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Effectiveness of Motivational Interviewing on adult behaviour change in health and social care settings: A systematic review of reviews

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Abstract

Background

The challenge of addressing unhealthy lifestyle choice is of global concern. Motivational Interviewing has been widely implemented to help people change their behaviour, but it is unclear for whom it is most beneficial. This overview aims to appraise and synthesise the review evidence for the effectiveness of Motivational Interviewing on health behaviour of adults in health and social care settings.

Methods

A systematic review of reviews. Methods were pre.specified and documented in a protocol (PROSPERO–CRD42016049278). We systematically searched 7 electronic databases: CDSR; DARE; PROSPERO; MEDLINE; CINAHL; AMED and PsycINFO from 2000 to May 2018. Two reviewers applied pre-defined selection criteria, extracted data using TIDIER guidelines and assessed methodological quality using the ROBIS tool. We used GRADE criteria to rate the strength of the evidence for reviews including meta-analyses.

Findings

Searches identified 5222 records. One hundred and four reviews, including 39 meta-analyses met the inclusion criteria. Most meta-analysis evidence was graded as low or very low (128/155). Moderate quality evidence for mainly short term (<6 months) statistically significant small beneficial effects of Motivational Interviewing were found in 11 of 155 (7%) of meta-analysis comparisons. These outcomes include reducing binge drinking, frequency and quantity of alcohol consumption, substance abuse in people with dependency or addiction, and increasing physical activity participation.
Conclusions
We have created a comprehensive map of reviews relating to Motivational Interviewing to signpost stakeholders to the best available evidence. More high quality research is needed to be confident about the effectiveness of Motivational Interviewing. We identified a large volume of low quality evidence and many areas of overlapping research. To avoid research waste, it is vital for researchers to be aware of existing research, and the implications arising from that research. In the case of Motivational Interviewing issues relating to monitoring and reporting fidelity of interventions need to be addressed.

Introduction
There is overwhelming epidemiological evidence that health behaviour such as smoking, substance abuse (drugs and alcohol), physical inactivity, and unhealthy eating are associated with increased morbidity and mortality. The cost to the UK NHS for diseases associated with poor diet, physical inactivity, smoking, alcohol and obesity are estimated to be in excess of £12 billion [1]. The challenge of addressing unhealthy lifestyle choice is complex and requires sustained behaviour change. The UK NICE (2014) guidelines [2] recommend a range of behaviour change approaches, guided by a taxonomy of interventions [3], aimed at changing health-related behaviour of individuals, communities or whole populations.

Motivation to change is a key component of the behaviour change process as it guides and maintains goal-related behaviour [4]. One approach to change motivation and subsequent behaviour is Motivational Interviewing, introduced by William Miller in 1983 to help people with alcohol problems change their drinking behaviour [5]. The approach was developed further in the 1990s into “A collaborative conversation style for strengthening a person’s own motivation and commitment to change” [5]. Motivational Interviewing aims to explore and resolve ambivalence that people might have about health behaviour in favour of change. It encourages people to say why and how they might change and pertains both to a style of relating to others and a set of skills to facilitate that process. The four overlapping processes involve: 1) engaging in a working relationship; 2) focusing on a problem to change; 3) evoking the person’s desire to change; 4) planning the change [5]. In 1997 an international organisation of trainers established ‘The Motivational Interviewing Network of Trainers (MINT)’ with an aim to improve the quality and effectiveness of counseling and consultations for professional delivering Motivational Interviewing. The organisation has grown to represent 35 countries and 26 languages, which demonstrates the global popularity of this intervention. Some reviews report positive outcomes for Motivational Interviewing and suggest it could be useful for a wide range of behavioural and health problems [6–9] whilst others are more cautious in their conclusions and recommendations [10–12].

Many different health care professionals and other groups are using behaviour change interventions including Motivational Interviewing to help people change or adapt their behaviour. However, it is unclear for which behavioural problems and populations Motivational Interviewing is most beneficial, or in some cases, where there is evidence of no effect or possible harm. This overview aims to identify, appraise and synthesise the review evidence for the effectiveness of Motivational Interviewing on health behaviour of adults in a wide range of health and social care settings to answer the following question;

What is the strength and quality of the current evidence to support the use of Motivational Interviewing to change adult behaviours in health and social care settings?
This question is important to guide health care professionals, researchers and other stakeholders to the most effective and worthwhile interventions for patients.

Methods

Design

We conducted a systematic review of existing reviews (referred to as an overview [13]). An overview synthesises the evidence from more than one systematic review at a variety of different levels, including the combination of different interventions, different outcomes, or people from different populations with different conditions.

Search methods

We systematically searched the following electronic databases from January 2000 to 28th May 2018; Cochrane Database of Systematic Reviews (CDSR); Database of Reviews of Effects (DARE); PROSPERO (an international prospective register of systematic reviews); MEDLINE; CINAHL; AMED and PsycINFO. The search string was adapted for each database. (See Appendix 1 for Medline search). A comprehensive search combined key terms using Boolean operators (e.g. AND, OR) for: Intervention (e.g. "motivational interviewing," "motivational enhancement") and Review type (e.g. "systematic review," "meta-analysis," "review literature," "qualitative systematic review," "evidence synthesis" OR "realist synthesis", "qualitative AND synthesis", "meta-synthesis" OR "meta synthesis") or "meta-ethnography" OR "meta ethnography" OR "meta study"). Truncated forms of these terms and alternative spellings were included. To be eligible for inclusion, reviews met the following criteria:

Inclusion criteria.

- Reviews using structured, pre-planned methods to synthesise research studies addressing a clearly defined topic or research question (which could comprise either quantitative, qualitative or mixed methodology)
- Published from January 2000
- Interventions described as Motivational Interviewing or Motivational Enhancement Therapy (MET) delivered in any format (e.g. face to face, online, group, text or telephone)
- English language
- Interventions focused on adults.

Exclusion criteria.

- Letters, commentaries, expert opinion, theoretical and "non-systematic" or unstructured reviews e.g. reviews without an aim that did not clearly describe the search strategy, selection criteria and quality assessment employed.
- Reviews focused solely on children and adolescents under the age of 18 years
- Reviews focused on Motivational Interviewing intervention to change professional or organisational group behaviour.
- Reviews focused on combined psychological interventions e.g. Motivational Interviewing combined with Cognitive Behavioural Therapy.
Identification of studies

Members of the review team (PC / SM) ran the search strategy and then examined all titles to exclude clearly irrelevant papers. Two reviewers (PC and HF) independently reviewed the abstracts of all potential records identified from the electronic searches and excluded those not meeting the inclusion criteria. Inter-rater reliability was assessed for agreement of abstract screening.

Two reviewers (PC and HF) independently assessed full papers for all potentially relevant reviews. Full text papers ranked as irrelevant by both reviewers were excluded at this stage of the screening process. The final selection of full text papers (judged as relevant or unsure) were discussed at a consensus meeting, with a third reviewer (MM or AP) as required.

Data extraction

Three reviewers (PC, HF and EC) independently extracted the following information: review question or aims; types of studies included; characteristics of participants and numbers included; interventions details. The TIDieR framework[14] was used to guide reporting of interventions components and comparators. Two reviewers (HF and PC) checked all the extracted data and discussion between the two reviewers resolved any disagreement; with assistance from a third reviewer (AP) when necessary. A data extraction form (excel) specifically developed by the overview author team was used to collate the data.

Categorisation of reviews

Two reviewers (PC and HF) categorised each review into one of four of the following domains depending on the focus of the review.

- Domain 1: Stopping or preventing an unhealthy behaviour
- Domain 2: Promoting healthy behaviour for a specific problem
- Domain 3: Behaviour change for multiple health related problems and/or multiple behaviour problems
- Domain 4: Behaviour change in specific settings

Reviews in Domain 1 and 2 were then sub-grouped by HF and PC according to the main health behaviour or problem.

Assessment of quality of reviews

Two reviewers (HF and PC) independently assessed the methodological quality of included reviews using the ROBIS tool [15]. Any disagreement was resolved through discussion between the two reviewers. The tool covers four domains to detect bias in systematic reviews relating to study eligibility criteria; identification and selection of studies; data collection and study appraisal; synthesis and findings. The full result of assessment of bias aids transparency and aims to help researchers judge risk of bias in the review process, results and conclusions.

Meta-analyses data extraction

One reviewer (PC) extracted comparative data for individual and combined outcomes from any review that included meta-analyses. Data exploring effectiveness of Motivational Interviewing as the main intervention compared with any other intervention or control was extracted. One reviewer (HF) checked the data entry.

This included the following data: Number of trials and participants in the meta-analysis; Measure of effect (e.g. effect size, mean difference, standardised mean difference, relative risk); Measure of variability (95% confidence intervals) and Measure of heterogeneity (I-squared).
Three reviewers (AP, PC and HF) checked the quality assessment of individual studies reported in the reviews and considered the results when grading the evidence. We used the GRADE (Grades of Recommendation, Assessment, Development, and Evaluation) criteria to assess whether the quality of the evidence presented in the meta-analyses was high, moderate, low or very low [16] for all available comparator data within each review. This involved judgement of risk of bias relating to study design, imprecision, inconsistency, indirectness, and publication bias [17]. In addition, one reviewer (PC) extracted any data that included exploration of moderator variables and tabulated effect size for each comparator.

**Meta-analysis synthesis**

For reviews including a meta-analysis two reviewers (PC and HF) independently checked the overlap in studies within all the reviews and resolved any uncertainty through discussion. We excluded data superseded by a more up-to-date review (e.g. where a Cochrane review had been updated while we were conducting the overview), or in cases where an overlapping review was conducted with the same review question, we selected the higher quality review judged using the ROBIS quality assessment tool [15]. We tabulated the intervention, comparison, outcome, number of studies and participants’ data relating to effectiveness and the GRADE of evidence [18]. Using the data relating to effectiveness we noted whether there was statistically significant evidence of benefit or harm for each outcome reported in the meta-analyses, or if there was no evidence of benefit or harm (no statistically significant effect).

**Narrative review synthesis**

For all systematic reviews without meta-analysis data (defined as narrative reviews), we summarised key findings. We systematically documented and explored the conclusions reported by the authors of the reviews. Where these reviews included overlapping aims and outcomes, we compared conclusions; where there was a discrepancy in conclusions, we focused conclusions of the most up-to-date and highest quality reviews (judged using ROBIS) [15]. We considered whether these were in agreement with the results of any related meta-analyses reported in other reviews and focused our conclusions on the most up-to-date and high quality data.

**Results**

The search identified 5222 records; we screened 2852 titles and removed 2363 obviously irrelevant records after removing duplications. Two reviewers screened 489 abstracts and 235 full text articles, excluded 131 reviews and extracted data from the remaining 104 reviews. The inter-rater reliability for abstract screening was 92%. The PRISMA flow diagram (Fig 1) shows the flow of literature through the searching and screening process.

**Description of included reviews**

Two reviewers categorised the reviews into four domains. The number of reviews in each domain are represented in Fig 2.

- **Domain 1.** Stopping or preventing an unhealthy behaviour including smoking cessation (n = 11) [11, 12, 19–43], substance misuse for general population (alcohol and drugs) (n = 23) [28, 29, 38–58], substance misuse for people with mental health problems (n = 8) [31, 33, 35–37, 59–61] and people with gambling addiction (n = 3)[7, 62, 63] (Total = 45).

- **Domain 2.** Promoting healthy behaviour for a specific problem including; management of oral health (n = 5) [64–68], eating disorders (n = 3) [10, 69, 70], weight loss management (n = 4) [71–74], management of metabolic disease (Type 2 diabetes) (n = 6) [75–80],
Fig 1. PRISMA Study flow diagram. MI = Motivational Interviewing; CBT = Cognitive Behavioural Therapy.

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management of neurovascular (stroke) and cardiovascular disease (n = 3) [81–83], management of sexual health (n = 5) [84–88], adherence to medication (n = 9) [89–97] and engagement with interventions; cardiac care [98], health screening [99] and mental health interventions [100] (n = 3), cancer care (n = 1) [101], musculoskeletal problems [102, 103] (n = 2), irritable bowel disorder [104] (n = 1).

Domain 3. Behaviour change for multiple health related problems and/or multiple behaviour problems (n = 9) including one recent review of Technology Delivered Motivational Interviewing (TDMI) [105] and eight reviews focused on various health problem such as excess drinking, smoking, and physical inactivity [8, 9, 106–111].


**Domain 1: Reviews focused on interventions aimed at preventing unhealthy behaviour**

**Smoking cessation.** Of the 11 reviews [11, 12, 19–27], two reviews focused on reducing exposure of smoke to children [11, 20], one on smoking during pregnancy [19], three on
general smoking cessation [22–24], two were carried out in emergency care settings [25, 26]. One review was updated from an earlier review of Motivational Interviewing to support smoking cessation [119] with the addition of 14 studies since 2010 [12]. One review focused on smokeless tobacco users although only one out of 34 trials included Motivational Interviewing [21].

**Substance misuse.** Thirty-one reviews assessed substance misuse/abuse of which 13 focused primarily on alcohol related problems [28, 39, 40, 43–46, 49, 50, 52, 53, 55, 58]. Reviews in this domain included different populations and problems [29, 38, 41, 42, 48, 56, 57] [53, 54]; both alcohol and drug abuse users [56]; young adults [39]; pregnant women and drug use [38], two reviews focused on cannabis use [41, 42]; one focused on offenders and treatment retention [29]. Eight reviews describe substance misuse in people with co-existing mental health disorders [31–37]. Jiang et al (2017) focused on brief non-face-to-face interventions e.g. telephone.


**Domain 2: Reviews focused on interventions aimed at promoting healthy behaviour for a specific problem**

**Oral hygiene behaviour.** Five reviews focused on oral hygiene, 3 compared conventional oral hygiene advice with Motivational Interviewing interventions [64, 65, 68]. One compared periodontal therapy alone with Motivational Interviewing and periodontal therapy combined [66], and one included a meta-analysis of psychological treatment for people with poor oral health [67].

**Eating disorders.** Three reviews focused on eating disorders of mainly female participants e.g. Anorexia nervosa and bulimia nervosa [10, 69, 70].

**Weight management behaviour.** Three reviews focused on changing diet and physical activity for weight management in obese adults [71, 72, 74] and one investigated the management of weight gain during pregnancy [73].

**Management of diabetes.** Six reviews focused on the management of people with diabetes. They include reviews focussed on evidence for; improving health behaviour in the management of diabetes [75], promoting glycaemic control [77] and lifestyle modifications programmes for metabolic risk [78]. Four other reviews categorised in Domain 3 (multiple health problems /behaviours) and Domain 4 (Behaviour change in specific settings) assessed the effectiveness of Motivational Interviewing for diabetes management alongside obesity and other health related problems [71, 91, 114, 118].

**Management of neurovascular disorders and cardiovascular disease (CVD).** Three reviews focused on behavioural interventions for neurovascular disorders, but the reviews only included 11 trials in total evaluating the effectiveness of Motivational Interviewing. One review investigated Motivational Interviewing for the management of activities of daily living for stroke victims, identifying one study only [81]. Hildebrand (2015) reported one of 39 trials that incorporated Motivational Interviewing into interventions to support occupational therapy for stroke victims [82]. Lee et al (2016) [83] investigated lifestyle modification, physiological and psychological outcomes for people diagnosed with Cardiovascular disease. Overall there is insufficient evidence in this group to make firm conclusions about effectiveness of Motivational Interviewing.
**Sexual health behaviour.** Five reviews focused on promoting safe sexual behaviours [84–88]. Two reviews focused specifically on sexual health in gay men [84, 85]. One review focused on the effectiveness of Motivational Interviewing on contraceptive use in women [87].

**Adherence to medication.** Adherence to medication was assessed for different populations and health problems. Hu et al (2014) assessed interventions including Motivational Interviewing to increase medication adherence in racial and ethnic minority groups [94]. Five reviews assessed medication adherence for patients with HIV [90, 94, 96, 97, 120]. Two recent reviews with meta-analyses assessed the effectiveness of Motivational Interviewing to enhance medication adherence for adults with chronic diseases and health problems [93, 95].

**Engagement with interventions.** Three reviews focused on engagement with a specific intervention [98–100]; one specifically on cardiac rehabilitation. Karmali et al (2014) assessed adherence to cardiac rehabilitation but only one trial of Motivational Interviewing was identified in this review [98]. A review with meta-analysis of outcomes relating to adherence by Lawrence et al (2017) [100] investigated individuals’ uptake of mental health interventions. Miller et al (2017) [99] assessed the efficacy of Motivational Interviewing to improve health screening for various problems e.g. breast screening, uptake of colonoscopy.

In addition, two other reviews grouped in Domain 1 and 2 assessed the effect of Motivational Interviewing on adherence to drug management programmes in offender populations [29] and adherence to treatment for chronic pain [102].

**Management of musculoskeletal problems.** Two reviews focused on musculoskeletal problem [102, 103] with some overlap of trial within the reviews. In the most recent review, Alperstein and Sharp (2016) identified 7 trials focused on pain outcomes and adherence to treatment in adults with various musculoskeletal problems e.g. low back pain, rheumatoid arthritis [102].

**Management of irritable bowel disorders.** One review explored the use of Motivational Interviewing to improve outcomes for people with irritable bowel disorders including quality of life measures [104].

**Cancer care.** One review focused on Motivational Interviewing to address various lifestyle behaviours and health problem associated with cancer such as fatigue, weight problems, and physical activity participation [101].

**Domain 3: Reviews that focused on multiple health related problems and / or multiple behaviour problems**

Nine reviews focused on behavioural interventions for people with multiple health problems [8, 9, 105–111]; These included multiple risk factors for cardiovascular disease [110]; diet, exercise, diabetes and oral health [109]; alcohol, drugs, diet and exercise [106, 111]; substance abuse, smoking, HIV risk, diet and exercise [107] multiple behaviour problems [8, 108] and multiple health outcomes [9]. Shingleton et al (2016) evaluated the efficacy of technology delivered Motivational Interviewing interventions in a mixed population from different socioeconomic backgrounds [105].

**Domain 4: Reviews focused on behaviour change interventions in specific settings**

Eight reviews reported behaviour change interventions delivered in specific settings [6, 112–118]. One included a combination of healthcare settings [118]; one focused on medical care settings [6]; four were carried out in primary care [114–117]. Merz et al (2015) [113] and Kohler and Hofmann (2015) [112] focused on young adults in emergency care units. In addition, two
reviews described in Domain 1 (preventing an unhealthy behaviour) also reported smoking cessation in emergency department settings [25, 26].

**Review characteristics and quality assessment**

Tables 1–4 report details of the review characteristics and implications for clinical practice and research. Further details of the interventions using the ‘Template for Intervention Description and Replication (TIDieR) [14] are reported in S1 Table. Of the 104 reviews 40 were judged by two authors (PC and HF) as overall low risk of bias [7, 11, 12, 20, 21, 25–27, 30, 35, 38, 41, 44, 47–49, 51, 53, 54, 56, 57, 59, 65, 71, 81, 83, 84, 89, 91–94, 97, 98, 100, 102, 111, 113–115]. Fig 3 summaries the risk of bias across all reviews. S2 Table reports the assessment of bias for each review individually using the ROBIS tool [15].

**Results of meta-analyses**

Thirty-nine reviews reported meta-analyses but it was not possible to extract data from all. [6–9, 12, 21–23, 26, 27, 30, 38, 39, 41, 45, 46, 48, 49, 56–58, 67, 71, 73, 74, 77, 81, 84, 87, 91, 93, 95, 100, 102, 106, 108, 111, 112, 116]. Table 5 provides a brief summary of results from the reviews with pooled data comparisons.

Of the 155 meta-analysis comparisons that were extracted, we found no high quality evidence. Twenty seven comparisons provide moderate quality evidence according to the GRADE criteria. Most of this evidence was categorised in Domain 1 (Stopping an unhealthy behaviour). Further details of the outcomes for the moderate quality evidence are reported in Table 6.

Seventy one comparisons provided low quality evidence and 57 provide very low quality evidence judged by the GRADE criteria. S3 Table summarises the comparisons that were judged as providing low or very low quality evidence. The key reasons for downgrading the evidence to low or very low quality primarily relate to: risk of bias of the review was unclear; heterogeneity was judged to be moderate to high, or confidence intervals very large; volume of evidence was judged to be insufficient to support a definitive conclusion and concerns about the quality of the trials included within the comparison judged by review authors.

**Moderate quality evidence for effectiveness of Motivational Interviewing**

Table 6 summarises the 27 comparisons, which provide moderate quality evidence for Motivational Interviewing interventions judged from six reviews [12, 49, 56, 58, 84, 111]. Eleven of these 27 comparisons (7% (11 of 155) of all meta-analyses’ comparisons) provide moderate quality evidence for mainly short term (<6 months) statistically significant beneficial effects of Motivational Interviewing. The remaining 16 comparisons demonstrate no benefit or harm, compared with a control of usual care or other active interventions. Moderate quality evidence of a beneficial effect of Motivational Interviewing was available for;

*Alcohol use*. 13 comparisons from two reviews [49, 58] explored the effect of Motivational Interviewing on outcomes relating to alcohol use in mixed populations. Eight of the 13 comparisons provide consistent evidence that Motivational Interviewing has a beneficial effect on outcomes relating to the frequency and/or volume of alcohol consumption, for short term outcomes (<4 months), but the evidence relating to sustained (>4 months) outcomes is less consistent. Comparisons relating to risky behaviour and drink driving demonstrated no benefit (or harm) of Motivational Interviewing. There is evidence of beneficial effects from one review of young adults (<25 years), for reducing binge drinking, frequency, quantity of alcohol consumption and peak blood alcohol concentration[58].
Table 1. Characteristics of included reviews of Motivational Interviewing (MI) and summary of findings for Domains 1 (Smoking Cessation). Abbreviations: MI = Motivational Interviewing, BMI Brief Motivational Interviewing, RCT = randomised controlled trial, MET = Motivational Enhancement Therapy.

<table>
<thead>
<tr>
<th>Review author</th>
<th>Objective</th>
<th>Type and Number of studies</th>
<th>Participants</th>
<th>Intervention /comparisons</th>
<th>Outcomes</th>
<th>Authors conclusions</th>
<th>Meta-analysis (M-A) or Narrative review (NR) and overall Risk of Bias (ROBIS score)</th>
<th>Implication for clinical practice and research (Interpretation of authors of overview)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basi et al (2014)[11]</td>
<td>To determine the effectiveness of interventions aiming to reduce exposure of children to environmental tobacco smoke. 57 controlled trials (n = unclear)</td>
<td>Parents, family members, child care workers and teachers</td>
<td>MI / Usual care — Placebo</td>
<td>Primary outcome: children’s exposure to tobacco smoke</td>
<td>Inconclusive</td>
<td>NR (LOW)</td>
<td>There is moderate quality evidence (assessed by GRADE) that MI interventions provide small beneficial effects in smoking cessation in the short and long term (4–12 months) compared to no treatment. Effects are likely to be small. (See Tables 3 &amp; 4) Further high quality research focusing on training and competency, fidelity, delivery and dose in different settings for specific groups is justified. Windows of opportunity to promote smoking cessation should be investigated further e.g. in specific antenatal groups and during pregnancy.</td>
<td></td>
</tr>
<tr>
<td>Baxter (2011) [19]</td>
<td>Interventions aimed at smoke-free homes in pregnancy and in the year following childbirth. 1/17 RCT included MI (n = 291)</td>
<td>Pregnant women</td>
<td>MI / Control group received ‘self-help’ materials via post.</td>
<td>Exposure levels of environmental nicotine at 6 months in TV room and kitchen</td>
<td></td>
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<tr>
<td>Behbod et al (2015) [20]</td>
<td>To determine the effectiveness of interventions designed to reduce exposure of children to environmental tobacco smoke, or ETS. 78 RCT’s n total. 15 used MI n &gt; 3000</td>
<td>Parents / family members, child care workers, and teachers</td>
<td>MI /BMI / Telephone delivered MI/ control, TAG other psychological interventions.</td>
<td>Tobacco smoke exposure / clinical symptoms e.g. of asthma</td>
<td>Only 26/78 studies reported benefits. Mixed results for MI. One study reduced children’s asthma symptoms.</td>
<td>NR (UNCLEAR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ebbert et al (2015) [21]</td>
<td>To assess the effects of behavioural and pharmacologic interventions for the treatment of smokeless tobacco (ST) use. RCT 1/34 studies used MI (n = 60)</td>
<td>Adult male ST users</td>
<td>MI / Usual care control, given information on how to sign up for an abstinence class</td>
<td>Complete abstinence from tobacco use six months or more after the start of the intervention</td>
<td>Only 1 trial of MI and high chance of bias. Insufficient evidence.</td>
<td>NR (LOW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heckman et al (2010) [22]</td>
<td>To investigate the efficacy of interventions incorporating MI for smoking cessation. 31 RCT’s and CRT (n = 9,485)</td>
<td>Mixed adults including pregnant/ postpartum women</td>
<td>MI /Brief advice plus some written materials.</td>
<td>Primary outcomes: abstinence or reduction in smoking</td>
<td>MI for smoking cessation is effective</td>
<td>M-A (HIGH)</td>
<td></td>
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<tr>
<td>Hettema et al 2010 [23]</td>
<td>To focus solely on smoking cessation and examine potential moderating factors to inform clinical practice guidelines. 31 studies (n = 8165)</td>
<td>Mixed adults of different race and sex</td>
<td>MI (Another treatment or no treatment control or placebo control).</td>
<td>Variable smoking abstinence outcome.</td>
<td>MI significantly outperformed comparison conditions at long-term follow-up</td>
<td>M-A (UNCLEAR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lindson-Hawley et al (2015) [12]</td>
<td>To determine whether or not MI promotes smoking cessation. 28 studies (n = &gt; 16,000)</td>
<td>Mixed population</td>
<td>MI / Brief advice or usual care in the trials.</td>
<td>Abstinence from smoking after at least six months follow-up</td>
<td>MI effective but possibility of publication or selective reporting bias. 2/28 studies included cost effectiveness but no clear conclusion could be drawn</td>
<td>M-A (LOW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mantzler et al (2012) [24]</td>
<td>To compare three different dimensions of MI at facilitating smoking cessation. 17 studies (n = 11600)</td>
<td>Adults between 18 and 64 years</td>
<td>MI strategies / variable controls e.g. written materials and education</td>
<td>Self-reported outcomes and biological measures</td>
<td>Inconclusive</td>
<td>NR (UNCLEAR)</td>
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<tr>
<td>Pelletier et al (2014) [25]</td>
<td>Effectiveness of smoking cessation interventions for patients in the adult or paediatric emergency care setting.</td>
<td>4 RCTs included MI (n = 74–1044)</td>
<td>Adults in emergency setting</td>
<td>MI plus brochures / control brochures</td>
<td>Smoking cessation</td>
<td>Inconclusive</td>
<td>NR (LOW)</td>
<td></td>
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<tr>
<td>Rabe et al (2013)[26]</td>
<td>To examine the efficacy of Emergency Department—Initiated Tobacco Control</td>
<td>7 RCTs (n = 1,986)</td>
<td>Adults age range from 18–78 years</td>
<td>MI plus booklets (Usual care, brief advice only; brief counselling</td>
<td>Smoking abstinence</td>
<td>MI increased abstinence up to 12 months.</td>
<td>M-A (LOW)</td>
<td></td>
</tr>
<tr>
<td>Stead et al 2014[27]</td>
<td>To assess the effect of combining behavioural support and medication to aid smoking cessation, compared to a minimal intervention or usual care or usual care.</td>
<td>53 studies, 16 included MI (n = &lt;25000)</td>
<td>Adult smokers, 35 to 68% female participants with average age from low 40’s to mid-50.</td>
<td>MI strategies / usual care or brief advice or less intensive</td>
<td>Abstinence from smoking after at least six months of follow- up.</td>
<td>Combination of pharmacotherapy with behavioural support improves quit rates compared to no treatment or a minimum intervention.</td>
<td>M-A (LOW)</td>
<td></td>
</tr>
<tr>
<td>Domain 3: Tobacco Use (Alcohol and Drugs)</td>
<td>Background</td>
<td>Objective</td>
<td>Participants</td>
<td>Interventions</td>
<td>Outcomes</td>
<td>Authors’ conclusion</td>
<td>Notes</td>
<td>Implications for clinical practice and research (Importance of each feature/caveat)</td>
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</tr>
<tr>
<td>Apiah et al. (2019) [34]</td>
<td></td>
<td>To assess the effect of MI intervention on reducing alcohol consumption among college students.</td>
<td>13 RCTs (n = 1800)</td>
<td>College students with mean age of 23–25 years</td>
<td>Alcohol use</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
<td>MI may be considered as a viable intervention to reduce alcohol consumption among college students.</td>
</tr>
<tr>
<td>Brempong, et al. (2011) [35]</td>
<td></td>
<td>To systematically assess the efficacy of interventions for reducing alcohol consumption.</td>
<td>8 RCTs (n = 1904)</td>
<td>College students, mean age of 25 years.</td>
<td>Alcohol use</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
<td>MI may be considered as a viable intervention to reduce alcohol consumption among college students.</td>
</tr>
<tr>
<td>Barrio et al. (2012) [36]</td>
<td></td>
<td>To make implications for future research initiatives.</td>
<td>11 studies (N = 1674)</td>
<td>College students/ people attending university</td>
<td>Amount and frequency of alcohol consumption, Blood alcohol concentration (BAC).</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
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<tr>
<td>Branscum et al. (2015) [37]</td>
<td></td>
<td>To make implications for future research initiatives.</td>
<td>11 RCTs (n = 1674)</td>
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<td>Blood alcohol concentration (BAC).</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
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<tr>
<td>Carey et al. (2010) [38]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>11 RCTs (n = 1674)</td>
<td>College students/ people attending university</td>
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</tr>
<tr>
<td>Chatter et al. (2017) [39]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>25 RCTs; 12 MI or MET</td>
<td>College students with mean age of 25 years.</td>
<td>Alcohol use</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
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<td>MI may be considered as a viable intervention to reduce alcohol consumption among college students.</td>
</tr>
<tr>
<td>Cooper et al. (2014) [40]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>23 RCTs. (15 included MI</td>
<td>College students with mean age of 25 years.</td>
<td>Alcohol use</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
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</tr>
<tr>
<td>Foxcroft et al. (2009) [41]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>8 RCTs (n = 17901)</td>
<td>College students/ people attending university</td>
<td>Alcohol use</td>
<td>MI is effective in reducing alcohol use among college students, with a significant reduction seen in participants who received MI compared to controls.</td>
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</tr>
<tr>
<td>Joseph and Basu et al. (2015) [42]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>11 RCTs (n = 1674)</td>
<td>College students/ people attending university</td>
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<tr>
<td>Gates et al. (2016) [43]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>23 RCTs. (15 included MI</td>
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<td>Tanner-Smith et al. (2015) [44]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>8 RCTs (n = 17901)</td>
<td>College students/ people attending university</td>
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<tr>
<td>Carelli et al. (2015) [45]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>11 RCTs (n = 1674)</td>
<td>College students/ people attending university</td>
<td>Alcohol use</td>
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<td></td>
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<tr>
<td>Chatter et al. (2015) [47]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>11 RCTs (n = 1674)</td>
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<tr>
<td>Cooper et al. (2014) [48]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>23 RCTs. (15 included MI</td>
<td>College students with mean age of 25 years.</td>
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<td>Gates et al. (2016) [49]</td>
<td></td>
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<td>23 RCTs. (15 included MI</td>
<td>College students with mean age of 25 years.</td>
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<tr>
<td>Foxcroft et al. (2009) [50]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>8 RCTs (n = 17901)</td>
<td>College students/ people attending university</td>
<td>Alcohol use</td>
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</tr>
<tr>
<td>Joseph and Basu et al. (2015) [51]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>11 RCTs (n = 1674)</td>
<td>College students/ people attending university</td>
<td>Alcohol use</td>
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</tr>
<tr>
<td>Gates et al. (2016) [52]</td>
<td></td>
<td>To evaluate the efficacy of MI in reducing alcohol consumption.</td>
<td>23 RCTs. (15 included MI</td>
<td>College students with mean age of 25 years.</td>
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</tr>
</tbody>
</table>

(Continued)
## Table 2. (Continued)

<table>
<thead>
<tr>
<th>Domain 1: Substance Abuse (Alcohol and Drugs)</th>
<th>Objective</th>
<th>Type and Number of Studies</th>
<th>Participants</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Outcomes</th>
<th>Authors' Conclusions</th>
<th>Meta-analysis (A1) or Narrative review (B1) and overall RCTs of the disorder?</th>
<th>Implications for clinical practice and research (Interpretation of authors of overview)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baker et al (2012) [33]</td>
<td>To determine whether psychological interventions that reduce alcohol consumption among people with co-existing mental health and substance abuse disorders are effective.</td>
<td>8 RCTs (n = 318)</td>
<td>Adults with common and severe mental health disorders and substance misuse e.g. Alcohol consumption measured by self-report, including quantity or frequency measures, or composite scores.</td>
<td>MI vs. control</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>Evidence is too mixed to draw any conclusions.</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>Narrative reviews suggest there is some support that MI may help reduce substance abuse in the short term, and there is potential for effects of MI for reducing substance misuse for people with mental health problems but further high quality research is needed, focusing on long-term outcomes.</td>
<td></td>
</tr>
<tr>
<td>Baker, et al (2012) [34]</td>
<td>Target alcohol misuse among people with co-existing mental health and substance abuse disorders.</td>
<td>6 RCTs (n = 318)</td>
<td>Adults with common and severe mental health disorders and substance misuse e.g. Alcohol consumption measured by self-report, including quantity or frequency measures, or composite scores.</td>
<td>MI vs. control</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>Evidence is too mixed to draw any conclusions.</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>Narrative reviews suggest there is some support that MI may help reduce substance abuse in the short term, and there is potential for effects of MI for reducing substance misuse for people with mental health problems but further high quality research is needed, focusing on long-term outcomes.</td>
<td></td>
</tr>
<tr>
<td>Cleary et al (2009) [35]</td>
<td>To examine the clinical effectiveness of MI to reduce pathological gambling.</td>
<td>3 RCTs (n = 109)</td>
<td>Patients with psychiatric disorders MI / TAU; psycho-education self-help booklet</td>
<td>MI vs. TAU</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>MI was effective in reducing pathological gambling severity, although not necessarily other symptoms of depression.</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>Narrative reviews suggest there is some support that MI may help reduce pathological gambling severity, although not necessarily other symptoms of depression.</td>
<td></td>
</tr>
<tr>
<td>Ginkel et al (2010) [36]</td>
<td>To examine the clinical effectiveness of MI and MI/Placebo in the management of post stroke depression.</td>
<td>1 RCT (n = 109)</td>
<td>Adults with stroke MI/ Care as usual</td>
<td>MI vs. usual care</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>MI was effective in reducing depression symptoms.</td>
<td>No moderate quality evidence of effectiveness (assessed by GRADE).</td>
<td>Narrative reviews suggest there is some support that MI may help reduce depression symptoms.</td>
<td></td>
</tr>
</tbody>
</table>

References:
Baker et al (2012) [33]
Baker, et al (2012) [34]
Cleary et al (2009) [35]
Ginkel et al (2010) [36]
Hjorthoj et al (2009) [37]
Kelly et al (2012) [38]
Petry et al (2017) [40]
Petry et al (2015) [41]
Kelly et al (2012) [42]
Ribeiro et al (2017) [43]
Yakovenko et al (2018) [44]

For Table 2, please refer to the original source for detailed information and references.
Table 3. Characteristics of included reviews of Motivational Interviewing (MI) and summary of findings for Domain 2. Abbreviations: MI = Motivational Interviewing, BMI = Brief Motivational Interviewing, RCT = randomised controlled trial, MET = Motivational Enhancement Therapy, HAART = Highly Active Antiretroviral Therapies, ETS = Environmental Tobacco Smoke, T2D = Type 2 Diabetes, CVD = Cardiovascular disease, NVD = neurovascular disease, BMI = Body Mass Index, BCT = Behaviour change techniques.

<table>
<thead>
<tr>
<th>Domain 2: Musculoskeletal problems</th>
<th>Review author</th>
<th>Objective</th>
<th>Type and Number of studies</th>
<th>Participants</th>
<th>Intervention / Comparison</th>
<th>Outcomes</th>
<th>Author's conclusions</th>
<th>Meta-analysis (M-A) or Narrative review (NR) and overall Risk of Bias (ROBIS score)</th>
<th>Implication for clinical practice and research (Interpretation of authors of overview)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apetrein and Sharp (2016) [61]</td>
<td>To examine the efficacy of MI on the primary outcome of adherence to treatment. In addition, to investigate the efficacy of MI on the secondary outcomes of pain intensity and function</td>
<td>7 RCTs (n = 962)</td>
<td>Age 18 yrs+ with benign chronic pain (&gt; 3 months) due to MSK problems e.g. low back pain, chronic pain, fibromyalgia and rheumatoid arthritis</td>
<td>MI: 2 studies included education, 1 placebo, 1 usual care, 1 other treatment unspecified</td>
<td>Primary outcome adherence to treatment for pain post treatment and at follow up; Secondary measure pain and physical function</td>
<td>Small to moderate effect of MI for increasing adherence to treatment for pain at short but not long term follow up. No gains in physical function.</td>
<td>M-A (LOW)</td>
<td>Low quality evidence (Assessed by GRADE) for small effects on adherence to treatment for pain. (See SI Table) Limited evidence but promising for adherence to treatment measures.</td>
<td></td>
</tr>
<tr>
<td>Chilton et al (2022) [19]</td>
<td>To summarise the available literature and provide a detailed overview of the application and effectiveness of MI for musculoskeletal conditions.</td>
<td>10 studies, 3 RCTs.</td>
<td>2 studies of LBP, 1 chronic pain, 1 fibromyalgia and 1 osteoporosis</td>
<td>Trans theoretical model (TTM)-based motivational counseling or MI or MI self-efficacy, workshop attendance and exercise adherence, pain intensity</td>
<td>Self-efficacy; workshop attendance and exercise adherence, pain intensity.</td>
<td>The evidence base for effectiveness of MI for musculoskeletal problems is limited due to methodological factors.</td>
<td>NR (UNCLEAR)</td>
<td>Narrative reviews found inconclusive evidence due to poor methodology of the primary studies within the reviews. High quality studies required.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domain 2: Oral Health</th>
<th>Review author</th>
<th>Objective</th>
<th>Type and Number of studies</th>
<th>Participants</th>
<th>Intervention / Comparison</th>
<th>Outcomes</th>
<th>Author's conclusions</th>
<th>Meta-analysis (M-A) or Narrative review (NR) and overall Risk of Bias (ROBIS score)</th>
<th>Implication for clinical practice and research (Interpretation of authors of overview)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gass et al (2014) [64]</td>
<td>To analyse the effectiveness of MI at improving oral health behaviours and dental clinical outcomes</td>
<td>10 RCTs (n = 1989).</td>
<td>Subjects attending university programs or dental clinics.</td>
<td>MI/traditional educational intervention” (i.e. presenting oral hygiene guidelines, videos programs or delivering leaflets).</td>
<td>Oral health behaviours; Oral health clinical outcomes; e.g. dental caries, Dental plaque</td>
<td>Inconclusive effectiveness for most oral health outcomes.</td>
<td>NR (UNCLEAR)</td>
<td>Low quality evidence (assessed by GRADE) for no statistically significant difference in gingivitis measures from 3 studies (See SI Table) Narrative reviews found inconclusive evidence due to poor methodology of the primary studies within the reviews.</td>
<td></td>
</tr>
<tr>
<td>Gao et al (2014) [68]</td>
<td>To synthesise the evidence on the effectiveness of MI compared with conventional (health) education in improving oral health.</td>
<td>20 papers including 16 studies (n = 3251).</td>
<td>Dental patients, special needs groups (adults with mental illness), disadvantaged communities</td>
<td>MI/Conventional (health) education (CIE), focusing on disseminating information and giving normative advice</td>
<td>Oral Hygiene, motivation/ readiness/ confidence, knowledge of periodontal health</td>
<td>The potential of MI in dental health care, especially on improving periodontal health, remains controversial. Additional studies with methodologic rigor are needed for a better understanding of the roles of MI in dental practice.</td>
<td>NR (UNCLEAR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kay et al (2016) [65]</td>
<td>To review the evidence regarding the use of motivational interviewing to promote positive oral health behaviours in a one-to-one setting.</td>
<td>8 studies 5 RCTs 2 Quasi RCTs and 1 qualitative study.</td>
<td>Mainly healthy adults, age up to 70 yrs old. 1 trial focused on children</td>
<td>MI, TAU, 2 mins oral hygiene, Traditional education and pictures of periodontal disease</td>
<td>Oral hygiene, plaque levels, Gingivitis, bleeding score</td>
<td>MI technique, which is based on the concept of autonomy support, has potential for helping patients with poor oral health</td>
<td>NR (LOW)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kopp et al (2017) [66]</td>
<td>To reveal the effects of MI as an adjunct to periodontal therapy.</td>
<td>5 RCTs (n = 481) (2 trials only provide MI without CBT)</td>
<td>Patients with periodontal disease</td>
<td>MI + Periodontal therapy / Periodontal therapy alone</td>
<td>Oral hygiene, Gingival values; plaque values, bleeding on probing, probing pocket depth.</td>
<td>MI as an adjunct to periodontal therapy might have a positive influence on clinical periodontal parameters and psychological factors related to oral hygiene. 3 out of 5 RCTs positive. Future studies should include fidelity measures, several MI sessions.</td>
<td>NR (UNCLEAR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Werner et al (2016) [63]</td>
<td>To study the effectiveness of psychological interventions in adults and adolescents with poor oral health.</td>
<td>11 RCTs (3 include MI n = 151)</td>
<td>Patients with moderate to severe chronic periodontitis. The majority of patients were &gt;50 yo of age</td>
<td>MI/TAU or traditional oral health education, delivered by a dental hygienist</td>
<td>Dental caries, periodontitis, gingivitis, and peri-implantitis</td>
<td>No statistically significant difference in gingivitis when MI was compared with treatment as usual. Small but statistically significant improvement in plaque. The clinical relevance of results is debatable. No statistically significant difference in oral health–related quality of life.</td>
<td>M-A (UNCLEAR)</td>
<td></td>
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</tr>
</tbody>
</table>

Domain 2: Eating Disorders (Continued)
Table 3. (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Participants</th>
<th>Interventions</th>
<th>Outcomes</th>
<th>Quality</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Macdonald et al (2021) [70]</td>
<td>RCT and non-controlled design (n = 783, in patient group; n = 204 in care group)</td>
<td>Mainly female patients and carers included</td>
<td>MI, MET or adapted MI / Varied: 7 of 13 studies included a control</td>
<td>Psychological distress; Self-esteem; Quality of life; Stage of change/readiness; Motivation to change; Eating behaviours, attitudes and symptomatology; Care burden</td>
<td>NR (UNCLEAR)</td>
<td>No high or moderate quality evidence to support MI for people with eating disorders. Very low quality evidence (assessed by GRADE) from 1 study in meta-analysis suggests positive results to support people with eating disorders otherwise other results are inconclusive.</td>
</tr>
<tr>
<td>Knoxels et al (2011) [18]</td>
<td>5 RCTs (n = 601 ranged from 27-223)</td>
<td>Mean age ranged from 16.1 to 42.5 years, 97% of participants were female</td>
<td>MI/TAU or TAU + MI or control group</td>
<td>Varies outcomes and depression questionnaires</td>
<td>NR (HIGH)</td>
<td>No support for widespread dissemination of MI interventions for eating disorders. The enthusiasm for the use of MI outweighs the reality of the current evidence base.</td>
</tr>
<tr>
<td>Dray et al (2012) [66]</td>
<td>9 studies, 5 RCTs.</td>
<td>People with Anorexia Nervosa (AN), Bulimia Nervosa (BN) and Eating Disorder</td>
<td>MI / waitlist (n = 1); TAU (n = 1); MI and treatment dropout.</td>
<td>Motivation, depression and self-esteem, eating attitudes, BMI and treatment dropout</td>
<td>NR (HIGH)</td>
<td>There are insufficient numbers of good quality studies and future research needs to focus on evaluating the efficacy of manual-based MI interventions.</td>
</tr>
<tr>
<td>Armstrong et al (2011) [71]</td>
<td>To systematically review randomized controlled trials (RCTs) that investigate the effectiveness of MI for reducing body mass, measured by change in body weight or BMI in adults who are overweight or obese.</td>
<td>12 RCTs (n = varied from 22 to 599)</td>
<td>Hypertension (n = 2); Diabetes (n = 3); Hyperlipidaemia (1); Firefighters, sedentary people (n = 5) and inpatients (n = 1).</td>
<td>M1: The comparison conditions varied from usual care, to print materials, to attention control. Change scores in body weight (kg) in standardized change scores in body mass in.</td>
<td>M-A (LOW)</td>
<td>No high or moderate quality evidence to support weight loss management. There is low quality evidence (assessed by GRADE) that MI may reduce BMI in mixed populations with moderate effects (See S3 Table).</td>
</tr>
<tr>
<td>Barnes et al (2003) [72]</td>
<td>To review randomised controlled trials of MI for weight loss in primary care settings.</td>
<td>24 RCTs (n = 7448)</td>
<td>One-weight individuals with mixed diagnosis age 40 to 60; 8% men (45) to 55% men (38); 2 studies (33%) recruiting African-American or Hispanic/Latino participants</td>
<td>MI: Usual care: written discharge contract listing recommended outpatient medications, cardiac rehabilitation, nutritional advice, and physical activity guidelines. Potential for MI to help primary care patients lose weight.</td>
<td>NR (HIGH)</td>
<td>Further research of higher quality is required focusing on long-term sustainability and fidelity of treatment. As obesity is a high-profile problem worldwide, further high quality research is justified to assess the effectiveness of MI as part of a weight loss programme compared with other methods of weight control.</td>
</tr>
<tr>
<td>Hill et al (2013) [73]</td>
<td>To (1) systematically evaluate the overall effectiveness of GWG interventions derived from theories of behaviour change using a generalised health psychology perspective (2) to assess the behaviour change techniques reported in the interventions.</td>
<td>14/21 RCTs; 7/21 2/21; 2/1 studies used MI as a control (n = 411 out of 2453)</td>
<td>Women of any pre-pregnancy BMI category in the intervention; MI: No information for control</td>
<td>Differences in GWG, rate of GWG, or adherence to guidelines</td>
<td>M-A (UNCLEAR)</td>
<td>The provision of information, motivational interviewing, self-monitoring of behaviour, and providing rewards contingent on successful behaviour may be key strategies when intervening in GWG.</td>
</tr>
<tr>
<td>VanWormer et al (2004) [74]</td>
<td>To provide a brief overview of MI and to synthesize and critically review the literature regarding its efficacy for diet modification.</td>
<td>RCTs (1 cluster RCT) (n = 1290)</td>
<td>3 x adult population (1 adolescent)</td>
<td>Motivational learning/TAU; group sessions involving diet, exercise and educational training</td>
<td>Blood pressure; Weight Sodium intake; Alcohol intake; Dietary intake; Attenance at group session; Self-monitoring of fat intake</td>
<td>M-A (HIGH)</td>
</tr>
</tbody>
</table>

Domain 2: Management of Metabolic Disorders (Diabetes) (Continued)
Table 3. (Continued)

Clifford Mulimba, and Byrnos Daniel (2004) [77]

To systematically examine the evidence of MI in improving health behaviours in adults with diabetes. In particular lifestyle and non-pharmacological self-management techniques.

8 studies, 6 RCTs (n = 1721)
Adults with type 1 and 2 diabetes. diagnosed adults, mixed sex. Age range 16-80

MI/ Varied including usual care, attention placebo, diabetes education and treatment recommended for achieving glycaemic control.

Physical activity, smoking, blood-glucose control, diet and weight management. Only four of the studies found positive and significant effects of MI on diabetes self-management outcomes in four of the eight health behaviour topics investigated. These behaviours were smoking, blood-glucose control, diet and weight management.

NR (UNCLEAR)

Very low quality evidence (Assessed by GRADE) for no statistically significant difference for standardised measurement used in diabetes treatment (See S3 Table). Narrative reviews are inconclusive. High quality research is needed to investigate the effectiveness of MI on diabetes management.

Eleong and Kwasokujin (2006) [78]

To examine empirical evidence for the impact of MI on behaviour change and resultant clinical outcomes in adults with T2D.

14 RCTs
Adults > 18 years with T2D.

MI based/ intervention/ usual care or a non-MI intervention.

Dietary changes, physical activity, smoking cessation, and alcohol reduction

NR (UNCLEAR)

Narrative reviews are inconclusive. High quality research is needed to re-examined.

Jones et al (2004) [79]

To review the evidence for the efficacy of MI in promoting glycaemic control in people with diabetes by examining the mean magnitude of effect in change in levels of glycated haemoglobin (HbA1c) as a function of MI.

13 RCTs (n = 1233 type 1; n = 1895 type 2)
Adults with Type 1 (n = 4); Type 2 (n = 7); Type 1 and 2 (n = 1); NR (n = 1).

MI/ UC (diet counselling; support visits; diabetes education session & support club; videophone healthy lifestyle sessions; meetings at diabetes clinic; varied visits; structured diabetes education session)

Measure of HbA1c. HbA1c is a standardised measurement used in diabetes treatment and a direct indicator of diabetes quality of life. Other psychological health factors

M-A (HIGH)

Few studies have examined evidence for the effectiveness of MI delivered by GPs to T2D patients. Evidence to support the effectiveness of MI on GP and patient outcomes is weak.

Lin et al (2014) [80]

To examine the effectiveness of MI delivered by GPs to Type 2 diabetes patients on the change of GPs attitudes, knowledge and practices and patients’ clinical outcomes.

5 RCTs (n = 256; MI RCTs; Ritchie et al 2006 N = 30) Adults over 18 years old diagnosed with MetS based on NCEP-ATP III or IDF.

MI/ Usual care

Waist circumference, HDL, triglyceride, BP, and FBG. The PROs related to quality of life; other psychological health factors

LMPs exhibited positive effects on some metabolic risks and on quality of life in adults with MetS. MI aimed at helping people manage their diabetes may need to be re-examined.

Soderlund (2018) [81]

To examine the effectiveness of MI for physical activity self-management for adults diagnosed with diabetes mellitus type 2 (T2D).

9 studies (RCTs, quasi studies and pilot studies N = 3260)
Adults with T2D. Mean age 50-60 years-old

MI/ Usual care

PA accelerometer, blood glucose monitor Self-report: medication, self-care outcomes

MI sessions should target a minimal number of self-management behaviours, be delivered by counsellors proficient in MI and use MI protocols with an emphasis placed on duration or frequency of sessions.

NR (HIGH)

Domain 2: Management of Neurovascular (Stroke) and Cardiovascular disease (CVD)

Thepwongsai et al (2016) [82]

To evaluate the effects of MI delivered by GPs to Type 2 diabetes patients on the change of GP’s attitudes, knowledge and practice and patients’ clinical outcomes.

8 studies, 5 RCTs (n = 183 GPs and n = T2D patients)

GP’s and Adults with T2D.

MI/ no control but 1 study had no control

GP satisfaction, knowledge, behavioural change, process of care and clinical outcomes e.g. blood sample tests

Few studies have examined evidence for the effectiveness of MI delivered by GPs to T2D patients. Evidence to support the effectiveness of MI on GP and patient outcomes is weak.

NR (UNCLEAR)
To investigate the effect of MI for improving activities of daily living after stroke.

**Cheng et al.**

- **Participants:** 1 RCT (n = 411), 18 years and over
- **Methods:** MI participants received usual stroke care, including inpatient care and discharge planning through regular multidisciplinary team meetings.
- **Outcomes:** Primary measure—Barthel Index, Functional Independence Measure, Modified Rankin Scale, Katz Index of Activities of Daily Living, Rehabilitation Activities Profile. Secondary outcomes—Changes of mood, e.g., GHQ-28.
- **Results:** Insufficient evidence to support the use of MI for improving activities of daily living after stroke. Limited evidence that participants receiving MI were more likely to have a normal mood than those who received usual care at 3 months and 12 months follow-up.

**Hildebrandt**

- **Participants:** 39 RCTs (only 1 MI (n = 240 men, 171 women), Stroke patients mean age 70 years
- **Methods:** MI usual care medical, nursing and therapy care in-patient setting
- **Outcomes:** Health measures. MI trial included GHQ and Yale Depression Questionnaire.
- **Results:** MI was found to be effective in improving depression and mental HRQOL.

**Lee et al.**

- **Participants:** 9 RCTs (n = 4684), Participants at risk of developing CVDs or with diagnosed CVDs, age 16 to 89 yrs
- **Methods:** MI and MET/ “Waiting list control
- **Outcomes:** Lifestyle modification, cessation or reduction in smoking, physical activity levels, intake of fruits and vegetables and dietary fat. Physiological and psychological outcomes. e.g., BP.
- **Results:** Insufficient evidence to be confident about conclusions. MI might have favourable effect on improving clients’ depression. No effect of MI for other outcomes.

### Domain 2: Management of Sexual Health Behaviour

**Berg et al.**

- **Methods:** Review of the effectiveness of MI on lifestyle modification and psychological and psychological outcomes for clients at risk and diagnosed with CVDs
- **Outcomes:** Mainly RCTs and quasi-RCTs (n = 6051), Gay, homosexual, or bisexual men. MI or MET “no intervention, waiting list control, placebo psychotherapy or other active therapy, or pharmacotherapy.”
- **Results:** ISTH/HIV acquisition: unprotected sex, AUD use; STI/HIV testing. Enhanced motivation for change concerning sexual risk
- **Conclusions:** The effectiveness of MI as an intervention strategy for unsafe sexual and substance use among MSM is uncertain. It was largely equivalent to other active and minimal treatments for HIV-related behaviours.

**Carrico et al.**

- **Methods:** To examine RCTs testing the efficacy of behavioural interventions to reduce CAI and substance use among SUMSM.
- **Outcomes:** Substance-using men who have sex with men (SUMSM)
- **Results:** MI/ Education
- **Conclusions:** Further research is needed to examine if integrative approaches that cultivate resilience and target co-occurring conditions demonstrate greater efficacy

**Dillard et al.**

- **Methods:** To examine the use of MI to improve health outcomes in persons living with HIV (PLWH).
- **Outcomes:** Male or Female diagnosed with AIDS or HIV.
- **Results:** MI/ Advice or education, health promotion programme, video information, Standard care or TAU
- **Conclusions:** MI can be an effective method of the mentic health treatment for PLWH, who struggle with adherence, depression, and risky sexual behaviours.

**Naar-King, et al.**

- **Methods:** To identify the efficacy of MI in relation to sexual risk and substance use.
- **Outcomes:** Male or female
- **Results:** MI/ Is assessment only education only (same dose as MI group); single session video; 4 seasons MI in 1 season MI, referral only; hand-outs
- **Conclusions:** MI has the potential to reduce sexual risk behaviour, but the effects on reducing substance use were less consistent

**Wilson et al.**

- **Methods:** To review evidence on the impact of MI on effective contraceptive use in women of childbearing age
- **Outcomes:** Women of reproductive age at high risk of pregnancy, use.
- **Results:** Contraceptive use Unwanted pregnancy at 12 and 24 months
- **Conclusions:** MI significantly increased effective contraceptive use immediately after a 6 month post-intervention. The effect without reinforcement was short lasting. No difference in subsequent pregnancies or births at the two-year period.

Domain 2—Engagement with Interventions (Continued)
<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>Type of Study</th>
<th>Participants</th>
<th>Intervention</th>
<th>Comparison</th>
<th>Outcomes</th>
<th>Adverse Events</th>
<th>Methodological Quality</th>
<th>Meta-analysis</th>
<th>Narrative Review</th>
<th>Risk of Bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al- Ganmi et al (2016)</td>
<td>[89]</td>
<td>Narrative review</td>
<td>NR</td>
<td>Low and very low quality evidence (Assessed by GRADE) for statistically robustness of conclusions, MI shows promise for improving adherence to medication interventions or medication in people who are HIV-positive, but the higher quality review concluded that for small effects on medication quality reviews concluded that the methodology within the participants infected.</td>
<td>M-A</td>
<td>( \text{unclear} )</td>
<td>Good short-term gains in cART adherence but limited efficacy in those who use drugs</td>
<td>NR</td>
<td>LOW</td>
<td>NR</td>
<td>LOW</td>
</tr>
<tr>
<td>Miller et al (2013)</td>
<td>[91]</td>
<td>Systematic review of reviews of the effectiveness of Motivational Interviewing</td>
<td>NR</td>
<td>No high or moderate quality evidence or intervention with interventions to increase uptake of or adherence to cardiac rehabilitation. Mean age ranged from 51 to 66</td>
<td>M-A</td>
<td>(LOW)</td>
<td>Cognitive-behavioral techniques and MI appeared to be effective.</td>
<td>(UNCLEAR)</td>
<td>(LOW)</td>
<td>NR</td>
<td>(UNCLEAR)</td>
</tr>
<tr>
<td>Lawrence et al (2017)</td>
<td>[95]</td>
<td>Systematic review</td>
<td>NR</td>
<td>NR</td>
<td>(LOW)</td>
<td>Narrative review of MI as a pre-treatment/any alternative intervention which covered cover letter, generic pamphlet, or salient blood testing.</td>
<td>(UNCLEAR)</td>
<td>(LOW)</td>
<td>NR</td>
<td>(UNCLEAR)</td>
<td></td>
</tr>
<tr>
<td>Al- Ganmi et al (2012)</td>
<td>[90]</td>
<td>Systematic review</td>
<td>NR</td>
<td>Low and very low quality evidence (Assessed by GRADE) for statistically robustness of conclusions, MI shows promise for improving adherence to medication interventions or medication in people who are HIV-positive, but the higher quality review concluded that for small effects on medication quality reviews concluded that the methodology within the participants infected.</td>
<td>M-A</td>
<td>( \text{unclear} )</td>
<td>Good short-term gains in cART adherence but limited efficacy in those who use drugs</td>
<td>NR</td>
<td>LOW</td>
<td>NR</td>
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<tr>
<td>Lawrence et al (2014)</td>
<td>[96]</td>
<td>Systematic review</td>
<td>NR</td>
<td>Low and very low quality evidence (Assessed by GRADE) for statistically robustness of conclusions, MI shows promise for improving adherence to medication interventions or medication in people who are HIV-positive, but the higher quality review concluded that for small effects on medication quality reviews concluded that the methodology within the participants infected.</td>
<td>M-A</td>
<td>(LOW)</td>
<td>Narrative review of MI as a pre-treatment/any alternative intervention which covered cover letter, generic pamphlet, or salient blood testing.</td>
<td>(UNCLEAR)</td>
<td>(LOW)</td>
<td>NR</td>
<td>(UNCLEAR)</td>
</tr>
<tr>
<td>Hill et al (2014)</td>
<td>[97]</td>
<td>Systematic review</td>
<td>NR</td>
<td>Low and very low quality evidence (Assessed by GRADE) for statistically robustness of conclusions, MI shows promise for improving adherence to medication interventions or medication in people who are HIV-positive, but the higher quality review concluded that for small effects on medication quality reviews concluded that the methodology within the participants infected.</td>
<td>M-A</td>
<td>( \text{unclear} )</td>
<td>Narrative review of MI as a pre-treatment/any alternative intervention which covered cover letter, generic pamphlet, or salient blood testing.</td>
<td>(UNCLEAR)</td>
<td>(LOW)</td>
<td>NR</td>
<td>(UNCLEAR)</td>
</tr>
<tr>
<td>Nezu et al (2015)</td>
<td>[98]</td>
<td>Systematic review</td>
<td>NR</td>
<td>Low and very low quality evidence (Assessed by GRADE) for statistically robustness of conclusions, MI shows promise for improving adherence to medication interventions or medication in people who are HIV-positive, but the higher quality review concluded that for small effects on medication quality reviews concluded that the methodology within the participants infected.</td>
<td>M-A</td>
<td>(LOW)</td>
<td>Narrative review of MI as a pre-treatment/any alternative intervention which covered cover letter, generic pamphlet, or salient blood testing.</td>
<td>(UNCLEAR)</td>
<td>(LOW)</td>
<td>NR</td>
<td>(UNCLEAR)</td>
</tr>
</tbody>
</table>
### Table 3. (Continued)

<table>
<thead>
<tr>
<th>Study</th>
<th>Population</th>
<th>Interventions</th>
<th>Outcomes</th>
<th>Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palacios et al (2016) [95]</td>
<td>Patients with HIV, Asthma, Osteoporosis, CVD and RA prescribed medication e.g. (HAART), 12 focused on Minorities.</td>
<td>MI / TAU, other counselling, health education session, Pharmacotherapy</td>
<td>Medication adherence</td>
<td>MI improves medication adherence at different exposure times and counsellors’ educational level. Results inconsistent.</td>
</tr>
<tr>
<td>Rueda et al (2006) [97]</td>
<td>General HIV-positive populations, women, Latinos, or adults with a history of alcohol dependence</td>
<td>MI control arm received usual or standard adherence support or an alternate intervention</td>
<td>Compliance to HAART at least 6 weeks after study initiation, electronic monitoring, pill counts, medication diaries, patient self-report, provider report, clinic and pharmacy records.</td>
<td>Interventions targeting practical medication management skills, interventions administered to individuals’ vs groups, and those interventions delivered over 12 weeks or more were associated with improved adherence outcomes.</td>
</tr>
<tr>
<td>Zomahoun et al (2017) [93]</td>
<td>Patients with epilepsy, kidney disease, diabetes, HIV/AIDS, hypertension, schizophrenia, osteoporosis and psychotic disorder</td>
<td>MI / Control TAU, Education video, psychiatric interview, self-monitoring condition</td>
<td>Medication adherence and health-related behaviour</td>
<td>MI interventions might be effective at enhancing medication adherence in adults treated for chronic diseases. Interventions based on MI only were more effective than those based on MI plus other interventions.</td>
</tr>
</tbody>
</table>

### Domain 2: Cancer care

| Spencer and Wheeler (2016) [101] | Cancer patients and survivors. Most common Breast cancer. | MI / TAU or leaflet | Smoking cessation; body weight; physical activity; psychological measures; fatigue; self-care; pain; cancer related stress. | Solid evidence exists for the efficacy of MI to address lifestyle behaviors as well as the psychosocial needs of cancer patients and survivors. |

### Domain 2: Management of patients with irritable bowel disorder (IBD)

| Wagonera, & Kavookjian (2017) [104] | Patients with IBS ulcerative colitis, age from 20 to 82 years-old | MI / unclear | Adherence, patient satisfaction with provider, quality of life, and patient perceived provider empathy. | MI can be effective in improving outcomes for individuals with IBD e.g. improved adherence rates, greater advice-seeking behavior, and perceived providers as having more empathy. |

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Table 4. Characteristics of included reviews of Motivational Interviewing (MI) and summary of findings for Domains 3 and 4. Abbreviations: MI = Motivational Interviewing, BMI Brief Motivational Interviewing, RCT = randomised controlled trial, MET = Motivation Enhancement Therapy, HAART = Highly Active Antiretroviral Therapies, ETS = Environmental Tobacco Smoke, SUMSM = Substance-using men who have sex with men, T2D = Type 2 Diabetes, CVD = Cardiovascular disease, NVD = neurovascular disease, BMI = Body Mass Index, BCT = Behaviour change techniques.

<table>
<thead>
<tr>
<th>Review author</th>
<th>Objective</th>
<th>Type and Number of studies</th>
<th>Participants</th>
<th>Intervention / Comparison</th>
<th>Outcomes</th>
<th>Summary of authors results</th>
<th>Meta-analysis (M-A) or Narrative review (NR) and overall Risk of Bias (ROBIS score)</th>
<th>Implication for clinical practice and research (Interpretation of authors of overview)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burke et al (2003) [106]</td>
<td>To review individually delivered interventions that incorporated the four basic principles of MI.</td>
<td>30 trials (n = 6275), ranged from 22 to 952, mean of 206</td>
<td>Multiple groups of people from different settings</td>
<td>Adapted MI (AMI) / varied AMI + relapse prevention (RP); RP alone; CRT; No treatment; placebo control; education booklet; brief feedback</td>
<td>Drinking frequency; BAC (peak) blood alcohol concentration exercise adherence and HIV risk behaviour</td>
<td>Only 11/30 studies produced statistically significant effect of M. AMIs were equivalent to other active treatments and superior to no-treatment or placebo controls for problems involving alcohol, drugs, and diet and exercise.</td>
<td>M-A (UNCLEAR)</td>
<td>No high quality evidence. For all behaviours combined there is Low quality evidence of small effects of MI judged against a “weak” comparison but no benefit over a “strong” comparison. Moderate quality evidence (assessed by GRADE) that MI increases physical activity participation in some populations, but the data is limited by small trials (See Tables 5 &amp; 6).</td>
</tr>
<tr>
<td>Dunn et al (2001) [107]</td>
<td>To examine the effectiveness of brief behavioural interventions adapting the principles and techniques of MI to four behavioural domains</td>
<td>29 RCTs (n = 6330) ranged from 21–1726</td>
<td>Mixed male/female; with health problems; substance abuse, smoking, HIV risk and diet/exercise problems</td>
<td>MI two treatment or a comparison treatment</td>
<td>Brief drinking, exercise participation, drug usage, cigarette usage.</td>
<td>Only modest evidence that MI works at least as well as other treatments for clients with low baseline readiness. The evidence is inconclusive.</td>
<td>NR (UNCLEAR)</td>
<td>High quality trials are required and justified due to the large number of people who remain inactive. Focus should be on intervention fidelity. As the narrative reviews in this section are judged as high chance of bias, no further conclusion can be drawn with confidence. More research is needed to assess fidelity of technology assisted MI.</td>
</tr>
<tr>
<td>Hettma et al (2005) [5]</td>
<td>To assess the effectiveness of MI across multiple behavioural problems</td>
<td>72 RCTs and controlled studies (n = 1428)</td>
<td>16/37 (43%) were predominantly or entirely African American</td>
<td>MI no treatment or placebo; MI added to standard or specified treatment; standard or specified treatment</td>
<td>Alcohol use, treatment compliance</td>
<td>Large variation in effect size across studies. No relationship between outcomes and methodological quality or other outcomes e.g. time of follow-up assessment, comparison group type or provider. Manualised interventions yielded weaker effect.</td>
<td>M-A (UNCLEAR)</td>
<td>Moderate quality evidence (assessed by GRADE) that MI increases physical activity participation in some populations, but the data is limited by small trials (See Tables 5 &amp; 6).</td>
</tr>
<tr>
<td>Lundahl et al (2010) [108]</td>
<td>To investigate the unique contribution MI has on counselling outcomes and how MI compares with other interventions.</td>
<td>119 studies (some RCTS) (n = 9618)</td>
<td>Majority sample were white, African American Or Hispanic. Other groups not recorded</td>
<td>MI/ Waiting list/ control groups; TAU with a defined or specifically named program; written materials; an attention control group.</td>
<td>Multiple outcomes</td>
<td>Judged against weak comparison groups, MI produced statistically significant small effects. Judged against specific treatments, MI produced nonsignificant results.</td>
<td>M-A (UNCLEAR)</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
</tr>
<tr>
<td>Martins et al (2009) [109]</td>
<td>To critically review the research in three emerging areas in which (MI) is being applied: diet and exercise, diabetes, and oral health.</td>
<td>37 empirical studies/24 exercise and diet; 9 diabetes; 4 oral health (n = 15012)</td>
<td>Adult obese women, southern Asian women; adults with diabetes, smokers physically inactive adults.</td>
<td>MI / behaviour therapy</td>
<td>Varied weight loss, fat intake, oral health, exercise uptake.</td>
<td>MI effective in supporting health behaviour change for 3 health behaviour domains, Oral health, diabetes and diet and exercise.</td>
<td>M-A (HIGH)</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
</tr>
<tr>
<td>O’Halloran et al (2014)</td>
<td>To determine if MI leads to increased physical activity, cardiorespiratory fitness or functional exercise capacity in people with chronic health conditions.</td>
<td>10 RCT or controlled trial (n = 981)</td>
<td>People 18 or over with a chronic health condition.</td>
<td>MI / Supervised exercise x 1; Unsupervised weight loss x 1; PCI x 2; Standard written information/ education x 2;usual care x 2.</td>
<td>Physical activity levels; cardiorespiratory Fitness; functional exercise capacity</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
<td>M-A (LOW)</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
</tr>
<tr>
<td>Rubak et al (2005) [1]</td>
<td>To evaluate the effectiveness of MI as an intervention tool and to identify factors shaping outcomes in the areas reviewed.</td>
<td>72 RCTs (19 meta-analysis) (n = 4173)</td>
<td>Mainly adults (older adolescents also included)</td>
<td>MI/ Traditional advice giving e.g. patients’ problem is viewed from a biomedical perspective.</td>
<td>Health outcome: e.g. blood glucose, blood cholesterol; BMI, smoking cigs/day, Blood alcohol, BP; utilisation of healthcare services; length of hospital stay, subjective reports.</td>
<td>MI outperforms traditional advice giving in the treatment of a broad range of behavioral problems and diseases. A prolonged follow-up period increased the percentage of studies showing an effect.</td>
<td>M-A (UNCLEAR)</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
</tr>
<tr>
<td>Singleton et al (2017) [105]</td>
<td>To describe and evaluate the methods and efficacy of technology delivered MI interventions (TAMIs).</td>
<td>41 studies most RCTs (34 adult population n = approx. 11000)</td>
<td>Mainly adults with substance abuse problems; other health or social problem e.g. weight gain, addiction, criminal, Technology-delivered MI interventions (TAMI) (some combined with other therapy) / various TAU e.g. Follow-up with school nurse</td>
<td>Acceptability/ feedback regarding the intervention and/or behavioural or psychological change related to the target health behaviour.</td>
<td>Limited data regarding efficacy. Strategies to deliver relational components remain a challenge. Future research should incorporate fidelity measures. TAMIs are feasible to implement and well accepted.</td>
<td>NR (HIGH)</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
<td></td>
</tr>
<tr>
<td>Thompson et al (2011) [110]</td>
<td>To review MI and to inform education, research and practice in relation to cardiovascular health.</td>
<td>9 studies, 3 including MI (n = 546 (MI = 266))</td>
<td>Adults with at least one or more newly diagnosed or existing cardiovascular risk factors</td>
<td>MI/ TAU</td>
<td>Obesity, Smoking, treatment non-compliance, physical inactivity medical outcomes e.g. BP.</td>
<td>MI is an effective approach to changing behaviour. It offers promise in improving cardiovascular health status.</td>
<td>NR (HIGH)</td>
<td>Moderate quality evidence that MI may have a small positive effect on self-reported physical activity in people with chronic health conditions.</td>
</tr>
</tbody>
</table>
### Table 4. (Continued)

<table>
<thead>
<tr>
<th>Review author</th>
<th>Objective</th>
<th>Type and Number of studies</th>
<th>Participants</th>
<th>Intervention / Comparison</th>
<th>Outcomes</th>
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<th>Meta-analysis (M-A) or Narrative review (NR) and overall Risk of Bias (ROBIS score)</th>
<th>Implication for clinical practice and research (Interpretation of authors of overview)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kohler et al (2015) [2,11]</td>
<td>To examine changes in alcohol consumption after brief MI for young people with existing alcohol use problems, who were admitted to an emergency care unit alcohol positive, with an alcohol-related trauma, or with a history of elevated alcohol consumption</td>
<td>6 RCTs (2 specifically over 18; n = 1433 age 18-25)</td>
<td>Young people in emergency care who screened positively for past or present risky alcohol consumption.</td>
<td>BMT: standard care, including written information (e.g. alcohol use risk handout, educational brochure).</td>
<td>Alcohol consumption, frequency and quantity</td>
<td>MI was never less efficacious than a control intervention. Two trials found significantly more reduction in one or more measures of alcohol consumption in the MI intervention group.</td>
<td>M-A (UNCLEAR)</td>
<td>Narrative reviews support the meta-analyses suggesting there is no difference in outcome between professional groups who deliver MI. High quality research assessing competency and fidelity of MI interventions is needed to confirm if any benefits reported by Merz et al (2015) are sustained over 12 months.</td>
</tr>
<tr>
<td>Knight et al (2006) [1,10]</td>
<td>To identify the extent to which MI has been used in different physical health settings and appraise the effectiveness of MI</td>
<td>4 RCTs, 1 non-random controlled trial and 3 pilot studies.</td>
<td>Hypertension, diabetes, asthma, hyperlipidaemia and heart disease.</td>
<td>MI/TAU (usual care)</td>
<td>Psychological, physiological and lifestyle change outcomes</td>
<td>MI has high face validity across several domains in physical health care settings.</td>
<td>Recommendations for its dissemination in this area cannot yet be made.</td>
<td>NR (UNCLEAR)</td>
</tr>
<tr>
<td>Lundahl, et al (2013) [6]</td>
<td>To investigate MI’s efficacy in medical care settings</td>
<td>48 RCTs (n = 9618)</td>
<td>Reported as moderate analyses rather than general participant description</td>
<td>MI in medical setting; 7 studies used a traditional waiting list group; (2) 16 studies used information only groups; 28 studies employed ‘treatment-as-usual”</td>
<td>Prognostic markers, disease endpoints, risk reduction behaviours: physical functioning and quality of life, substance abuse, patient adherence to medical advice and patient approach to change.</td>
<td>The emerging evidence for MI in medical care settings suggests it provides a moderate advantage over comparison interventions and could be used for a wide range of behavioural issues in health care.</td>
<td>M-A (UNCLEAR)</td>
<td></td>
</tr>
<tr>
<td>Mera et al (2015) [3]</td>
<td>To identify evidence to reduce alcohol use and prevent alcohol related consequences in young adults (18–24 years old) admitted to the emergency department following acute alcohol intoxication.</td>
<td>4 RCTs (n = 618)</td>
<td>Young adults (18–24).</td>
<td>Brief MI: usual care (2 trials); 1 x personalized feedback &amp; phone booster at 1 &amp; 3 months; 1 x education brochure + 5 min discussion.</td>
<td>Various alcohol-related outcomes: change in alcohol use, problems/risks, drinking &amp; driving.</td>
<td>Inconclusive evidence. Most effective interventions include at least one therapeutic contact several days after the event.</td>
<td>NR (LOW)</td>
<td></td>
</tr>
<tr>
<td>Noordman et al(2012) [114]</td>
<td>To review effectiveness of face-to-face communication-related BCTs provided in primary care and to explore which health care provider is more effective in using face-to-face communication-related BCTs?</td>
<td>50 RCTs. 9 include MI</td>
<td>18+ years. People with risky lifestyle behaviour. Patients with heart or vascular disease.</td>
<td>BCTs including MI: advice, pamphlets (or booklets) unstructured information, minimal care ‘usual care’ to no intervention.</td>
<td>Subjective (self-reported) and objective outcome measures related to patients’ lifestyle behaviour.</td>
<td>MI, education and advice can be used as effective communication-related BCTs delivered by physicians and nurses.</td>
<td>NR (LOW)</td>
<td></td>
</tr>
<tr>
<td>Purush, et al (2014) [117]</td>
<td>To review MI interventions used to elicit health related behaviour change among older adults in primary care settings.</td>
<td>8 RCTs and Pilot RCTs (n = 1388)</td>
<td>Older people. Average participant age was over 60 years.</td>
<td>MI/ varied 1 x newsletter; 4 x usual care; 1 x tailored information; 1 x telephone information call.</td>
<td>Weight loss, participation in physical activity; smoking cessation; fruit and vegetable consumption.</td>
<td>MI may be effective when incorporated into health promotion and disease prevention interventions.</td>
<td>NR (UNCLEAR)</td>
<td></td>
</tr>
<tr>
<td>Taggart et al(2014) [115]</td>
<td>To evaluate the effectiveness of interventions used in primary care to improve health literacy for change in smoking, nutrition, alcohol, physical activity and weight.</td>
<td>52 studies</td>
<td>Adults aged 18 years and over. Mixed sex, different socioeconomic backgrounds.</td>
<td>MI/ no description</td>
<td>Health literacy outcomes; Knowledge Skills; Self efficacy</td>
<td>Individual MI counselling and written materials were more effective in achieving impacts around smoking cessation compared to group education.</td>
<td>NR (LOW)</td>
<td></td>
</tr>
<tr>
<td>Vaidulakir et al(2014) [116]</td>
<td>Is MI effective in improving behaviour modification in patients seeking treatment for health conditions in primary care settings?</td>
<td>12 RCTs varied from 26–5315 (n = 3326)</td>
<td>Primary care patients, mixed race and sex.</td>
<td>MI/no treatment; mailed pamphlet; usual care; usual care + pamphlet; anti-smoking advice.</td>
<td>Substance use outcomes; bodyweight reduction; physical activity, adherence.</td>
<td>MI is useful in clinical settings. I MI session may be effective in increasing change-related behaviour on certain outcomes.</td>
<td>M-A (UNCLEAR)</td>
<td></td>
</tr>
</tbody>
</table>

**Smoking cessation.** One comparison from a review on smoking cessation was judged to provide moderate quality evidence. This review comparing Motivational Interviewing with usual care or brief advice, provides evidence of beneficial effects on abstinence from smoking, particularly when attention was paid to treatment fidelity[12].

**Substance abuse (drugs).** One comparison from a review of people with substance abuse dependency and addiction provides evidence of a benefit of Motivational Interviewing when compared with no intervention. The other four comparisons derived no benefit or harm when Motivational Interviewing was compared with usual care or any other treatment [56].

[https://doi.org/10.1371/journal.pone.0204890.t004](https://doi.org/10.1371/journal.pone.0204890.t004)
Physical activity. Four comparisons from a review of Motivational Interviewing for promoting physical activity participation were judged to provide moderate quality evidence when Motivational Interviewing was compared with a control or usual care. One out of the four comparisons provide evidence of benefits. No benefit was found for the other three comparisons, including outcomes for people with cardiovascular disease and obesity [111].

Sexual health. Four comparisons from one review provide moderate quality evidence of no benefit or harm of Motivational Interviewing relating to changing high risk sexual behaviours in men who have sex with men [84] when compared with a control.

Exploration of moderator variables

Of the six reviews that provide any evidence judged to be of moderate quality, three did not report the results of any subgroup analyses [56, 84, 111]. The three reviews that contain moderate quality evidence and report subgroup analyses are:

- Lindson-Hawley 2015 [12]—smoking cessation (Table A in S1 File)
- Foxcroft 2014 [49]—alcohol use in young people (Table B in S1 File)
- Vasilaki 2006 [58]—alcohol consumption (Table C in S1 File)

Exploration of the reported subgroup analyses provides consistent evidence which suggests that Motivational Interviewing is beneficial when compared to ‘weak’ comparison groups such as controls.
<table>
<thead>
<tr>
<th>Sub-groups</th>
<th>Reviews contributing data to overview</th>
<th>Reviews with data, but superseded by more up-to-date or higher quality review judged by overview authors using ROBIS</th>
<th>Reviews in which there was no data suitable for extraction</th>
<th>Moderate quality evidence relating to effect of MI</th>
<th>Low or very low quality evidence relating to effect of MI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Domain 1: Interventions aimed at stopping / preventing behaviour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance abuse (drugs or alcohol)</td>
<td>Smedslund et al 2011 [56]</td>
<td>Burke et al 2003 [106]</td>
<td></td>
<td>Small effects on drug /alcohol in mixed population e.g. college drinkers, outpatient alcohol clinics, and drink drivers at &lt; 6 month when compared with no treatment. Evidence of no benefit or harm compared with other active treatment or treatment as usual</td>
<td></td>
</tr>
<tr>
<td><strong>Domain 2: Interventions aimed at promoting specific health behaviour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical activity promotion</td>
<td>O’Halloran et al 2014 [111]</td>
<td></td>
<td></td>
<td>Small effect on self-reported physical activity in people with some, but not all, chronic health conditions immediately post intervention</td>
<td>Very low quality evidence of very small effect on cardiorespiratory fitness immediately post interventions</td>
</tr>
<tr>
<td>Management of metabolic disorders</td>
<td>Jones et la 2014 [77]</td>
<td></td>
<td></td>
<td>MI in the management of blood glucose levels is limited. Effects not statistically significant. MI aimed at helping people manage their diabetes may need to be re-examined.</td>
<td></td>
</tr>
</tbody>
</table>

(Continued)
Results of narrative reviews

Of the 104 reviews included in this synthesis, 65 did not combine any data within meta-analysis. The main findings from the narrative reviews are summarised in Tables 1 to 4. The

Table 5. (Continued)

<table>
<thead>
<tr>
<th>Sub-groups</th>
<th>Reviews contributing data to overview</th>
<th>Reviews with data, but superseded by more up-to-date or higher quality review judged by overview authors using ROBIS</th>
<th>Reviews in which there was no data suitable for extraction</th>
<th>Moderate quality evidence relating to effect of MI</th>
<th>Low or very low quality evidence relating to effect of MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of neurovascular disorders</td>
<td>Cheng et al 2015 [81]</td>
<td></td>
<td></td>
<td></td>
<td>Insufficient evidence to support the use of Motivational Interviewing for improving activities of daily living after stroke (1 study only).</td>
</tr>
<tr>
<td>Management of Musculoskeletal problems</td>
<td>Alperstein and Sharp (2016) [102]</td>
<td></td>
<td></td>
<td></td>
<td>Low quality evidence of small effects on, adherence to treatment for pain management and reduction in pain</td>
</tr>
<tr>
<td>Parenting practice</td>
<td>Lundahl et al 2010 [108]</td>
<td></td>
<td></td>
<td>Small effect on health related behaviour (2 studies only)</td>
<td></td>
</tr>
<tr>
<td>Sexual health</td>
<td>Berg et al 2011 [84] (HIV risk promotion for men who have sex with men Wilson et al 2018 [67] Hettema et al (2005) [8]</td>
<td>Evidence of no effect or benefit on behaviour related to sexual health in men who have sex with men with HIV</td>
<td></td>
<td>Small effect on men who have sex with men on condom use, alcohol use, and reducing unprotected anal sex. Small effect on contraceptive use in women at 1–12 months follow up. Moderate effect on HIV knowledge and behaviour. Some short-term evidence for increasing effective contraceptive use immediately after and up to 4 months post-intervention. No difference in subsequent pregnancies or births at the two-year period.</td>
<td></td>
</tr>
</tbody>
</table>

Domain 3 & 4 – Reviews focused on behaviour change interventions for multiple health related problems and/or multiple behaviour problems in specific settings

ALL BEHAVIOURS COMBINED | Lundahl et al 2010 [108] Lundahl et al 2013 (medical care settings) [6] Van Buskirk [116] (primary care settings) | Small statistically significant effect when all behaviours combined for different populations and settings judged against a weak comparison group e.g. usual care or no treatment. No difference between groups when judged against other interventions. Small effect of MI when all behaviours combined in general medical care and primary care settings. |
Table 6. Summary of meta-analyses comparisons judged using the GRADE criteria to provide moderate quality evidence of effect of motivational interviewing.

<table>
<thead>
<tr>
<th>Health behaviour</th>
<th>Review authors</th>
<th>Comparison</th>
<th>Population</th>
<th>Outcome</th>
<th>Assessment times</th>
<th>No of studies</th>
<th>n (total)</th>
<th>Effect size</th>
<th>Confidence intervals</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>Vasilaki et al 2006 [58]</td>
<td>other treatments</td>
<td>Any</td>
<td>Reducing alcohol consumption</td>
<td>unclear</td>
<td>9</td>
<td>?</td>
<td>ES 0.43</td>
<td>[0.17, 0.70]</td>
<td>Beneficial</td>
</tr>
<tr>
<td>Foxcroft et al 2014 [49]</td>
<td>No MI intervention comparison</td>
<td>young people (&lt;25 years)</td>
<td>Average blood alcohol concentration (BAC)</td>
<td>4+ months</td>
<td>4</td>
<td>798</td>
<td>SMD -0.08</td>
<td>[-0.22, 0.06]</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Binge drinking</td>
<td>&lt;4 months</td>
<td>11</td>
<td>1340</td>
<td>SMD -0.23</td>
<td>[-0.42, -0.04]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4+ months</td>
<td>16</td>
<td>4028</td>
<td>SMD -0.05</td>
<td>[-0.12, 0.01]</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Drink driving</td>
<td>4+ months</td>
<td>4</td>
<td>1353</td>
<td>SMD -0.11</td>
<td>[-0.31, 0.09]</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Frequency of alcohol consumption</td>
<td>&lt;4 months</td>
<td>15</td>
<td>1928</td>
<td>SMD -0.26</td>
<td>[-0.44, -0.09]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4+ months</td>
<td>16</td>
<td>4390</td>
<td>SMD -0.11</td>
<td>[-0.19, -0.03]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peak BAC</td>
<td>&lt;4 months</td>
<td>5</td>
<td>753</td>
<td>SMD -0.27</td>
<td>[-0.44, -0.11]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4+ months</td>
<td>9</td>
<td>2042</td>
<td>SMD -0.14</td>
<td>[-0.23, -0.05]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Quantity of alcohol consumed</td>
<td>&lt;4 months</td>
<td>22</td>
<td>2677</td>
<td>SMD -0.25</td>
<td>[-0.37, -0.14]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4+ months follow-up</td>
<td>28</td>
<td>6676</td>
<td>SMD -0.14</td>
<td>[-0.20, -0.08]</td>
<td>Beneficial</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Risky behaviour</td>
<td>&lt;4 months</td>
<td>6</td>
<td>1048</td>
<td>SMD -0.09</td>
<td>[-0.30, 0.13]</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4+ months</td>
<td>7</td>
<td>1781</td>
<td>SMD -0.14</td>
<td>[-0.30, 0.02]</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>O’Halloran et al 2014 [111]</td>
<td>Control (or usual care)</td>
<td>Any chronic health condition</td>
<td>Adherence</td>
<td>Immediately post-intervention</td>
<td>8</td>
<td>921</td>
<td>SMD 0.19</td>
<td>[0.06, 0.32]</td>
<td>Beneficial</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cardiovascular disease</td>
<td>Adherence</td>
<td>Immediately post-intervention</td>
<td>2</td>
<td>115</td>
<td>SMD 0.22</td>
<td>[-0.15, 0.59]</td>
<td>No benefit or harm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Overweight/obese people</td>
<td>Adherence</td>
<td>Immediately post-intervention</td>
<td>4</td>
<td>498</td>
<td>SMD 0.14</td>
<td>[-0.06, 0.33]</td>
<td>No benefit or harm</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chronic health conditions</td>
<td>Functional exercise capacity</td>
<td>Immediately post-intervention</td>
<td>2</td>
<td>333</td>
<td>SMD 0.13</td>
<td>[-0.08, 0.34]</td>
<td>No benefit or harm</td>
</tr>
</tbody>
</table>

(Continued)
### Table 6. (Continued)

<table>
<thead>
<tr>
<th>Health behaviour</th>
<th>Review authors</th>
<th>Comparison</th>
<th>Population</th>
<th>Outcome</th>
<th>Assessment times</th>
<th>No of studies</th>
<th>n (total)</th>
<th>Effect size</th>
<th>Confidence intervals</th>
<th>GRADE Reasons for downgrading evidence</th>
<th>Effect</th>
<th>Reasons for downgrading evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sexual health</td>
<td>Berg et al 2011</td>
<td>control</td>
<td>Men who have sex with men</td>
<td>Sexual partners</td>
<td>unclear</td>
<td>3</td>
<td>4219 SMD 0.01</td>
<td>[-0.11, 0.13]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (overview)</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unprotected anal intercourse</td>
<td>medium term</td>
<td>3</td>
<td>4191 SMD -0.04</td>
<td>[-0.10, 0.02]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (overview)</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unprotected anal intercourse</td>
<td>long term</td>
<td>3</td>
<td>4021 SMD -0.02</td>
<td>[-0.08, 0.04]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (overview)</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unprotected anal intercourse (UAI) with non-primary partner</td>
<td>unclear</td>
<td>2</td>
<td>553 RR 1.04</td>
<td>[0.73, 1.47]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (overview)</td>
<td>No benefit or harm</td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>Lindon-Hawley et al 2015</td>
<td>brief advice/ usual care</td>
<td>Mixed</td>
<td>Abstinence (strictest definition)</td>
<td>longest duration</td>
<td>28</td>
<td>16803 RR 1.26</td>
<td>[1.16, 1.36]</td>
<td>Beneficial</td>
<td>Downgrade 1 (review)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance abuse</td>
<td>Smedslund et al 2011</td>
<td>no intervention</td>
<td>people with substance abuse, dependency or addiction</td>
<td>Extent of substance use</td>
<td>short follow-up (0–6 months)</td>
<td>15</td>
<td>2327 SMD 0.17</td>
<td>[0.09, 0.26]</td>
<td>Beneficial</td>
<td>Downgrade 1 (review)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>other active intervention</td>
<td>people with substance abuse, dependency or addiction</td>
<td>Extent of substance use</td>
<td>short follow-up</td>
<td>12</td>
<td>2137 SMD 0.02</td>
<td>[-0.07, 0.12]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (review)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>other active intervention</td>
<td>people with substance abuse, dependency or addiction</td>
<td>Extent of substance use</td>
<td>medium follow up</td>
<td>6</td>
<td>1586 SMD -0.02</td>
<td>[-0.16, 0.13]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (review)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>treatment as usual</td>
<td>people with substance abuse, dependency or addiction</td>
<td>Extent of substance use</td>
<td>post-intervention</td>
<td>9</td>
<td>1940 SMD 0.01</td>
<td>[-0.09, 0.11]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (review)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>treatment as usual</td>
<td>people with substance abuse, dependency or addiction</td>
<td>Extent of substance use</td>
<td>short follow-up</td>
<td>10</td>
<td>2102 SMD 0.01</td>
<td>[-0.08, 0.10]</td>
<td>No benefit or harm</td>
<td>Downgrade 1 (review)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Reasons for downgrading evidence**

- a-serious limitation in the Risk of bias
- b-imprecision (e.g. wide confidence intervals or small sample size)
- c- Inconsistency (e.g. high I²)
- d-indirectness (e.g. variation in participants, intervention, comparisons or outcomes)
- e-publication bias.

**GRADE Working Group grades of evidence**

**High quality:** Further research is very unlikely to change our confidence in the estimate of effect.

**Moderate quality:** Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.

**Low quality:** Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.

**Very low quality:** We are very uncertain about the estimate.

* Berg (2011) reported that they GRADED the evidence as low or moderate quality but no details were available in the publication other than a note to contact the authors for more detail. Therefore the overview authors judged the evidence.

[https://doi.org/10.1371/journal.pone.0204890.t006](https://doi.org/10.1371/journal.pone.0204890.t006)
majority focus on behaviour change in a general population, but also include people with specific mental and physical problems.

Narrative reviews of people with mental health problems include psychotic disorders[33], comorbid schizophrenia, combined mental health problems [31, 32, 35], general depression [10, 33–35, 69], post-stroke depression [36] and eating disorders [10, 69, 70]. One review in this category judged as low risk of bias suggests that Motivational Interviewing is important in psychiatric settings for reduction of substance use in the short term.

Narrative reviews of physical health problems include: cardiovascular problems (Motivational Interviewing for increasing physical activity) [83, 110]; musculoskeletal health (adherence with intervention for back pain) [103]; diabetes self-management (effect of smoking, blood-glucose control, diet and weight management [62, 75, 76, 78–80]; oral health hygiene [64–66, 68] (use of dental fluoride, increasing dental utilization and reducing sugar consumption); obesity (adherence to weight loss programmes); management of neurovascular disorders [82]. The most recent reviews report outcomes for the effectiveness of Motivational Interviewing for cancer care [101] and outcomes related to the treatment of irritable bowel disorder [104].

**Quality of narrative reviews**

In total 20 narrative reviews were judged as low risk of bias graded using the ROBIS tool [15] [11, 20, 25, 35, 42, 44, 47, 51, 53, 54, 59, 65, 83, 89, 92, 97, 98, 113–115]. Five of these reviews report positive effects of Motivational Interviewing. Rueda et al (2006) found beneficial effects of Motivational Interviewing for adherence to highly active antiretroviral therapy where there appears to be promising results for interventions delivered over 12 weeks or more [97]. Taggart et al (2012) found further support for benefits of Motivational Interviewing in achieving impacts around smoking cessation compared to other group education [115]. Cooper et al (2015) reported positive results for some but not all outcomes for reducing cannabis use [42]. Noordman et al (2012) conclude that Motivational Interviewing can be effectively delivered by physicians and nurses as a face-to-face communication-related behaviour change technique [114]. Reviews published since 2016 report mixed results. Kay et al (2016) suggest that Motivational Interviewing has potential for use in oral care [65]. Chatters et al (2016) report short term benefits for reducing cannabis use in younger adults [47]. However, most were unable to make firm conclusions about effectiveness of Motivational Interviewing [20, 44, 59, 89]. In a review of brief non face-to-face Motivational Interviewing interventions Jiang et al (2017) found promising evidence for telephone delivery in the treatment of substance abuse, but the results were not consistent for other alternative modalities such as text messages in groups or internet-based interventions.

**Discussion**

This overview is the first to integrate and systematically grade the quality of the evidence for the effectiveness of Motivational Interviewing interventions across a wide range of settings and populations for people with many different health problems and diseases. We have created a comprehensive map of all reviews relating to Motivational Interviewing to provide clarity relating to an intervention for which there have been multiple overlapping (and sometimes conflicting) reviews. Conflicting review evidence can create barriers and challenges to practitioners wanting to deliver evidence-based practice. This overview provides practitioners, policy makers and researchers with a summary of the quality and strength of the evidence for Motivational Interviewing. It signposts practitioners to the most up to date reviews, enabling them to efficiently access best review evidence to support clinical decisions. We found no
high-quality evidence from the meta-analysis data within any review, mainly due to methodo-
logical flaws in the reviews and poor quality of the included studies.

Motivational Interviewing appears to be most effective for stopping or preventing
unhealthy behaviours (categorised as Domain 1) such as binge drinking, reducing the quantity
and frequency of drinking, smoking and substance abuse. For gambling behaviour, low quality
evidence of short to long-term effectiveness suggests that further research on the effectiveness
of Motivational Interviewing is warranted to address this significant public health problem
[62]. For promoting healthy behaviour (categorised as Domain 2) where people may have little
desire to change, most of the evidence is inconclusive or of low quality. For example, there is
low quality evidence for the effectiveness of Motivational Interviewing for weight loss out-
comes in obese and overweight adults. The exception in Domain 2 is physical activity promo-
tion where there is moderate quality evidence of beneficial effects of Motivational Interviewing
for increasing physical activity in people with chronic health conditions. However, the trials
assessing adherence to physical activity participation were small and further high quality
research in this field is justified to investigate the effectiveness of Motivational Interviewing in
different populations, settings and context.

Mode of delivery
The exploration of moderator variables from meta-analysis data does not provide enough data
to be confident about the effects of different modes of delivery for Motivational Interviewing.
Reviews that focus on the mode of delivery report inconsistent results [45, 51, 95, 105]. The
TIDieR guidelines [14] capture some of the features that are relevant to intervention delivery
but the mode of delivery is considered to be an important component of intervention and is
not reported consistently in the literature [121]. Recent reviews have compared telephone [51]
or technology-delivered Motivational Interviewing interventions (TAMIs) [105] and report
inconsistent results or no beneficial effects. For example, Shingleton et al (2016) [105] found
that TAMIs are feasible to deliver but there is limited evidence of effectiveness. For an inter-
vention that relies on building and developing a relationship between client and provider it
seems unlikely that this mode of delivery could be successfully adapted for Motivational Inter-
viewing without considerable focus on training and fidelity measures.

Implication for clinicians and policy makers
The National Institute for Health and Care Excellence (NICE) guidelines [2] include Motiva-
tional Interviewing as a component associated with some effective interventions for behaviour
change strategies. However, the NICE (2014) Programme Development Group (PH49) are
cautious about making general recommendations due to lack of details of intervention compo-
nents reported in this field of research [2].

This overview has identified clear gaps in the evidence in support of most of the interven-
tions categorised in Domain 2 (e.g. weight loss programmes for obesity, oral health behaviour,
management of diabetes and musculoskeletal disorders, adherence to medication and engage-
ment with interventions). The high quality reviews on smoking cessation [12] and alcohol
abuse [49] both recommend caution when interpreting results. However, the overall effect size
reported by Lundahl et al [108] of 0.22 (95% CI 0.17 to 0.27) is similar to other complex beha-
vioural intervention [122, 123]. If applied to the 1 million smokers in the UK, or the millions
of physically inactive people globally [124], it is plausible that the impact of Motivational Inter-
viewing on health at a population level may be larger. Further rigorous research is required to
support this assumption.
Training and fidelity

Many different health care professionals including nurses, counsellors, physicians, medical students, social workers, and physiotherapists deliver Motivational Interviewing interventions, but there is little information about their training. Reviews that compared different health care providers found either no difference between groups [114] or reported limited conclusions due to small sample size [12].

Details of the fidelity of training of professionals delivering the interventions were generally poor although this is not unique to reporting of Motivational Interviewing. Training issues are fundamental to the success of any complex intervention and Motivational Interviewing, like other surgical, therapy or other behavioural interventions, requires practice of skills and a basic level of competency. There is no formal requirement for training in Motivational Interviewing or evaluation therefore practitioners can claim to use the approach without assessment, and competency is likely to influence outcome. Hall et al (2016) suggest that investment in training would need to be large to impact on change in practice [125].

It is difficult to comment on the cost effectiveness of Motivational Interviewing as it was not the focus of this overview, however we identified very little health economic data. Where cost data was available from a trial of smoking cessation in the UK, no clear conclusions could be drawn as the sustained quit rates did not reach statistical significance [12].

Strengths and limitations of the overview

This overview is the first to synthesise systematic review evidence on the effectiveness of Motivational Interviewing from a wide range of populations and settings with an aim to provide information that informs practice and policy. It highlights the discrepancy between the widespread recommendations of Motivational Interviewing as a universal behaviour change strategy and the available evidence supporting this approach. We carried out a comprehensive search with an inclusive selection criteria and it is unlikely that we missed any reviews written in English prior to our initial search, but this overview is not exhaustive.

The conclusions of this overview are highly dependent on, not only the quality of the reviews but the studies within the reviews. We extracted data according to the TIDieR guidelines [14] but many intervention details were missing, making it difficult to draw conclusions with confidence. This problem needs to be addressed in future trials to facilitate data synthesis and provide clear recommendation to all stakeholders. Our assessment of review quality (ROBIS) [15] and evidence quality (GRADE) [17] are subjective judgements and we used these judgements to categorise the evidence, concentrating our conclusions on those judged to be moderate quality (or low bias for narrative reviews). Some may consider our methods overly critical, but authors of the higher quality reviews are equally cautious with their recommendations [11, 12, 49].

Recommendations and implication for future research

The established Network of Trainers (MINT) alone have delivered Motivational Interviewing around the world to millions of people [126] but many questions remain unanswered regarding effectiveness.

Recommendations for clinical practice. Many different health professional groups are using Motivational Interviewing but the evidence for training reported in the literature is limited. The ‘Motivational Interviewing Treatment Integrity code’ (MITI) has evolved over the last 10 years [127] with an aim to standardise the delivery of Motivational Interviewing interventions. Guidelines for the minimum intervention content and training requirements for Motivational Interviewing are available and should be followed to standardise intervention delivery [127, 128].
**Recommendations for future reviews.** This overview has identified and brought together systematic reviews relating to Motivational Interviewing interventions; however further systematic reviews are warranted to inform clinical practice and future primary research in this field. Recommendations include, but are not limited to;

1. Research should address the fact that in clinical practice Motivational Interviewing is often delivered in combination with another psychological intervention. Systematic reviews exploring combined interventions were excluded from this overview; consequently, it is important to identify and appraise any existing systematic reviews relevant to this, prior to planning new reviews or primary research.

2. Future systematic reviews would benefit from the development of a taxonomy to ensure meaningful categorisation of the delivered intervention which considers the theoretical basis for Motivational Interviewing. Meaningful categorisation of Motivational Interviewing should be central to informing clinically relevant analyses and subgroup analyses.

3. A systematic review to explore the cost-effectiveness of Motivational Interviewing as an intervention for those health conditions where there is moderate quality evidence of a beneficial effect of Motivational Interviewing on patient outcomes.

4. A systematic review to explore the barriers and facilitators to delivery of Motivational Interviewing, focussed on those health conditions where there is moderate or high quality evidence of a beneficial effect.

5. A systematic review of qualitative evidence to explore the acceptability and perceptions of this intervention to people who are offered Motivational Interviewing.

6. Stakeholder involvement should be conducted in future reviews of the Motivational Interviewing literature particularly relating to categorising interventions and outcomes.

7. The use of reporting templates, recognised guidance and best practice for the conduct of systematic reviews and primary research is essential. e.g. PRISMA [129] and TIDieR [14].

**Recommendations for future primary research.**

1. Exploration of the effect of Motivational Interviewing should consider long-term outcomes and cost-effectiveness. Subgroup analyses should explore the length of intervention delivery and time since the end of the intervention.

2. Investment in training would need to be large to impact on change in practice [130] and this along with other issues relating to sustainability of the intervention e.g. context, should be considered in future trials.

3. To ensure avoidance of research waste [131, 132] it is essential that researchers are fully aware of existing reviews before embarking on further reviews, and that critical systematic reviews of evidence are completed prior to further primary research.

**Conclusion**

For the health problems that Motivational Interviewing was originally developed to address such as smoking cessation and alcohol misuse, the evidence provides some support for implementation particularly if fidelity of the intervention is prioritised. However, Motivational Interviewing has been implemented already for a wide range of other health and social problems where a “one size fits all” approach has been adopted with inconsistent effects.
Supporting information

S1 Checklist. PRISMA checklist.

S1 Table. Characteristics of interventions according to TIDIER checklist reporting guidelines.

S2 Table. Quality assessment of included reviews based on ROBIS (risk of bias in systematic reviews) tools.

S3 Table. Summary of comparisons judged to provide low or very low quality evidence.

S1 File. Exploration of moderator variables.

S1 Appendix. Medline search string.

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