REVIEWS

The effectiveness of motivational interviewing as a form of care for adults with type 2 diabetes: A descriptive review

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Abstract

Background: The incidence of type 2 diabetes (T2D) has increased rapidly worldwide during the last two decades. Lifestyle and behavioral factors such as diet, exercise and self-care have a crucial role in the prevention and management of T2D. The motivation behind the desire to change is a cornerstone of adopting a healthier lifestyle. Motivational interviewing (MI) is a counseling technique that emphasizes to individuals incentives to change rather than just giving information. There is a lack of scientific evidence to indicate whether MI is a suitable form of care among patients with T2D. The aim of this study was to identify the outcomes of Motivational Interviewing in the context of care of adults with type 2 diabetes.

Methods: A descriptive review of studies published between January 2001 and March 2011 describing motivational interviewing in the care of patients with type 2 diabetes was conducted by interrogating electronical databases (CINAHL, Medline, PsycINFO, Web of Science and Scopus) and conducting a manual search. Two researchers selected the studies and assessed their quality independently.

Results: Five studies were selected for inclusion in this review. Our results show that studies describing MI used as a form of therapy in the care of T2D patients yield mixed results. Statistically significant effects for some clinical outcomes and among behavioral and psychological outcomes were reported.

Conclusions: The studies reviewed indicate that although MI seems to be a promising form of care among patients with T2D, further research into applying MI within T2D care is urgently needed.

Key words
Motivational interviewing, Type 2 diabetes, Review

1 Introduction

The incidence of type 2 diabetes has increased rapidly worldwide during the last two decades. The number of patients with type 2 diabetes (T2D) globally is expected to rise from an estimated 284 million adults (6.4%) to around 439 million (7.7%) by 2030 [1]. The main reasons for the rapid increase include population growth, aging, urbanization and increasing numbers of individuals who are overweight or obese [1, 2]. Lifestyle and behavioral factors such as diet, exercise and

self-care have a crucial role in the prevention and management of T2D. Intensive lifestyle interventions have been proven to produce long-term positive effects on reducing diabetes risk [3]. Lifestyle interventions have also been found to be cost-effective in diabetes prevention [4].

Motivation plays a crucial role in changing one's lifestyle and in self-care activities. Motivation is influenced by life values and feelings of self-worth [5] as well as social support [6]. In motivational interviewing (MI), motivation is considered to be a state of readiness to change that is susceptible to external influences [7]. MI is a counseling technique that places emphasis on individuals' motivation to change rather than solely on giving information. The main principles of MI include expressing empathy by offering acceptance and understanding, developing discrepancy, avoiding arguments, rolling with resistance and supporting self-efficacy [7, 8]. Miller & Rollnick describe MI as more than a way of doing counseling – it is a way of being with patients. MI can be divided into two major phases. The first phase is about building motivation to change with the help of motivational feedback, reflective listening, assessing patients' level of readiness to change and dealing with resistance. The second phase is about strengthening commitment to change, when the therapist needs to shift strategies and focus on developing a plan for future and getting the client to commit to the plan as well as giving information and advice [7].

MI was originally developed for treating substance abuse and other behavioral problems. Recent systematic reviews and meta-analyses offer evidence that MI is a promising technique to aid in giving up smoking [9], assisting in weight reduction [10] and promoting cardiovascular health [11]. Recently it has also been applied to other fields of healthcare, especially for reinforcing behavior change with respect to self-care [12, 13].

The ability of health care staff to provide not only practical support but also empathetic, individualized and on-going support has been shown to increase T2D patients' ability to self-manage their disease [14]. In the treatment and especially in the prevention of T2D, lifestyle factors play an important role. As the prevalence of T2D is increasing, so are the costs associated with it. Nurses, as well as other health care staff, are under pressure to work effectively on prevention and care using minimal time and resources. Information about which factors are important in increasing patients' self-care activities and motivation to care for themselves is needed in order to create a functioning health care system for the future. Motivational interviewing could be an efficient form of therapy for supporting behavior change.

A search of the literature assessing MI in the area of physical health care yielded some recently published systematic reviews and meta-analyses [11, 15, 16]. None of them were directly aimed at T2D. With the growing number of patients suffering from T2D it is crucial to create, use and most importantly assess new methods for the care of T2D. That is why this systematic review is needed in this area. The aim of this descriptive review was to identify the outcomes achieved by using one of these new methods, motivational interviewing, in the care of adults with T2D. The data synthesis is presented in a narrative form since a meta-analysis of the results was not possible because of the variation in assessment and reporting of the outcomes in the articles included in this review.

2 Methods

To avoid study bias, a detailed review protocol was written and approved by a review group (H.K, M.K) before beginning selection of the studies. The study question defined in advance was: what kinds of outcomes have been reached by using MI in the care of T2D patients? To answer the study question, a descriptive review was undertaken using guidelines for identification of quantitative data [18].

2.1 Searching

The databases of the Cumulative Index of Nursing and Allied Health Literature (CINAHL), Medline, Web of Science and Scopus were searched systematically for relevant studies published during the period January 2001 to the beginning of March 2011. A search with corresponding search terms and limitations was also conducted at a later stage of the review

process in PsycINFO yielding no new articles. The databases used were chosen as they are the ones most likely containing data we were aiming to find in this review and addressing the subject from a view point of a nurse and primary health care in the context of T2D patients. A manual search was also undertaken of journals relevant to the review topic and the reference lists of studies selected for inclusion were scanned for additional relevant papers. To make the search process more valid an information specialist assisted in selecting optimal search terms. The search terms used are listed in Table 1. Total of 127 references were found from the databases and three from the manual search.

Table 1. Search terms used to identify relevant papers

Type 2 diabetes	T2DM, T2D, NIDD, NIDDM, type 2 diabetes mellit*, type 2 diabet*, type II diabet*, non-insulin-dependent diabet*, adult-onset diabet*, maturity-onset diabet*, (MH "Diabetes Mellitus, Non-insulin-dependent"), MeSH: (Diabetes Mellitus, type 2)
Motivational interviewing	Motivation AND interviewing, "motivational interview*" (MH "Motivational interviewing"), MeSH: (Motivation AND Interviews as topic)

2.2 Selection

The inclusion and exclusion criteria for the papers included in the study were defined in the study protocol prior to commencing the review. Inclusion criteria (defined according to PICO) were as follows: 1) Adults (Aged > 18 years) with diagnosed T2D; 2) MI or MI-based counseling used as an the only intervention; and 3) Original, empirical studies reported in English, Finnish, Swedish or French (languages on which authors have a knowledge of) and published between 2001 and 2011. No specific criterion for outcomes was set as the aim of the review was to synthesize all reported outcomes.

The study selection process was performed by two investigators (H-M.M, H.K) independently. Differences in opinion were discussed. A detailed chart of the studies included and rejected was kept; this included reasons for rejection. The systematic search process is outlined in Figure 1.

2.3 Validity assessment

After the process of study selection, the five remaining articles were assessed by two investigators (H-M.M, H.K) independently to determine their quality. The quality assessment tools used were the Joanna Briggs Institutes Critical Appraisal Checklists [17]. Randomized controlled trials (RCTs) [19-22] were assessed using a checklist for randomized and pseudo-randomized studies, allocating points from 1-10 and with a minimum quality threshold of 5 points. The main criteria used for validity assessment for RCT's [19-22] were: randomization to groups, blinding of participants to allocation, concealment of the allocation from allocator, whether the outcomes of subjects who withdrew was used, blinding of assessors, comparableness of groups at baseline, indentical treatment of the groups outside the intervention, measurement of the outcomes and the use of statistical analysis. Each fulfilled criteria was given one point. Maximum was 9 points and minimum zero. The cut point was set in five points which were supposed to ensure an appropriate quality level for articles included. All RCTs assessed for quality managed to reach the 5-point limit and were included in the review. The main criteria for assessing a study using a quasi-experimental pre-post design [23] were: being based on a random / pseudo-random sample, clear definition of the inclusion criteria, assessment of the outcomes objectively, sufficient description of groups if comparisons included and the use of appropriate statistical analysis. Also here each fulfilled criteria was given one point. Maximum was five points and minimum zero. This study was allocated five points and was, therefore, included in the review.

2.4 Data extraction and synthesis

A detailed data extraction sheet was used to assist in the data extraction process. The main variables extracted were those describing the study generally (aims, study design, number of participants, follow up period and eligibility/exclusion criteria used when selecting the participants), variables describing the characteristics of the intervention (ways of tailoring the intervention, duration, number of contacts and information about the health care staff who delivered the counseling) and variables describing the outcomes of the interventions (clinical measures, behavioral measures and psychological measures).

The data extraction, analysis and synthesis were conducted by one reviewer (H-M.M) independently and then assessed by two reviewers (H.K, M.K). Since the study designs and the results of the studies included were clinically diverse, the data were synthesized in a narrative form rather than by a meta-analysis of the results.
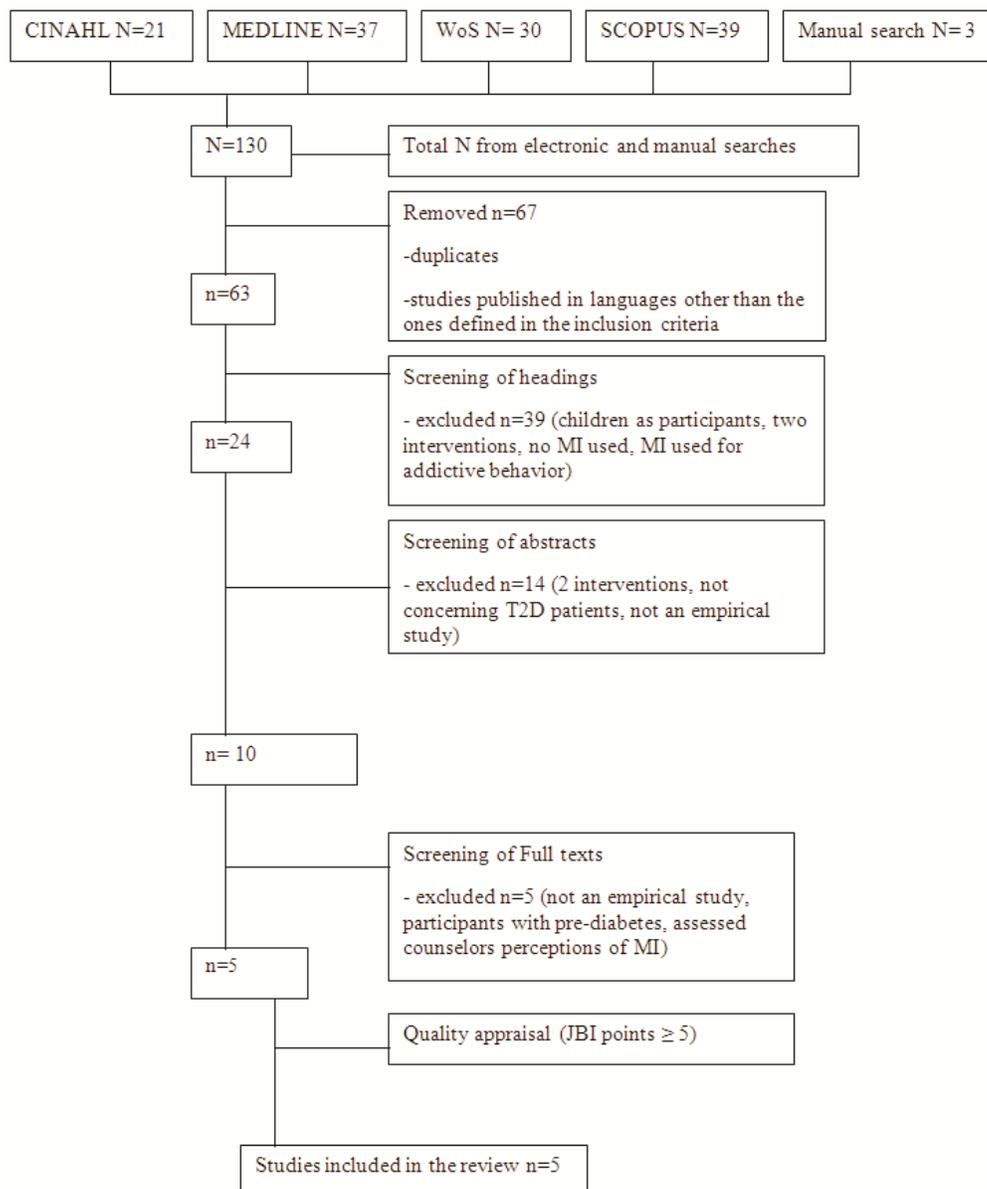

Figure 1. Flowchart of the study selection process

3 Results

3.1 General description of studies

The systematic search process is outlined in full in Figure 1. A total of 63 studies were screened for titles, abstracts, full texts and quality. The main reasons for excluding studies are described in Figure 1.

This descriptive review yielded five published studies concerning motivational interviewing used in the care of type 2 diabetics. All articles included in the review were published between the years 2007 and 2011 and were original, empirical studies. Four of the studies were RCTs [19-22] and one was quasi-experimental using pre-post design [23]. The main aims of all studies were to examine and assess the value of MI in T2D management and care.

The quality of the studies included in the review was considered to be good. However, one of the studies failed to provide accurate information about the study population and the methods used. All studies included descriptions of the inclusion and exclusion criteria. The randomization technique was reported in 3 out of 4 RCTs. Sample size of the patients receiving MI ranged in RCTs from less than 20 [21] to nearly 300 [22] patients. The baseline characteristics of the participants did not differ substantially between the studies included. The age range defined in the inclusion criteria for the participants was 18-75 years. All studies defined diagnosed type 2 diabetes as an inclusion criterion as well as severe co-morbidity as an exclusion criterion. One study [19] included only women while the other studies included both sexes.

3.2 Description of interventions

The way motivational interviewing (MI) was used as an intervention varied between the studies included in this review: Table 2 provides a summary. Notable differences appeared especially in the key components associated with tailoring the intervention: staff, structure of the sessions and length of the intervention.

Professionals from several different fields acted as interventionists in the studies included in the review. Two of the studies used nurses or GPs working in T2D care as interventionists and trained them in using MI [20, 22]. One study [23] used a design in which all the participants received MI from an interventionist who was trained in MI and supervised by MI professionals, and one study [19] used licensed clinical psychologists who had received structured training in MI as interventionists and applied this to patients in groups. The tailoring of the intervention was not reported in one of the studies [21].

There was also quite considerable variation in how MI sessions were constructed and how many sessions were offered to the patients. The number of sessions offered ranged from two [23] to five [19]. In two of the studies [20, 22] MI was used within patients routine quarterly check-ups and in one study [21] MI sessions were given four times. Calhoun et al (2010) offered participants two sessions of MI, approximately 30 minutes each, following a standardized introductory script. The meetings focused on behaviors identified through participants' responses or the questions they asked during the meeting. Calhoun et al (2010) described using open-ended questions, the discrepancies technique and eliciting and discussing individual participants' personal readiness for behavior change [23].

Heinrich et al. reported that nurses who specialized in the care in chronic diseases were trained in MI in two five hour sessions conducted by a certified trainer. After the training sessions the nurses applied MI during patients' standard quarterly consultations whilst patients in the control group received the usual care [22]. Rubak et al. reported using a comparable study design although the interventionists were GPs [20]. West et al. used MI more intensively, offering the participants five sessions of MI in addition to group-based behavioral treatment [19].

Table 2. Studies examining the use of motivational interviewing in the care of adults with type 2 diabetes

Authors, population, sample size	Study aim & design	Follow-up period	Intervention	Principal findings
Calhoun et al (2010) residents of an Native American Reservation (n=26)	Within-subjects pre-post design study to assess the utility of MI techniques in a Native American population	3 months	Participants received 2 MI-sessions, each lasting approximately 30 mins, within 3 weeks of the baseline measurements, from a MI-trained interventionist following a standardized introductory script.	*Clinical outcomes*: -no significant changes *Behavioral outcomes*: -decreased levels of consumption of unhealthy food *Psychological outcomes*: -significant reduction in depressive symptoms, self-blame and worry about the future - increase in family support and satisfaction with treatment
Heinrich et al (2010) nurses (n=33) and patients (n=584) in primary health care settings in Holland	RCT to assess the effects of a MI-based counseling training for nurses among type 2 diabetes patients	12 and 24 months	Nurses in the study received training in MI consisting of two sessions, follow-up meetings and feedback. Nurses applied MI during standard quarterly consultations with their patients. Patients of the control group nurses received their usual care.	*Clinical outcomes:* -at 12 months: no effects found -at 24 months: significant difference for HDL-cholesterol in favor of the control group *Behavioral outcomes*: -no significant differences between groups *Psychological outcomes:* -chance HLOC scores were significantly lower and knowledge scores were significantly higher in experimental group
Pourisharif et al (2010) Iranian T2DM patients (n=93)	RCT to assess the use of MI in a group form	9 weeks	MI and Cognitive Behavioral Group Training were administered to two groups, involving four sessions, each lasting for 90 minutes. Publication does not describe what kind of care the control group received.	*Clinical outcomes:* -MI significantly improved the BMI. *Behavioral outcomes*: -not studied *Psychological outcomes:* -not studied
Rubak et al (2009) 48 practices (65 GP's) in Denmark with patients with T2DM (n=265)	RCT to assess whether training GP's in MI can improve T2DM patients' understanding of diabetes, beliefs concerning prevention and treatment and motivation for behavioral change	12 months	GPs in the intervention group completed a MI training course consisting of a theoretical and practical introduction to MI. GPs in the control group received no formal training in MI. Patients in the intervention group received MI in addition to their usual care.	*Clinical outcomes:* -not studied *Behavioral outcomes:* -patients in the intervention group became significantly more autonomous towards self-care and received more information about it -patients in the intervention group were significantly more aware of the importance of controlling their diabetes *Psychological outcomes:* -patients in the intervention group were significantly more motivated to change their behavior
West et al (2007) overweight American women with T2DM (n=217)	RCT to assess whether adding MI to a behavioral weight control program improves weight loss outcomes and glycemic control	18 months	All participants took part in a 42-session weight management program. The intervention group received individual MI-sessions 5 times, each session lasting approximately 45 mins. Sessions were delivered by licensed clinical psychologists who had received structured training in MI. The control group received an attention placebo with the number and length of sessions matching that of the intervention group.	*Clinical outcomes:* -women in the intervention group lost significantly more weight -significantly greater A1C reductions were observed among women in the intervention group *Behavioral outcomes*: -adherence to the weight control program was significantly enhanced among women in the intervention group *Psychological outcomes:* - not studied

3.3 Outcomes of interventions

The effectiveness of the intervention was measured in different ways in the five studies. Two of the studies [22, 23] included clinical measures and evaluation of changes in patients' behavior as outcomes. One of the studies [20] focused solely on behavioral and psychological outcomes and two [19, 21] focused on clinical measures.

3.4 Clinical outcomes

Four of the studies [19, 21-23] used clinical outcomes to measure the effectiveness of MI-interventions. Heinrich et al (2010) examined MI-intervention effects with respect to HbA1c (Glycated hemoglobin), weight, systolic and diastolic blood pressure, total cholesterol, LDL- and HDL-cholesterol and triglycerides in follow-ups after 12 and 24 months. No intervention effects were found after 12 months, but after 24 months a significant difference was found between groups for HDL-cholesterol with the control group having better results. The groups did not show statistically significant differences among the other outcomes [22]. In West et al's study the primary outcomes were weight and HbA1c at baseline and 6, 12 and 18 months after the intervention, and they found that participants receiving MI had lost significantly more weight than control subjects at each follow up assessment. They also mentioned that even though both the intervention and the control group did lose weight, the weight loss was significantly greater in the intervention group and regaining weight began earlier in the control group. West et al also reported participants in the intervention group experiencing significantly greater HbA1c decreases than control subjects [19]. Pourisharif et al assessed how MI affected the physical health indexes BMI and HbA1C. They reported that MI significantly improved BMI, but did not have a statistically significant effect on HbA1c [21]. Pourisharif et al did not report the intervention, measures or results accurately enough to allow us to place any emphasis on their data. Calhoun et al evaluated HbA1c and random blood glucose as clinical outcomes and found no statistically significant changes [23].

3.5 Behavioral outcomes

Three studies [20, 22, 23] assessed the effects of MI on participants' health-related behavior. Calhoun et al (2010) used a non-standardized self-reported questionnaire for assessing participants' physical activity and a dietary intake questionnaire to assess food intake. The results revealed a trend towards a decrease in the consumption of unhealthy food from baseline to post-intervention follow up. An increase in the amount of time spent performing physical activity was also reported although it was not statistically significant [23]. Heinrich et al (2010) evaluated self-management behaviors using validated food frequency questionnaire (FFQ), part of the Summary of Diabetes Self-Care Activities (SDSCA) scale for smoking and physical activity and a Dutch form of the International Physical Activity Questionnaire (IPAQ). The results indicated that there were no significant differences between the intervention and control groups except for fat intake which was reduced in the control group [22]. Rubak et al also used the SDSCA scale to assess participants' self-care activities. The results reported concerned only smoking and alcohol consumption and showed no significant differences between the intervention and control groups [20].

3.6 Psychological outcomes

Psychological outcomes, such as self-care competence, health locus of control, quality of life and self-determined behavior were assessed in three studies [20, 22, 23]. Rubak et al focused on assessing psychological measures after one year by using a collection of previously validated questionnaires such as the Health Care Climates Questionnaire (HCCQ), the Treatment Self-Regulation Questionnaire (TSRQ), the Diabetes Illness Representation Questionnaire and the Summary of Diabetes Self-Care Activities. The results showed that patients in the intervention group were significantly more autonomous in the changes to their behavior and more motivated to change their behavior than patients in the control group. Patients in the intervention group also reported receiving significantly more advice from their GPs and were significantly more aware of the importance of controlling their diabetes [20].

Calhoun et al. used the DC Fatalism Questionnaire, Diabetes Locus of Control, Diabetes Quality of Life, Beck Depression Inventory II and 5-Item Stage of Change to assess psychological outcomes. The results showed a statistically significant

positive impact on participants self-reported depressive symptoms, a decrease in Genetic/Racial Fatalism, an improvement in family support, and a decrease in self-blame, as well as a significant improvement in satisfaction with treatment and a decrease in worrying about the future [23].

Table 3. Post-intervention outcomes

Author(s)/ Follow-up	Calhoun et al 3 months	Heinrich et al 12, 24 months	Rubak et al 12 months	Pourisharif et al 9 weeks	West et al 18 months
CLINICAL OUTCOMES					
Weight	0	NS	0	0	+
BMI	0	NS	0	+	0
HbA1C	NS	NS	0	NS	+
Blood Pressure	0	NS	0	0	0
Cholesterol	0	-	0	0	0
Random blood glucose	NS	0	0	0	0
BEHAVIORAL OUTCOMES					
Exercise	NS	NS	0	0	0
Dietary intake	NS	-	0	0	0
Smoking	0	0	NS	0	0
Alcohol Consumption	0	0	NS	0	0
PSYCHOLOGICAL OUTCOMES					
Beck Depression Inventory-II	+	0	0	0	0
Beliefs and understanding of T2D	0	+	+	0	0
Quality of life	+	NS	0	0	0
Satisfaction of treatment	+	NS	NS	0	0
Diabetes Management Self-Efficacy	+	NS	+	0	0
Health Locus of Control	NS	+	0	0	0

Note. 0= not measured/reported, NS= non-significant outcomes, += statistically significant positive outcomes, - =significant difference in favor of the control group

Heinrich et al. used the Health Care Climate Questionnaire, Diabetes Management Self-Efficacy Scale, Health Locus of Control, Diabetes specific quality of life and diabetes knowledge questionnaires for assessing the psychological outcomes of the intervention. Statistically significant effects were found on the intervention groups' knowledge scores and participants chance HLOC scores, which refer to their beliefs that health outcomes are random occurrences that do not depend on an individual's own actions. No other statistically significant differences were found [22].

Table 3 summarizes the statistically significant outcomes from all the studies included in the review. Similar outcomes have been combined even though the questionnaires used to assess them were slightly different.

4 Discussion

The aim of this descriptive review was to identify the outcomes of using MI in the care of T2D patients. This review is an overview of all studies published between January 2001 and March 2011 that could provide answers to the study question. With the growing prevalence of T2D and the costs associated with it, it is important to explore different forms of care and their applicability, value, cost-effectiveness and, most importantly, effect on patients.

Several literature reviews [11, 15, 16, 24] have been published during the last few years reviewing the use of MI in physical health care settings. In the discussion sections it is often stated that more research is needed on the use of MI in physical

health care. Existing RCTs have used the method in such a diverse ways that it is difficult, if not impossible, to draw definitive conclusions about whether MI is a truly effective form of care.

The five studies included in this review differed from one another substantially [19-23]. Four of the studies [19-22] used RCT for the study design and one [23] adopted a between-subjects pre-post design. Although the study designs were quite similar, the way in which interventions were tailored and how their effects were examined varied. The quality of the studies was rather good, only one of the studies included failed to provide sufficiently accurate information to allow it to be fully exploited in the analysis.

The length of the follow-up period, small sample sizes, lack of adequate power in statistical analysis and lack of baseline data are worth discussing in relation to the articles included in this review. In two studies [21, 23] the follow-up measurements for HbA1c were done after only three months or less which can be considered as relatively short time to monitor changes in HbA1c. Performing statistical analysis according to which conclusions have been made using small sample sizes can be perceived as weakening the power of the study [21, 23]. One of the studies [19] did not use baseline measurements for describing the change in patients' attitudes and motivation, which can be considered as a limitation.

The level of readiness for behavior change is one cornerstone of MI [7]. Calhoun et al (2010) studied the use of MI for Native Americans living on a reservation, whose mean BMI was 31.8 and mean HbA1C was 8.8% [23]. The level of readiness for change in this population could be considered to be higher than, for example, among the population studied by Heinrich et al. – middle aged patients in The Netherlands with a baseline HbA1C (77.3%) below 7% and 41.3 % of whom had a BMI below 28 [22]. Nationalities and ethnic groups differed in the selected papers, which might have some effects on the efficiency of MI in the study population.

The results of the studies were promising in general but there were no reports demonstrating the benefit of MI in T2D care beyond doubt. It was particularly interesting that the results did not conclusively demonstrate that MI is especially beneficial with respect to clinical outcomes or in increasing patients' motivation to care for themselves. Among the studies reviewed, MI was associated with no unambiguous improvements in specific fields, but the outcomes that exhibited positive effects varied between studies.

Motivational interviewing, as originally described by Miller & Rollnick, includes several aspects that need to be taken in account [7]. It is unclear whether the interventions used in the studies discussed herein managed to adhere the pure form of MI. It is also worth considering whether it is even possible to evaluate MI in any form of RCT in an absolutely reliable way since its effectiveness mainly depends on patients' personal characteristics.

5 Limitations

A systematic review process requires a specified protocol written prior commencement. In the protocol developed for this review, inclusion and exclusion criteria for the studies were specified precisely. The criteria specified limited the number of studies included in the review to five and, unexpectedly, the studies were substantially different from one another regarding both contents and quality, resulting in difficulties in producing an in-depth synthesis of the results. This can be considered to be a limitation of this review but it also demonstrates that MI needs to be explored more in physical health settings, especially among T2D patients.

The fact that only studies published in certain languages were included in this review introduced a risk of language bias: it is possible that studies reporting statistically significant results in the field have been published in other languages. Authors' tendency to publish only reports of trials that have produced positive results raises the possibility of publication bias, which needs to be taken in account when assessing the validity of this review. Using two investigators performing the study selection and quality assessment independently minimized selection bias and removing duplicate studies at an early

stage of the study selection process minimized multiple publication bias. The accuracy of the data extraction process was attested by using the expertise of the review group (H.K, M.K) to revise the data extraction.

6 Conclusions

Although according to the results of this review MI seems to be a promising form of counseling in T2D care, it needs to be studied further. In particular, good quality RCTs are needed. Intervention studies assessing issues such as what constitutes an appropriate number of MI sessions or MI given by different professionals are needed before MI is applied more widely to this already over-stretched health care sector. Studies including larger populations and more comparable results are also needed.

7 Relevance to clinical practice

The ability of health care staff to create an empathetic environment has been shown to be beneficial in T2D care. This review suggests that MI is a promising method for creating an empathetic environment and reinforcing clients' motivation to change. However, we need more information about how to tailor MI to be truly effective especially for T2D patients.

Competing interests

The authors declare that they have no competing interests.

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