

MOTIVATIONAL INTERVIEWING IN CLINICAL SETTINGS

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## **Dedication**

For Rosemary and John, Izzy, Emily, George and Ed.

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## ABSTRACT

Motivational interviewing (MI) is a patient-centered counseling technique used for behavior change. MI has been evaluated in hundreds of clinical trials across a range of medical, educational and criminal justice contexts, mostly focusing on mental health and addictions. Despite promise as a technique in primary care, questions still remain around how MI might work, how best to measure clinician competence, and the extent to which this technique is transferable to different conditions, contexts and cultures.

This dissertation seeks to understand how MI can be used in clinical settings, through three separate studies. The first is a systematic review and meta-analysis of MI for the prevention and management of chronic disease. The second study presents a new tool to measure clinician competence in Motivational interviewing and validates this against the current gold standard. Finally, to attempt to understand the different contexts in which MI can be used, the third study is a qualitative analysis of multilingual Singaporean clinicians and their views on incorporating MI into their own clinical practice.

The meta-analysis shows that MI seems to be a useful tool in the prevention and management of chronic diseases. With a predominantly female sample, this technique indicates statistically significant effect sizes ranging between  $d=0.11$  for physical activity, and  $d=1.01$  for blood pressure. Subgroup analyses indicated stronger effects for US vs. international studies, in particular within US communities where there are high proportions of minority groups.

In the second study, the validation of the OnePass tool for measuring MI competence, interrater reliability was good to excellent (between  $0.44 < \kappa < 0.84$ ) for all compulsory items, and there was a strong correlation between overall scores on the MITI and on the OnePass, indicating validity. Of particular note was the relatively low length of time taken to train OnePass coders, and the high agreement for the OnePass construct that assesses empathy.

The final study of 37 Singaporean clinicians showed that Motivational Interviewing is appropriate in real world contexts where multiple languages may be spoken during the course of an average day. Despite minimal institutional support, the clinicians in the sample all described using some aspects of MI with their patients, and perceived benefits to both their own practice and the health outcomes of their patients.

Overall conclusions from this dissertation indicate that MI is an appropriate intervention for behavior change in a range of clinical contexts and settings. Future research should relate clinician competence to patient outcomes, and start to examine the nuances of culture, values and language on the use of MI.

## INTRODUCTION

Motivational interviewing is a patient-centered, directive way of being with patients, and has been found to be a useful tool in changing behavior. With origins in clinical psychology, over 200 clinical trials and an international network of trainers with over 1000 members, MI has steadily grown in terms of both evidence-base and popularity with practitioners. Questions still remain around how MI might work, and how best to train and measure practitioners' competence. To date, most of the research has been focused around psychological interventions, based in North America, Western Europe and Australia, and based on monolingual (mainly English-speaking) practitioners.

Medical and nursing schools are starting to incorporate MI and complementary techniques such as active listening and strengths-based approaches, necessitating more detailed information about conditions and behaviors where MI can be useful. There are calls for more information about how we can reliably measure clinical competence, and how, if at all, this technique might work with non-western populations and where multiple languages are used in the normal course of medical interactions.

This dissertation seeks to examine Motivational Interviewing in some of these clinical contexts. The first chapter is a meta-analysis of studies that discuss MI for the prevention and management of chronic diseases. Using a Cochrane-style approach, we identify and analyze studies that encompass a broad range of contexts and conditions.

Chapter 2 moves from the published trials to measuring MI competence in practitioners. This validation study examines the OnePass tool for clinical competence, demonstrating inter-rater reliability, and concurrent validity when compared to the current gold standard in clinician evaluation – the Motivational Interviewing Treatment Integrity (MITI) tool .

The final chapter adopts a qualitative approach to investigate what happens when clinicians are taught MI without being part of a clinical trial. This study looks at the international and multilingual context of Singapore. Singapore has unique characteristics since English is the language of training, MINT trainers may conduct trainings as described elsewhere in the world without the need for translators. However, despite strong western influences, there are cultural factors in Singapore that are distinctly non-western, namely a tendency towards Confucian values, and a government-encouraged trend for personal responsibility. Our sample of clinicians is uniquely placed to discuss MI In a non-western content, and particularly in how MI may be used with multilingual patient populations.

## **Motivational Interviewing for Chronic Disease Prevention: A systematic review and meta-analysis**

### **Introduction**

In 2008 chronic diseases accounted for 63% of all deaths globally[1] or an estimated 36 million deaths [2]. The impact is truly global with 29% occurring in low and middle-income countries[3]. In the United States, an estimated 50% of all deaths were caused by either heart disease, cancer or stroke[4]. In 2005, 133 million Americans were living with at least one chronic disease diagnosis[5], of whom approximately 25% experienced limitations in their daily activities[6].

Four lifestyle factors (physical activity, nutrition, tobacco and alcohol consumption) are largely responsible for chronic disease[3] either directly, or through increasing risk factors such as obesity, elevated blood pressure, and high cholesterol. While there may be underlying genetic factors that contribute to these conditions, it seems that lifestyle and environment [7] can exacerbate any underlying genetic predisposition.

The link between obesity and chronic disease is particularly strong[8-10], with obesity often preceding cardiovascular disease[11, 12], diabetes[13], and certain cancers[14, 15]. For those with an existing disease diagnosis, being overweight increases the severity of symptoms, especially for kidney disease[16-18], diabetes[19], arthritis[20] and chronic pain[9, 21-24].

In the past 30 years, global obesity rates have risen with an estimated 1.5 billion adults [25] and 22 million children under 5 [26] classified as overweight in 2008. In the US 78% of adults are currently overweight, with a projected rise to 82% by 2015[25]. However, it is in emerging economies where obesity rates are rising most

dramatically. In China, where changes in eating habits have accompanied rapid economic growth [27], obesity in children and adolescents has reached 13% of the teenage population in certain cities[28], with high projected costs to the economy[29]. Similarly, in South Africa, obesity rates are rising to epidemic levels[30, 31].

In addition to direct metabolic benefits related to diabetes[32], cancer[33] and cardiovascular disease[34], physical activity affects chronic disease by reducing adiposity. However, few adults achieve national guidelines for physical activity; in the US, 23% of all adults report no leisure time physical activity[35]. In the UK, 71% of adults do not meet the national guidelines on physical activity[36].

Similarly, there is evidence that changing specific dietary habits can alter risks of developing certain diseases. Low consumption of fruits and vegetables is attributed to 2.8% of deaths worldwide[37]. Fewer than 25% of adolescents and adults reporting eating the recommended 5 servings of fruit and vegetables per day[35]. Even a modest increase in fruit and vegetable consumption can lower the risk of certain colorectal and stomach cancers[38] and other chronic diseases[39], and increasing dietary fiber intake is thought to be protective against a range of chronic diseases and cancers[40].

Maintaining or reaching a healthy weight is an important factor in preventing and managing chronic disease. However, there is no fail-safe method to achieve weight control due to the variety of behaviors that may be involved. These behaviors include general food intake[41], eating outside the home[42], and specific dietary habits such as consumption of sweetened beverages[43], to increasing physical activity[44, 45] and decreasing sedentary activity[46, 47]. Furthermore, complexity lies in the political[48] and sociological structures and factors that precede the conditions [49-52], the social stigma experienced by some patients [53-55] and also the numerous potential medical sequelae[56, 57].

Evidence suggests that the multiple and chaotic influences on diet and physical activity[58] may be addressed with patient-centered counseling[59]. This approach is not always used by clinicians [60]. Furthermore, when counseling is done poorly, patients may become particularly frustrated and actively avoid seeing medical help in future. This is particularly apparent in obese patients, who report the perception that providers ‘blame’ them and their lifestyles for their health problems and treat them as ‘not quite human’[61-63].

Patient-centered approaches that incorporate an understanding of the complexity of making healthy choices[64] are a key part of managing chronic diseases[65]. Behavioral counseling techniques like motivational interviewing have shown promise in tobacco and alcohol reduction[66, 67], but to date, MI has often been neglected in clinical settings[68-71], in part due to lack of knowledge of recommendations[72], and clinicians’ familiarity and comfort using techniques perceived as being more psychotherapeutic in nature[73].

### **Description of the intervention**

Motivational interviewing (MI) is a person-centered counseling approach that aims to help individuals change behavior by working through their ambivalence and supporting self-efficacy[74]. It originated in addictions treatment and has since expanded into other health conditions include chronic diseases [75, 76]. Drawing from Rogerian principles[77], MI is based on collaboration, evocation and autonomy[78], and tries to effect behavior change by engaging with the patient/client in a non-judgmental and autonomy-supportive way. Through a collaborative relationship with the counselor, the client is encouraged to explore health behaviors and start to formulate self-determined goals for change.

Unlike many health education strategies, MI practitioners do not give unsolicited advice or information, and are discouraged from using direct persuasion[75]. They are encouraged to elicit and reflect clients' own motivations for change[79, 80].

There is a growing body of literature on the efficacy of motivational interviewing, suggesting that this technique can be effective across a range of clinical and lay practitioners, patient populations and clinical conditions. Prior meta-analyses have shown modest yet significant combined effect sizes between 0.3 and .77 for addictive behaviors such as smoking[66, 67, 81, 82], substance abuse[83, 84], to other health-related behaviors[85-87].

### **How the intervention might work**

Motivational interviewing emerged from clinical practice and observation rather than any a priori theory. However, there has been considerable theoretical and empirical attention given to how and why MI works, and a growing body of researchers looking at mechanisms of effectiveness.

Confronting clients/patients about undesirable behaviors elicits defensiveness and has the potential to break rapport[74], yet the provision of information about the risks of being overweight or continuing with particular dietary habits or exercise are standard in medical and dietetic practice[76]. Theorists have long considered that individuals are more likely to follow through with an intention or plan that they articulate themselves[88]; in MI, the early signposts of such intentions have been labeled 'change talk'[80, 89], and include language indicating a desire ('I want to..'), ability ('I could...'), willingness ('I will..') or reason for changing ('I have to... because') (see table 1, p7). Recent studies suggest that an increase in frequency and intensity of change talk can lead to a greater likelihood of change actually taking place[79].

Table 1: Examples of Change Talk

Client language example	Type of Change Talk
Ideally, <b>I want to be</b> about 30lb lighter than I am now, like I was before I had my first child.	Client indicates <b>desire</b> to change ‘I want’
I’ve just changed my job, so I’ve been getting used to a new routine. I’m pretty sure <b>I could</b> find some time to exercise as soon as I’ve settled in.	Client indicates that there are conditions under which change would be possible they have the <b>ability</b> to change ‘I could’.
Why do I want to lose weight? Well, <b>I don’t want to</b> keep buying bigger clothes every few months. I’d rather spend the money on a treat like a massage or a holiday.	Here, the client is telling the practitioner a strong <b>reason</b> and a further motivation to change behaviour
<b>I need</b> to get control of my blood sugar otherwise I might not be able to apply for my driving license when I turn 16	Client is expressing an externally imposed <b>need</b> to change their behavior.

Practitioner skill in MI lies partly in the ability to elicit change talk, through several distinct strategies. Importance and confidence rulers are used, where clients use a 0-10 scale to rate the extent to which they consider the behavior important, and how confident they are in their ability to make the desired change[90]. In addition to these 0-10 scales (often known as the ‘rulers’ within the MI community), reflective listening and carefully-chosen open-ended questions address the client’s self-efficacy[91], and prompt consideration of the barriers and benefits of making a change, by encouraging the articulation of their own solutions for moving forward[92]. Another central strategy is exploring the person’s core values, and then eliciting how their health behavior(s) align with or contradict these values.

Another way to explain how MI works is through Self Determination Theory (SDT). Many components of SDT[93] are directly addressed by MI[94], [95]. For example, both emphasize client autonomy[96] and collaboration between practitioner and client., and both seek to explore underlying values and motivations for changing a particular behavior.



## **Why it is important to do this review**

Existing systematic reviews and meta-analyses have addressed the impact of MI on obesity [85, 97]. Some broader reviews included nutrition and physical activity behaviors[81], and some chronic disease outcomes. To date, no review has exclusively focused on chronic disease and the associated risk factors. Furthermore, several new trials have concluded between 2010-2012, bringing important new evidence to the research base.

This meta-analysis addresses the extent to which motivational interviewing is effective in changing chronic disease risk factors and nutrition and physical activity behaviors at both primary and secondary prevention levels.

The strength of this review is that it has employed a comprehensive search strategy crossing languages and disciplines. This review also provides an assessment of the level of MI training that the counselors performing the MI received, and has considered other moderating factors such as location of study, strength of control and underlying patient population factors.

## **Objective**

To assess the effectiveness of motivational interviewing for improving chronic disease risk factors and related nutrition and physical activity behaviors

## Methods

### Study Selection

Using Cochrane Collaboration guidelines[98], we searched several electronic databases: Medline, PubMed, CINAHL (Cumulative Index to Nursing and Allied Health) Embase, PsychInfo, CENTRAL (Cochrane Central Registry of Controlled Trials), and Google Scholar from January 2000 – April 2012 (Search dates, July 2011, Dec 31<sup>st</sup> 2011 and April 8<sup>th</sup>, 2012). Databases were searched using four themes; diet related terms (nutrition, diet, obesity, overweight, diabetes mellitus, hypertension, body mass index), physical activity terms (physical activity, exercise, accelerometer, pedometer), counseling terms (motivational interviewing, motivation, counseling) and setting terms (primary care, nursing, community, doctor). These themes were then combined using the Boolean operators ‘and’ and ‘or’.

Hand searches of the bibliographies of studies and existing meta-analyses were performed to supplement the electronic search. In addition, the bibliography at [www.motivationalinterview.org](http://www.motivationalinterview.org), and the clinical trials register in the US [www.clintrials.gov](http://www.clintrials.gov) were searched, as was the member-only listserv of the Motivational Interviewing Network of Trainers (MINT). Other studies were identified through communication with MI researchers and practitioners who work in the field of diet and physical activity.

## **Criteria for considering studies for this review**

Prior to searching, KR and FM determined that studies would be included in the review if either patients or practitioners were randomly allocated to a condition that included some kind of motivational interviewing. Only studies from 2000 onwards were included, with no limitations on length of study, or language of report. All studies focused on nutrition and/or physical activity, and measured a range of physical, self-reported and psychosocial outcomes, including changes in biologic outcomes (such as HbA1c in diabetic patients, or blood pressure in hypertensive patients). Studies were excluded if no control group was used.

Study screening happened in several stages. Two reviewers (KR and FM) scanned the titles and abstracts for each reference, ensuring that inclusion criteria were met. Where no clear determination could be made, the full text was reviewed.

Data extraction was performed according to Cochrane guidelines[98]. FM and JW reviewed each paper for data extraction and assessment of risk of bias, FM and KB reviewed for MI fidelity.

## **Types of participants**

Studies were included if their participants population was healthy, or with a chronic disease diagnosis or risk factor. Studies were excluded if their primary focus was mental health, substance abuse (including smoking), or medication adherence.

## **Types of interventions**

Studies were included if they were labeled as motivational interviewing either as the sole intervention or as the primary component of an intervention arm. Where a study had inadequate description of MI training, the study authors were approached for further information. One study was excluded because the author self-described the intervention as not being based on MI, despite the use of MI related strategies [99]. There were several ways in which the MI was incorporated into the interventions across studies: 1) MI sessions in person or by telephone without any additional; 2) MI sessions with additional materials (such as parent intervention materials or a video/DVD material; or 3) as part of a multi-component intervention involving both group health education and individual MI.

We included only interventions that had an adequate description of MI training based on review by FM and KB, either in the published report or after contacting study authors. We designed an additional coding procedure to assess the depth and breadth of the MI training drawing from best practices in the MI training literature[100-102]. The key features of training duration[103], use of coding scales for fidelity[104-107], post-training supervision or coaching[108, 109], and the use of simulated patient or role play [110, 111] were scored independently by KB and FM and later used as a moderator for intervention effect.

## **Control**

The control groups were categorized as either strong or weak; strong controls matched the dose of the intervention either by focusing on an alternative target behavior such as smoking cessation[112], or had an 'attention control' such as non-MI counseling sessions around nutrition and/or physical activity addressing the same target behavior. In behavioral research, the impact of having patient contact on patient outcomes must be considered, thus to truly determine if the effect is due to MI or due to patient contact, a good comparator would include the same number of

patient contacts as the MI intervention. Controls classified as ‘weak’ had either no intervention (usual care) or generic patient education materials.

### **Selection of outcome measures**

All reported outcome measures were extracted for each study. Primary outcomes were all continuous (weight, waist circumference, number of portions of fruit and vegetables, and minutes of physical activity).

The computation of effect sizes used two approaches; for waist circumference, blood pressure and HbA1c, mean differences were used as all studies employed the same outcome metric. For other outcomes, the variety of scales used across studies necessitated the use of standardized mean differences. The use of standardized mean difference allows different measures of the same outcome to be summarized by dividing the difference in mean outcome between groups by the standard deviation of the outcome among participants[98] thus creating an index that is comparable across studies[113].

### **Methodological Quality**

#### **Assessment of risk of bias in included studies**

Risk of bias assessment for RCTs was performed using Cochrane recommendations[98] including consideration of sequence generation, allocation concealment, blinding, outcome data, selective outcome reporting and other issues. Here, FM and JW provided independent assessment of potential sources of bias based on description of study procedures and protocols, and called upon KR where there was any disagreement.

Published scales for methodological quality (such as the Jadad scale) were not used to assess bias due to evidence that scales may be unreliable in the assessment of validity and transparency of the review [114-116]. In line with Cochrane

recommendations[98], the widely-used Jadad scale for scoring quality of meta-analyses was not used as we wanted to seek additional non-published information[117]. The Jadad method relies solely on information in the public domain through report and published data, while other approaches allow for authors to be contacted for clarification and further information.

Criteria for other sources of bias included differences between groups at baseline, collateral and biological measurement to corroborate self-reports of outcome measures, differences in providers' time spent in training between conditions, and potential contamination of conditions.

### **Measures of treatment effect**

Treatment and attention control groups were compared for outcomes at post-test and other follow-up times where available. Post-test data was classified as being collected immediately at the end of the intervention. Short term follow-up was up to 6 months, medium follow-up was 6-11 months, and long term follow up was 1 + years. For the continuous data, standardized mean differences and 95% confidence intervals were used[118]. Where we encountered missing or ambiguous information relating to primary outcomes or study protocols, we contacted the corresponding author by email and phone (up to four times). Where authors were unavailable, effect sizes were imputed from available measures such as using the 95% confidence intervals for within-group means (to calculate standard deviations)[98], using the standard error, or chi-squared statistics[119].

Cohen's criteria for magnitude were used[120]; effect sizes were considered to be small where  $d=0.20$ , medium where  $d=0.50$  and large at  $0.80$ .

## Assessment of heterogeneity

Considering heterogeneity of studies is particularly important in a meta-analysis. It could be clinically irresponsible to aggregate means of studies, particularly if there are large differences in effect sizes. For this meta-analysis, we assessed heterogeneity by computing actual variation between studies, estimating the extent to which observed effects would vary if the 'true' effect was the same in all studies, and determining heterogeneity by observing the excess variation between the observation and the estimate.

We used both Q and  $I^2$  tests [98, 121] in an attempt to identify the true variation of studies and thus consider several differing perspectives on the heterogeneity. The Q statistic measures weighted squared deviations whereas the  $I^2$  statistic measures the ratio of true heterogeneity to total observed variation.

Significant Q demonstrates that heterogeneity is unlikely to be attributable to sampling error[122], whereas  $I^2$  measures the variation in treatment due to heterogeneity[121].  $I^2$  has been described as measuring inconsistency across findings of studies rather than real variation across true effects[113], but is helpful as it is not affected by the number of studies in the analysis, and can be interpreted as a ratio.

Studies where  $I^2$  was over 75% were considered as having high heterogeneity for statistical purposes[123], necessitating the use of random-effects models that calculate the weighting of each study to allow for the variation in the intervention, study participants or study design. With continuous variables, the differences between fixed and random effects are less marked than with dichotomous variables, so the random effects model provides a more conservative estimate [118].

## **Assessment of reporting biases**

One major concern surrounding any meta-analysis is over the ‘file drawer effect’ whereby publication bias may mean that there are ‘missing’ studies. To assess the likelihood of missing publications due to the bias of reporting trials that demonstrate better outcomes, we used funnel plots to display the relationship between the study size and effect size[124]. Following Bornstein, we used standard error rather than sample size or variance in order to facilitate our assessment of asymmetry on the funnel plot, as this helps show the variance of the smaller-scale studies which have higher levels of variance[113]. In addition, we searched our databases and clinical trials registries to investigate whether there were funded studies that would be expected to have outcomes published by now.

## **Subgroup Analyses**

To investigate heterogeneity in the sample (as indicated by the scores from  $I^2$  and  $Q$  tests), effect sizes for each moderator were calculated using random effects models as we considered that studies within each subgroup do not share a common effect size. Between-group differences were considered as significant when the 95% confidence intervals did not overlap. Moderator analyses were divided into patient factors and study factors (table 2, p 17).

The moderators around patient factors include:

1. Age of study participant; adult, adolescent or child-parent dyad
2. Geographical location of the study, by country and region of world.



3. Ethnoracial composition of the study population; oversampling of minority groups (minority participants over 30% of the study population)
4. Obesity as a pre-existing condition for recruitment.

For the study characteristics, our moderators are:

5. Level of MI training, categorized into high-level training or low/moderate training. To be counted as a high level group, we determined that study counselors received at least 16 hours of instruction, follow up after initial training, and individual supervision or coaching around MI skills. For the low/moderate group, participants received, no more than two of the aforementioned training strategies.
6. Strength of control group, grouped as strong (attention control – i.e. the same number of contacts with patients as in the intervention groups - with either an intervention not using MI but addressing the same behavior, or using MI to address a different behavior) or weak (standard care or health education materials)
7. Attrition: high if more than 21% of baseline participants did not finish the study and low if 80% or more finished the study.
8. Level of prevention: primary prevention for studies aiming to prevent onset of disease or address risk factors, and secondary/tertiary for studies where participants were either living with a disease or were survivors of a disease.
9. Clinician types were monitored and split into three categories; physicians, nurses, or other health counselors (including psychologists, health educators and coaches, physical therapists).
10. Type of visit: at least two face to face visits, or 0-1 face to face visits across the course of the study (incorporating studies that were either entirely telephone-based, or with a mixed mode approach)

11. Number of available MI visits: 1-4 available sessions, or five or more sessions. Sessions could be delivered by phone or in person. In this category, the number of completed visits was not always reported.

*Table 2: Moderator Type and Definition*

<b>Category</b>	<b>Moderator</b>	<b>Description/Definitions of groups</b>
Participant	Age	1. Adult 2. Adolescent (13-18) or 3. Child/parent dyad.
Participant	Location	1. US sample 2. non-US sample
Participant	Race	For US samples only, as this is reported differently and inconsistently in international studies. 1. High Minority (over 30%) or 2. Low Minority (under 15%)
Participant	Overweight	1. Overweight as recruitment criteria 2. Weight not part of recruitment strategy
Study	Level of training in MI	1. Strong (MI training over 16 hours, post-training supervision and some fidelity coding), 2. Moderate (description of MI training, but not fulfilling all three criteria in 'strong' category).
Study	Control Strength	1. Strong (alternative intervention mirroring dose and personal contact of intervention) 2. Weak (standard care or health education handouts)
Study	Attrition	1. Attrition <20% 2. Attrition >21%
Study	Prevention Level	1. Primary prevention in healthy or 'at risk' population 2. Secondary/Tertiary prevention; study participants have an existing diagnosis of a chronic disease or a former diagnosis (cancer or stroke).
Study	Study Size	1. More than 100 participants

		2. Fewer than 100 participants
Study	Clinician Type	1. MD 2. RN/NP 3. Other Counselor
Study	Face to Face MI encounters	1. More than one 'In person' visits 2. 0-1 In person visits
Study	Maximum number of MI visits offered	1. Over four MI encounters 2. Four or fewer MI encounters

### Sensitivity analysis

As with any study, we were keen to assess how, if at all, our assumptions during the analysis affected the results of the meta-analysis. Throughout the study, we tested our inclusion criteria and used different statistical models (such as fixed vs random effects models) to assess the impact of our decision-making on the results. We also sought to address the impact of potential missing data and unexplained heterogeneity by FM and JW assessing allocation sequence, concealment of allocation, blinding of patients and providers, blinding of assessors, incomplete outcome data, selective reporting, and any other observed biases[98].

## Results

### Study Coding

Electronic searches yielded an initial 1132 records. After excluding 1104 duplicates or non-MI studies based on title and summary, the abstracts of 188 reports were reviewed. Of these, 44 progressed to a full text review, and 35 were included in the final analysis. Of the abstracts reviewed, primary reasons for exclusion were study design or protocol weaknesses including lack of control/comparison group[125-133], no pre-post outcomes[134] or description of MI intervention,[135], no chronic disease

outcome[136], or if participants had mental health ICD-10 diagnosis. A further group of studies were excluded where MI was introduced after a non-MI intervention[137]. Qualitative studies were excluded from meta-analysis, as were studies that only reported satisfaction or knowledge change as outcomes[138].

For the 35 included studies, FM and JW coded 28 variables for each study focusing on the methodological quality and participant characteristics with inter-rater reliability of 96%. FM and KB coded a further 13 variables relating to the quality of training of interventionists and delivery, with inter-rater reliability of 93%. Disagreements occurred across most study variables, and were resolved by discussion by the team and on two occasions, by the involvement of an additional reviewer (KR).

### **Characteristics of Included Studies**

Full characteristics of included studies can be found in table 3, p21.

Table 3: Characteristics of included studies

<b>Study</b>	<b>Sample (#)</b>	<b>Max Loss to follow-up</b>	<b>Outcome</b>	<b>MI Condition</b>	<b>Comparison Group/ Attention Control</b>	<b>MI Counselor</b>	<b>Max # MI Sessions</b>
Ahluwalia 2007[98]	173 African American Smokers	24.30%	Fruit intake	MI+TMI+F&V+HEM	Smoking Cessation Intervention	Masters	5
Befort 2008[139]	43 Obese African-American women	22.70%	Diet and Physical Activity	MI + TMI	HEM - Non weight	Health Educator	4
Bennet 2007[140]	56 physically inactive cancer survivors	14.20%	Physical Activity	MI + TMI+FB (Pedometer	Calls to make appointments at same time points by same counselors	MA health educator	5
Carels 2007[141]	55 Obese Sedentary Adults	16.40%	Weight, CV Fitness	BWLP +SC +MI	BWLP+ matched attention control	Clin psych doctoral student	15
Campbell 2009[142]	113 Colorectal cancer survivors and healthy individuals	10.90%	Diet	TMI	Generic health education mailings	research team	4
Channon 2003[143]	22 adolescent patients with diabetes	14%	HbA1c	MI	Standard Care	nurses	9
Channon 2007[144]	66 adolescent patients with T1D diabetes	9.09%	HbA1c	MI	Non-directive social support information and education	health psychologist / nurse	4
Craigie 2011[145]	52 overweight postpartum women in deprived Scottish community	31%	Weight	MI +TMI + HEM	Standard HEM	lifestyle counselor	6
DiMarco 2009[146]	39 overweight patients	33%	Control over eating	Guided Self Help + MI	Guided self help plus traditional education sessions	Grad students in clinical psychology	2
Djuric 2011[147]	40 women undergoing breast cancer treatment	25%	Diet and Physical Activity	MI + FB (Ped)	Written Materials	Registered Dietitian	21
Elliot 2007[148]	599 firefighters	18%	Diet and Physical Activity	MI	Team curriculum intervention or standard care	counselors	9
Gillham 2010[149]	52 minor stroke survivors	3.85%	Diet and Physical Activity	MI +TMI + HEM	Standard care	Health educator	3
Greaves 2008[150]	141 overweight adults without diabetes or heart disease	15.30%	Weight and Physical Activity	TMI and MI	HEM	lay counselors (nursing background)	11

Hardcastle 2008[151]	334 overweight and obese patients at risk of CHD	35%	Weight, Diet, BP, Phys Act	MI + HEM	Standard care	RD + PA specialist	5
Hawkins 2010[152]	66 older adults with uncontrolled diabetes	13.20%	HbA1c	VMI	V-Healthy lifestyle counseling	Nurse practitioner	15
Ismail 2010[153]	1659 diabetic patients with uncontrolled T1D	3.50%	HbA1c	MET+CBT	MET+CBT	Diabetes Nurses	12
Koelewijn-van Loon 2010[154]	615 patients at risk for CVD	10.90%	Diet, Weight, Phys Activity	MI+HEM	Standard care	practice nurses	3
Lange 2010[155]	791 Chilean patients with T2D	45.40%	HbA1c	TMI	Standard care	nurses	13
MacDonell 2011[156]	44 overweight African American adolescents	29.50%	Eating and Physical Activity	MI	Matched dose with Dietetic Counseling	Registered Dietitian	4
Ogedegbe 2008[157]	190 hypertensive African Americans	30.00%	Blood Pressure	MI	Standard care	Counselors	4
Olson 2008[158]	282 overweight adolescents	32.04%	Diet, Weight, Phys Activity	MI	Standard care	GP/primary care	1
Penn 2009 [159]	102 overweight adults	25.90%	Diabetes onset, diet and physical activity	MI	Written materials	Dietitian and Physiotherapist	25
Resnicow 2001[160]	1011 mainly African-American Churchgoers	17.45%	Fruit and Vegetable intake	MI/TMI	culturally sensitive written materials	Registered Dietitians /Dietetic Interns	4
Resnicow 2004[161]	854 Adults recruited from African American Churches	16%	Fruit and Vegetable intake	TMI+HEM	HEM	lay	2
Resnicow 2005[162]	1056 Adult Churchgoers	14%	Fruit and Vegetable intake	TMI+ Cultural HEM	HEM and health fair	Graduate level psychologists	4
Rosenbek Minet 2011[163]	349 patients with diabetes	14.60%	HbA1c	MI	Standard Care	GP	5
Rubak 2011[164]	628 patients with diabetes	22.20%	HbA1c	MI	Longer encounters than standard	GP	3
Schwartz 2007[165]	19 parents of overweight children	33%	BMI percentile, Diet	MI (MD+RD)	Standard care	MD/RD	3
Taveras 2010 (First Steps)[166]	84 mother-child dyads (child under 1 month old at baseline)	5%	Diet, Physical Activity	MI+TMI+Pa renting workshops	Standard care	MD/health educator	9

Taveras 2011 (High Five) [167]	475 children aged 2-6 years old at risk of obesity	6%	Diet, Screen time, Active Play	MI + education	Tailored written intervention	nurse practitioners	6
van Keulen 2011[168]	1629 patients	27%	Physical Activity and Fruit and Vegetable Intake	MI	TPC	Psychology students	4
Welch 2011[169]	234 patients with poorly controlled diabetes	43.10%	HbA1c	MI+DSME	DSME	diabetes educators	4
West 2007[170]	217 overweight women with type 2 Diabetes	10%	HbA1c	MI	Attention control	Clinical psychologists	5
West 2011[171]	388 overweight women	14.50%	weight	Behavioral Lifestyle Weight loss program _MI	Education control	Dietitians, nurses and psychologists	24
Whittemore 2009[172]	58 adults at risk of diabetes	12%	Diet and Physical Activity	MI	Enhanced Standard Care	nurse practitioner	6

MI=Motivational Interviewing, TMI= Telephone MI, VMI = Video MI, DSME=Disease self management education, HEM=Health Education Materials, BWLP = Behavioral weight loss program, CBT=Cognitive Behavioral Therapy, FB=feedback

### MI Intervention characteristics

Across the included studies, MI was delivered in various ways. MI was the sole intervention in almost half of the studies (49%). For the remainder of the studies 20% combined MI with health education materials or literature. Three studies included a workshop for participants, two included involved giving participants feedback (through a pedometer), and two involved a guided self-help program. Only one study incorporated another type of counseling (CBT).

MI was delivered in a variety of clinical and community settings, with most focusing around primary care settings, at least for the recruitment of the sample. Study interventionists ranged in their clinical background and training, with 25% of studies

using more than one type of clinician (physician, nurse, physical therapist, Registered Dietitian(RD), psychologist. Of the 35 studies, 20% used nurses and nurse practitioners, 17% were psychologists and trainee psychologists, and 14% were health educators/lifestyle counselors. The remainder of the studies used physicians, Registered Dietitians (RDs), or graduate-level research associates.

MI was conducted with individuals (not groups) in all studies, although three studies included a group workshop as an secondary intervention. The majority of studies (60%) delivered the intervention face-to-face;14% delivered the intervention by phone, and 23% used a combination of modes of delivery. One study used video for MI delivery[173]. Duration of MI encounters varied from 15 minutes to an open-ended, client-directed length, and the maximum number of visits offered in the study design varied from a single visit to a maximum of 25 opportunities for MI (also on a patient-directed basis). It was impossible to calculate the mean time spent in any MI intervention, as few studies reported of the mean and standard deviation of either length or number of visit(s).

All included studies described the training process for interventionists, but assessing the quality of the MI within each study was difficult, given the variation in the level of detail of each study protocol in relation to MI. Ten studies (29%) described the trainer as being a member of the Motivational Interviewing Network of Trainers (MINT). Ninety-seven percent of studies described training lasting longer than 5 hours, with 31% involving more than 12 hours training. Forty-nine percent of studies reported using a coding measure to test practitioner competence, and 40% also reported follow-up supervision or coaching. Forty percent of studies also covered all three features of 'good' training practice; 16 hours of training, post-training coding for fidelity and follow-up coaching and/or supervision.



## **Participant Characteristics**

A total of 12,537 individuals were represented by the included studies (descriptions in table 3). With the exception of four studies, study participation was predominantly or totally female. Mean participant age ranged from 5-68.8 years (mean = 48.3, standard deviation= 16.12). Fourteen studies (40%) were conducted outside the US, in the UK (7 studies), the Netherlands (2 studies), Denmark (2 studies), New Zealand and Chile. For the US studies, 11 included over 30% minority participants. 12 studies recruited only overweight or obese patients, 10 studies had patients with an existing diagnosis of either diabetes, hypertension or cancer, and a further three studies drew from groups of cancer or stroke survivors. Remaining studies sampled healthy patients.

## **Study Design Characteristics**

Studies generally tested either MI (in person or by telephone, or by both) with additional health education materials (such as video or printed materials) rather than additional psychotherapies; only one study examined MI and CBT together. Comparison groups varied, with 37% receiving attention control through either matched non-MI counseling sessions with their practitioner, a telephone call from a health coach at the same time points as intervention individuals or an alternative behavioral focus using MI. 31% study controls received standard care, and 31% received enhanced health education materials. Of the health education group, there was some variety with two studies reporting an element of individual tailoring in the control group intervention.

## **Methodological Quality**

Of the included studies, 31 were assessed to have a low risk of selection bias. Four studies were unclear in their description of methods of randomization.

With intensive training for the clinicians in motivational interviewing interventions, and the widespread knowledge of the intervention in clinical communities, it is almost impossible to blind the intervention providers, thus in each study the practitioner was not blinded to their study allocation. The extent to which study subjects were blind to their study group was not reported in any study.

All studies reported attrition (which varied from 3%- 45%). Where attrition was over 10%, all studies analyzed the demographic characteristics of the participants who were lost to follow-up. No significant differences between those in the cohort and those that dropped out groups were reported, indicating a low risk of attrition bias.

## **Effects of interventions**

Effect size estimates ranged from  $d=-1.53$  for waist circumference to  $d= 0.11$  for physical activity. With the exception of waist circumference, all effects were statistically significant ( $p<0.01$ ) in favor of MI interventions. Waist circumference had a large raw effect size but this was not significant, perhaps due to the limited sample size (and variance?). According to Cohen's classification of effect size magnitude[120], weight change, BMI change physical activity, and fruit/vegetable intake showed a small effect, and blood pressure had a large effect. Figure 1 shows a forest plot for fruit and vegetable intake.

Q tests for heterogeneity were significant in seven of the outcomes, and  $I^2$  values of over 70% for these studies indicating firstly that random-effects models are more appropriate than fixed effect models, and that further exploration of heterogeneity is required.

Table 4: Combined Effect Sizes and Heterogeneity Results

Outcome	Effect size	95% confidence interval	Z	$I^2$	No of studies
Weight Change	0.29	[-0.20, 0.38]	6.34**	95%	11
Waist Circumference	1.53	[0.06, 3.11]	1.88	0%	5
BMI Change	0.33	[-0.17, 0.50]	3.91**	0%	10
Physical Activity	0.11	[0.04, 0.18]	3.08**	86%	16
Fruit and Vegetable intake	0.24	[0.12, 0.25]	4.10**	70%	17
HbA1c Change	0.38	[-0.04, 0.72]	2.16*	87%	7
Blood Pressure	1.01	[-0.78, -1.24]	8.52**	100%	4

Statistically Significant at: \* $p < 0.01$ , \*\* $p < 0.001$

Table 5: Combined effect sizes and 95% confidence intervals for fruit and vegetable intake

Study	Experimental			Control			Weight	SMD	95% CI
	Mean	SD	Total	Mean	SD	Total			
Ahluwalia 2007	3.18	7	107	-0.75	5.08	66	5.6	0.62	[0.30, 0.93]
Befort 2008	1.2	2.8	14	2	3.2	19	2.1	-0.26	[-0.95, 0.44]
Campbell 2009a	0.7	1.3	70	0.5	1.23	64	5.2	0.16	[-0.18, 0.50]
Campbell 2009b	0.7	1.22	109	0.2	1.27	120	6.4	0.40	[0.14, 0.66]
Djuric 2011	3.1	3.25	13	-0.7	2.06	17	1.6	1.4	[-.59, 2.22]
Elliot 2007	0.7	3.85	165	-0.1	3.41	129	6.9	0.22	[-0.01, 0.45]
Gilliham 2010	7.6	6.63	25	2	6.85	25	2.8	0.82	[0.24, 1.40]
Hardcastle 2008	1.05	4.27	203	0.73	5.04	131	7.1	0.07	[-0.15, 0.29]
Koelewijn 2010	2.1	8.46	264	1.7	8.06	258	7.9	0.05	[-0.12, 0.22]
MacDonnell 2012	0.17	0.69	22	-0.35	0.82	22	2.6	0.67	[0.06, 1.28]
Olson 2008	0.165	1.22	148	-0.09	1.4	136	6.8	0.20	[-0.04, 0.43]
Resnicow 2001	5.4	2.2	248	4.2	2.1	231	7.7	0.56	[0.37, 0.74]
Resnicow 2004	6.6	8.95	526	5.2	8.15	328	8.4	0.16	[0.02, 0.30]
Resnicow 2005	1.07	3.31	304	0.28	3.10	267	8.0	0.25	[0.08, 0.41]
Schwartz 2007	0.2	1.8	12	1.12	1.54	19	1.9	-0.55	[-1.28, 0.19]
Taveras 2010	3.7	1.2	58	4.2	1.4	22	3.4	-0.39	[-0.89, 0.10]
Taveras 2011	0.22	1.43	253	0.16	1.52	192	7.6	0.04	[-0.15, 0.23]
Van Keulen 2011	11	53.9	302	-3	50.92	327	8.1	0.27	[0.11, 0.42]
<b>Total (95% CI)</b>			<b>2843</b>			<b>2373</b>	<b>100</b>	<b>0.24</b>	<b>[0.12, 0.35]</b>

Heterogeneity:  $\tau^2=0.04$ ;  $\chi^2=57.62$ ,  $df = 17$  ( $P<0.00001$ );  $I^2=70\%$   
 Tests for overall effect:  $Z=4.10$  ( $P<0.00001$ )

Figure 1: Forest plot for fruit/vegetable intake

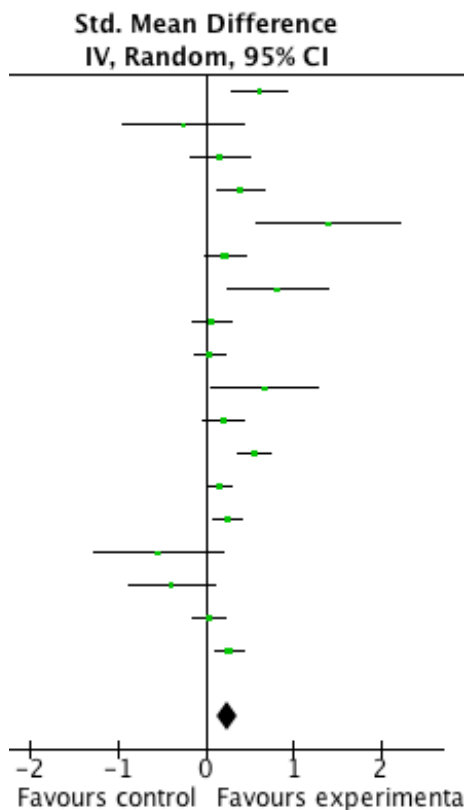
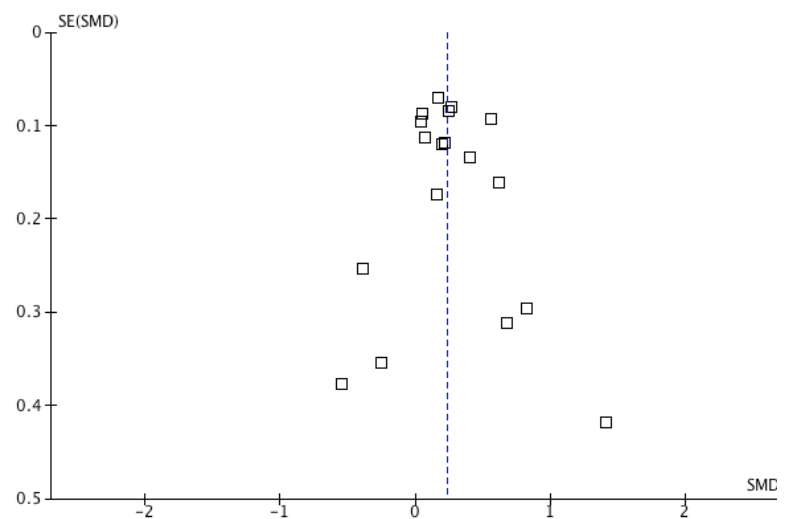


Figure 2: Funnel Plot for fruit/vegetable intake



## **Publication Bias**

The largely symmetrical funnel plots (see figure 2) demonstrates low risk of publication bias with a cone-like distribution of the standard error when plotted against the standardized mean difference. Where a funnel plot has gaps in data points, particularly in the bottom left corner (representing smaller studies with a typically higher variance), or where the ‘funnel’ is not symmetrical, there is a high likelihood of missing studies, possibly through publication bias[113]. Funnel plots were generated for other outcome variables, and revealed similar symmetry, indicating that there is a low level of publication bias in this meta-analysis. As with any meta-analysis, there is a possibility of some unreported studies. After searching the [www.clintrials.gov](http://www.clintrials.gov) website, and the NIH CRISP database for trials that were registered but that we could not find follow-up publications, we identified potentially three studies that do not have published data, including one for blood pressure.

## **Moderator Outcomes: Participant Characteristics**

Subgroup analyses were performed to determine any moderating effects of patient characteristics on overall effect sizes. These patient characteristics included age, gender, race, location of study, and obesity as an inclusion criterion. Three of these subgroups had at least one significant component, which are presented in table 6, below.

Both studies with adolescents and with adults demonstrated significant effect sizes, however there was no statistical significance of the effect size between groups according to the age of the participant.

Table 6: Participant Characteristics Subgroup Analysis

Analysis		$d_c$	95% Confidence Interval	No. of Studies
Age	Adolescent	0.29*	[0.09, 0.49]	4
	Parent+Child	-0.20	[-0.58, 0.23]	3
	Adult	0.52**	[0.25, 0.80]	27
Location***	US	0.74**	[0.40, 1.08]	20
	International	0.23*	[0.05, 0.41]	14
Race (US only)***	High Minority	1.15**	[0.53, 1.76]	11
	Low Minority	0.21*	[0.04, 0.37]	10

Statistically Significant at: \* $p < 0.01$ , \*\* $p < 0.001$ , \*\*\* significant difference between groups

The location of intervention affected significance levels, with US-based studies having a significantly larger effect ( $d_c=0.74$ ) than the international studies ( $d_c=0.23$ ). Within the 20 studies based in the US, the studies with high minority participation also showed a significantly larger effect size ( $d_c=1.15$ ) than the US-based low minority studies ( $d_c=0.21$ ).

### Study/Intervention Characteristics as Moderators

Subgroup analyses for the potentially moderating effects of study and intervention characteristics are presented in table 7. Study characteristics included control strength, attrition, level of prevention and study type, and intervention characteristics included level of MI training, clinician type, number of face to face MI sessions, and the total number of MI sessions offered.

Only two of the study characteristics showed significant differences that indicate a moderating effect. The strength of the control group (using attention control or a secondary intervention rather than standard care) was significantly associated with

effect size when using a t-test, with the larger effects of MI in the stronger control group ( $d_c=0.58$ ,  $p<0.001$ ) compared to ( $d_c=0.25$  n.s.) in the weak control group. Studies focusing on secondary or tertiary prevention showed a significant combined effect size ( $d_c=1.18$ ,  $p<0.001$ ) compared to primary prevention studies ( $d_c=0.19$ ,  $p<0.001$ ).

For the intervention characteristics, the only subgroup yielding significant differences was clinician type, with non-medical counselors (psychologists, RDs, health educators and researchers) showing a greater effect ( $d_c=0.75$ ,  $p<0.001$ ) than physicians ( $d_c=0.07$ , n.s.).

Table 7: Study/Intervention Characteristics as moderators

Analysis	$d_c$	95% Confidence Interval	No. of Studies
Level of MI training			
Strong	0.61**	[0.26, 0.95]	14
Moderate	0.42**	[0.16, 0.68]	19
Control Strength***			
Strong	0.58**	[0.22, 0.33]	24
Weak	0.25	[-0.02, 0.52]	10
Attrition			
Attrition <20%	0.32**	[0.13, 0.51]	21
Attrition >21%	0.82**	[0.32, 1.31]	13
Prevention Level***			
Primary	0.18**	[0.08, 0.28]	20
Secondary/Tertiary	1.18**	[0.56, 1.65]	14
Study Size			
More than 100 participants	0.60**	[0.34, 0.85]	20
Fewer than 100 participants	0.30*	[0.03, 0.56]	14
Clinician Type*** (MD/Counselor)			
MD	0.07	[-0.09, 0.23]	4
RN/NP	0.27	[-0.03, 0.57]	8
Other Counselor	0.75**	[0.41, 1.09]	19
Face to Face MI encounters			
2 or more In person visits	0.52**	[0.21, 0.82]	25
0-1 In person visit	0.38*	[0.23, 0.52]	9
Max number of MI visits			
5 or more available visits	-0.03	[-0.61, 0.55]	18
No more than 4 available visits	0.56**	[0.27, 0.86]	16

Statistically Significant at: \* $p < 0.01$ , \*\* $p < 0.001$ , \*\*\* difference between groups significant



## Discussion

This meta-analysis shows that motivational interviewing appears to be an effective strategy in the prevention and management of chronic diseases. With the exception of waist circumference, all primary outcome measures showed a statistically significant effect size ranging from  $d_c=0.11$  (for physical activity) to  $d_c=1.01$  (for blood pressure). Most effects were in the low to moderate range, consistent with previous meta-analyses of Motivational Interviewing for smoking cessation and drug and alcohol use [67, 81, 174, 175]. The four biological measures used across studies showed moderate effect sizes;  $d_c=0.29$  for weight change,  $d_c=0.33$  for change in BMI,  $d_c=0.38$  for HbA1c, and  $d_c=1.01$  for blood pressure. Our subgroup analyses indicated that MI performs well against a strong comparison group, and there could be additional potential for using MI with patients who have a current or former disease diagnosis. Stronger effects were observed for US vs. international studies, in particular within US communities where there are high proportions of minority groups.

The relatively low effect sizes found across all study outcomes may still have a significant public health impact when considered at a population health level, especially when considering relative cost of training clinicians in MI against the multiple costs of chronic disease, both to the patient and to society as a whole. By putting these behavioral factors of diet and physical activity on the agenda of the many clinicians who interact with patients following diagnosis, there is a huge potential to build on the modest effects seen in these studies. Where there is continuity of care, there is also potential for enhanced rapport and engagement between provider and patient, and the possibility of lasting health improvement.

Similar to other meta-analyses of MI and other health conditions, there is a high level of heterogeneity across the studies. Of all the subgroup analyses performed, only five showed significance; the geographical location of the study, the ethnoracial

composition of the participants, the background discipline of the interventionist, targeting secondary and tertiary disease prevention, and the strength of control of the study. The relative lack of explanation of heterogeneity from our moderator analysis, despite testing multiple possible variables, indicates that there may be other differences between studies that would be visible upon further close examination of studies within each of our moderator analyses, however, detailed examination of our findings may provide further evidence for where MI might best be utilized as a clinical intervention.

Previous research has consistently proposed that MI might be more effective with people with lower levels of motivation, particularly in smoking cessation studies[81]. The studies within this meta-analysis did not consistently measure levels of motivation for behavior change around diet and/or physical activity, perhaps due to the increased complexity of accurately measuring motivation when applied to changing or adding one or more new behaviors rather than focusing on stopping a single behavior – the core of addictions treatment. However, our moderator analysis that showed greater effect size when MI was delivered to those with existing or former disease diagnosis. This may signal a different kind of motivation, not previously explored in the MI literature. It seems that having a strong ‘cue to action’ from a disease diagnosis might herald an opportunity where MI may meet the needs of the patient and the healthcare setting designed to reduce the severity of the chronic disease.

Previous meta-analyses on MI and smoking cessation have indicated that international studies have larger effect sizes than US studies. This was reversed in the present meta-analysis, where the US-based sample showed a significantly larger combined effect size. It is not clear why this is the case, although the underlying population factors such as the high obesity rates in the US, and the low levels of physical activity when compared to Europe could mean that studies are more salient to a US population. Within the US group, studies with high proportions of minorities

had a significantly larger effect than those with low minority recruitment. It is possible that this may be due to higher US-based research budgets, and the accompanying application process that requires detailed information about how to over-recruit from minority groups. Unfortunately, this ethnoracial comparison is only available for US based studies, due to the differences in reporting (and baseline population composition) of minorities among the international studies.

Understanding why US populations, and studies with higher proportions of minorities seem to be responding better to MI would help to develop our understanding of where MI might best be used and why. For example, much has been written about the medical mistrust in African American populations in the US so it could be that the high minority samples respond more positively to the MI approach of a practitioner due to their preconceived idea of what happens during any medical exchange. However, despite this strong overall difference in effect, the subgroup was created with study level characteristics and so it is possible to make erroneous assumptions about which individuals received greatest benefit from the intervention.

A final subgroup that showed strong effects that could moderate the effect of MI was the background discipline of the practitioner, with non-medical counselors (psychologists, health educators, physical therapists, registered dietitians) showing larger effects than physicians. This could be in part due to the longer professional training on behavioral counseling that non-medical practitioners have. While instruction in MI was part of each study protocol, and the techniques were often new to practitioners, underlying concepts of person-centeredness and reflective or active listening occur in other counseling techniques that allied health professionals have possibly had more exposure to than doctors.

Limitations in this meta-analysis should inform the interpretation of results. A major issue for this and other published MI meta-analyses is the measurement of fidelity of MI delivered in the intervention. In Hettema and Hendrick's 2010 study, they reported

that only two studies reported fidelity practices[66]. In this meta-analysis, the studies included had much better reporting of fidelity – fourteen studies reported the same three fidelity measures, indicating that there is more awareness of the importance of the ‘MI-ness’ of the intervention. Despite this positive trend in the reporting of performing fidelity measures, there was no consistent reporting of the impact of the fidelity on the outcome measures, or how the practitioners scored on their coding measure. There were also narrative reports that some studies had unexpected delays between MI training and intervention delivery; with the research on drift in practitioner skill over time, particularly without regular supervision, these delays could again call fidelity into question. Assuming that practitioners do experience a diminishing of skills between initial training and the start of the study would indicate that MI could potentially be more effective than this meta-analysis might suggest, and that the modest effect sizes seen here are a positive but conservative estimate of this kind of intervention.

Secondly, the influence of specific clinicians on the overall effect sizes remains a problem in drawing overall conclusions about MI as a generalizable intervention. Numbers of clinicians in each study was not reported consistently, and the model of patients seeing multiple clinicians vs a single clinician was also reported inadequately. This also feeds into the discussions about the potential active components of MI, and would warrant further investigation. In the studies where there are low numbers of interventionists, we have no information on how individual interventionists score on particular counselor behaviors thought to be important in how MI might work, such as the ability to evoke change talk, or the ability to engage, empathize and reflect the affect of a patient. In terms of the impact on this meta-analysis, the small number of clinicians could have skewed the results in either direction, with a single less-competent clinician lowering the overall effect of an individual study, or a few extremely competent clinicians driving a particularly large effect size.

An additional limitation of this overall sample is the minimal inclusion of males in these MI interventions. Only two studies in this meta-analysis had more than 20% males in their population, and over half of the studies recruited only female subjects. To understand the extent to which MI is a useful and practical intervention in the management of chronic disease, more inclusion of both genders, or an increase in male-specific studies should be conducted.

MI seems to be a potentially important approach treatment in the prevention and management of chronic disease. The overall effect sizes are consistent across most subgroups, indicating that MI is a useful intervention across different population groups or different ages and races, with different target behaviors, and across different study designs. Of particular promise is the strong effect of MI on minority populations in the US and on groups with a chronic disease diagnosis.

Recommendations about areas for attention in future studies include more recording and reporting fidelity throughout the study, and measuring and reporting client motivation across diet and physical activity behaviors. Considering and reporting the cost effectiveness of MI interventions would also lead to a more comprehensive picture of the feasibility of MI interventions in the prevention and management of chronic disease.

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## **Validation of the One Pass Measure for Motivational Interviewing Competence**

### **Introduction**

A key part of any intervention research is being able to say definitively that the intervention has occurred. For drug trials or surgical interventions, the presence (or absence) of the intervention is straightforward, but for ‘talking therapies’ designed to change health behaviors, the assessment of fidelity is more complex[1]. The rapid dissemination of motivational interviewing (MI) has led to concerns about fidelity [2-5] and accordingly, researchers have developed several coding systems that measure competence and fidelity in the clinical use of motivational interviewing and MI-related interventions.

Evidence of MI efficacy has led to a sharp increase in the number of studies and clinical training programs using this counseling approach, which in turn has led to a need for cost-effective and reliable tools for evaluating MI skills and supervising practitioners, especially where there are innovations and adaptations of the core MI techniques.

The Motivational Interviewing Treatment Integrity (MITI) system was developed from the more comprehensive Motivational Interviewing Skills Code (MISC)[6]. MISC examines both patient and practitioner utterances, while MITI reduces coding time by focusing solely on the practitioner. The MITI codes the micro skills of MI such as counting the number of questions and reflections heard within a 20-minute segment of a clinical encounter.

Other measures to code MI interactions include VASE-R[7], SCOPE[8], BECCI[9], ITRS [10]and OnePass. This paper seeks to evaluate the OnePass, a recent addition to the



spectrum of coding tools, providing an assessment of both reliability and concurrent validity with the MITI.

### **1.1 Evaluation of Counselors**

Having a valid measurement of clinical skill has become increasingly important, particularly as motivational interviewing has gained acceptance across healthcare settings[11]. With over 200 clinical trials across a range of health behaviors, the need for measures to be valid and reliable across various types of clinicians, patients, and health behaviors is crucial to a better understanding of practitioner competence[2, 3].

In addition to understanding whether or not MI has been used in a given situation, valid evaluation can also assist in the development and understanding of the impact of training [6, 12], allow supervisors to distinguish between basic and advanced practice[13], and understand the components of MI that may contribute to its overall effectiveness[14-16].

### **1.2 Evaluating MI competence**

To date, numerous MI coding methods have been developed to address the needs of clinical supervisors and researchers. All coding tools cover the core concepts of MI as outlined by Miller and Rollnick[17], including overall dimensions of the encounter (such as empathy, collaboration and resistance), and also the specific strategies of MI (such as open questions, reflections and avoiding giving unsolicited advice). With the exception of the VASE-R[18], tools favor audio rather than video, due largely to the

difficulties of obtaining high quality videotape that does not distract the coders from the content of the MI session[19], which means that body language is not coded during these encounters.

A major criterion for fidelity measures is inter rater reliability. The most typical measurement of reliability of rater judgement is the intraclass correlation coefficient (ICC). The ICC examines the variance between the raters, using an analysis of variance, with the level of reliability reported as Cohen's or Fleiss' kappas. Higher ICCs indicate more agreement between raters, with 1 representing perfect agreement. Typically, agreement of 0.4 is considered acceptable or moderate, with 0.6 or above indicating good inter rater reliability[20].

Table 8: Range of ICCs for recent studies

Author	Coding System	Language	Lowest ICC (domain)	Highest ICC (domain)
Miller (2004)	MISC	English	0.65 (spirit)	0.95 (open questions)
Moyers (2005)	MISC	English	0.1 (Advice)	0.90 (reflections)
Bertholet (2010)	MISC	French	0.74 (change talk)	0.77 (sustain talk)
Glynn (2010)	MISC	English	0.29	0.74
Magill (2010)	MISC	English	0.33 (Direction)	0.99 (MI spirit)
Vader (2010)	MISC	English	0.07 (MINA)	0.96 (MIA)
Moyers (2005)	MITI	English	0.52 (empathy)	0.96 (closed questions)
Bennett (2007)	MITI	English	0.56	0.91
Forsberg (2007)	MITI*	Swedish	0.42 (empathy)	0.57 (giving information)
Brueck (2009)	MITI*	German	0.56 (empathy)	0.91 (Open questions)
Lane (2004)	BECCI	English	0.79	0.93
Rosengren (2005)	VASE	English	0.04	0.93
Moyers (2009)	SCOPE	English	0.49 Complex reflections	0.56 (reflections)
Gibbons (2010)	ITRS	English	0.57	0.97
Hallgren (2011)	SCOPE	English	0.59	0.93
Strayer (2011)	CBCCAI	English	-	0.82
Baer (2012)	CASPI	English – Computer	0.33 (affirmation)	0.84
Resko (2012)	SECT	English	0.12	0.57
Smith (2012)	MITI	English	0.40 (simple reflections)	0.74 (Open questions)

Table 8 shows the lowest and highest ICC for each reported measure, along with the MI specific domain where available. For the ICC, perfect agreement would be indicated by a score of 1, while perfect disagreement would be -1. In these prior studies, ICCs ranged from 0.04 on one aspect of the VASE tool to 0.99 for 'MI Spirit' on the MISC in Magill's 2010 study. The range of the highest and lowest ICC per study was large (0.04-0.79) indicating a high degree of variability in the measures. Only MI spirit appeared in both lowest and highest columns, and empathy appeared three times as the least reliable item, and never as the most reliable item.

### **1.3 The MITI**

The Motivational Interviewing Treatment Integrity rating system (MITI) was developed at the University of New Mexico in part to reduce the time and cost incurred in using the Motivational Interviewing Skills Code (MISC), which uses both clinician and patient utterances. Additionally, several constructs of MISC were found to have low reliability estimates that did not seem to provide useful information about the encounter, so MITI was created to eliminate these features [6, 21, 22].

MITI was essentially a shorter version of the MISC, with principal components of motivational interviewing determined by using an exploratory factor analysis. MITI codes only 20 minutes of an encounter, ideally chosen at random from the full session but avoiding the opening 5 minutes as this tends to follow conversational conventions such as introductions and explanations of a session. MITI is currently viewed as the gold standard in fidelity, with translations in multiple languages[13] and having served as the coding system in many large-scale studies like project MATCH[23] and EMMEE[6]. From 2012, it has been used to code counseling samples

from prospective members of the Motivational Interviewing Network of Trainers as part of their application to become new members.

Training in the MITI system requires 40 hours of initial training. Additional time is required to address project-specific requirements, and coders typically spend time benchmarking within their teams to calibrate their scores. The need for additional supervision to prevent coder drift adds further time and logistical complications for the use of the MITI instrument across studies.

The MITI covers basic principles of motivational interviewing—empathy, direction, and evocation—on a five-point scale, with basic competence at a level 3. These broad categories are known as ‘globals’ and are assessed as a general impression of the 20-minute work sample. The second section of the measure focuses on specific behavior counts; coders make a tally of each utterance that the counselor makes. Categories for these types of utterance include open questions, closed questions, simple reflections, complex reflections, and giving information, and finally whether the utterance is MI adherent (MIA) or MI Non-adherent (MINA). The ratio between several of these types of reflections is then calculated. An overall average score of 4 on the ‘global’ items indicates a good level of competence (see appendix 1).

#### **1.4 Rationale for new measure**

MITI has a long track record and widespread acceptance across the MI community. However, there are three areas of limitation that could prevent some researchers using the tool.

MITI closely follows the Miller and Rollnick model of MI[17], yet as the MI community grows, adaptations and interpretations of MI are evolving and tools are needed that can reflect protocol-specific strategies and skills. For example, there are different ways of using MI, such as in group settings [24], or with differences in structure of

the encounter[25]. Looking forward, the differences in how non-Romance languages such as Mandarin and Turkic languages formulate questions requires new thinking and adaptability over coding systems and concepts for which the MITI was not designed and therefore is not currently able to capture.

## 1.5 OnePass

OnePass was developed by Ken Resnicow at the University of Michigan, as a user-friendly MI fidelity assessment and supervision tool that could be easily adapted to different uses of MI and clinical context. The original intent was to use intuitive language, have a shorter training demands, and to accommodate other models of how MI is conceptually and strategically executed. The OnePass requires raters to listen to a clinical encounter only once before providing the one-sheet feedback. The name emerged as a contrast to the multiple times or ‘passes’ that earlier coding systems, such as MISC, required.

Unlike the MITI, OnePass only includes impressionistic ratings rather than behavioral counts, and rather than computing exact ratios of open to closed questions and simple to complex reflections, the rater provides a subjective rating of ratios achieved. Additionally, OnePass includes several ‘if applicable’ items that may be omitted or added according to the study or clinical protocol being followed.

This paper describes the psychometric properties of the OnePass tool. Specific aims were to

- 1) evaluate the inter-rater reliability of OnePass and compare inter-rater reliability with MITI scores of the same sample
- 2) assess concurrent validity of the new measure compared to the existing ‘gold standard’ MITI.

Ethics approval was obtained from the University of Michigan Institutional Review Board

## Methods

### 2.1 Participants and MI training

All students enrolled in a graduate level 15 week (45 hour) course in MI from the University of Michigan were invited to participate in this study, and all 27 gave written consent. Students were predominantly graduate students of Public Health although the course was open to other faculty and departments. Two of the participants were medical doctors, but most did not have prior experience in patient counseling. Participants were 92% female and 88% spoke English as a first language.

The course was delivered in weekly 3-hour workshops by KR, utilizing a range of pedagogical methods including didactic lecture elements, video excerpts, readings, real play, role-play and live 'real' demonstration. At least 1/3 of all class time was devoted to student practice activities, starting with skill-focused 'drills' such as formulating reflections, open questions and identifying change talk, before students moved on to opportunities for more lengthy real-play scenarios with their classmates. Following each larger activity, opportunities were provided for students to reflect on their experience of being the client as well as being the counselor. Throughout the course, students received individual feedback on performance from the instructor.

All students were required, around week 15, to counsel a standardized patient to complete the course. Unlike some clinical contexts, the requirement was only to complete the counseling encounter, rather than to achieve a required level of skill. Each encounter was video taped and students were assigned peer partners who provided feedback to each other after viewing the videotape.

Throughout this research project, only FM had access to the OnePass scores and identifiers, with only aggregate information available to KR. As a token of thanks for participating in the research element, all students were offered a more extensive supervision session with an experienced MI practitioner.

## **2.2 Coders**

We used six coders from around the United States. Three coded MITI only and three rated OnePass. No coder used both systems to rate student samples. Three coders had doctorates and three had masters degrees, and all were trained in motivational interviewing. Five were members of the Motivational Interviewing Network of Trainers, each with over five years of experience in the clinical application of MI, and three regularly teach and supervise coding techniques. Only one of the coders was familiar with both coding systems. All three MITI coders had previously undertaken large-scale coding projects for multiple settings, scenarios and counselors. Two OnePass coders were new to larger coding projects, although all had experience supervising clinicians.

## **2.3 Tape Samples and Situations**

Standardized patient scenarios were used to simulate professional practice without the ethical complications of recruiting actual patients [26]. Use of standardized patients has grown across the health professions as a reliable way of assessing clinical competence[27, 28], professionalism [29], improving clinical practice[30], responses to emotion [31], and maintaining consistency in a range of patient scenarios[32]. Beyond licensing examinations, standardized patients are increasingly

accepted as a useful training tool for the developing psychosocial and communication skills in both clinicians and lay health educators[33].

We used two different standardized patient scenarios already in use at the University of Michigan medical school standardized patient program. One patient was a smoker considering quitting, and the other was overweight and concerned about developing diabetes. The two characters include outlines incorporating the daily routine of the patient, key family members, areas of behavior change that would be possible, barriers to change and core values. Both scenarios were women aged 40-60.

The six standardized patients were all trained “lay” actors who were already employed by the University of Michigan medical school Standardized Patient program. Unlike other standardized patient roles that focus on symptoms and diagnosis, the MI role plays required certain patterns of response. To attempt to mirror a typical MI session, all standardized patients were offered a ½ day training by the authors in the basic principles of MI. They were specifically trained to disclose more information and express more openness to change if the student counselor used effective reflective listening techniques and appropriately elicited change talk. We briefed patients on how to respond to MI-specific strategies, such as the 0-10 change ruler, providing consistency across the scenarios.

Each patient encounter was 20 minutes long, with an alert given at five minutes before the end of the session. At the end of the encounter, the standardized patients gave each student feedback about their performance.

Videotaping of the encounters was completed at the standardized patient laboratory at the University of Michigan School of Medicine, where there are unobtrusive



cameras and high quality ambient sound recording. All but one encounter occurred on the same day. Student counselors were randomly assigned to one of the two scenarios and were given approximately five minutes prior to the assessment to look through the patient notes which contained basic information such as age, gender, and medical history.

### **2.3 Administration of Coding**

Each rater coded all 27 audiotapes independently, without consultation with the research team. Although commonly used for MITI coding projects, our MITI coders did not have any initial standardization meetings, nor did they have regular sessions to check for coder drift. This was done both because of logistic limitations as well as to achieve parity with the process used for the OnePass.

#### **Coder Training**

For the MITI team, coders were sent samples directly and they were allowed to proceed with coding as they chose. For the OnePass team, coders were sent the coding manual, and two practice tapes to familiarize themselves with the coding system, but their skills were not formally assessed. Both coders had informal conversations with FM to clarify coding issues, but there was no formal training session. In particular, no guidance was given on the items of the OnePass that were determined to be non-compulsory. MITI coders were all trained and had high levels of experience. For two of the three OnePass coders, this was their first major coding project. All raters were highly experienced practitioners of MI with high levels of competence in motivational interviewing without specific training for this study.

## **2.4 Overview of statistical analysis**

### **2.4.1 Inter-rater Reliability**

All raters were allowed to consult the respective manuals during the rating period, but completed the ratings independently. Inter-rater reliability was estimated for each of the two measures by using intraclass coefficients[34], computed in SPSS 19.

Fleiss's kappa was used to compare three raters[35]. To identify any potential issues with specific coders, we also used Cohen's kappa for the inter-rater reliability of rater pairs. In addition to ICCs, we examined agreement rates across raters for cutpoints such as agreement on levels of competence.

### **2.4.2 Concurrent Validity**

We evaluated concurrent validity between the two coding systems using Pearson's product moment correlation ( $r$ ). Pearson's  $r$  was chosen given the continuous and interval distribution of scales used in both the MITI and the OnePass.

To compare OnePass to MITI, we evaluated mean scores of all three MITI raters and also the considered the pair with the highest ICC to give MITI the best chance of comparison after our protocol deviation of no contact between MITI raters.

Because the two instruments use slightly different language to capture MI constructs, KR and FM developed a list of directly comparable items and an expanded list which included multiple items that covered similar constructs expressed using different wording. Table 9 provides these direct and similar comparisons between the two measures.

Table 9: MITI and OnePass equivalent and expanded equivalent measures

Comparison item	MITI Item	One Pass Equivalent	
EVOCAION	Evocation	Q6	...evoke and reinforce CHANGE TALK?
Expanded evocation	Evocation	Q6 Q12	...evoke and reinforce CHANGE TALK? ..avoid providing unsolicited advice and/or information?
COLLABORATION	Collaboration	Q1	...collaboratively set session agenda?
AUTONOMY	Autonomy	Q14	...support client autonomy? (provides choice)
Expanded Autonomy	Autonomy	Q13, Q14	...provide a menu of options? ...support client autonomy? (provides choice)
DIRECTION	Direction	Q15	...explore, guide, choose as recommended?
Expanded Direction	Direction	Q15 Q 5	...explore, guide, choose as recommended? ...use Action Reflections?
EMPATHY	Empathy	Q3	...affirm the client's position and experience?
Expanded Empathy	Empathy	Q3 Q10	...affirm the client's position and experience? ...respond appropriately to client affect?
Global Spirit	Spirit	Q18	...demonstrate MI Spirit?
Additional spirit	Spirit	Q 19	Overall, how well did the counselor conduct session?
	Spirit	Q18 Q19	...demonstrate MI Spirit? Overall, how well did the counselor conduct session?
Expanded spirit	Spirit	Q1 Q6 Q14 Q18 Q19	...collaboratively set session agenda? ...evoke and reinforce CHANGE TALK? ...support client autonomy? (provides choice) ...demonstrate MI Spirit? Overall, how well did the counselor conduct session?
Alternative expanded Spirit	Spirit	Q1 Q6 Q14 Q18	...collaboratively set session agenda? ...evoke and reinforce CHANGE TALK? ...support client autonomy? (provides choice) ...demonstrate MI Spirit?
Global Spirit and One Pass Total score	Spirit	Average of all scores	

For the metrics portion of the MITI, where coders counted examples of closed or open questions, and noted instances of simple or complex reflections, we used the MITI behavior counts transformed into ratios and percentages, and the OnePass rater’s subjective estimate of the equivalent ratios/percentages table 10 (below).

*Table 10: Evaluation equivalents for MITI and OnePass*

MITI ITEM	One Pass Equivalent	
Reflection to question Ratio	Q21	Reflection to Question ratio
Percentage Open Questions	Q22	Open to Closed Question ratio
Percent Complex Reflections	Q23	Complex to Simple Reflection ratio
Percentage MI-Adherent	All items with the exception of 2,4,5,19-23	

## Results

### 3.1 Inter-rater reliability

Following Landis and Koch[20], we used the following breakdown for inter-rater reliability:

Kappa Statistic	Strength of Agreement
<0.0	Poor
0.0 to 0.20	Slight
0.21 to 0.40	Fair
0.41 to 0.60	Moderate
0.61 to 0.80	Substantial
0.81 to 1.00	Almost Perfect

This form of kappa benchmarking was used as it has more descriptive categories. Fleiss's benchmarking has just three categories (Poor below 0.4, intermediate to good, and excellent over 0.75)[36], while Altman has five categories (poor below 0.2, fair, moderate, good and very good)[37]. There has been discussion about the arbitrary nature of benchmarking standards[35], and these do vary by discipline, however, within the MI literature, the Landis and Koch estimates have typically been used.

#### 3.1.1 Inter-rater reliability for MITI

Table 11 shows the inter-rater reliability of the MITI. For all three MITI raters, there were varying levels of inter-rater reliability from  $k = -0.708$  (percent complex reflections) to substantial agreement of  $k = 0.63$  (open questions). Only one additional

item (autonomy,  $k=0.48$ ) scored in the moderate range of agreement. We also analyzed each pair of raters to identify the highest inter-rater reliability possible for subsequent validity analyses. Each pair had at least one negatively correlated item, and raters 1 & 2, and 2 & 3 compared poorly most of the time. Raters 1 and 3 had consistently better kappa scores. Autonomy ( $k=0.54$ ), empathy ( $k= 0.52$ ), complex reflection ( $k= 0.6$ ) and percentage MI adherent ( $k= 0.48$ ) showed moderate agreement. Three items showed substantial agreement; giving information ( $k=0.78$ ), simple reflections ( $k= 0.67$ ) and percentage complex reflections ( $k= 0.68$ ). The almost perfect category of agreement was present for the behavior counts of open questions ( $k=0.89$ ) and closed questions ( $k= 0.82$ ), and the associated reflection to question ratio ( $k= 0.89$ ). The median rating for raters 1 & 3 was  $k=0.524$ , or moderate agreement. Corresponding medians for raters 1&2 was  $k=-0.16$ , and for raters 2 &3,  $k=-0.074$

Table 11: Inter-rater reliability for MITI scores

MITI ITEM	ALL 3	Rater 1 vs 2	Rater 1 vs 3	Rater 2 vs 3
EVOCATION	-0.23	-0.033	-0.262	-0.211
COLLABORATION	0.284	<b>0.371</b>	0.213	0.057
AUTONOMY	0.480	0.333	<b>0.541</b>	0.187
DIRECTION	0.101	-0.94	0.163	<b>0.422</b>
EMPATHY	0.300	-0.125	<b>0.524</b>	-0.074
Giving Information	0.309	0.102	<b>0.780</b>	-0.458
MIA	-0.128	-2.99	<b>0.250</b>	-0.371
MINA	-0.123	-0.641	<b>0.360</b>	0.009
Closed Question	0.390	-0.349	<b>0.820</b>	-0.197
Open Question	0.626	0.299	<b>0.885</b>	0.156
Simple Reflection	0.212	-0.164	<b>0.664</b>	-0.186
Complex Reflection	0.222	-0.864	<b>0.595</b>	-0.024
Global Spirit	0.313	0.291	<b>0.291</b>	0.031
Percent Complex Ref	-0.708	-1.486	<b>0.128</b>	0.062
Percent open questions	0.307	-0.079	<b>0.677</b>	-0.171
Reflection to question ratio	0.479	-0.401	<b>0.890</b>	-0.150
Percent MI Adherent	-0.131	-1.361	<b>0.475</b>	-1.31
Mean	0.159	-0.314	<b>0.470</b>	-0.131
Median	0.284	-0.164	<b>0.524</b>	-0.074

(bold type indicates ‘best possible’ correlation among the four combinations)

### 3.2 OnePass Reliability

The inter-rater reliability for OnePass ranged from -0.195 to 0.99 in table 5 (below). For all three raters, only one item was slightly negatively correlated (respond to affect), and only one additional item did not achieve at least moderate reliability (respond to affect and roll with resistance). Both of these items were non-compulsory items on the OnePass.

Three items reached ‘moderate’ agreement ( $0.41 < k < 0.6$ ); set agenda ( $k = 0.58$ ), summarize ( $k = 0.44$ ), open-closed ratio ( $k = 0.51$ ). All other items reached substantial or almost perfect inter-rater reliability. The overall mean, incorporating all items, was  $k = 0.82$ , which, according to Landis and Koch was ‘almost perfect agreement’[20].

To provide the same information as the MITI inter-rater reliability, we repeated the tests using Cohen's kappa for each pair of raters. As shown with the inter-rater reliability across all three raters, there was little difference between pairs. Median kappas for the three pairs ranged from 0.57 to 0.68, with substantial agreement (k=0.73) as the median for the three raters.

Table 12: Inter-rater Reliability for OnePass

ONEPASS ITEM	ALL 3 (Fleiss's K)	Rater 4 & 5 (Cohen's K)	Rater 4 & 6 (Cohen's K)	Rater 5 & 6 (Cohen's K)
1. Set Agenda	0.578	0.37	<b>0.67</b>	0.48
2. Open Questions	0.621	0.27	0.55	<b>0.65</b>
3. Affirm client	<b>0.671</b>	0.52	0.65	0.58
4. Reflective Listening	<b>0.688</b>	0.54	0.71	0.54
5. Action Reflections*	<b>0.754</b>	0.65	0.67	0.69
6. Evoke Change Talk	<b>0.792</b>	0.78	0.53	0.79
7. Elicit Importance*	0.731	-0.84	-0.81	<b>0.99</b>
8. Elicit Confidence*	<b>0.621</b>	0.57	0.61	0.37
9. Address Values	<b>0.785</b>	0.67	0.69	0.76
10. Respond to Affect*	-0.195	-0.20	-0.75	<b>0.67</b>
11. Roll with Resistance*	0.324	0.27	-0.61	<b>0.67</b>
12. Avoid advice	<b>0.805</b>	0.73	0.64	0.80
13. provide menu	<b>0.717</b>	0.60	0.62	0.68
14. Support autonomy	<b>0.761</b>	0.62	0.61	0.80
15. Explore, Guide, Choose	<b>0.743</b>	0.50	0.62	0.84
16. Summarize	0.443	0.12	0.45	<b>0.49</b>
17. Arrange Follow-up*	0.739	0.84	0.43	0.64
18. Demonstrate MI	0.739	0.57	0.54	<b>0.80</b>
19. Overall conduct	0.799	0.71	0.65	<b>0.81</b>
20. Talk Time	<b>0.841</b>	0.79	0.72	0.83
21. Reflection ratio	<b>0.725</b>	0.68	0.54	0.64
22. Open-closed ratio	0.511	0.10	0.37	<b>0.65</b>
23. Complex simple ratio	<b>0.686</b>	0.57	0.46	0.68
Overall Means	<b>0.821</b>	0.67	0.78	0.80
Mean of Kappas	<b>0.654</b>	0.462	0.43	0.69
Median of Kappas	<b>0.728</b>	0.57	0.61	0.68

(\* indicates an optional item) Items in **bold** type indicate the highest agreement



### 3.3 Concurrent Validity of OnePass and MITI

Using the mean scores of all three OnePass coders, and the most reliable pair of MITI coders (1 & 3), we assumed that  $0.3 < r < 0.49$  is a moderate correlation, and  $r > 0.5$  is a strong correlation. We found high levels of correlation between the MITI and the OnePass (table 6), with all but three items (expanded evocation, collaboration and expanded empathy). The highest correlation ( $r=0.634$ ) was between the overall scores. Four of the five ‘globals’ showed good levels of correlation (Evocation, autonomy, direction and empathy).

Table 13: MITI /OnePass Correlation

MITI ITEM	One Pass Equivalent	Pearson's Rank Correlation
EVOCAION	Q6	0.506**
Expanded evocation	Q6, 12	0.322
COLLABORATION	Q1	0.374
AUTONOMY	Q14	0.559**
Expanded Autonomy	Q13,14	0.574**
DIRECTION	Q15	0.554**
Expanded Direction	Q15, 5	0.476*
EMPATHY	Q3	0.543**
Expanded Empathy	Q3,10	0.221
Global Spirit	Q18	0.527**
Additional spirit	19	0.640**
	18,19	0.596**
Expanded spirit	Q6, 1, 14, 18,19	0.623**
	6,1,14,18	0.610**
Global Spirit and One Pass Total score	Average of all scores	0.634**

\*\* Significant at 0.01 level , \* Significant at 0.05 level

For performance metrics the only significant correlations was for the reflection to question ratio, (table 14).

*Table 14 MITI metrics and OnePass equivalents*

MITI ITEM	OnePass Equivalent	Spearman's Rank Correlation
Reflection to question Ratio	21	.500**
Percentage Open Questions	22	.357
Percent Complex Reflections	23	.147
Percentage MI-Adherent	All but 2,4,5,19-23	0.038

\*\* Significant at 0.01 level

There was higher association in the combined metrics score, particularly with the exclusion of the 'percentage MI' excluded from the evaluation (table 8).

*Table 15: Aggregates of Metrics for MITI and OnePass*

MITI Measure	One Pass Equivalent	Pearson's Rank Correlation	Spearman's Rank Correlation
All Metrics	All Metrics	0.498**	0.485*
Without PMI	All Metrics	0.543**	0.532**

\*\* Significant at 0.01 level

## Discussion

We started this analysis to investigate the validity of the OnePass as an additional tool for the evaluation of motivational interviewing and adaptations of MI. To this end, we have two major findings. Firstly, the OnePass shows promise as an evaluation instrument for MI fidelity, with good inter-rater reliability following minimal instrument-specific coder training. Secondly, we have moderate concurrent validity with the MITI. Despite some limitations, this initial comparison provides evidence of the potential for future research using both of these tools.

### *OnePass Reliability*

Given the short time taken to train raters, the moderate to substantial inter-rater reliability of the OnePass is promising. Our coders had all previously received MI training from KR, and thus our actual training time may be an underestimate of the time that would be required for novice coders unfamiliar with MI practice. However, the coders did not meet during the coding process nor did they spend any time benchmarking their decisions, which presents cost and logistical savings. With the same initial trainer, there may be an additional confounder that inflates the inter-rater reliability of the OnePass. OnePass coders were all familiar with novel adaptations (such as action reflections[38] and using a three stage model [25]) to traditional core MI competencies.

The high inter-rater reliability for empathy that we observed with our OnePass raters warrants mention. Although empathy is frequently cited as being important in clinician-patient interactions[39], coding of empathy has often yielded low ICCs in MI studies (see table 1). Difficulties in measuring the complex construct of empathy have also been reported outside the MI literature [40, 41]. In the OnePass, ‘affirm client’s position’ is the core item indexing empathy, and it showed substantial agreement

(0.67) between raters in this sample. Our other measure of empathy, ‘respond to affect’ fared less well, perhaps due to the optional nature of the item. For the optional items on OnePass, raters need to make two separate judgments, firstly whether or not to include the item. If the item is judged to be present, then the score must be given. In terms of the inter-rater reliability of these items, there was limited agreement about inclusion/exclusion, however when raters agreed on the inclusion of the item, agreement on the score was substantial (0.67). This does indicate that greater attention needs to be placed on the instructions for inclusion of optional items.

### *Validity*

Correlations between the OnePass and the MITI were moderate, but these findings are somewhat inconclusive, because the low ICCs between MITI raters limits the validity of the comparison[42]. We tried to address this by comparing the OnePass to the strongest pair of MITI raters, but this is admittedly only a partial fix.

Previous studies have included extensive time taken to benchmark different levels of performance among coders[43, 44]. Most studies using MITI as the coding tool have included weekly sessions to avoid coder drift[21], and further randomized checks on coders to ensure consistency. Without this key element of the MITI protocol, the inter-rater reliability of the MITI raters may have suffered. Further reasons for the low ICCs include a lack of familiarity among raters with novel elements of MI that are present in this sample, such as action reflections[25], and a different way of thinking about ‘benign’ closed questions. This could potentially lead to a reflection to be coded as complex in OnePass but as ‘giving information’ in MITI.

### *Limitations*

In addition to the limitations stemming from the MITI protocol deviation, there are several areas for improvement. We could not include behavioral outcomes as we used standardized patients. For future larger-scale studies, tying One pass and MITI scores to behavior change would provide a more meaningful comparison between the two measures.

Our sample was fairly homogenous, which could reduce the generalizability of our findings and point towards selection bias [34]. Our student counselors all chose to both undertake the graduate-level MI course and also participate in the study, and most performed very well in the recorded encounter. With a broader spread of individuals and exposure in MI, there might be greater divergence in ability and in the way that coders interpreted performance.

A further limitation was the narrow contexts of the patient scenarios. With only two available scenarios, we provided a standard that allowed comparison across the 27 students, and were designed to give student counselors the best possible chance to demonstrate their MI skills. We gave the standardized patients detailed information on how to respond, and primed them to have potential for change. Beyond this assessment, the range of patients is much greater and could affect the reliability of the scale. With a particularly silent or aggressive patient, the dynamics of the coding process could change.

### *Future Studies*

Our findings strongly indicate that further research will be helpful in the understanding of how OnePass can be used in evaluating MI. In particular, including patient outcomes in a real-world setting would provide valuable information, particularly if compared again to the MITI.

In future studies we would like to test MITI as developers recommend in the manual, by performing benchmarking among coders before and during the project, and experiment with the extent to which using benchmarking among OnePass coders could further improve the inter-rater reliability of the OnePass.

There is a suggestion that the professional observers of motivational interviewing may assess clinician competence differently than patients[31]; in future, it may be useful to include standardized patient impressions of each counselor as a more comprehensive assessment. With recent research advocating an assessment approach that combines multiple perspectives[45], perhaps future research should also incorporate a level of self-assessment of the clinician.

### **Conclusion**

The growth in acceptance of Motivational Interviewing as technique for behavior change across medical professions has led to an explosion in the number of studies and interventions that incorporate MI. With this study, we are proposing a measure of clinician competence that requires little training or continuous benchmarking, but suggests a high level of inter-rater reliability, and a good degree of correlation with the MITI scale. We do not suggest that the OnePass is a more valid tool than the MITI, but that with new adaptations and interpretations of motivational interviewing, that the OnePass may capture additional elements of this evolving discipline while demonstrating a level of comparability with the MITI.

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## **Motivational Interviewing in the Real World: Experiences from Singapore**

### **Introduction**

#### **1.1 Training in Motivational Interviewing**

From origins in the treatment of addictions[1], Motivational Interviewing is now found across psychological[2], medical[3] and criminal justice settings[4, 5]. The skills and strategies in MI have been studied in clinician populations including physicians,[6] nurses[7], dentists[8], pharmacists[9], and dietitians[10] and with both healthy lifestyle behaviors such as smoking cessation[11] or healthy eating[12, 13], and with disease management behaviors such as medication adherence[14] or weight management[15]. MI has been included in many professional guidelines as an effective approach for behavior change[16, 17], with some evidence that the technique may be particularly effective with individuals who are most entrenched in their views about not changing[11].

Currently, the international network of trainers, the Motivational Interviewing Network of Trainers (MINT) has over 1000 members, each of whom conducts trainings in a range of settings. If each trainer conducts just five trainings per year,

there would be 5000 MI trainings globally. And if every one of those trainings has an average of 10 participants, then 50,000 individuals per year are being trained in Motivational Interviewing across the world.

This is a conservative estimate of the pool of clinicians who have received some MI training in any given year. Being a part of the MINT is not a pre-requisite to conduct training, and there are many trainers, within MINT and outside, who conduct more than ten 2-day trainings throughout the year.

The settings for these trainings are diverse; there are trainers working with criminal justice staff, in clinical settings, and in research. To ensure fidelity and consistency of MI across practitioners, Miller (2004) recommends individual feedback and supervision post-training[18-21], with many recent clinical trials including both coding and supervision to ensure fidelity [22]. Frequently, clinicians' competence is assessed at baseline through an audiotaped interview with a patient immediately after training, and again at one or more time-points during the study. Competence is assessed through measures that have been developed specifically to evaluate clinician competence in MI[23-25], and in several of these research studies, the level of practitioner competence appears to be linked to patient outcomes at the end of the project[26, 27].

The clinicians who participate in these research projects largely have high levels of personal motivation and commitment to a person-centered approach, and many

have had previous exposure to concepts central to Motivational Interviewing such as reflective listening, and using a ‘strengths-based’ approach[28]. However, these highly-motivated and also highly-assessed individuals who form the body of research about MI efficacy and MI training methodology are just a small percentage of the total number of people across the world who have had at least some exposure to the technique. For this silent majority, what do they think of MI after being sent on a course by their line managers or clinical directors? Do they return to their clinical settings and immediately incorporate training into practice, or do they see the techniques as being inefficient and time consuming in their busy clinical practices?

It is these clinicians that are the true ambassadors of Motivational Interviewing, but they are largely a group without voice. This qualitative study attempts to give a small sample of these trainees the opportunity to discuss the extent to which MI is used following their training.

## **1.2 Multicultural and Multilingual Populations and Motivational Interviewing**

With current levels of national and international migration, there are increases in the number of patient and practitioner encounters that take place where one or both of the participants of the conversation are speaking a second language. This may be where there are international medical graduates who find work in a country where a language other than their native tongue is spoken[29], or in countries or communities that have large multicultural and multilingual populations, such as Singapore. In clinical trials that use MI, this multilingual environment is rarely

accounted for in the study design for pragmatic reasons – it is extremely difficult to ensure a group of clinicians in a randomized trial have comparable competence in the same series of languages.

The lack of available information about how MI is used in practice is exacerbated in locations where MI-specific clinical trials are not yet taking place. Currently MINT trainers come from over 40 countries, with training occurring in many more locations. While MI trainings, coding systems and protocols have been translated into many languages[30-33], it is important to consider the extent to which MI is being adopted and welcomed by clinicians in real world settings in other locations.

Singapore is an ideal location to examine how MI may be being transmitted into a multilingual setting outside the west. With English language clinical interactions likely to occur more often than Chinese, Malay or Tamil interactions, parallels may be drawn with English-language studies, yet there is potential to develop a picture that extends beyond a western framework.

### **1.3 Singapore's multilingual population and history**

Singapore is a country of 5.31 million inhabitants and an area of 715.8km<sup>2</sup>[34]. Within the region Singapore is wealthy, with a high GDP (\$65,048) and well-respected education and legal systems.

There are three major ethnic groups in Singapore: the majority Chinese (76%) indigenous Malays (13%) and ethnic Indians with origins in Tamil Nadu and Sri Lanka[34]. With this multi-ethnic foundation, there have been new waves of immigration predominantly from these ethnic groups, but also with large numbers of nurses and domestic workers from the Philippines, and construction workers from Thailand and Bangladesh.

The island's history has led to a unique cultural melting pot with four national languages; English, Mandarin, Malay, and Tamil. In addition to these languages, local dialects are widely used, particularly in the older population. Prior to 1965, families had to choose whether to have their children educated in English or Chinese-language schools, leading to strong language biases in the older population[35]. Most people are at least bilingual, but may struggle with formal forms of English that are most widely used in official settings[36]. Young people nowadays are educated in at least English and Mandarin[37], with many speaking further languages at home with their parents or (in the case of Chinese dialects), their grandparents.

#### **1.4 Singaporean 'Values'**

Visitors to Singapore are frequently exposed to the pursuit of material wealth, locally termed the 'Five Cs'. The five 'Cs' in question are cash, car, condominium, country club and credit card. In Singapore, where land and property are limited, demand for access to individual housing and 'country' pursuits such as golf exceeds supply. As

such, the ability to participate in golf or tennis (through membership of a country club) shows wealth. As 80% of Singaporeans live in government-built, (relatively) low cost apartments that are almost identical in architecture, the financial ability to live in an architecturally interesting, luxurious condominium with landscaped gardens and sports facilities is another demonstration of wealth, which is often used as a proxy for success [38].

Alongside these five Cs are more traditional Confucian values of benevolence, propriety (behaving in an appropriate way for society), family (described as filial piety) and morality. Within these broad concepts, honesty, trust, respect and sincerity are central to Confucianism and continue to be important in modern Singapore[39]. In Singapore, the exposure to different cultures and influences means that these Confucian values coexist with varying degrees of a western outlook. In medical settings, patients (especially the elderly) frequently have family-members advocating for them, but may also desire autonomy of decision rather than allowing the physician to dominate [40]. This combination of Eastern and Western values was also demonstrated in a perceived ‘defensive pessimism’ following the SARS outbreak[41].

Confucian values have a strong basis in trust, honesty, sincerity and respect – all elements that seem to match well with a motivational interviewing approach, yet there has been considerable media attention on medical paternalism in Singapore. Within the last decade, in response to media reports of doctors ignoring patients,

there seems to have been a consistent effort to involve patients in decision-making, with patient autonomy explicitly cited as desirable in clinical practice and in medical schools[42]. Despite a recognition for a need for patient autonomy and collaboration, surveys have also shown that 'asian' values may also affect doctors' perceptions of patients; Chan (2000) found that doctors still held an attitude that patients are not always 'capable of rational choice' and that doctors do not always tell the whole truth on account of this[43]. In 2008, when medical students in Singapore were surveyed about their attitudes to the doctor-patient relationship, their scores on partnership and patient-centeredness were lower when compared with an equivalent US cohort[44].

There is some data to suggest that the expression of emotion is less frequent and intensive in Chinese culture than in other cultures[45], with scholars linking this regulation of emotion to a desire not to disrupt group harmony in line with Confucian values. Chinese culture undoubtedly has an impact on Singaporean culture, but it is important not to take China-specific research as wholly applicable to Singapore. Anecdotally, Singaporeans seem to support the Chinese findings - that lower emotion is displayed by figures of authority, perhaps in line with the 'moral leadership' desired by Confucianism. However, the data to back this up is largely missing, and where there is information, it does not directly relate to medical professions. Poon (2003) found that management students of all races with a local



Singaporean education had lower scores of emotional intelligence than those with non-Singaporean education[46].

### **1.5 Medical Context of Singapore**

To understand some of the challenges facing Singaporean medical practitioners, it is necessary to set the scene for the local disease burden. Currently there are 1.8 doctors per 1,000 people in Singapore, far lower than Cuba (6.7 doctors per 1,000) the UK (2.7 per thousand) and the USA, with 2.4 physicians per thousand. In global terms, Singapore's doctor patient ratio is most similar to China's doctor-patient ratio, of 1.7 physicians per 1,000 people. With the high population density, good infrastructure, and basic health insurance provision, doctors in primary care clinics are particularly busy, with report of seeing over 60 patients in a day.

Many diseases have low prevalence in the overall population[34], but affect lower socioeconomic groups disproportionately. Singaporeans are health-conscious, but with long average working hours, and a national characteristic of eating out almost daily, there are predictions of a future burden of chronic disease that will put additional pressure on the healthcare system.

Infectious diseases are still present, with outbreaks of dengue fever (accompanied by national campaigns to eliminate breeding grounds of stagnant water and large-scale

fumigation of infected areas). However, there are other non-communicable diseases that are becoming increasingly significant, including cancers, diabetes and heart disease[34]. Among the elderly, multiple chronic disease diagnoses are commonly found, and despite a policy that enforces elder care by children, there are many impoverished elders living in Singapore.

The Singapore government policy towards health is to combine a minimal level of government support that is supplemented with personal responsibility and employer contributions to healthcare[47]. Unlike many health systems where social insurance pools resources for future generations, in Singapore, each generation meets its own healthcare needs, reflecting broad societal values of personal responsibility. How this policy translates into care is as follows: Singaporeans mostly seek primary healthcare consultation from private physicians, either through individual practitioners operating in a community setting, or in larger medical groups. The remaining 20% of the population seek primary care from the nationally-supported 'polyclinics'. These polyclinics generally house 20-50 different physicians who see patients on a first-come, first served basis. Until recently, there were no pre-bookable appointments, however, with increasing numbers of patients with chronic conditions, and best evidence citing continuity of care as being important in the stabilizing and improvement of conditions, diabetic patients may now have regular checkups with a named physician or care manager (nurse).

## **1.5 Motivational Interviewing Training in Singapore**

Spearheaded by the National Healthcare Group and the Institute of Mental Health, there have been Motivational Interviewing trainings in healthcare settings in Singapore since 2005, with more than six Motivational Interviewing Network of Trainers (MINT) members conducting multiple trainings. On average, there have been 7 Motivational interviewing trainings specifically for health professionals annually. Several Singaporean clinicians have sought additional training and shadowing opportunities in the US.

Clinical training has been largely voluntary or by nomination, where a clinic manager chooses several individuals to attend training, usually one from each polyclinic. The most typical format to date has been an introductory two-day course, with occasional ‘top-up’ half-day workshops at least 6 months after the initial training.

## **Methods**

### **2.1 Study Design and Participant Selection**

Semi-structured, in-depth interviews with Singaporean clinicians were conducted between June 2010 and November 2012. Participants were invited to take part in the

study through word of mouth, and by email. Anyone who had attended a Motivational Interviewing training session lasting at least 16 hours was eligible to take part. With three principal trainers who had conducted 6 trainings between 2006 – 2010, the total available population was approximately 100 individuals across the National Healthcare Group. Of these, several people were unreachable due to changing jobs or going overseas for further study. Of the remaining group, interviews were scheduled in waves until thematic saturation occurred. Ethic approval was granted by the University of Michigan Institution Review Board HUM 00039712.

## **2.2 Data Collection: Interviews**

Interviews took place either by telephone or in person, between June 2010 and November 2012. All participants were invited to use their language of preference for the interview, and could choose whether or not they wanted the interview to be audio-recorded. Each interview was scheduled to last 40 minutes, after which the interviewer thanked each participant for his/her time. Participants who wanted to continue the discussion were given a further 20 minutes with a maximum of 1 hour interview in total.

Interviews were conducted using ethnographic principles[48], whereby informants were asked about their experiences with MI following training. In Spradley's view, building rapport is an essential part of the process of the interview, similar to how engagement with clinician is an important step in MI[49]. After an introduction

where rapport was built between interviewer and participant, there were three sections to the interview: firstly how, if at all, the participant used MI in their own clinical context with probes to any barriers that were mentioned. The second section addressed any personal adaptations of Motivational Interviewing, and the final area allowed discussion on training and supervision within the Singapore context. The framework for the interviews is provided in table 16.

*Table 16: Interview Framework*

<b>Interview Section</b>	<b>Specific Questions/Probes</b>
Introductions	Project information and written informed consent Training experience What does MI mean to you
1. MI in Clinical Practice	Extent of use (what does and doesn't work – with clinical example) Barriers to use of MI
2. Adaptations of MI	Personal adaptations of MI
3. Training and Supervision	Self-assessment of skills Areas for improvement Barriers to supervision Training others

Using a narrative approach where clinicians recalled instances of using Motivational Interviewing allowed each individual to retell stories from their own clinical practice[50]. No confidential patient information was given during interviews.

Additional questions and prompts were asked where particular information about personal clinician adaptations of MI or barriers to implementation were revealed.

One author (FM) was the sole interviewer. For these interviews, it was immediately apparent that she is not part of either macro or micro-cultures involved around this

group of Singaporean clinicians. Her language ability (Mandarin) and previous role within the Singapore health system allowed a degree of apparent acceptance on the part of the clinicians, yet being outside of the culture encouraged participants to be more explicit in their descriptions of work processes in a way that may not have been possible with a locally-born interviewer.

### **2.3 Additional Sources**

In addition to the information given by participants in the study, several managers and clinical directors were interested in the project and requested the opportunity to speak about their experiences supervising and managing staff who were using Motivational Interviewing in their practice. The questions used for this subset focused on their understanding of MI, and on implementation of MI into a new setting.

### **2.4 Analysis**

Immediately after the interview, the content was transcribed verbatim in the language of the interview. For those interviewees who did not wish to be recorded, notes from the interview were written up in detail. Early interviews were analyzed thematically to develop a codebook, with FM and WT reviewing each interview independently for themes using a consensual approach[51]. Subsequent interviews

were analyzed using this codebook by a local Singaporean (WT) and a Mandarin-speaker (FM), who had lived extensively in Singapore. Where disputes arose between FM and WT, additional reviewers were sought. All issues were resolved through discussion, and organized into themes. Data for this project was managed using NVivo 9 software (QSR international).

#### **2.4.1 Approaches to Data Analysis**

Grounded theory was the underlying principle for analyzing data[52], just as narrative-based approaches or ethnographic interviews were used during data collection. One of the guiding principles of grounded theory is to approach the qualitative data openly in order to generate research questions for future testing without a strong predetermined framework[53]. We approached the data using open coding, whereby text was grouped into units that contained a complete thought, as determined by the coders. The approach was iterative, with categories added as new themes emerged. Subcategories (known as nodes in NVivo) often determined by consensus after the broad themes had emerged, and then these were grouped together to generate a broader theory[52]. Data was kept in its original 'raw' form from transcripts in an attempt not to over-interpret participants' words[51].

For qualitative research, this is a large sample-size – Glaser and Strauss considered 8 participants to be sufficient to reach a state of saturation, whereby no new themes or properties emerge. For this study, we allowed additional interviews to take place as several different groups were represented, and we wanted to have broader representation of the different races, linguistic groups, and clinical disciplines in Singapore. With the waves of email invitations to interview, several clinicians had expressed an interest to be interviewed even as saturation occurred. To maintain rapport with the organization and respect the desire for participation, remaining interviews were carried out and analyzed also. In the analysis and transcription, all patient identifiers were taken away, including the profession, where it could be an identifying feature.

## Results

### 3.1 Participant Characteristics

In total, 37 interviews were completed with medical practitioners who had undertaken Motivational Interviewing training. There was a mix of clinician types, with most working in chronic disease management and primary care settings. The majority were women, and all had over 5 years experience of clinical practice. Table 2 shows the demographic characteristics of the 37 participants. Two interviews were in Mandarin, all others were in English, but included local dialect words where appropriate. No clinician knew names of other participants, although a few suggested additional clinicians who they thought would be interested in



participating. Clinicians were also based in clinics that were spread out around the island and had no opportunity to discuss the project prior to interview. The providers were largely those who had chosen to adopt MI into their clinical practice (all but 3 practitioners said they used it on a near-daily basis), however, there were practitioners who were happy to discuss the pitfalls of using the technique.

Table 17: Provider Characteristics

	Providers (n=37)
<b>Sex</b>	
Female	29 (79%)
male	8 (21%)
<b>Race</b>	
Chinese	27 (74%)
Malay	4 (11%)
Indian	4 (11%)
Eurasian	2 (4%)
<b>Provider type</b>	
Physician	9 (24%)
Nurse	23 (62%)
Dentist	2 (4%)
Pharmacist	1 (2%)
Medical Social Worker	1 (2%)
Occupational Therapist	1 (2%)
<b>Current field of practice</b>	
Chronic Disease Management	16 (43%)
Primary Care	9 (24%)
Mental Health	4 (11%)
Health promotion/education	3 (6%)
Other Specialty	5 (14%)

In addition to these 37 interviews, an additional 5 interviews were conducted with managers. These managers were all ethnically Chinese, and oversaw either nurses or nurse managers.

### 3.2 Themes

We analyzed the material across the interview rather than look at specific responses to any given question. Many themes emerged, which we categorized into two broad areas that had several subthemes. Table 3 shows the major themes and subthemes that emerged during discussions. All themes/subthemes were mentioned by at least three respondents[51].

Table 18: Map of themes and subthemes

Provision of healthcare	Time	Institutional Performance Indicators vs patient care	
	Training	Time too short	
		Putting training into practice	
		Limited support in clinic	
	Personal Development	Existing skills with evidence	
		Surprise that it worked	
		Second language	
		Personal Stress lowered	
	Patient-based local cultural factors	Patient Expectations	Approaches to listening
			Expectations of Professions
Clinical encounter time			
'The Lecture'			
Patient Demographics		Languages spoken	
		Education level	
	Local Culture		

All probes and questions generally led to discussion of factors that related to the provision of care, or patient-centered factors in using MI. Clinician-centered subthemes focused around perceived tensions between the desire to improve professionally and the constraints of a busy hospital system. Subthemes in the 'patient' category could have utilised the idea of 'culture', as this term was used in all 37 interviews. However, for the purposes of this study, patient culture was divided into patient expectations and patient demographics, each covering patient languages and educational level. Our subcategory of 'local culture' referred to explicit non-language/race-based facets that clinicians mentioned.

All clinicians reported using Motivational Interviewing with some of their patients.

### **Theme 1: Provision of healthcare**

- **Time available to see patients**

The issue of time emerged in all 37 interviews. There was much discussion of the time pressures in Singapore, and clinicians frequently drew attention to this being different to psychotherapeutic settings in North America and Europe. For many, the experience of starting to use MI skills proved difficult as they felt that this required time to practice "*After the training I had no time to practice with patients, so I tried this MI with my friends*"(N21). For others, gaining mastery of the skills led to being more efficient in clinical practice. Several clinicians revealed that using MI saved them time "*they ask me how come I see my patient so quick*". One mental health clinician (speaking in Mandarin) explained further overleaf.

*“Do you think I could get through 60 [in-]patients in my morning clinic **without** using MI? Let me tell you – I can look at demeanor, expression and make my first reflection right then ‘Mr Tan, looks like you have had a tough week?’ – by doing this, the patients get to the point more often than not and actually save time going through a long list of questions that do not seem to get us anywhere fast.”*

*Mental Health clinician*

Several pointed to external pressures that they felt impacted on their ability to counsel effectively *‘it’s a juggling act – we have to manage both our new electronic system and maintain eye contact and do MI.’*

- **Institutional performance indicators vs patient care**

There were concerns about Key Performance Indicators (KPIs) within their respective settings that seemed at odds with learning this new skill. Several interviewees (all nurses) indicated that they were starting to practice their MI skills with friends and family-members, particularly if they were other health professionals. For some, their KPI was about seeing a set number of patients *‘unfortunately, if I am behind or I know I have a heavy morning, I have to go through the patients as fast as possible, but if I had more time I would make more efforts to use MI’*

- **Training experience**

- **Training time limited**

All care managers indicated a willingness to have longer trainings and more clinical supervision after training. Several suggested that they would probably not have said this immediately post-training, but that after starting to implement techniques into their own practice, they had further questions for trainers. One care manager had started a group to train her colleagues to support future nurses *'I don't know if it works, but I have trained junior nurses in this MI so we can all help others and talk through approaches that work'*(N5)

- **Putting training into practice**

All clinicians recognized the need to keep using MI skills in order to improve *'If you don't use it often, you somehow lose the technique - you just seem to get tongue-tied and you just can't find the right words – and your mind just goes blank, then instead of using MI you end up telling them what you think is best for them'*(N21).

Over half of the interviewees mentioned problems in implementing their training; in particular, they had issues around the perceptions of MI from their peers and management teams. Several said that their colleagues feel it is difficult *'my colleagues just think it is very complicated and we have debate about how long do we roll with resistance – my colleagues said we can't wait forever without doing something with this patient'*. They felt that there were certain 'urban myths' around MI, including that it was only used for psychotherapeutic behavior changes and that it really needed much longer than they had available in the Singaporean context. Others reported *'they[managers and colleagues] say "what you are doing is just reflection, just telling*

*patients how they feel” and they (also) say that you should tell patients the gist of the story] – why are they here for[sic]? what is diabetes, how should they control diabetes’.*

*(N13) Another comment related to a colleague’s perception ‘I even got a comment from one of my colleagues that I am concentrating too much on MI. And I felt a bit depressed, because MI is really just not telling patients what to do, it’s just accepting with them and they are quite resistant at that point... they think I should tell them A to Z about diabetes. Receiving comments like this has made me sway back to some of the health education techniques so I am torn between what I am supposed to do’.*

Positive experiences were also noted *‘I didn’t know my manager was behind me but she noticed that I was using MI and that my work with the patient was good. Managers like it when the patients are happy’ (N23) or reports that patients seemed to respond better ‘I had one patient who said they just[only] want to see me and not just anyone in the clinic’.(N32)*

- **Support in clinics**

The experience of having support in the clinics was mixed. Around half of the sample indicated that they had been selected to go on the initial training. For some, this was their first exposure even to the idea of MI. For all participants, their training agreement included a promise to share their knowledge with the rest of their clinical team once back in clinic. For some of the nurses, this was an additional stress. The combination of learning a new skill without much chance to practice and to see how

patients were responding to it was made worse by having to present to the rest of the clinical team soon after. By the time the interviews took place, 17 individuals had done some kind of 'MI training' to their peers *'I came back from training and had to make a powerpoint for my colleagues'* or *'I gave a lunchtime talk and tried to get my colleagues to do some of these things'*.

- **Personal Development**
  - **MI-consistent skills prior to training**

There was widespread surprise around clinicians' own MI-consistent behaviors prior to training. One nurse said *'I suddenly had a label for these things that I have been trying to do.'* *'I think MI didn't change so much of my practice – just a few little things'*. (N27), and *'A lot of MI practice is the same as current ideas in my profession. But going for MI training has given me the words, so I know that I am trying to build rapport and help patients develop autonomy, it is liberating to ask patients what goals they want to set. Even when they say they don't know what they want, using a few probes really gets them to think about what they would like to do.'*(O31)

- **Second language use**

Following early interviews where second language use was mentioned, this probe was included in all subsequent interviews. Every clinician was at least bilingual, with all clinicians indicating that they had attempted MI techniques in another language. Responses on the efficacy of their second language attempts in MI were mixed. There were 8 individuals who indicated that they were not confident in using a

language where they could not fully express themselves ‘you have to be able to say everything or you can’t express the small small differences in words’

*‘I use MI in all the[**four**] languages I speak. I think you have to be OK in the language. All the feelings and emotions happen in these other languages, I don’t see ANY difference[ in how you can use MI]. I also don’t see any difference in how they [patients] respond when I am using any language. The MI techniques have no problem, If you speak their language they have more replies, more to say.’ (N3)*

On the other hand, many participants said that they noticed their patients were responding as well if not better when they used a second language ‘I think I just shut up a bit more in Mandarin. I remember my Chinese teacher scolding me and I worry that I will get something wrong - I don’t think the patient notices, they seem to want to keep talking to me. I definitely let the patient say more when I speak another language – not as much temptation to chit chat.’(D17) ‘Perhaps I think more carefully about what I am going to say because it isn’t quite as natural – I might rehearse a phrase in my mind before I speak’(D20). Another clinician reported ‘Some of the elderly patients even cried during the session and then they like that I speak dialect. But then they get their diabetes under control so I don’t see them again!’(N23)



- **Personal work satisfaction**

The issue of dealing with work-related stress also emerged often. For several of the clinicians, using MI gave them permission to let the patient make decisions about their health. Several nurses mentioned that prior to MI training they had been feeling guilty that the reason their patients were not changing behavior was because their clinical skills were inadequate. *'I can cope with very angry and very frustrated patients better. I am less burn[ed] out at the end of the day. When I recognize their frustration at the wait time they agree and then they let the cat out of the bag and say 'oh, I skip my medicine, and work is very stressful then they might tell me that they actually have defaulted on payment and that is why they haven't been to clinic'(N21). This was echoed by another in-patient nurse who recalled her early years in practice 'I took on the emotional burden if the patient was not doing well, so it becomes quite emotionally taxing when you are working with people with chronic diseases. It is like a reminder that you are failing in your profession. With MI it is a relief that the patient can decide what they want for themselves, and I think they are changing. Before they just got angry when I told them you can't do this. With MI I have started to enjoy the interaction again, especially trying to end on a positive note.'* (N17)

## **Theme 2: Local cultural factors**

The second broad thematic area was clinicians' perceptions of the local cultural and demographics of their patient population. The views represented here are all clinicians speaking about patients without any patient input. Rather than divide each subtheme into barriers to using MI and areas where MI is particularly useful, it was decided to focus on each subtheme and explore the ideas that emerged during discussion.

- **Patient Expectations**

Patient expectations of the clinical encounter were mentioned by each interviewee in one way or another; and within this, four further areas were frequently expressed: approaches to listening, expectations of professions, clinical encounter time, and 'the lecture'. Many of these areas overlap and are interconnected – the approaches to listening seem to be informed by the expectations of clinical encounter time. In many respects, some of these items are also connected to the Singaporean medical system whereby appointments are short to accommodate the relatively low physician to patient ratio. What was also mentioned was that even when an active-listening approach was taken, that patients often became used to the approach, requesting to see named clinicians (unusual in Singapore), even if this would take longer, rather than have the next available appointment.

Some also mentioned that families sometimes want to have direct and immediate results (about mental health patients) *'I can understand that the families want them to do something, but having to accept that a patient is not ready is hard for the family. And for me.'*

- **Approaches to listening**

Four interviewees said that Singaporeans *'just don't expect to be listened to'*. The first of the interviewees, a nurse from a diabetes care team said that patients were worried that this unusual approach was going to mean that they would be charged more for the session. There were 8 clinicians who mentioned that the patients wanted to be given an instruction and then left to consider it.

- **Expectations of professions**

All but two of the nurses mentioned that sometimes they had a hard time working with patients because they were not physicians *'they just go through the session with me because they have to before they get to see the doctor'*. Physicians also spoke of their patients' expectations, saying that *'Sometimes it confuses patients when we throw a question back at them – rather than listening to the doctor tell them to do this do that. Most patients come in wanting an answer from us(physicians)'*(P16)

- **The lecture dance**

One clinician mentioned that there was a ritual around some of the chronic care appointments whereby both clinician and patient had their own narratives and that the interaction would typically not have any major content. This 'lecture dance' had two set roles; the clinician re-telling the same information about the disease, including a mild reprimand for not doing anything about lifestyle issues, and a level of contrition (or antagonism) on the part of the patient. Another clinician said *'it's not like you just throw patients education, you give them what they want I didn't really believe it[after training] until I went back and actually used it'*.

- **Patient Demographics**

- **Languages spoken by patients**

That patients speak different languages is a fact of Singapore life. For clinicians it can be a daily struggle in dealing with interpreters, broken English or Mandarin, and the potential for confusion in instructions about medications or in the disease that is causing a patient pain and discomfort. Thirty clinicians reported using a second language effectively and went on to say that this was extremely well-received by the patient. Clinicians found *'I didn't say anything complicated, just asked the auntie how*

*she was feeling, and reflected that her breathing must affect her walking. She was so pleased that I was trying to speak her dialect. I know I made a few mistakes, and she corrected me a few times, but she felt really engaged and seemed to know that I was doing my best to work with her '(P20). Many mentioned their lack of fluency as not being an issue 'I just speak a bit of Market Malay with my patients – DEFINITELY no jargon'(N8)*

*Others felt that MI was making them think more about their own languages 'I don't think we actually talk a lot about feelings in Tamil. With my cognitively impaired patients, they are expecting me to talk in English so I don't want to unsettle that, but with family members, yes. Speaking the language helps them feel understood'. A Malay speaker commented 'Some of these things just sound odd in Malay. The 0-10 scale is hard to convey and then the patients look like 'huh' what are you doing? But feelings and values work well.'(O3)*

*'I just do a translation from what I would say in English. I don't think it's that much of a difference. Sometimes they know we are trying to find a better word, and then they help us out'(P37)*

- **Education levels**

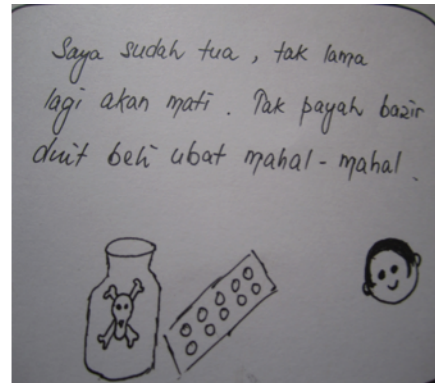
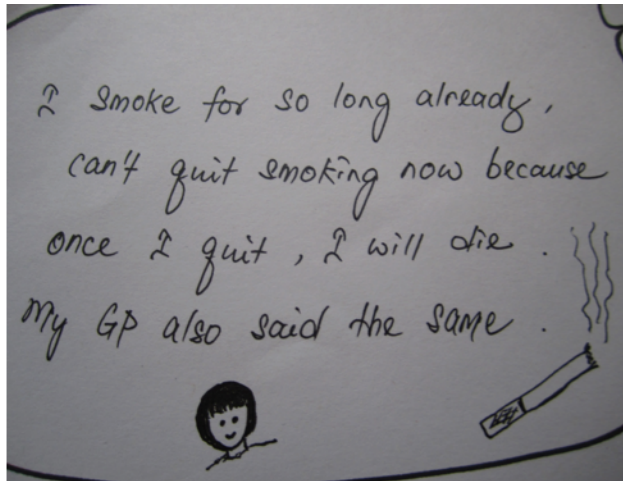
Participants reported the education level of the patient as being a factor in their decision of whether or not to use MI. *'I feel that there is a component of abstract reasoning[in MI], and some of my patients don't understand when I want to use that kind of rationale. Usually it is those who are ok to think in a more deep way, then I use MI more'*(O32)

- **Culture**

Many interviewees referred to particular 'difficult patients' and their attitudes. There seemed to be a lot of fatalism within elderly chronic disease patients, including a reported apathy that seemed to be distinct from 'sustain talk' as we currently imagine it[49]. *'They are just a bit clueless about their health – I want MI to be a 2-way thing, and if I can't get them to communicate – then I don't think it can work'*. Or from the other perspective *'it's only the patients who take a keen interest in their health and what they are doing, and I find that MI works really well with these, and I find I get quite good results'* (P3)

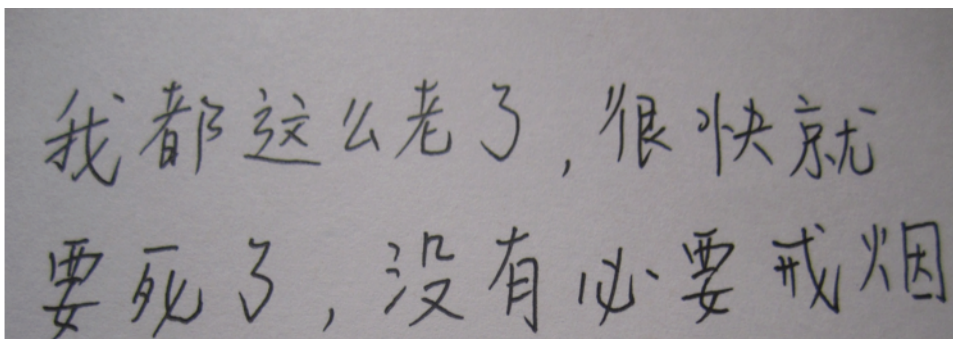
I asked one (trilingual) clinician to report how this fatalism might be expressed by a patient. Figure 3 shows the response (in English, Malay and Mandarin).

Figure 3: Singaporean fatalism expressed by a patient



Malay language version above

Chinese Language Version:



Other practitioners mentioned 'training' their patients in a new way of thinking 'when I start to use MI and some of the concepts, like the 0-10 scale, the patients think it is academic, but if I stick with it, after a few sessions they seem to get it and try a bit more... and are less apprehensive, and are more willing to make changes.'

## Discussion

Practitioners in Singapore use MI in a range of contexts and generally find it a technique that they perceive to be useful in changing health behaviors. Several themes emerged from the interviews that indicate that there are both practitioner and patient-related issues surrounding the uptake of MI post-training. There were several areas of congruence, where all our participants reported similar experiences, such as having successful attempts to use MI in at least two languages.

There were also areas of divergence, with distinct groups of practitioners within the sample. Divergent topics included time taken to use MI about a third of the sample reporting that MI helped manage a heavy clinical load. Other participants said that they did not have sufficient time to practice and use MI in their busy context. From the small sample size, there is no robust data on factors that may have moderated this divergence in views, but would be an interesting topic for further research.

Possibilities for moderators include experience and ability and could be tested with an additional study stage looking to assess competence using a validated measure.

From the practitioner and institution side, lack of time features heavily as a factor in training and in the use of MI in practice. Lack of support back in clinical practice further affects practitioners' ability to develop skills. Part of this lack of support seems to be due to MI's relative youth in Singapore – without experienced clinicians already in place to work in a supervisory role and provide guidance on using MI techniques, it is difficult for lone clinicians to keep trying to use MI techniques when



they are not confident that they have understood the content of a 2-day course. This is further exacerbated by expectations that after 2-days, the person who went on a training course has become the 'expert' and is the future point of contact for MI in their respective clinics.

Language is a central issue for patient counseling, and the choice of which language to use is something that many of the participants seemed to struggle with. Reports that MI seemed to work with patients whatever language was spoken were encouraging. The additional information that over 1/3 of the sample suggested that they found MI easier in their second language warrants further investigation.

Hypotheses given by interviewees included a feeling that they didn't know jargon words in second or third languages, and were therefore not tempted to use complicated words or linguistic forms. Two participants indicated that their own hesitancy in a second language led to them holding back during the patient encounter and reported that this allowed the patients to start to explore more reasons for change within themselves. Another participant reminded us that in Chinese there is no linguistic equivalent of Latin for the English-speaking population so medical words that may not be understood in English such as 'hypertension' or 'diabetes' are 'high blood pressure' and 'sugar urine disease' in Mandarin. While there are different registers in many languages, having a reduction in jargon could mean that the baseline communication between clinicians and patients in some languages could be more direct.

There were several areas that did not emerge as frequently as may be expected.

After indications of low levels of emotion from previous studies, the issue of emotion was not always mentioned, however, there were nurses that spoke of patients (and themselves) becoming emotional when deeper level reflections were used.

#### **4.2 Implications for Research**

Trainings of MI in Singapore seem to have been well-received, however, local outcomes-based studies would help explore how MI mechanisms such as ‘change talk’ could operate across cultures.

An examination of using MI in a second language would be very timely, not just for Singapore, but for all multilingual contexts. Discourse analysis looking at both the first and other languages of particular clinicians would allow further exploration of some of the theories put forward by participants in this study, particularly if this was accompanied by patient views on the interactions.

A further linguistic study is also recommended into how languages with different linguistic roots work with patients. In Singapore, the local variety of English, known as ‘Singlish’ has many similarities with Chinese grammar. A common question form will have ‘or not’ tagged onto the end. For ‘do you exercise?’ could be ‘take exercise or not’. In Mandarin the same question is topicalized ‘exercise, do not do?’ (运动身体做不做). We currently do not know if a question like this is perceived as closed question with a ‘yes’ or ‘no’ response, or whether this operates more like a double-sided questions, giving the respondent both options rather than just the more

judgemental English version ‘Don’t you exercise?’ Another question that emerged during the interviews was the suggestion particle in Chinese and how this might be interpreted or used with MI. The suggestion ‘particle’ is a single syllable word (吧 *ba*) that is placed at the end of a sentence that roughly translates as ‘how about it!’. The implications for coding could be significant, and need professional linguists to be involved in the understanding of both how the language works, and the emotional responses that some of these linguistic patterns elicit.

### **4.3 Implications for Training and Practice**

Local trainers are clearly needed, particularly those with local clinical experience, and example videos and statements that are appropriate to the local population.

For institutions, factoring in additional post-training supervision and confidence-building activities will also avoid clinicians feeling stranded when expected to train others in a technique that they are barely comfortable using.

### **4.4 Limitations**

This qualitative study examined 37 clinicians across Singapore. We felt that we reached saturation with the themes explored, however, we did not include any interviews with patients, nor did we have any objective measure of each clinician’s MI skills at the point of the interview. In the course of the interviews and the narratives that were told about particular patients, it was clear that there were some

misunderstandings of MI concepts that could affect those clinicians' perceptions of MI efficacy with their patients.

Our sample may not represent broader groups of clinicians in Singapore, particularly in a broader spread of clinical disciplines, as our sample was limited to predominantly primary care settings. Our sample clinicians were largely supporters of the MI approach to behavior change counseling as all reported using MI on at least some occasions. Although it was stated in the consent form and at the start of the interview that a range of views were being sought, the sample may ultimately have been skewed towards practitioners for whom MI was congruent with their existing counseling style.

A further limitation is the trainings that participants attended. Although the specific training or trainer was not recorded, most of the respondents are likely to have one of five trainers, perhaps leading to a lack of generalizability across all clinicians trained in MI.

Despite these limitations, this is the first study to explore how Singaporean clinicians use MI, and to the author's knowledge, the first qualitative study to explore the experience of using MI in a multilingual context

## Conclusion

Motivational Interviewing was well received by clinicians in Singapore. There were distinct areas of congruence around a greater need for post training support, but there were also areas of divergence including the level of competence required in a language to be an effective counselor, and the extent to which MI can actually reduce time taken to counsel in busy clinical settings.

Our findings suggest that motivational interviewing is an appropriate counseling tool in both multilingual contexts and where underlying culture is distinct from the US, European and Australian cultures that dominate the research literature, and that areas such as Singapore can make an important contribution to the literature about MI implementation, training, and clinical outcomes.

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## Conclusion

The three chapters in this dissertation have examined different aspects of motivational interviewing in clinical settings.

From the meta-analysis, it seems that MI is a suitable and exciting clinical technique for behavior change and for the prevention and management of chronic disease. The range of settings and clinicians in the sample of studies indicates that the promise shown for MI in medical settings is well founded. Several directions for future research are recommended, particularly around how physicians may use MI in brief encounters.

The OnePass measure for clinical competence in MI, in chapter two, showed great promise as a reliable and valid tool. The high levels of inter-rater reliability despite minimal measure-specific training and benchmarking of the tool warrants further examination.

Finally, the Singapore study has shown the potential for new research directions within the field of MI along linguistic and cultural lines. From the clinicians interviewed here, there is a clear indication that MI fits into this multilingual, non-western clinical setting, and at least anecdotally, there is a perception that the technique has an impact on patient outcomes also.

The evidence-based for motivational interviewing is strengthening, but there are still research questions that require more examination. With changing global boundaries and increasing numbers of interactions occurring between individuals with different cultural and linguistic backgrounds