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THE EFFICACY OF MOTIVATIONAL INTERVIEWING AS A BRIEF INTERVENTION FOR EXCESSIVE DRINKING: A META-ANALYTIC REVIEW

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Abstract — **Aims**: (1) To examine whether or not motivational interviewing (MI) is more efficacious than no intervention in reducing alcohol consumption; (2) to examine whether or not MI is as efficacious as other interventions. **Method**: A literature search followed by a meta-analytic review of randomized control trials of MI interventions. Aggregated between-group effect sizes and confidence intervals were calculated for each study. **Results**: Literature search revealed 22 relevant studies, of which nine compared brief MI with no treatment, and met methodological criteria for inclusion. In these, the aggregate effect size was 0.18 (95% C.I. 0.07, 0.29), but was greater 0.60 (95% C.I. 0.36, 0.83) when, in a post-hoc analysis, the follow-up period was three months or less. Its efficacy also increased when dependent drinkers were excluded. There were nine studies meeting methodological criteria for inclusion which compared brief MI with another treatment (one of a diverse set of interventions), yielding an aggregate effect size of 0.43(95% C.I. 0.17, 0.70). The literature review pointed to several factors which may influence MI's long-term efficacy effectiveness of MI. **Conclusions**: Brief MI is effective. Future studies should focus on possible predictors of efficacy such as gender, age, employment status, marital status, mental health, initial expectations, readiness to change, and whether the population is drawn from treatment-seeking or non-treatment-seeking populations. Also, the components of MI should be compared to determine which are most responsible for maintaining long-term changes.

INTRODUCTION

Brief interventions have proved to be a cost-effective strategy for reducing both risky alcohol consumption and alcohol-related problems (Heather, 1996; Wutzke *et al*., 2001). They are defined as any therapeutic or preventive consultation of short duration (one to five sessions) undertaken either by a health-care professional, general practitioner, or nurse (Aalto *et al*., 2001). The basic goal of brief interventions is to reduce levels of alcohol consumption. They usually include five stages: assessment, feedback, information, advice, and providing self-help materials (Beich *et al*., 2002). However, brief interventions are not suitable for everyone. Heather (1995) concluded that three target populations are appropriate candidates for brief interventions. The first includes individuals who drink above guidelines for safe drinking but who would not be considered 'alcoholic'. The second includes problem drinkers with low or moderate levels of dependence. The final category includes people with high levels of dependence who are not reached by conventional treatment services. Therefore, brief interventions seem to be most suitable for excessive drinkers with low-to-moderate levels of dependence and highly dependent drinkers whom existing treatment services fail to engage (Heather, 1995).

Brief interventions sometimes adopt the techniques of theoretical approaches to counselling (e.g. motivational ones). Strong motives can change specific behaviours, and level of motivation has been consistently identified as an important factor in the treatment of alcohol problems (Cox and Klinger, 2004; Noonan and Moyers, 1997). For instance, in the case of hazardous drinking, identifying the harmful effects of drinking alcohol can instil the motivation to change. Instead of using a direct confrontational strategy to treat alcohol problems, Miller (1983) proposed an alternative method called motivational interviewing (MI). Miller and Rollnick (2002, p. 25) defined MI as 'a client-centered, directive method for enhancing intrinsic motivation to change by exploring and resolving ambivalence'. As they discussed, five key principles underlay MI. First, it emphasizes the individual's present interests and problems. Second, it involves selective responding to the client's speech in a way that resolves ambivalence and motivates the person to change. Third, it is a method of communication rather than a set of techniques. Fourth, it focuses on intrinsic motivation for change. Fifth, within this approach, change occurs because of its relevance to the person's own values (Miller and Rollnick, 2002). Miller and Rollnick (1991) named five key techniques of MI: *expresses empathy*, *develops discrepancy*, *avoids argumentation*, *rolls with resistance*, and *supports self-efficacy.*

Three previous reviews have examined the efficacy of brief interventions delivered with MI principles. First, Noonan and Moyers (1997) reviewed the methodology of 11 randomized controlled trials (9 with problem drinkers and 2 with drug abusers) in a variety of settings. Five studies used MI in a hospital setting; two studies examined MI as a standard intervention; one study compared it with an alternative group treatment; and three studies tested it as an enhancement for an existing treatment. The authors concluded that MI is efficacious with a variety of problematic substance-use behaviours (alcohol, marijuana, and opiate use). However, they also argued that given the variance across effect sizes calculated for each study, it was likely that the efficacy of MI was linked to specific client variables (e.g. severity of impairment), although these variables had not been measured in the studies.

Second, Dunn *et al*. (2001) reviewed 29 randomized controlled trials examining the efficacy of MI across four behavioural domains: substance-abuse, smoking, HIV risk-taking, and diet/exercise. Due to the variations among the studies, the authors did not combine the effect sizes meta-analytically. Their findings revealed the greatest efficacy for MI when it was used to enhance more intensive

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substance-abuse treatments. However, they concluded that the optimal level of MI training, MI skills, and MI duration were still unknown.

Finally, Burke *et al*. (2003) carried out the first meta-analysis of MI interventions that had been delivered in a variety of domains: alcohol use, other drug use, diet/exercise, eating disorders, treatment adherence, smoking cessation, and HIV risk. Analysing 30 controlled clinical trials of what they termed adaptations of MI (AMIs), the authors found that AMIs were more efficacious than no treatment or placebo controls, and as efficacious as other active treatments with interventions targeting alcohol use, other drug use, or diet/exercise.

The objectives of the current study, which updates the previous meta-analytic reviews, were to examine (i) whether MI is more efficacious than no treatment in reducing alcohol consumption, and (ii) whether MI is as efficacious as other treatments.

METHOD

Literature search

The studies used for the meta-analysis dated from 1983 to 2003 and were identified by using the terms 'motivational interviewing', 'brief intervention', and 'motivational enhancement therapy' to search the following sources: MEDLINE, PsychInfo, Science Direct, and Ingenta. The references in two earlier meta-analytic reviews (Dunn *et al*., 2001; Noonan and Moyers, 1997) were also used, because they were those in the bibliography of the MI web site (http://www.motivationalinterview.org/library/MIBiblio2002).

Inclusion criteria

First, studies that claimed to examine the efficacy of a brief intervention delivered according to the principles of MI were selected on the basis of Miller and Rollnick's (2002) definition of MI. In addition, consistent with Dunn *et al*.'s (2001) decision, the current analysis included articles of even the briefest interventions (30 min), as long as they met the following criteria: (i) claimed to adopt the principles and techniques of MI as described by Miller and Rollnick (1991), (ii) delivered a face-to-face intervention rather than one by computer or telephone, (iii) randomly assigned participants to groups, (iv) included a comparison group, (v) were an independent, stand-alone study. In addition, (vi) the study had to have been either published or in press, because peer-reviewed studies are of higher quality.

Methodological quality score

The quality of each study was assessed according to 12 criteria developed by Miller *et al*. (1991; Table 1). The total of these ratings can range from 0 to 17 (Bien *et al*., 1993b; Miller *et al*., 1991).

Analysis of effect sizes

As Durlak (1995) argued, in meta-analyses of treatment effectiveness, the most important consideration is calculation of effect sizes. Specifically, for the present study the between-groups effect size and confidence intervals in each case were calculated using Coe's (2000a) Effect Size Calculator. The formula used for these calculations was from Cohen's (1988): d (effect size) = (XC – XE)/SD, where d refers to the effect size; XE is the mean of the intervention group; and XC is the mean of the control or comparison group. In addition, SD refers to the pooled standard deviation, which is calculated according to the formula: $SD_{pooled} = \sqrt{(N_E-1)SD_E^2 + (N_C-1)SD_C^2/N_E + N_C - 2}$, where N_E and N_C are the sample sizes of the experimental and control groups, and SD_E and SD_C are their standard deviations (Coe, 2000b). Each effect size estimate was corrected for potential small sample-size bias, according to Hedges and Olkin (1985). Inverse-variance-weighted aggregate effect sizes were computed with an SPSS macro, and comparisons were carried out using a weighted analysis of variance macro for SPSS (Lipsey and Wilson, 2001, pp. 208–220).

Positive values of effect sizes indicate better outcomes for brief MI. The studies were categorized in two different design types: (i) MI vs a no-treatment control, and (ii) MI vs

Table 1. Methodological quality rating scales

Criteria	Rating scales
(1) Group allocation	4 = Randomisation 3 = Within-subjects counterbalanced 2 = Case–control/matching/alternating cohorts 1 = Quasi-experimental design 0 = Violated randomisation or nonequivalent groups
(2) Quality control	1 = Treatment standardised by manual/specific training etc. 0 = No standardisation specified
(3) Follow-up rate	2 = 85–100% follow-ups completed 1 = 70–84.9% follow-ups completed 0 = <70% follow-ups completed or follow-up <3 months
(4) Follow-up length	2 = 12 months or longer 1 = 6–11.9 months 0 = <6 months or unspecified
(5) Contact	1 = Personal or telephone contact for >70% completed 0 = Questionnaire, unspecified, or <70%
(6) Collaterals	1 = Collaterals interviewed in >50% of cases 0 = No collateral verification
(7) Objective	1 = Objective verification (records, serum, breath) 0 = No objective verification
(8) Dropouts	1 = Treatments dropouts are enumerated 0 = Dropouts neither discussed nor accounted
(9) Attrition	1 = Lost cases enumerated and considered in outcome report 0 = Lost cases not enumerated or considered
(10) Independent	1 = Follow-up done by treatment-blind interviewer 0 = Follow-up non-blind; not specified; questionnaire
(11) Analyses	1 = Appropriate statistical analyses of group differences 0 = No statistical analyses; clearly inappropriate analyses
(12) Multisite	1 = Parallel replications at 2+ sites, separate research teams 0 = Single site/comparisons of sites using different programs

Source: Miller *et al*. (1991, p. 15).

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Table 2. The characteristics of the studies reviewed

Study	*N*/gender	Mean age	Design	Duration	Therapist	Training	Outcome	Drinker status
Agostinelli *et al*. (1995)	26/FM	NR	MI/NT	Mail	Researcher	NR	MI > NT	Abuse
Baer *et al*. (1992)	134/FM	21	MI/CT	60	PhD Student	No	MI = CT	Abuse
Baer *et al*. (2001)	348/FM	19	MI/NT	60	NR	NR	MI > NT	Abuse
Bien *et al*. (1993)	32/M	44.5	MI/TAU	60	PhD Student	Yes	MI > TAU	Dependence
Borsari and Carey (2000)	60/FM	18.7	MI/NT	60	Clinician	Yes	MI > NT	Abuse
Brown and Miller (1993)	28/FM	37	MI/NT	30/40	Clinician	No	MI > NT	Dependence
Gentilello *et al*. (1999)	762/M	36	MI/NT	30	PhD Student	Yes	MI > NT	Dependence
Handmaker *et al*. (1999)	42/F	24	MI/CT	60	PhD Student	NR	MI > CT	Abuse
Heather *et al*. (1996)	174/M	34.4	MI/CT/NT	30/40	Student	Yes	MI > CT/NT	Dependence
Kelly *et al*. (2000)	32/F	43.7	MI/NT	360	Clinician	Yes	MI > NT	Abuse
Longabaugh *et al*. (2001)	539/FM	27.3	MI/SC	40/60	Clinician	Yes	MI > SC	Abuse
Maisto *et al*. (2001)	301/FM	21	MI/BA/SC	30/45	Student	Yes	MI = BA,SC	Abuse
Marlatt *et al*. (1998)	348/FM	19	MI/NT	60	Student	Yes	MI > NT	Abuse
Miller *et al*. (1988)	42/FM	40	MI/NT	60	Student	Yes	MI > NT	Abuse
Miller *et al*. (1993)	42/FM	40	MI/NT/CT	60	Student	Yes	MI > NT,CT	Abuse
Monti *et al*. (1999)	94/FM	19	MI/SC	35	Student	Yes	MI > SC	Abuse
Murphy *et al*. (2001)	99/FM	19.6	MI/SC/NT	50	Student	Yes	MI > CT/NT	Abuse
Project MATCH (1997)	1726/FM	40.5	MI/CT	240	Clinician	Yes	MI = CT	Dependence
Roberts *et al*. (2000)	348/FM	NR	MI/NT	120	Student	Yes	MI > NT	Abuse
Sellman *et al*. (2001)	122/FM	36	MI/CT/NT	240	Therapist	Yes	MI > CT/NT	Mild
Shakeshaft *et al*. (2002)	115/FM	NR	MI/CT	90	Staff	Yes	MI = CT	Abuse
Smith *et al*. (2003)	151/FM	24	MI/TAU	15	Nurse	Yes	MI > TAU	Abuse

CT, comparison treatment; NT, no treatment; SC, standard care; BA, brief advice; NR, not reported; Mail: in this study personalized non-labeling feedback was sent to participants by post; TAU, treatment as usual.

a comparison treatment. In addition, in order to ensure homogeneity among the studies evaluated, only studies that measured changes in alcohol consumption were included in the meta-analysis.

RESULTS

Table 2 presents the characteristics of the 22 studies identified in the literature search. Seven of these studies examined the efficacy of MI among college students (Agostinelli *et al*., 1995; Baer *et al*., 1992, 2001; Borsari and Carey, 2000; Marlatt *et al*., 1998; Murphy *et al*., 2001; Roberts *et al*., 2000). Six of them tested MI's efficacy in outpatient community settings (Handmaker *et al*., 1999; Kelly *et al*., 2000; Miller *et al*., 1988, 1993; Sellman *et al*., 2001; Shakeshaft *et al*., 2002), whereas five delivered MI in emergency-room or clinic settings with patients reporting alcohol-related problems, such as a physical injury (Gentilello *et al*., 1999; Heather *et al*., 1996; Longabaugh *et al*., 2001; Monti *et al*., 1999; Smith *et al*., 2003).

Two studies examined the efficacy of MI in specialist substance-abuse treatment agencies (Bien *et al*., 1993a; Project Match Research Group, 1997). Brown and Miller (1993) offered MI at treatment entry as an enhancement of the usual treatment. Finally, only one study reported unfavourable results for MI (Maisto *et al*., 2001).

Methodological quality of the studies included in the meta-analysis

From the 22 studies reviewed, 7 studies were excluded from further analysis either because they did not meet the inclusion criteria or because inadequate information was provided. Table 3 shows the methodological quality score (MQS) of each study included in the meta-analysis.

Of the 15 studies, 7 studies (47%) met Miller and Wilbourne's (2002) criterion for excellent methodology (MQS; 14 of 17 possible points). Common methodological problems were attrition, short follow-ups, lack of collateral or objective (e.g. serum and breath analyses) verification, non-blind follow-ups, and lack of parallel replication with separate research teams. However, all the studies met the criteria for inclusion in the present meta-analytic review.

Table 3. The methodological characteristics of the studies included in the meta-analysis

	Methodological Quality Criteria Scoring (MQS)												
Study	1	2	3	4	5	6	7	8	9	10	11	12	Total
Bien *et al*. (1993)	4	1	1	1	1	1	1	1	1	1	1	0	14
Borsari and Carey (2000)	4	1	2	0	1	0	0	1	1	0	1	0	11
Brown and Miller (1993)	4	1	2	0	1	1	0	1	1	1	1	0	13
Gentilello *et al*. (1999)	4	1	0	2	1	0	1	1	1	1	1	0	13
Handmaker *et al*. (1999)	4	1	1	0	1	1	1	1	1	1	1	0	13
Heather *et al*. (1996)	3	1	2	1	1	1	0	1	1	1	1	0	13
Kelly *et al*. (2000)	4	1	2	2	1	0	1	1	1	0	1	0	14
Longabaugh *et al*. (2001)	4	1	1	2	1	0	1	1	1	0	1	0	13
Marlatt *et al*. (1998)	4	1	2	2	1	1	1	1	1	0	1	0	15
Maisto *et al*. (2001)	4	1	2	2	1	1	1	1	1	1	1	0	16
Miller *et al*. (1988)	4	1	2	2	1	1	0	1	1	1	1	0	15
Miller *et al*. (1993)	4	1	2	2	1	1	0	1	1	1	1	0	15
Murphy *et al*. (2001)	4	1	2	1	1	0	0	1	1	0	1	0	12
Smith *et al*. (2003)	4	1	1	2	1	1	1	1	1	0	1	0	14
Shakeshaft *et al*. (2002)	4	1	0	1	1	0	0	1	1	0	1	0	10

The final sample of 15 studies includes two different groups: 9 compared brief MI with no treatment and 9 compared brief MI with another treatment. Of the 15 studies, 3 studies compared brief MI both with a no-treatment group and another treatment group.

Characteristics of participants

A total of 2767 participants were included in the 15 brief intervention trials analysed. Thirteen studies reported the ages of the participants, the mean of which was 31.77 years (SD = 10.26). Twelve studies reported the gender of the

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Table 4. Means (SDs) of outcome measure, between-groups, and aggregate effect sizes for nine studies of MI compared to no-treatment control groups

Study	Mean (SD) MI group	Mean (SD) Control group	Between-groups effect sizes (CI)	Aggregate effect size(CI)	Heterogeneity Q	df	P
Borsari and Carey (2000)	11.4 (7.0)[a]	15.8 (8.2)[a]	0.57 (0.05, 1.09)				
Brown and Miller (1993)	18.5 (27.9)[a]	60.9 (52.5)[a]	1.03 (0.16, 1.82)				
Gentilello *et al*. (1999)	NR	NR	0.02 (–0.14, 0.18)				
Heather *et al*. (1996)	27.6 (20.6)[a]	30.7 (18.4)[a]	0.16 (–0.29, 0.60)				
Kelly *et al*. (2000)	2.4 (1.4)[b]	5.6 (3.3)[b]	1.19 (0.29, 0.61)				
Marlatt *et al*. (1998)	2.4 (1.5)[c]	2.6 (1.4)[c]	0.14 (–0.07, 0.35)				
Miller *et al*. (1988)	NR	NR	–0.03 (–0.48, 0.42)				
Miller *et al*. (1993)	15.1 (23.1)[a]	15.1 (14.0)[a]	0.00 (–0.74, 0.74)				
Murphy *et al*. (2001)	22.5 (5.8)[a]	26.5 (8.4)[a]	0.55 (–0.06, 1.16)				
				0.18** (0.07, 0.29)	29.62	8	0.0002

Between-group effect size = follow-up control – follow-up MI/pooled standard deviation. CI, 95% confidence interval; $^{**}P < 0.01$.
[a]Standard drinks per week.
[b]Standard drinks per day.
[c]Number of standard drinks per drinking occasion.

Table 5. Aggregate effect sizes for studies of MI vs NT for follow-up periods of ⩽3 months and ⩽6 months

Follow-up period	Number of samples	Effect size	95% confidence interval	Heterogeneity Q	df	P
⩽3 months	5	0.60*	0.36, 0.83	12.7	4	0.013
⩽6 months	4	0.06	–0.06, 0.18	1.1	3	0.788

Positive outcomes indicate better outcomes for the brief MI groups.
$^{*}P < 0.001$.

participants, with a total of 1265 males and 565 females. Of the 2767 participants, 996 were classified as dependent drinkers, and 1771 were categorized as heavy or abusive drinkers. Various instruments were used to assess alcohol consumption, such as the Brief Drinker Profile (Miller and Marlatt, 1984) and drinking diaries. Finally, follow-up assessments were conducted at 3, 6, 12, and 25 months.

The efficacy of MI over no treatment in reducing alcohol consumption

Nine studies compared brief MI with a no-treatment (NT) control group. Table 4 shows that the aggregate between-groups effect size was statistically different from zero and indicated superior outcomes for MI. The significant Q statistic showed that aggregated effect sizes were more heterogeneous than expected under a fixed-effects model ($Q = 29.62$, $P < 0.05$). Therefore, two analyses were conducted to explore possible reasons for the heterogeneity. Because these analyses were conducted *post hoc*, the results from them should be viewed as hypothesis generating.

First, aggregate effect sizes for those studies with a follow-up period of ⩽3 months were compared with those with a follow-up period of ⩽6 months. Table 5 shows that the aggregate effect size for the five studies that compared MI with NT was significant at the ⩽3 month follow-up but not significant at the ⩽6 month follow-up. A significant difference between the two groups of studies was confirmed by an ANOVA analogue statistic ($Q = 15.9$, $P < 0.001$), which showed that the effects of MI compared with NT were greater at the first follow-up than the second follow-up.

Second, for the ⩽3 month follow-up with significant heterogeneity, we tested whether the exclusion of dependent drinkers in one study could explain the variability. A significant ANOVA analogue fit statistic ($Q = 7.82$, $P < 0.05$) showed that the effect of MI compared with a control condition was significant when individuals with more severe problems were excluded ($d = 0.40$, 95% CI = 0.36, 0.44). The mean duration of MI in these studies was 87 min. Thus, ∼87 min of brief MI is more efficacious than no treatment in reducing alcohol consumption among hazardous drinkers in the short term (⩽3 months).

The efficacy of MI compared with other treatments

Nine studies examined whether brief MI was as efficacious as other treatments. Five studies compared brief MI with treatment as usual/brief advice/standard care, one with directive-confrontational counselling, one with educational intervention, one with skill-based counselling (SBC), and one with cognitive behavioural treatment.

Table 6 shows that MI was more efficacious than a range of other treatments for alcohol problems. The aggregate effect size was statistically homogeneous, indicating that further analysis was not warranted because variability across effect sizes did not exceed what would be expected from sampling error. In this analysis, only three studies involved more extended treatments, such as cognitive behavioural therapy (CBT), SBC, and directive-confrontational counselling. The average duration of MI in these nine studies was 53 min. Thus, ∼53 min of brief MI is more efficacious than a diverse set of other treatments.

DISCUSSION

The meta-analytic review of fifteen randomized controlled trials reveals that brief MI is an efficacious strategy for reducing alcohol consumption. Specifically, it was found that (i) ∼87 min of MI was more efficacious than no treatment in reducing alcohol consumption among non-dependent drinkers in the short term (⩽3 months), (ii) ∼53 min of MI was more efficacious than an aggregated set of diverse comparison treatments, although it cannot be inferred from this result that MI is more efficacious than any one of the other treatments alone. In addition, it was found that effect sizes in favour of MI compared with no treatment were largest at first follow-up, suggesting that MI's effects fade across time. This

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Table 6. Means (SDs) of outcome measure, between-groups, and aggregate effect sizes for nine studies of MI compared to other treatments (brief treatment groups and other counselling treatment groups)

Study	Mean (SD) MI group	Mean (SD) other treatments	Between-groups effect sizes[a] (CI)	Aggregate effect size (CI)	Heterogeneity		
					Q	df	*P*
Bien *et al*. (1993)	12.9 (26.4)[a]	272.2 (528.9)[a]	0.70 (–0.09, 1.49)				
Handmaker *et al*. (1999)	NR	NR	0.60 (–1.34, 2.54)				
Maisto *et al*. (2001)	44.4 (48.6)[a]	51.6 (52.2)[a]	0.14 (–0.18, 0.47)				
Murphy *et al*. (2001)	22.5 (5.8)[a]	26.8 (17.2)[a]	0.33 (–0.20, 0.85)				
Longabaugh *et al*. (2001)	1.6 (1.1)[b]	1.7 (1.1)[b]	0.07 (–0.16, 0.30)				
Smith *et al*. (2003)	27.1 (28.3)[a]	27.3 (24.1)[a]	0.01 (–0.33, 0.35)				
Heather *et al*. (1996)	27.6 (20.6)[a]	35.5 (24.7)[a]	0.35 (–0.07, 0.76)				
Miller *et al*. (1993)	15.1 (23.1)[a]	22.2 (30.1)[a]	0.26 (–0.49, 1.00)				
Shakeshaft *et al*. (2002)	15.1 (23.3)[a]	12.3 (23.7)[a]	–0.03 (–0.24, 0.18)				
				0.43** (0.17,0.70)	–3.51	8	0.05

Between-group effect size = follow-up other treatment – follow-up MI/pooled standard deviation.
*P < 0.01.
[a]Standard drinks per week.
[b]Number of heavy drinking days.

finding is consistent with the results of other meta-analyses of MI (e.g. Hettema *et al*., 2005), which suggest that control groups typically 'catch up' across time and not that MI gains return to baseline. However, as Heather (1995) argued, the evidence for brief interventions comes from different studies using various methodologies; therefore, generalization should be limited to the populations sampled in those studies. For instance, results obtained with a treatment-seeking sample should be generalized only to treatment-seeking individuals with the same age and gender composition.

Treatment- vs non-treatment-seeking samples

Of the 15 studies reviewed, 10 studies included a non-treatment-seeking sample, and 5 studies involved a treatment-seeking population. The treatment-seeking sample was recruited through either the media or a simple advertisement, whereas members of the non-treatment-seeking sample were screened as excessive drinkers from either primary care or emergency-room settings. Of the nine studies that examined the efficacy of MI over a NT control group, four studies involved a treatment-seeking population.

These findings lead to the conclusion that MI is efficacious with both treatment-seeking and non-treatment-seeking samples. However, when compared with other treatments, MI seems to be more efficacious with treatment-seeking samples. In addition, whether participants are heavy or dependent drinkers influences the efficacy of MI. Of the 15 studies, 4 studies involved dependent drinkers. These four studies yielded, on average, large within effect sizes. It should also be pointed out that the magnitude of the effect sizes increased in these four studies when a low-dependent, treatment-seeking population was involved. Therefore, it could be concluded that MI is an effective treatment for heavy or abusive drinkers and for low-dependent drinkers who voluntarily seek help. One possible explanation is that individuals who voluntarily seek help are more ready to change than those who do not seek help.

Readiness to change

Two studies (of the fifteen) assessed whether MI increased participants' readiness to change compared with the other methods. First, Heather *et al*. (1996) examined the efficacy of MI over either a SBC or a NT group in changing participants' readiness to change (as measured by the Readiness to Change Questionnaire, Rollnick *et al*., 1992). They found that the brief motivational intervention (BMI) was superior to the SBC among individuals who were not ready to change, whereas there was no evidence to support the superiority of SBC among those who were ready to change. In contrast, Maisto *et al*. (2001) found that brief advice was more effective for patients who were low in readiness to change than for those who were high in readiness to change. Surprisingly, readiness to change alcohol consumption was related to outcomes with neither standard care (SC) nor motivational enhancement therapy. However, these two studies differed in many ways, including the instruments used to measure readiness to change, the characteristics of participants (heavy vs dependent drinkers), and the length of the follow-up period (6 months vs 12 months). These differences make it difficult to draw firm conclusions about whether MI enhances readiness to change alcohol consumption. However, as Dunn *et al*. (2001) argued, it seems that post-treatment readiness to change predicts changes in alcohol consumption more strongly than the particular type of intervention that was delivered. Future research is needed to investigate the influence of readiness to change on the efficacy of MI and how this mediates changes in behaviour.

Age and MI

Of the 15 studies, 13 reported the ages of the participants, with a mean age of 31.77 years (SD = 10.26). It has been suggested that age influences the efficacy of MI. However, only one study (from the 15) addressed this issue. Shakeshaft *et al*. (2002) examined the effectiveness of BMI and CBT for alcohol abuse. They found that both BMI and CBT significantly reduced alcohol consumption. In addition, examining participants' age as a predictor of treatment outcome, they found that clients who consumed high levels of alcohol and who were older at baseline were significantly more likely to reduce the number of binge episodes during the post-treatment period. However, a number of other studies included in the present meta-analytic review involved college students with a mean age of 18 years who had favourable

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outcomes after receiving MI. In conclusion, age appears to be an important predictor of treatment outcome. It would be expected that older participants are more active in treatment and more likely not to withdraw than younger ones. However, due to lack of studies examining this issue, a final conclusion cannot be drawn at this time. Future research should examine age as a mediator of treatment outcome.

Gender and MI

Twelve studies (of the 15) reported the gender of the participants; a total of 1265 males and 565 females participated. As this disproportion suggests, alcohol problems are more prevalent among men than women. However, only one study (of the 15) examined how gender interacts with treatment outcome (Marlatt *et al*., 1998). Men reported higher quantity and frequency of drinking than women, but there was no interaction between gender and treatment outcome. Thus, brief MI was equally effective for both genders. However, as Moyer *et al*. (2002) argued, although no interaction between gender and treatment outcome has been reported, it is possible that men and women benefit from different types of brief interventions, such as confrontational vs non-confrontational. Future studies need to test specific hypotheses related to this issue.

Duration of MI and training

When brief MI was compared with extended treatments (CBT, SBC, or directive-confrontational counselling), its average duration was shorter (53 min vs 90 min), making MI more cost-effective than more extensive treatments. For instance, in one study in which both MI and CBT were effective in reducing alcohol use, MI lasted 60 min, but CBT lasted four and one-half hours. In addition, MI was found to be more effective than other brief interventions, such as brief advice and SC. It could be argued that an increase in the duration of MI might lead to more positive outcomes in the long-term. Future research needs to test hypotheses related to this issue.

Components of MI

MI involves five key techniques; it expresses empathy, develops discrepancy between the client's real and ideal behaviour, rolls with resistance, avoids argumentation, and supports self-efficacy (Miller and Rollnick, 1991). Three studies examined whether the major components of MI were, in fact, applied as intended. For instance, in Smith *et al*.'s (2003) study, a clinical psychologist and a health psychologist who were experienced in using MI rated six tape-recorded sessions for therapists' adherence to the protocol. Both raters identified the following as the three most frequently used strategies: eliciting motivational elements, giving advice, and emphasizing responsibility for change. Promoting self-efficacy was the only component that was not used. In Bien *et al*.'s (1993a, b) study, each interview was recorded and coded by two trained undergraduate research assistants on a specially designed Therapist Behaviour Frequency Form. Results indicated that more than 95% of the therapist's behaviour in the motivational treatment group was consistent with MI principles. Finally, in Miller *et al*.'s (1993) study, all sessions were audio-taped and coded via a structured behaviour checklist. Results revealed that therapists in the MI group used less confrontation and more listening, questioning, restructuring, and understanding than those in the directive-intervention group. However, they observed that in the MI group the effects of the treatment-process events were not evident until the 12 month follow-up, suggesting that different elements of MI influence short-term gains and long-term maintenance of change.

Of the 15 studies, 4 measured clients' satisfaction with MI. In Shakeshaft *et al*.'s (2002) study, the participants strongly agreed that MI helped them to achieve and maintain their treatment goal. However, there was no difference between MI and CBT in participants' level of satisfaction. It should be mentioned that clients' initial expectations from an intervention might influence treatment outcomes. In Murphy *et al*.'s (2001) study, the BASICS participants gave higher ratings on interest, personal relevance, and effectiveness in reducing college students' drinking than the control participants. In Marlatt *et al*.'s (1998) study, the participants indicated that they would recommend the interview to a friend. In addition, they characterized the interviewer as well-organized, competent, well-trained, warm, and understanding. Finally, in Borsari and Carey's (2000) study, the participants reported high levels of satisfaction with the intervention. The four studies that examined whether the five key principles of MI were applied found that expressing empathy, rolling with resistance, and avoiding argumentation were explored more than the other principles. However, developing discrepancy and supporting self-efficacy were not assessed in all four studies. It could be argued that the major components of MI and how they are applied have been understudied. Future research is needed to further explore this issue and to identify whether specific MI components influence short-term achievements vs long-term maintenance. Although it can be concluded that MI therapists are generally perceived as empathic and good listeners, future research is needed to investigate whether clients' initial expectations of the intervention influence their treatment outcomes.

Limitations of the review

This meta-analytic review has methodological limitations, which is an inevitable feature of any meta-analysis. One criticism of meta-analyses is that they treat all studies the same regardless of variations in methodology. For instance, the studies included in this meta-analysis used different instruments to assess alcohol consumption, and they included samples of excessive drinkers drawn from different populations. However, one strength is that all the studies reported adequate information about their assignment of participants to the intervention or the control group. Another important limitation of the analysis is related to generalization of the results. The findings can be generalized only to heavy- or low-dependent drinkers. In addition, the majority of the studies included graduate-student psychologists as the therapists rather than experienced clinicians working in real treatment settings. However, despite the study's methodological limitations, it provides evidence that MI is an effective strategy for reducing alcohol use.

CONCLUSION

In summary, the meta-analytic review revealed that MI is an effective intervention for reducing alcohol consumption. The

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review also showed that MI is more effective with young adults who are heavy- or low-dependent drinkers than with older drinkers or those with a more severe drinking problem. Specifically, low-dependent drinkers who voluntarily seek help seem to benefit the most from MI. Because MI has been established as an effective strategy for reducing alcohol use, future studies should focus on factors that influence its long-term efficacy and should test its cost effectiveness. These factors include participants' age, gender, employment status, marital status, mental health, initial expectations, and readiness to change, and whether or not they sought treatment. In addition, the major components of MI should be examined in greater detail, especially with regard to which of the components are more influential in sustaining long-term changes.

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