Do Brief Alcohol Motivational Interventions Work Like We Think They Do?

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Abstract

Background—Questions remain about how brief motivational interventions (BMIs) for unhealthy alcohol use work and addressing these questions may be important for improving their efficacy. Therefore, we assessed the effects of various characteristics of BMIs on drinking outcomes across three randomized controlled trials (RCTs).

Methods—Audio recordings of 314 BMIs were coded. We used the global rating scales of the Motivational Interviewing Skills Code (MISC) 2.1: counselor's acceptance, empathy, and motivational interviewing (MI) spirit, and patient's self-exploration were rated. MI proficiency was defined as counselor's rating scale scores ≥ 5. We also used the structure, confrontation and advice sub-scale scores of the Therapy Process Rating Scale; and the Working Alliance Inventory. We examined these process characteristics in interventions across: one US RCT of middle-aged medical inpatients with unhealthy alcohol use (n=124) and two Swiss RCTs of young men with binge drinking in a non-clinical setting: Swiss-one (n=62) and Swiss-two (n=128). We assessed the associations between these characteristics and drinks/day reported by participants 3–6 months after study entry.

Results—In all 3 RCTs, mean MISC counselor's rating scales scores were consistent with MI proficiency. In overdispersed Poisson regression models, most BMI characteristics were not significantly associated with drinks/day in follow-up. In the US RCT, confrontation and self-exploration were associated with more drinking. Giving advice was significantly associated with less drinking in the Swiss-one RCT. Contrary to expectations, MI spirit was not consistently associated with drinking across studies.

Conclusions—Across different populations and settings, intervention characteristics viewed as central to efficacious BMIs were neither robust nor consistent predictors of drinking outcome. Although there may be alternative reasons why the level of MI processes were not predictive of

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outcomes in these studies (limited variability in scores), efforts to understand what makes BMIs efficacious may require attention to factors beyond intervention process characteristics typically examined.

Keywords

Alcohol; brief motivational intervention; intervention process

INTRODUCTION

Brief interventions for unhealthy alcohol use have been shown to be effective in primary care settings (Bertholet et al., 2005; Kaner et al., 2007). Nevertheless, efficacy is modest and there is wide variability in effectiveness, especially across settings. In order to determine the ingredients of effective interventions researchers have conducted content analyses of intervention processes. Over the past two decades, motivational interviewing (MI) has had a large influence in the field. Researchers have used it to develop new therapies (i.e. Motivational Enhancement Therapy (MET) (Miller and Rollnick, 2002; Miller and Wilbourne, 2002) and to develop or modify brief interventions (brief motivational interventions, BMIs)(Rollnick et al., 1992). These BMIs are based on the view that characteristics of MI may be particularly useful for addressing unhealthy drinking in opportunistic setting such as primary care. BMIs are therefore a subset of brief interventions (BIs), which is a heterogeneous group of interventions that range from 5 minutes (or less) of brief advice to repeated sessions of MI (Bertholet et al., 2005; Kaner et al., 2007). Among BI studies citing a theoretical framework, MI was the most often cited (Bertholet et al., 2005). In general it is thought that interventions consistent with the principles of MI will have greater efficacy than those that are not. As a result, BMI training and supervision is typically focused on making clinicians proficient in core MI skills (e.g., empathy, acceptance, MI spirit). In studies of MET, the most consistent evidence is for the negative influence of MI-inconsistent behavior and for the importance of patient language during the intervention (e.g. change talk), results that have been similar in brief intervention research (Apodaca and Longabaugh, 2009; Gaume et al., 2008; Moyers et al., 2007; Moyers et al., 2009).

Nevertheless, it is also important to take into account intervention characteristics that go beyond MI characteristics per se, such as directiveness (especially the extent to which the intervention is structured by the provider, and the use of confrontation). Both directiveness and therapeutic alliance are associated with alcohol treatment outcomes (Karno and Longabaugh, 2005a; Karno and Longabaugh, 2005b), (Dundon et al., 2008; Ilgen et al., 2006; Meier et al., 2005) but these dimensions are seldom examined in brief intervention studies. In addition, giving advice has been an essential element of brief intervention but not necessarily of MI (Bien et al., 1993; Daeppen et al., 2007b).

Even though there is a large body of process research in the alcohol field, much of it has been done with data from studies without a no-treatment control group (e.g., Project MATCH, the COMBINE Study (Anton et al., 2006; Project MATCH Research Group, 1997). There have been relatively few process studies of BMIs and most of these have relied

on patient or clinician self-reports rather than trained observer ratings of intervention sessions themselves (Daeppen et al., 2007a; Heather et al., 2013; McCambridge, 2013; Orford et al., 2009a; Orford et al., 2009b). Many questions remain regarding how BMIs work and addressing these questions is important for improving their efficacy. Studying mechanisms of change is crucial to understand how treatment works and is central to improving clinical practice and patient care (Kazdin and Nock, 2003). Even though it is best to examine mechanisms of action in studies with positive results, studies with negative results can still be of interest to assess gradient effects in order to identify or collect evidence on potential or suspected mechanisms of action. In fact, as of today, many studies on mechanism of behavior change have been conducted in studies with negative results or in studies without a no treatment control group (Amrhein et al., 2003; Moyers et al., 2007). Other studies focused on intervention processes without relying on intervention content analysis. The United Kingdom Alcohol Treatment Trial (UKATT), compared two alcohol problem treatment modalities, social behaviour and network therapy and motivational enhancement therapy (UKATT Research Team, 2005). Among the treatment processes identified, Heather and McCambridge showed that there was a strong relationship between post-treatment readiness to change and treatment outcomes (Heather et al., 2013). In post-treatment interviews conducted with participants in order to identify which elements may have helped them change their drinking, UKATT participants mostly attributed change to the involvement of others in supporting behavior change, to the awareness of the consequences of drinking, and to general factors (determination, commitment, and decision; detoxification or medication; and feeling comfortable talking) (Orford et al., 2009b).

MATCH and UKATT were essentially negative studies, with no differences on primary outcomes across groups but nevertheless provided lots of information on mechanisms of behavior change. Similarly, negative studies in which participants decreased drinking can provide useful information on change, even though the mechanism of change may be different in a group that receives counseling versus one that does not.

Assessing characteristics of BMIs broadly accepted as ingredients of efficacy or at least as best recommended practices and for training of interventionists across studies and in different settings and populations will give better insight as to which of these characteristics are associated (or not) with drinking outcomes, and which should be emphasized in training and in the refinement or development of new interventions.

We assessed the effects of various characteristics of BMIs on drinking outcomes in the intervention groups in three randomized controlled trials (RCTs) comparing BMI to no BMI. We investigated three sets of audio-recorded BMIs; two from null studies (no difference in drinking between BMI and no BMI groups)(Gaume et al., 2011; Saitz et al., 2007) and one from a positive study (less drinking in BMI group compared to no BMI group)(Daeppen et al., 2011); drinking decreased among participants in all 3 studies. The aim of the present research was to examine the association between intervention processes in BMIs and alcohol outcomes. In particular, we were interested in examining the association between global intervention characteristics recommended in MI practice, as well as therapeutic alliance, confrontation, structure, and advice, and drinking. As a secondary aim, we were interested in

examining patient behavior during the intervention sessions as assessed by self-exploration on the MISC and ratings of patient cooperation and engagement.

We hypothesized that:

1. higher ratings of MI skills would be associated with less drinking in follow-up (In addition, we expected that interventions from the study that showed significant effects of the BMI on drinking relative to controls would show higher ratings of intervention quality than the two negative studies).

2. within the context of an MI-based brief intervention, we would not observe a detrimental effect of structure on drinking outcomes

3. advice and a stronger therapeutic alliance would be associated with less drinking.

4. confrontation would be associated with less favorable drinking outcomes.

MATERIAL AND METHODS

We studied three sets of audio-recorded brief motivational interventions (BMI) for unhealthy alcohol use. All three sets came from randomized controlled trials testing the efficacy of BMI for unhealthy alcohol use versus no intervention. In all three trials, participants decreased their drinking. One study was conducted in the United States (Saitz et al., 2007) and two in Switzerland (Daeppen et al., 2011; Gaume et al., 2011). All studies sought to deliver a brief (20–30 minutes) intervention following the principles and philosophy of motivational interviewing (MI). Providers in Switzerland were explicitly encouraged to deliver less structured intervention without advice (Seneviratne et al., 2007).

In the US study, interventions were delivered to medical inpatients with unhealthy alcohol use (defined as > 14 drinks/wk or   5 drinks/occasion for men and > 11 drinks/wk or   4 drinks/occasion for women and persons   66 years old); 77% had alcohol dependence as determined by the Composite International Diagnostic Interview Alcohol Module. Follow-up took place 3 months later, with an 80% follow-up rate. The study showed null results (i.e. no difference in alcohol use at 3 months between the intervention and control groups) (Saitz et al., 2007). One hundred and twenty-four BMIs were coded among the 166 participants who received an intervention. The reasons for absence of coding (n=42) were: technical problems (intervention inaudible, recording skipping or prematurely interrupted) (n=24), no recording on the tape (n=5), presence of a third person (relative or friend) during part of the intervention (n=5), intervention was not recorded (n=6), intervention in Spanish (n=1), unlabeled recording (n=1).

In Switzerland, interventions were delivered at the army recruitment center in Lausanne. The study participants were young men (20 years old) who reported heavy episodic drinking (defined as drinking 60g of ethanol at least once a month). In the first study, study participation was offered to a random sample of the total population: after an initial assessment, participants were randomized to receive or not receive a BMI. In the second study, participation was offered to people willing to receive a BMI: young men were made aware of the possibility to receive a BMI. Individuals interested in receiving it were

randomized into 2 groups where individuals were given either the BMI immediately or 6 month later. Follow up took place 6 months later, with 89% follow-up rates for both.

The first study, 'Swiss-one', showed positive results of the BMI on drinking outcomes for individuals with heavy episodic drinking (i.e. participants in the BMI group reported less drinking at follow-up compared to participants in the control group)(Daeppen et al., 2011). Out of 125 BMIs, 62 were coded and used in the present study. The second study, 'Swiss-two', was a null study among individuals with heavy episodic drinking (Gaume et al., 2011). Of 219 BMIs, 128 were coded and used in the present study. The reasons for absence of coding (across both studies) were (154): participants refused to be recorded (separate consent for the recording) (n=50), no recorder available (n=57), technical problems (intervention inaudible, recording skipping or prematurely interrupted) (n=41), intervention not for alcohol (n=6).

In all three studies, BMIs were delivered by trained and supervised personnel.

Coding of the audio-recorded interventions

All BMIs were coded by trained coders under ongoing supervision throughout the coding process. The various instruments were chosen because of the theoretical underpinnings of the provided BMIs and because of the study hypotheses.

Global rating scales of the MISC 2.0—The MISC includes global scale ratings of both counselor and patient behaviors. Each dimension is rated on a 1–7 Likert-type scale. In the current study, counselor's acceptance, empathy, and the individual scale items for MI spirit (autonomy support, evocation, collaboration) were rated in addition to patient's self-exploration. MI proficiency was defined as a score ≥ 5 for the counselor's rating scales.

Structure, confrontation, and advice—We used two subfactors of the directiveness scale of the Therapy Process Rating Scale (TPRS), revised: the structure and confrontation factors, and the advice score based on 3 supplemental items of the TPRS (Karno, 2007; Karno and Longabaugh, 2005a). The structure factor relates to focusing the patient on specific content during the intervention and includes 3 items. The confrontation factor relates to interpretation and direct confrontation with the patient and includes 3 items. Interpretation is an attempt by the counselor to supply a reason or a meaning to the patient's behavior, feelings or thoughts. Direct confrontation refers to a "challenge to the patient's defense" (it can at times bear some similarity to interpretation). Pointing out discrepancies in the patient's attitudes, thoughts or behaviors (for example between what is said and what is done) is considered confrontation. The advice score relates to the presence of advice with and without permission and the presence of order, command or direction. Low scores indicate little or no use of structure/confrontation/advice.

Working alliance inventory (short form)(WAI)—The WAI is a 12-item questionnaire (Horvath and Greenberg, 1989). The observer-rated version was used for the present study. The WAI was rated by the coders after completion of the MISC and TPRS. Each item is rated on a 1–7 Likert scale. A total score and three sub-scores based on 4 items each (goal, task and bond) can be computed. For the present study, the three sub-scores were used.

Patient cooperation and engagement scales—Two additional scales were included to capture additional dimensions of patient behavior in the intervention: cooperation and engagement. Both dimensions were rated on 1–7 Likert-type scales. For cooperation, individuals high on the scale are responsive to the therapist questions and comments during the session, cooperate with the therapist's efforts and show little resistance. Individuals low on the scale appear unfriendly and uncooperative with therapist direction, with a sense of resistance or opposition. For engagement, individuals high on the scale appear actively involved, openly seeking and engaged in the session, participating and fully attending. They appear to be thinking, reflecting, experiencing, processing or discovering during the session. Individuals low in this scale appear disengaged, uninterested, unattached and may give the impression of waiting for the session to be over.

Coding reliability

To assess coding reliability, 20% of the tapes were double-coded. The intraclass correlation coefficient (ICC) was used to evaluate the reliability of the coding. ICC values equal to 0 represent agreement equivalent to that expected by chance, while 1 represents perfect agreement. According to Landis and Koch, the ICCs were interpreted as follows : poor to fair (below 0.4), moderate (0.41–0.60), excellent (0.61 and over) (Landis and Koch, 1977). ICC's were 0.22 for acceptance (poor), 0.57 for empathy (moderate), 0.45 for MI-spirit (moderate), 0.57 for self-exploration (moderate), 0.26 for cooperation (poor), 0.63 for engagement (excellent), 0.51 for WAI goal (moderate), 0.51 for WAI task (moderate), 0.41 for WAI bond (moderate), 0.41 for confrontation (moderate), 0.85 for structure (excellent), 0.85 for advice (excellent). Due to poor reliability, the acceptance and cooperation scales were dropped from the analyses and are not discussed further.

Outcomes

Drinking outcomes were measured at 3 (US study) and 6 months (Swiss studies). The US study used the 30-day timeline follow-back method (Sobell and Sobell, 1995) to derive the mean number of drinks per day over the past 30 days. Swiss studies used quantity and frequency questions to compute weekly alcohol consumption in drinks (using the first 2 questions of the Quick Drinking Screen (i.e. drinking days per week * standard drinks per drinking day) divided by 7 to obtain a mean number of drinks per day (Sobell et al., 2003). We chose one outcome to avoid multiple comparisons. We chose drinks per day because it summarizes both drinking amounts and abstinence in one measure (e.g. in contrast to drinks per drinking day) and because it is an outcome commonly used and found to be sensitive to change in BMI studies.

Analyses

In a first step, descriptive statistics were performed to assess potential differences and similarities between studies with respect to MISC global rating scales and cooperation and engagement scales (since all interventions were supposed to follow MI principles). Mean scores between the three studies were compared (using PROC GLM, contrast, SAS 9.2).

In a second step, Poisson regression models accounting for overdispersion and adjusting for baseline alcohol use (drinks per day) were used to assess the relationship between MISC

rating scales scores, engagement scale score, WAI scores and structure/confrontation/advice scores and alcohol use at follow up. Models using US data were also adjusted for age, gender and presence of alcohol dependence. No adjustment was necessary for the Swiss studies given the homogeneity in gender and age. Since participants were young men and because few had AUDIT 20 or greater (3 (4.8%) in Swiss-one study and 13 (9.6%) in Swiss-two, no adjustment was deemed necessary for the presence of alcohol dependence.

All analyses were performed using SAS software 9.2 (Cary, North Carolina).

RESULTS

Characteristics of intervention processes

The characteristics of the subjects are presented in Table 1. In the US, 124 BMIs were coded. In Swiss-one and Swiss-two, 62 and 128 BMIs were coded, respectively. Thirty-one subjects with coded recordings were lost to follow up in the US study (25%), and 8 (13%) and 13 (11%) in Swiss-one and Swiss-two respectively. Subjects with and without available follow-up data did not differ significantly on intervention characteristics and drinking at baseline except for: self-exploration in the US study (mean for lost to follow-up: 5.3 vs 4.9, p=0.04) and baseline weekly alcohol use in Swiss-one (mean for lost to follow-up: 7.4 vs 13.9, p=0.01).

Overall, counselor scores were adequate with respect to MI standards: in all 3 RCTs, mean counselor MISC rating scales scores were 5 in all counselor dimensions, which corresponds with « MI proficiency » (Table 2). MISC global rating scales scores differed significantly across the three studies (see Table 2). MISC rating scales scores for empathy, MI spirit and self-exploration and engagement were significantly lower in the Swiss-one RCT compared to the Swiss-two and the US RCT. There were no significant differences between the US and Swiss-two RCT with respect to empathy, MI-spirit, self-exploration and engagement.

Associations between intervention processes and alcohol outcomes

In overdispersed Poisson regression models adjusted for baseline drinking, most BMI characteristics were not significantly associated with drinks per day at follow-up (Table 3). In the US RCT, confrontation and self-exploration were associated with more drinking. Giving advice was associated with less drinking in the Swiss-one RCT. Although not significant, the direction of the associations for advice and confrontation were consistent across the RCTs. MI spirit was inconsistently associated with drinking in the Swiss RCTs (significantly less drinking in the Swiss-two and significantly more drinking in the Swiss-one RCT), and not associated with drinking in the US RCT. There was no association between WAI subscores and drinking at follow-up in the three RCTs.

DISCUSSION

We studied three sets of audio-recorded and coded BMIs for unhealthy alcohol use. Examining within study associations (with outcome) and between study comparisons (of intervention processes), we found little evidence of an MI process being the indicator of

more successful interventions. Contrary to hypotheses, we found no evidence that higher levels of clinician's proficiency using MI skills as measured by the MISC accounted for decreases in drinking after BMI. Indeed, no robust or consistent association between characteristics viewed as central to efficacious BMIs and better clinical outcome (less drinking) were found across the studies.

Similar findings were observed in the cross-study comparison. Of the three RCTs, one showed a positive impact of BMI, and the other two did not. Across the three RCTs, MI was delivered with proficiency, though the least favorable ratings in terms of MI proficiency were observed in the study with positive results. Thus, there was little evidence from the cross-study comparison to support specific counselor processes associated with intervention success.

The few observed differences in patient behavior during the BMI appear to have been a function of study or participant characteristics, for example, self-exploration was higher in the study in which participants actively sought a BMI and in the study in which participants had more severe unhealthy alcohol use. Overall, there was little evidence from these well-delivered interventions, that better counseling skills were associated with better outcomes.

Kazdin and Nock emphasize the need to study mechanisms of therapeutic change (Kazdin and Nock, 2003). As there have been relatively few studies specifically designed to address this question for BMI, studying intervention characteristics and associations with outcomes in the intervention group of randomized trials is a potentially valuable approach to examine mechanisms of action. Other studies have focused on the processes of motivational enhancement therapy (MET), using a similar approach. According to MI theory, there is a causal chain between therapist MI behaviors, patient language in favor of change and behavior change. Support for this mechanism has been found in MET studies (Moyers et al., 2007; Moyers et al., 2009), but evidence is scarce and far from robust. Nevertheless, it should be acknowledged that BMIs are not the same as MET; processes taking place in the context of an ongoing therapy may not be found in a single encounter (i.e. BMI). Even if based on the same theoretical underpinnings, BMI and MET may operate differently.

Furthermore, as suggested in a recent review, and similar to our results, variables comprising MI spirit do not appear to account for MI effectiveness (Apodaca and Longabaugh, 2009). It appears that MI-inconsistent behaviors play a more prominent (and negative) role in drinking outcomes than MI-consistent behaviors. Various studies have shown that MI-inconsistent behaviors are related to worse outcomes (Karno and Longabaugh, 2004; Karno and Longabaugh, 2005b; Miller et al., 1993). With respect to MI-consistent and inconsistent behaviors, Apodaca and Longabaugh concluded from studies of MI-inconsistent therapist behaviors that they mediated MI effectiveness (Apodaca and Longabaugh, 2009). In our study, confrontation, though not structure (the two subfactors of the MI-inconsistent directiveness) was negatively associated with drinking outcomes. Confrontation is clearly viewed as MI-inconsistent, but it is important to point out that the definition of confrontation may vary depending on the theoretical model (e.g., interpretation and confrontation as coded in the TPRS do not exactly overlap with what MI considers confrontation). Our findings may help further refine which elements may have a detrimental effect on outcomes.

MI-consistent behaviors, although not extensively studied, have not been identified as strong candidates for being mediators of MI efficacy, which can be viewed as consistent with our results.

The absence of an association between therapeutic alliance and outcome in our study is inconsistent with previous intervention process studies of substance use disorders. Dundon found some (but inconsistent) evidence of association between alliance and drinking outcomes (Dundon et al., 2008), and Ilgen found an interaction between alliance and motivation (Ilgen et al., 2006). These differences may, in part, be explained by differences in measures used. In the present study (in contrast to Dundon who used patient and provider ratings and Ilgen who used provider ratings), we used an observer rated version of the WAI. Results may differ when ratings, even with the same instrument, are completed by the patient or the counselor or by an external rater. For example in the Dundon study, a secondary analysis of a placebo controlled RCT of naltrexone (randomization to "medication clinic only", "intervention promoting pharmacotherapy" or "CBT"), significant associations were found in the "medication clinic only" group between the provider ratings and the number of visits attended but not with drinking outcomes, and, in the pharmacotherapy promotion group, between provider ratings and drinking outcomes but not the number of visits, and no significant associations were found between alliance and outcomes in the CBT group. No significant association was found for patient ratings in any of the groups.

Another potential explanation for a lack of association between alliance and outcomes is related to brief intervention itself: when alliance plays a role in psychotherapy, or in primary care, it is in the context of an ongoing relationship between patient and provider and not in the context of a single encounter (as is the case with BMI). There is some support for this hypothesis from the study of brief interventions for long-term benzodiazepine use: the fact that the intervention is delivered by a health care provider with whom a long-standing relationship exists may be an important determinant of efficacy. (Heather et al., 2011). Especially in the three studied RCTs, it was clear that the BMI was a single experience and that no further contacts would take place. Alliance in the context of a treatment taking place over a series of encounters may play a different (and more determining) role than in the context of a BMI delivered by a provider the patient will likely never meet again

In general, despite evidence of efficacy for MI, and, to some extent and limited to some settings and circumstances, for BMI, we still know little about its mechanisms of action. Hypothesized core characteristics, such as MI spirit, do not appear to predict treatment outcomes.

Our results should be considered in the context of the study's limitations. First, because all studies aimed to deliver BMI and did so with a strong effort on training and supervision, interventions were delivered consistently and therefore the range of the process variables was restricted. The fact that intervention elements were generally delivered proficiently across studies may have also limited our ability to identify a predictive effect of the studied variables. Second, the instruments used (the MISC and the WAI especially) had only moderate inter-rater reliability. Limited inter-rater reliability has been reported in other

studies using the MISC, and MISC global rating scales are intended to capture overall impression over a 30 min session MISC global scales are not equivalent to behavior counts, which can be obtained through a second pass on the MISC). Future studies should use more fine grained measurements of process variables. More specific constructs might be needed and developed to investigate the dynamic processes at the session level more precisely. More complex models should be considered (other than simply a linear effect of individual variables) to determine how process influences outcomes; it may be useful to explore moderated mediation (i.e. conditional effects may be present: the effect of the intervention on alcohol use related outcomes, via various mediators (for example MI skills), may depend on moderator variables (for example severity of alcohol problems, readiness to change, etc.) or to conduct experimental studies in which one manipulates these processes.

Even though the study used three samples of BIs conducted in different settings (community and hospital) and populations (young males seeking and not seeking intervention, general medical inpatients), it should be noted that more than half of our study population consisted of Swiss young males. Studies were chosen based on availability of audio recordings of BIs to the study teams in a joint effort to study mechanisms of efficacy between a US and a Swiss research team. Coding is very labor intensive and resources available limited analysis to three study samples. Therefore, study results should be replicated in settings and populations outside of those evaluated in our study. Demographic factors, severity, type and setting of BMI delivery as well as cultural factors should be investigated in future studies.

These results should not be viewed as evidence that MI proficiency and the other studied variables have no relationship to efficacy. Nevertheless our results indicate that, in the context of an adequately delivered BMI, and within the range of proficient MI scores, « more » MI does not seem to be associated with more favorable outcomes. Second, some subjects were lost to follow-up and differences were observed between those with and without available follow-up data, which may have biased some results. Third, our study did not try to measure clinically meaningful differences but rather to identify whether characteristics viewed as central to BMI efficacy would be associated with drinking outcomes at all. As such, our results should be seen as hypothesis generating and not as definite conclusions on the impact of session characteristics on BMI efficacy.

The present study has notable strengths. We were able to study core BMI characteristics within three sets of data in two different countries, settings, and populations, and included more than 300 coded interventions. All three RCTs included a no-treatment control group, a feature that has been lacking many other studies that looked at determinants of intervention efficacy. In addition, we included an RCT that showed BMI efficacy. Even though limited to the studied RCTs, our results show some commonalities between studies and settings. We also assessed processes not limited to the practice of MI.

In conclusion, across different populations and settings, intervention characteristics viewed as central to efficacious BMIs were neither robust nor consistent predictors of drinking outcome. Although there may be alternative reasons why the quality of MI processes were not predictive in these studies, these findings suggest that efforts to improve the efficacy of

BMIs from intervention process characteristics may require attention to factors beyond constructs typically examined.

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Table 1

Baseline sample characteristics

	US (n=124)	Swiss-one (n=62)	Swiss-two (n=128)
Age, mean (SD)	46.7 (11.0)	19.2 (0.9)	19.6 (1.0)
Male, %	76.3%	100%	100%
Drinks per day, mean (SD)	6.8 (9.0)	1.9 (1.8)	1.9 (1.9)
Heavy drinking episodes per month, mean (SD) [**]	12.0 (10.6)	4.1 (3.9)	4.2 (3.1)
AUDIT score, mean (SD)	18.6 (10.2)	10.6 (4.6)	11.7 (5.4)
Family history of alcohol use disorders, %	84.4%	24.2%	39.4%

[**] US study: defined as 5 drinks per occasion for men and 4 for women and people age 66 years, Swiss studies: defined as 6 or more drinks per occasion. The standard drink definition is different in the US (14g of ethanol) and in Switzerland (10g of ethanol).

Table 2

Comparison of MISC global rating scales scores (empathy, MI-spirit, self-exploration) and engagement rating scale scores across the three samples

	Scales by study sample, mean (SD)			Between samples comparisons, p			
	US RCT (n=124)	Swiss-one RCT (n=62)	Swiss-two RCT (n=128)	US to Swiss-one	Swiss-one to Swiss-two	US to Swiss-two	Global F test
Empathy *	5.44 (0.90)	5.13 (0.64)	5.44 (0.66)	0.009	0.01	0.97	0.02
MI-spirit *	5.38 (0.98)	5.10 (0.72)	5.54 (0.67)	0.03	0.0005	0.1	0.002
Self-exploration *	5.01 (1.06)	4.55 (0.97)	5.19 (0.76)	0.002	<.0001	0.1	<.0001
Engagement *	5.64 (1.13)	4.76 (1.05)	5.39 (0.85)	<.0001	<.0001	0.06	<.0001

*
Empathy and MI-spirit are counselor's rating scales, self-exploration and engagement are patient's rating scales

Table 3

Poisson regression models accounting for overdispersion and adjusting for baseline measures of drinking assessing the association between MISC rating scales scores, WAI scores, structure, confrontation, advice scores and drinking (drinks per day) at follow-up

	US RCT			Swiss-one RCT			Swiss-two RCT		
	Estimate	*SE*	*p*	*Estimate*	*SE*	*p*	*Estimate*	*SE*	*p*
Empathy	−0.12	0.15	0.5	0.11	0.20	0.6	0.07	0.08	0.4
MI-spirit	0.04	0.15	0.8	**0.32**	**0.15**	**0.03**	**−0.15**	**0.07**	**0.03**
Self-exploration	**0.31**	**0.15**	**0.03**	0.11	0.12	0.4	−0.05	0.07	0.4
Engagement	0.24	0.15	0.1	−0.01	0.11	0.9	−0.02	0.06	0.8
Confrontation	**0.95**	**0.47**	**0.04**	0.16	0.36	0.7	0.19	0.17	0.3
Structure	−0.16	0.27	0.5	0.17	0.26	0.5	0.13	0.14	0.4
Advice	−0.22	0.48	0.6	**−2.83**	**1.30**	**0.02**	−1.12	1.72	0.5
WAI goal	0.02	0.05	0.7	0.04	0.03	0.3	−0.02	0.01	0.2
WAI task	0.05	0.04	0.3	0.04	0.03	0.1	−0.01	0.02	0.5
WAI bond	0.07	0.05	0.1	0.03	0.03	0.4	−0.007	0.02	0.7

Bolded numbers indicate statistically significant associations (alpha level 0.05).

Note: We adjusted for dependence in US study because of the high prevalence of dependence (77%) and because of differential subgroup effects of the intervention (Saitz et al., 2009); Models using US data were also adjusted for age and gender. In the Swiss studies, these were young men and the concept of dependence applies differently and more importantly, few had AUDIT 20 or greater (3 (4.8%) in Swiss-one study and 13 (9.6%) in Swiss-two). Therefore, analyses were not adjusted for age, gender or dependence for the Swiss studies.