outcome (drinking composite score at 3-month follow-up) and its sub-dimensions

	B	SE	t	p	[95%	CI]
Drinking composite score						
BMI (vs. Control) <sup>a</sup>	-0.13	0.06	-2.27	0.02	-0.25	-0.02
Usual drinking days per week						
BMI (vs. Control) <sup>a</sup>	-0.35	0.09	-3.68	<0.001	-0.53	-0.16
Usual drinks per drinking days						
BMI (vs. Control) <sup>a</sup>	-0.08	0.33	-0.23	0.82	-0.72	0.57
Binge drinking frequency <sup>b</sup>						
BMI (vs. Control) <sup>a</sup>	-0.07	0.07	-0.99	0.32	-0.22	0.07

<sup>a</sup> BMI was coded 1 and Control was coded 0.

<sup>b</sup> Variable used as continuous (scale from 0-4).

Linear regressions adjusted for the measure at baseline. SE, Standard error; CI, Confidence interval;

BMI, brief motivational intervention. N=362.

**Table 3.** Baseline descriptive statistics and correlations for counselor' characteristics and within-session behaviors

	Descriptive		Correlations									
	Mean (SD) N (%)	Median	1 <sup>c</sup>	2 <sup>c</sup>	3	4	5	6	7	8	9	
<b>Counselor characteristics (N=18)</b>												
1. 1. Gender: Women (men coded 1, women 2) <sup>a</sup>	10 (55.6)											
2. Professional status: Psychologist (coded 2) [vs. Physician (coded 1)] <sup>a</sup>	9 (50.0)		.67**									
3. Clinical experience [years] <sup>b</sup>	8.3 (8.0)	5	-.03	-.46+								
4. Experience in MI [years] <sup>b</sup>	3.8 (4.1)	2.5	.06	-.11	.55*							
5. Viewing themselves as effective when conducting BMI [1-10] <sup>b</sup>	5.7 (1.9)	6	-.07	-.09	.52*	.45+						
6. Thinking that BMI might help [1-10] <sup>b</sup>	6.8 (2.1)	7	-.10	.11	.15	.16	.68**					
<b>Counselor within-session behaviors (N=208 coded sessions)</b>												
7. Mean of MI global ratings [1-7] <sup>b</sup>	5.1 (1.0)	5.33	.02	.36***	-.24***	.10	.03	.25***				
8. MI-consistent behaviors frequency <sup>b</sup>	52.7 (24.8)	50	.42***	.46***	.19**	.42***	.22**	.20**	.39***			
9. MI-inconsistent behaviors frequency <sup>b</sup>	1.0 (2.3)	0	.12+	-.22**	.28***	-.13+	.03	-.15*	-.54***	-.08		
10.% Complex reflections <sup>b</sup>	9.9 (8.0)	7.8	.03	.12+	.14*	.29***	.19**	.12+	.11	.10	-.03	

<sup>a</sup> Categorical variable: descriptives are frequency and percent.

<sup>b</sup> Continuous variable: descriptives are mean, standard deviation (SD), and median.

<sup>c</sup> Chi square independence test for categorical by categorical variables and mean comparisons using 2-sample t test for continuous by categorical variables showed associations in the same direction and same significance levels.

Significance levels: +=p<0.1, \*=p<0.05, \*\*=p<0.01, \*\*\*=p<0.001.

**Table 4.** Influence of counselor characteristics on the main outcome

	B	SE	t	p	[95%	CI]
Counselor gender						
Male	-0.18	0.07	-2.40	0.02	-0.32	-0.03
Female	-0.09	0.07	-1.21	0.23	-0.23	0.05
Counselor professional status						
Psychologist	-0.12	0.07	-1.69	0.09	-0.27	0.02
Physician	-0.13	0.07	-1.86	0.06	-0.27	0.01
Clinical experience (years)						
0 to 4	-0.07	0.08	-0.89	0.37	-0.22	0.08
5+	-0.17	0.07	-2.51	0.01	-0.31	-0.04
Experience in MI (years)						
0 to 2.4	-0.12	0.07	-1.58	0.12	-0.26	0.03
2.5+	-0.14	0.07	-1.98	0.05	-0.28	0.00
Viewing themselves as effective when conducting BMI [1-10]						
1 to 5	-0.08	0.09	-0.93	0.35	-0.25	0.09
6+	-0.15	0.07	-2.31	0.02	-0.28	-0.02
Thinking that BMI might help reduce alcohol use [1-10]						
1 to 6	-0.07	0.08	-0.90	0.37	-0.23	0.09
7+	-0.16	0.07	-2.40	0.02	-0.29	-0.03

Linear regressions adjusted for the drinking composite score at baseline. In each model, the reference is the control group. SE, Standard error; CI, Confidence interval. N=362.



**Table 5.** Influence of counselor within-session behaviors on the main outcome

	B	SE	t	p	[95%	CI]
Mean of MI global ratings [1-7]						
0 to 5.33	-0.10	0.08	-1.22	0.22	-0.25	0.06
5.33+	-0.15	0.07	-2.22	0.03	-0.29	-0.02
MI-consistent behaviors frequency						
0 to 49	-0.23	0.07	-3.24	0.001	-0.37	-0.09
50+	-0.02	0.07	-0.22	0.823	-0.16	0.13
MI-inconsistent behaviors frequency						
0	-0.18	0.07	-2.61	0.009	-0.31	-0.04
1+	-0.05	0.08	-0.59	0.559	-0.21	0.11
% Complex reflections						
0 to 7.7	-0.06	0.07	-0.75	0.45	-0.20	0.09
7.8+	-0.21	0.07	-2.81	0.005	-0.35	-0.06

Linear regressions adjusted for the drinking composite score at baseline. In each model, the reference is the control group. SE, Standard error; CI, Confidence interval. N=362.

## SUPPORTING INFORMATION FOR ONLINE PUBLICATION

### *Attrition analyses*

*Methods.* Attrition patterns were evaluated using non-parametric procedures (Pearson Chi Square test for categorical variables and Wilcoxon rank-sum test for continuous variables) since the variables were not normally distributed. We then carried out efficacy analyses using both the last value carried forward technique (i.e. replacing missing outcome values by baseline data) and the multiple imputation technique. We used the '*mi impute regress*' function in Stata IC 12.1, which fills in missing values of a continuous variable using the Gaussian normal regression imputation method (StataCorp, 2013). Independent variables for the imputation regression were the baseline drinking composite score, severe alcohol use patterns with probable dependence (AUDIT 12+), readiness to change, professional status, education level, and living environment. We set the imputation to be repeated 50 times for a more accurate estimation.

*Results.* At 3-month follow-up, 362 participants (82.1%) were followed-up. There was no difference between treatment groups with regard to attrition (81.2% vs. 82.9%,  $p=0.29$ ). Comparison with participants not followed-up showed that those followed-up were more often in training or employed and less inactive (67.4%, 26.2%, and 6.35%, compared to 63.3%, 21.5%, and 15.2%,  $p=0.03$ ), that they drank less (mean [SD] baseline drinking composite score=0.3 [0.7], compared to 0.5 [0.7],  $p=0.04$ ), and had less often probable dependence according to the AUDIT (cut-off of 12 points, 32.0% compared to 44.3%,  $p=0.04$ ).

For the main outcome analysis, the coefficients were slightly smaller than in the completers-only analysis, but they remained significant ( $B= -0.12$ ,  $SE=0.06$ ,  $p=0.048$  for multiple imputation technique;  $B= -0.11$ ,  $SE=0.05$ ,  $p=0.03$  for last value carried forward technique). Regarding the composite sub-dimensions, similar patterns were observed, with close coefficients and same significance levels (see Table 1). We thus further used completers-only data.

### *Post-hoc analyses of counselors' characteristics and within-session behaviors interactions and influence on the outcome*

In order to disentangle the effects of different variables reported above, we additionally carried out post-hoc interaction analyses among counselor baseline characteristics, among within-session behaviors, and between counselor baseline characteristics and within-session behaviors. To avoid multiple testing and risk of type I error, we tested only the combinations of variables which were most scientifically or clinically relevant. This approach was used because multivariate models were not possible given the control group was the reference across variables, which introduced high multi-collinearity.

*Methods.* This analysis was done using the *factor variables* function in Stata IC 12.1. This function creates dummy coded variables and might be used to generate interactions. In the present

analysis, we used this function to create interactions of 2 variables with 3 modalities (e.g. 2=BMI high score sub-group, 1=BMI low score sub-group, 0=no BMI, control group). The function creates variables for all combinations (i.e. 0-0, 0-1, 0-2, 1-0, 1-1, 1-2, 2-0, 2-1, and 2-2). As the control group is always the same, there are no observations for the combinations 0-1, 0-2, 1-0, and 2-0. We thus analyzed the interactions of 1-1 (low-low), 1-2 (low-high), 2-1 (high-low), and 2-2 (high-high) compared to the reference which was 0-0 (control group) in linear regression models predicting the drinking composite score at follow-up and controlling for the drinking composite score at baseline.

*Results.* We first tested whether the effect of gender remained significant when taking professional status or experience into account. Results (see Table 2) showed a synergistic effect for gender and experience, with significant reductions in drinking related to having had a counselor that was male and having more clinical experience ( $B = -0.18$ ,  $p = 0.02$ ). Regarding the interaction of gender and professional status, gender effect seemed to prevail with differences significant for male physicians ( $B = -0.16$ ,  $p = 0.04$ ) and close to significance for male psychologist ( $B = -0.28$ ,  $p = 0.09$ ) despite the fact that only one psychologist was male and 2 physicians female.

We then looked to disentangle the effects of MI experience, attitudes toward BMI, and MI skills. Significant effects for MI experience and counselor self-efficacy were synergistic ( $B = -0.17$ ,  $p = 0.04$  for experienced therapists viewing themselves as more effective). On the other hand, 'Thinking that BMI might help' and within-session MI skills seemed to prevail over MI experience: high ratings on the 'Thinking that BMI might help' scale were related to better outcomes both among more experienced counselors ( $B = -0.16$ ,  $p = 0.04$ ) and less experienced counselors ( $B = -0.16$ ,  $p = 0.09$ ); sessions with higher percentage of complex reflections were related to better outcomes both by more experienced counselors ( $B = -0.20$ ,  $p = 0.02$ ) and less experienced counselors ( $B = -0.21$ ,  $p = 0.05$ ); sessions with avoidance of MI-inconsistent behaviors were related to better outcomes both by more experienced counselors ( $B = -0.16$ ,  $p = 0.04$ ) and less experienced counselors ( $B = -0.20$ ,  $p = 0.05$ ); and similar patterns at the trend level was observed for mean global ratings ( $B = -0.14$ ,  $p = 0.08$  and  $B = -0.17$ ,  $p = 0.08$ ). The surprising finding that less MI-consistent behaviors was related to better outcomes was also observed for both experience levels but was stronger for more experienced counselors ( $B = -0.32$ ,  $p = 0.001$ ) than for less experienced ones ( $B = -0.17$ ,  $p = 0.05$ ).

StataCorp (2013) Stata 12.1. StataCorp LP, College Station, TX, USA.

Table 1. BMI efficacy on the main outcome and its sub-dimensions using missing values imputation technique and last value carried forward technique

	B	SE	t	p	[95%	CI]
<i>Missing imputation</i>						
Drinking composite score						
BMI (vs. Control) <sup>a</sup>	-0.12	0.06	-1.99	0.048	-0.23	0.00
Usual drinking days per week						
BMI (vs. Control) <sup>a</sup>	-0.30	0.10	-2.92	0.004	-0.50	-0.10
Usual drinks per drinking days						
BMI (vs. Control) <sup>a</sup>	-0.01	0.33	-0.02	0.99	-0.65	0.64
Binge drinking frequency <sup>b</sup>						
BMI (vs. Control) <sup>a</sup>	-0.07	0.07	-0.95	0.34	-0.21	0.07
<i>Last value carried forward</i>						
Drinking composite score						
BMI (vs. Control) <sup>a</sup>	-0.11	0.05	-2.23	0.026	-0.20	-0.01
Usual drinking days per week						
BMI (vs. Control) <sup>a</sup>	-0.29	0.08	-3.52	<0.001	-0.46	-0.13
Usual drinks per drinking days						
BMI (vs. Control) <sup>a</sup>	-0.11	0.28	-0.38	0.70	-0.66	0.44
Binge drinking frequency <sup>b</sup>						
BMI (vs. Control) <sup>a</sup>	-0.06	0.06	-0.98	0.33	-0.18	0.06

<sup>a</sup> BMI was coded 1 and Control was coded 0.

<sup>b</sup> Variable used as continuous (scale from 0-4).

Linear regressions adjusted for the measure at baseline. SE, Standard error; CI, Confidence interval;

BMI, brief motivational intervention. N=441.

Table 2. Post-hoc interactions analyses of the influence of counselors' characteristics and within-session behaviors on the main outcome

	N	B	SE	t	p
Clinical experience X Gender					
Low-Male	24	-0.15	0.13	-1.18	0.24
Low-Female	73	-0.04	0.09	-0.41	0.68
High-Male	72	-0.18	0.08	-2.26	0.02
High-Female	46	-0.15	0.10	-1.57	0.12
Gender X Professional status					
Male-Physician	84	-0.16	0.08	-2.04	0.04
Male-Psychologist	12	-0.28	0.17	-1.68	0.09
Female-Physician	23	-0.04	0.13	-0.29	0.77
Female-Psychologist	96	-0.10	0.08	-1.28	0.20
Experience in MI X Viewing themselves as effective when conducting BMI					
Low-Low	48	-0.09	0.10	-0.90	0.37
Low-High	60	-0.13	0.09	-1.47	0.14
High-Low	24	-0.06	0.13	-0.44	0.66
High-High	83	-0.17	0.08	-2.11	0.04
Experience in MI X Thinking that BMI might help					
Low-Low	50	-0.07	0.10	-0.73	0.47
Low-High	58	-0.16	0.09	-1.69	0.09
High-Low	24	-0.08	0.13	-0.64	0.52
High-High	83	-0.16	0.08	-2.04	0.04
Experience in MI X Mean of MI global ratings					
Low-Low	53	-0.07	0.10	-0.74	0.46
Low-High	51	-0.17	0.10	-1.74	0.08
High-Low	34	-0.13	0.11	-1.16	0.25
High-High	70	-0.14	0.08	-1.74	0.08

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Experience in MI X MI-consistent behaviors frequency					
Low-Low	60	-0.17	0.09	-1.96	0.05
Low-High	44	-0.03	0.11	-0.25	0.80
High-Low	43	-0.32	0.10	-3.21	0.001
High-High	61	-0.01	0.09	-0.11	0.91
Experience in MI X MI-inconsistent behaviors frequency					
Low-Low	49	-0.20	0.10	-2.01	0.05
Low-High	55	-0.05	0.10	-0.50	0.62
High-Low	85	-0.16	0.08	-2.09	0.04
High-High	19	-0.05	0.14	-0.36	0.72
Experience in MI X % Complex reflections					
Low-Low	62	-0.07	0.09	-0.73	0.46
Low-High	42	-0.21	0.11	-1.93	0.05
High-Low	42	-0.04	0.10	-0.39	0.70
High-High	62	-0.20	0.09	-2.36	0.02

Linear regressions predicting the main outcome and adjusted for the drinking composite score at baseline. In each model, the reference is the control group, N=361. SE, standard error.