

A systematic review of motivational interviewing within musculoskeletal health

Roy Chilton^{a*}, Renata Pires-Yfantouda^a and Mark Wylie^b

^a*Department of Psychology, City University, London, UK;* ^b*Suffolk Community Healthcare, Autism Spectrum Team, The Laurel Centre, Stowmarket, UK*

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Motivational interviewing (MI) has been investigated within a range of healthcare environments though to date no studies have systematically assessed its application and effectiveness within musculoskeletal health. The aim of this study is to identify interventions that have utilised MI to create change within musculoskeletal healthcare, evaluate quality and effectiveness, as well as identify the level of training received by those utilising the approach. The search strategy identified both published and unpublished or grey literature through electronic resources, reference list and content searches. Five studies were identified for quality assessment. Due to variations in delivery modality, musculoskeletal condition and type of MI application it was not possible to provide direct comparative interpretations for these factors. A data synthesis was used to provide a summary of study characteristics, a narrative overview and conduct a quality assessment as well as considering authors comments on study limitations. The results of the quality assessment highlighted a number of methodological issues which supported and expanded upon those expressed by the studies authors. None of the studies contained children or young people and in terms of training there were variations in training provider, duration and competency, as well as variation in the fidelity of MI. The findings have highlighted the need for well designed randomised controlled trials that are suitability powered to measure the effectiveness of MI within musculoskeletal health. Future studies may consider the application of MI within musculoskeletal conditions in terms of self-management and its application to creating lifestyle changes (e.g. diet, exercise) for adults, as well as children and young people. Research currently being conducted may expand upon the evidence, feasibility and validity of MI within areas such as fibromyalgia, osteoporosis, arthritis, understanding of knee replacement and rehabilitation.

Keywords: systematic review; musculoskeletal; MI; motivational interviewing

Introduction

The Department of Health's Musculoskeletal Services Framework (DoH, 2006) highlights over 200 musculoskeletal conditions responsible for an estimated 30% of general practitioner (GP) primary care consultations, affecting nearly one-quarter of adults and approximately 12,000 children. It is the aim of the musculoskeletal service framework to provide appropriate level information, support and treatment for those with musculoskeletal conditions. While at a European level, a Bone and Joint

*Corresponding author. Email: roychilton28@hotmail.com

Decade (2005a) report produced guidance for the prevention and treatment of musculoskeletal conditions aimed at the healthcare practitioner. This was accompanied by a public health strategy to reduce the burden of musculoskeletal conditions (Bone and Joint Decade, 2005b). While these reports provide recommendations and frameworks relating to public health, prevention and treatment there is also a need to understand how to best convey this guidance and information in order to engage with people either experiencing, or at risk of musculoskeletal difficulties and to create sustainable behavioural change at a person-centred level. This can be particularly confounded when individuals appear ambivalent to making changes within their lives that may alter the burden of their condition.

Within the literature a number of articles (Connelly & Ehrlich-Jones, 2010; Dart, 2011; Shannon & Hillsdon, 2007) have stated that client's respond readily to motivational interviewing (MI) which seems well-suited for use within consultations by healthcare professionals working with musculoskeletal problems. MI (Miller & Rollnick, 2002; Rollnick, Miller & Butler, 2008) is described by Rollnick and Miller (1995) as "a directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence" (p. 3). Previous reviews have considered MI in a number of different applications such as brief interventions (BI) (Dunn, Deroo & Rivara, 2001) and meta-analysis of controlled clinical trials investigated adaptations of motivational interviewing (AMI) (Burke, Arkowitz, & Menchola, 2003). Hettema, Steele and Miller (2005) suggested that in terms of addictive and health behaviour, MI is useful both as a BI and also as a way of improving outcomes when added to other treatment approaches.

MI has been investigated in a range of healthcare environments (Britt, Hudson & Blampied, 2004; Martins & McNeil, 2009; Rollnick, Miller & Butler, 2008). Knight, McGowan, Dickens and Bundy (2006) systematically reviewed MI within physical care settings and identified studies within type 1 diabetes (adolescents) and type 2 diabetes (overweight adults, overweight women), asthma, hyperlipidaemia, hypertension, coronary artery bypass surgery and cardiac rehabilitation (coronary artery disease). While the authors concluded that MI had the potential to be an effective intervention, due to inadequate quality of trials such as low levels of internal content validity amongst randomised controlled trials (RCTs) and other studies, small sample sizes, lack of power, use of disparate multiple outcomes, a need for the universal use of validated questionnaires and poorly defined therapy and training, further research was required. Rubak, Sandboek, Lauritzen and Christensen (2005) concluded that in 80% of studies investigated (smoking cessation, weight loss/physical activity, alcohol abuse and psychiatrics/addiction) MI outperformed traditional advice giving.

In relation to musculoskeletal health, recent systematic reviews have investigated behavioural treatments for chronic low back pain (Henschke et al., 2010) as well as interventions to improve adherence to exercise for chronic musculoskeletal pain in adults (Jordan, Holden, Mason & Foster, 2010). To date no studies have systematically assessed the application and effectiveness of MI specifically within musculoskeletal health. Understanding the current use and effectiveness of MI within specific areas of musculoskeletal health would inform on the direction of future research in order to understand the effectiveness of utilising this approach within musculoskeletal healthcare. As musculoskeletal conditions are not solely

located within the adult age group (DoH, 2006) children and young people will also be included in the inclusion criteria.

In terms of the level of training required to attain proficiency within MI, it has been demonstrated that attendance at a training workshop may only produce limited skill improvement (Miller & Mount, 2001). It has been suggested that proficiency in MI occurred only when systematic feedback on performance and, or personal skill coaching is involved (Rollnick et al., 2008). It has also been suggested that future studies should adequately report how those implementing the intervention were trained (Hettema et al., 2005). On this basis the level and competency of MI delivery within interventions will also be assessed within this study as this may have an important impact on outcome and provide helpful insight for practitioners considering using MI within a clinical context. A basic scoping exercise located no existing review articles relating to MI and musculoskeletal health.

Objectives

To summarise the available literature and provide a detailed overview of the application and effectiveness of MI within musculoskeletal conditions. Specific objectives are as follows:

- Identify all interventions that have utilised MI to create change within musculoskeletal health;
- Evaluate the quality and effectiveness of these interventions;
- Identify the level of MI training received by those utilising the approach.

Inclusion criteria

The systematic review question was framed in terms of Population, Intervention, Comparator, Outcome and Study design (PICOS) (Centre for Reviews and Dissemination, CRD, 2009). The requirements of inclusion in the initial stages of the search are to be as broad as possible to fulfil the aims of the study.

- Population – Identify individuals that have a musculoskeletal condition (no age restrictions).
- Intervention – The intervention should contain all or partial elements of MI and can be in combination with another intervention.
- Outcome – All outcomes to be recorded (e.g. physical and psychological).
- Study designs – No search restrictions to be placed on study design or language.

Exclusion criteria

No formal exclusion criteria will be placed on the search.

Search strategy

Electronic searches

To ensure as accurate representation of musculoskeletal conditions as possible, two search strategies were employed. First, the keyword *musculoskeletal* was entered and

a search conducted using the databases indexing facility or medical subject heading (MeSH) descriptors. Second, a number of free text terms (available upon request) were collated from the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) (Version, 2007) Chapter 10 – Diseases of the musculoskeletal system. Each search was combined with the phrase *motivational interviewing*. The searches were conducted between 25 February 2011 and 15 March 2011, each database was searched individually.

Search sensitivity

Pilot searches were conducted on EMBASE and Medline predominantly with exploded or indexed function and repeated with an external individual (Subject Librarian for Social Sciences at City University).

Published literature

The following databases were searched without language restrictions, Allied and Complementary Medicine (AMED) (1985–February 2011), British Nursing Index (BNI) (1985–2011), Cochrane Library – Cochrane Database of Systematic Reviews (CDSR), Database of Abstracts of Reviews of Effects (DARE), Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Methodology Register (CMR), Health Technology Assessment (HTA), Cumulative Index to Nursing and Allied Health Literature (CINAHL) (1982–2011), EMBASE (1980–2011), MEDLINE (1948 to February week 3 2011) and PsycINFO (1800s–2011). The bibliography section of the MI website (1983–2009) was also searched (<http://www.motivationalinterview.org/library/biblio.html>).

Unpublished, grey literature and conference proceedings

In order to minimise publication bias, unpublished or grey literature was also searched without language restrictions, using the following methods, **National Research Register (NRR) Archive (early 2000 to September 2007) – NRR Records from Regional and National Research Programmes, NRR Records from Research Centres: Lead Centres for Multi-Centre Projects, NRR Records from Research Centres: Single-Centre Projects, NRR Records from Research Centres: Participating Centres for Multi-Centre Projects. ClinicalTrials.gov, System for Information on Grey Literature (OpenSIGLE), National Technical Information Service (NTIS) (1964–2011), Health Management Information Consortium (HMIC) (1979–2011) and ISI Web of Science – with Conference Proceedings**. Due to the varied range of journals in which MI articles are published, PubMed Journals Database (1950–2011) was also used to identify any journals that required hand searching. Finally, all records from the Index of Conference Proceedings at the British Library were checked as part of the Document Supply Conference File on the Integrated Catalogue.

Study selection

Both MeSH and ICD-10 free text search results were screened by the author (RC) for reference to a musculoskeletal condition and the phrase motivational

interviewing, full text articles were retrieved to provide an accurate representation of study content (Chokkalingam, Scherer & Dickersin, 1998; Hopewell, Eisinga & Clarke, 2008). Articles were categorised (i.e. review, original article, article, letter, commentary, practice, evidence-based practice, protocol, book, chapter, design paper, conference material or a registered trial) and screened for addition references (content and reference list search). Duplication articles were removed.

Results

Summary of search effectiveness (study selection)

The search strategy identified **five studies** for inclusion within **chronic pain** (Habib, Morrissey & Helmes, 2005) **low back pain** (Leonhardt et al., 2008; Vong, Cheing, Chan, So & Chan, 2011) **fibromyalgia** (Ang, Kesavalu, Lydon, Lane & Bigatti, 2007) and **Osteoporosis** (Cook, Emiliozzi & McCabe, 2007). Five studies were also excluded as they were ongoing pieces of research (Table 1).

Data synthesis

Due to the variation of studies in terms of delivery modality, musculoskeletal condition and type of MI application, a meta-analysis was not suitable. A narrative overview provides a summary of study characteristics (Table 2), to minimise extraction errors and bias both RC and MW independently completed a Data Extraction Form (available upon request) while a third person (RP) was available should any unresolved disagreements occur, this was not required. The outcome from the quality assessment process is presented in Table 3. Results of quality assessment

The two assessors (RC & MW) independently completed a quality assessment (Deeks et al., 2003; Downs & Black, 1998). Inter-rater reliability was $\kappa = 0.328$ ($p < 0.001$), 95% CI (0.1587, 0.4975) and was interpreted (Landis & Koch, 1977) as a fair level of agreement. Discussions were held in order to collate a final opinion, any disagreements or missing data were discussed and a consensus agreed upon between both assessors, no aspect of the process required a third party (RP). The Downs and Black checklist assesses Reporting, External Validity, Internal Validity (bias), Interval Validity (confounding – selection bias) and Power. The following summary reflects a consensus across all or 80% of studies:

Reporting

() = question number

(5) None of the studies provided a list of, or identify any principal confounders at the onset of the study.

(8) No adverse events as a consequence of the intervention were provided.

External validity

(11) It was not possible to determine whether the subjects asked to participate in the studies were representative of the entire population which they were recruited from.

Table 1. Characteristics of ongoing studies.

Study	Description	Study status
Ang et al. (2011)	Protocol description for Research to Encourage Exercise for Fibromyalgia (REEF) randomised attention-controlled trial. Participants are randomised to either the MI intervention (six telephone delivered exercise-based MI counselling calls) or the attention controlled group (equal number of telephone calls to control for attention)	Currently underway at time of search
Solomon et al. (2010)	Design and initial enrolment of the Osteoporosis Telephonic Intervention to Improve Medication Adherence (OPTIMA) blinded randomised controlled trial. Participants are assigned to either 12-months of mailed education (control group) or one to one telephone-based counselling and the mailed education (intervention group)	Currently underway at time of search
Ehrlich-Jones et al. (2010)	Describes the Improving Motivation for Physical Activity in Arthritis Clinical Trial (IMPAACT) randomised controlled trial. To evaluate a tailored health promotion program to increase physical activity among individuals with arthritis. Within the treatment group, participants receive physician counselling and IMPAACT intervention, while control subjects receive physician counselling	Effectiveness of intervention being evaluated at time of study
ClinicalTrial.gov identifier NCT00324857	A randomised controlled trial to demonstrate the efficacy of interventions (motivational interviewing and a decision aid video) to improve understanding of knee replacement risks, benefits and expected outcomes amongst primary care African Americans. Also increase willingness to consider knee replacement and increase primary care referral rates for surgical consideration amongst primary care African Americans, the control group is described as an attention control	Currently ongoing at time of search
ClinicalTrial.gov identifier NCT00979719	A randomised controlled design to help rehabilitation patients (conditions – pain, osteoarthritis, rheumatoid arthritis, heart diseases and diabetes mellitus type 2) adopt and maintain a physically active lifestyle. The intervention group receive a interactive computerised expert system, providing tailored treatment, while the active control receive the standard (non-tailored) computerised program, the passive control are asked to complete a questionnaire	Currently ongoing at time of search

(12) Studies did not or it was not possible to determine whether those participant's recruited had a similar distribution of confounding factors as the source population.

Table 2. Study characteristics of included studies.

Article (author, location, setting, intervention recipients)	Musculo-skeletal condition	Study design	Intervention (type, delivery role)	Outcome measures	Results (summary)
Leonhardt et al. (2008) – German primary care setting, Adult	Low back pain	Multi-centre cluster-randomised trial	TTM-based motivational counseling, Practice nurses	FQPA, Self-efficacy* Stages of change*	No evidence of an intervention effect
Vong et al. (2011) – Physical therapy department, Adult	Low back pain	Double-blinded randomised controlled trial	Motivational Enhancement Therapy (MET), Physical therapists	PSEQ, PRES, Pain intensity (VAS), Physical function* RMDQ, SF-36, Home exercises log	MET significantly improved aspects of motivation, physical capacities, self-perceived general health and exercise compliance
Habib et al. (2005) – Setting unclear (Prior to community based pain management workshop), Adult	Chronic pain**	Randomised controlled trial Pilot study	Preparation for Pain Management Intervention Brief Intervention (BI), Registered practising psychologists	Workshop attendance	Participants in the treatment group were significantly more likely to attend workshops
Ang, Kesavalu et al. (2007) – Exercise sessions/ Telephone delivered Adult	Fibromyalgia	Quasi-experimental (pre-post & follow-up) Pilot study	Exercise-based motivational interviewing, 3 rd year doctoral student in clinical psychology	FIQ, BPI, AIMS, Exercise adherence (verbally assessed)	Significant improvement on FIQ, BPI and exercise. AIMS relatively unchanged
Cook et al. (2007) – Community-based (telephone), Adult	Osteoporosis	Non-randomised trial	ScriptAssist Telephonic Counselling Programs, Registered nurses at Script Assist call centre	Adherence levels, Pharmacy fill records	Participants referred to ScriptAssist were significantly more adherent than the general population

Note: *See article for full description/reference; **diagnosis characteristics (N = control/intervention group) - disc condition (23/14), neuropathic (7/8), rheumatoid arthritis (1/1), fibromyalgia (4/3), osteoarthritis (4/6), headache (0/1), congenital abnormality (0/3), unknown diagnosis (0/3); N/A – Information not available; FQPA – Freiburger Questionnaire on Physical Activity; PSEQ – Pain Self-Efficacy Questionnaire; PRES – Pain Rehabilitation Expectation Scale; VAS – Visual Analogue Scale; RMDQ – Roland Morris Disability Questionnaire; SF-36 – Short-Form Health Survey; FIQ – Fibromyalgia Impact Questionnaire; BPI – Brief Pain Inventory (short-form); AIMS – Arthritis Impact Measurement Scale.

Table 3. Summary of quality assessment checklist for included studies.

Study	Description (item number)
Leonhardt et al. (2008)	<p><i>Reporting</i> (2) Partial information reported regarding outcomes measures used in the study</p> <p><i>Internal Validity – bias</i></p> <p>(20) Due to partial reporting, unable to determine the validity or reliability of all main outcome measures</p> <p><i>Internal Validity – selection bias</i></p> <p>(24) Unable to determine whether intervention assignment was concealed from both patients and health care staff until recruitment was complete</p> <p>(25) Unable to determine whether there was adequate adjustment for confounding within the analyses of the main findings</p> <p><i>Power</i></p> <p>(27) Power not reported</p>
Vong et al. (2011)	<p><i>Internal Validity - selection bias</i></p> <p>(22) Unable to determine the time period over which participants were recruited</p>
Habib et al. (2005)	<p><i>Reporting</i></p> <p>(9) No follow-up</p> <p>(10) Actual <i>p</i> values not stated (only <05, <01)</p> <p><i>Internal Validity – bias</i></p> <p>(17) No follow-up</p> <p><i>Internal Validity - selection bias</i></p> <p>(24) Unable to determine whether randomised intervention assignment was concealed from both participants and health care staff until recruitment was completed</p> <p>(26) No follow-up</p> <p><i>Power</i></p> <p>(27) Power was not reported</p>
Ang, Kesavalu et al. (2007)	<p><i>Internal Validity – selection bias</i></p> <p>(21)(22)(23)(24)(25) No control group</p> <p><i>Power</i></p> <p>(27) Power was not reported</p>
Cook et al. (2007)	<p><i>Reporting</i></p> <p>(4) Interventions were not clearly described</p> <p>(7) No data regarding estimates of random variability for the main outcomes</p> <p>(9) The characteristics of patients lost to follow-up were not described</p> <p><i>Internal Validity – bias</i></p> <p>(17) Unable to determine if analyses were adjusted for different lengths of follow-up or whether the time period between intervention and outcome is the same for the cases and controls</p> <p><i>Internal Validity - selection bias</i></p> <p>(21) Participants were not from the same population, compared against national baseline as comparison data</p> <p>(22) Unable to determine whether participants were recruited over the same period of time</p> <p>(23) Participants were not randomised to an intervention group</p> <p>(24) Participants not randomized</p> <p>(25) Unable to determine whether adequate adjustment for confounding was conducted in the analysis, no confounding factors mentioned</p>

(13) Studies did not or it was not possible to determine whether the staff, places or facilities the participant's were treated with were representative of those that the majority of patients receive.

Internal validity - bias

(14)(15) With the exception of Vong et al. (2011). Studies did not or it was not possible to determine whether participants and those measuring the main outcomes were blinded to the intervention.

(19) Unable to determine whether compliance with the intervention was reliable.

Transtheoretical Model (TTM) based motivational counselling (Leonhardt et al., 2008)

This study aimed to assess the effects of TTM-based motivational counselling approach to increasing physical activity in patients with low back pain. Interventions based on the TTM were tailored to the patient's motivation and readiness to change. The study contained three study arms, groups A and B General Practitioners (GPs) delivered a German Low Back Pain guideline with practice nurses inviting participants in group B for up to three counselling sessions (duration 15–20 min per session), the control group (group C) GPs received the guideline by mail. Follow-up was conducted at six- and 12-month periods.

In terms of training, practice nurses were trained in general counselling skills (such as active listening, paraphrasing, verbal affirmation and reinforcement), TTM-based counselling and the MI style. They learned to identify particular stages of change, use stage-specific counselling strategies, through the pre-action stages they learned to focus on active listening, expressing empathy and identifying ambivalence, while at the action stages incorporate a more direct style using reinforcement and direct advice, an emphasis was placed on change coming from the patient. Emphasis was placed on interactive exercises and role play, nurses received supportive material such fact sheet, wording suggestions, reminders and were provided with all written material used throughout the training. The training was evaluated by paper and pencil test (stage identification and matching of specific counselling procedure to stage).

Authors study limitations

The authors noted that there was a reliance on self-report data, low response rate from physicians (14% of invited practices) and that informed consent favoured participation of individuals interested in physical activity. They concluded that the findings were most probably due to the initially high motivation of physicians, nurses and the participants involved in the study and therefore likely to be a biased sample.

Motivational enhancement therapy (MET) (Vong et al., 2011)

The aim of this study was to investigate whether the addition of MET to conventional physical therapy (PT) produced better outcomes than PT alone for individuals with chronic low back pain. (MET) The MET content was based on MI strategies and a review of the research literature for motivation enhancing factors. It was piloted to assess validity for individuals with pain and modified according to feedback. Both participants and the assessor were blinded to either MET plus PT or PT only. The PT group received 10, 30-min PT sessions in 8 weeks which included

15 min of interventional therapy and a tailor-made back exercise program. For the MET group, participants received MET within their PT sessions. The physical therapists incorporated MET into the PT sessions using MI skills and psychosocial components aimed at enhancing motivation to engage in treatment and creating behavioural change. Treatment time for both groups was kept within 30 min and participants were followed-up at one month.

Training was provided by a clinical psychologist who provided MET or general communication skills training (PT only group). Therapists communication was observed and evaluated using a checklist (five-point MET strategy scale) by an investigator who had received MI and counselling training, the results reflected the requirements of either the MET plus PT group or the PT group.

Authors study limitations

The authors noted that the study had a limited follow-up (one month). Due to the “intention to treat” method of managing the data, the results may not represent the 10 participants (MET plus PT group) and 11 participants (PT group) that dropped out. While the training hours of the physical therapists were shorter than the MI Network of Trainers recommend this was addressed by the training being similar to other studies plus including a two-week trial to standardise performance. Authors stated that participants were screened in a formal interview and by checking medical records. People with obvious depression and anxiety problems or a history of psychiatric problems were excluded from the study and therefore there may be limitations on generalising findings to patients with such conditions.

Preparation for pain management intervention (Habib et al., 2005)

The aim of this pilot study was to develop and evaluate the Preparation for Pain Management Profile (PPMP) for increasing engagement in pain management workshops within the community. The PPMP was developed and administered in a MI brief intervention based format by psychologists. The treatment group received a brief (two session) intervention containing a semi-structured assessment (approximately 1 to 1.5 h) and feedback interview (approximately 1.5 h) based on the PPMP and delivered in a MI style. The control group received a standard plan assessment (approximately 1 to 1.5 h) and an attention placebo interview (up to one hour). There was no follow-up in this study. In terms of training, the study described the interviewers as registered practising psychologists having intensive training in MI techniques.

Authors' study limitations

The authors noted that 12 participants (five control and seven treatment group) had a diagnosis of osteoarthritis or rheumatoid arthritis and suggested being in a remission or acute phase during the study had the potential to slightly affect the findings, only self-managing when symptoms are present. Researchers re-analysed the data with these participants excluded and found no significant change. Demand characteristics were questioned as both interviewers had intensive training in MI, to control for this the interviews were semi-structured and interviewers were required to follow that format. Future recommendations involved excluding individuals who

have chronic conditions characterised by fluctuations between remission and recurrent acute phases, also using the MI Skill Code (Moyers, Martin, Catley, Harris & Ahluwalia, 2003) to ensure treatment fidelity to motivational interviewing.

Exercise-based MI (Ang, Kesavalu et al., 2007)

The aim of this pilot study was to investigate the effect of exercise-based MI on patients' self-reported pain and physical function. Participants received two weekly educational classes (30 min each, weeks 1–2). The first class provided information on fibromyalgia and the importance of exercise they were also given a handwritten, individualised exercise prescription and heart rate monitor. The second class focussed on barriers to exercise adherence, both classes were taught by a rheumatology fellow and at the end of each lecture participants received a 15-min supervised exercise session with a fitness instructor. The following 10 weeks (weeks 3–12) participants received six sessions of telephone-delivered counselling (each averaging 25 min). Participants were followed-up at week 30.

In terms of training, the motivational interviewer was a third-year doctoral student in clinical psychology. Prior to the intervention their MI training was within a classroom environment with further training through videotapes and textbooks. While delivering the intervention they received weekly supervision with a clinical psychologist, activities related to the fidelity of treatment, each participant's progress was discussed, evaluation of techniques in which audiotapes and role-play were used. Finally there were discussions regarding the differences between MI other frequently used techniques such as cognitive behavioural therapy. It is also noted in the study that an MI technique for chronic pain (Jensen, 2002a) was also adapted to promote exercise adherence.

Authors' study limitations

With respect to study limitations, the authors stated that as there was no control group the findings may be subject to regression to the mean and that the use of self-report measures to assess outcomes limited objectivity. Finally, they stated that research participants are usually more motivated than non-research fibromyalgia patients and therefore the influence of a selection bias was also questioned.

ScriptAssist telephonic counselling program (Cook et al., 2007)

The aim of this study was to evaluate the ScriptAssist telephonic program to improve osteoporosis medication adherence. The intervention was delivered via telephone by one of four registered nurses at the ScriptAssist call centre. Participants were screened either as At-Risk (for future non-adherence) and received a median of five telephone contacts or Low-Risk (for future non-adherence) and received a median of three telephone contacts, the average call duration of both groups was 15.3 min. Participants were followed-up for an average of 4.1 months after the start of the treatment. In terms of training the patient counselling was described as being delivered by "call centre nurses trained in MI and cognitive-behavioural therapy techniques" (p. 446).

Authors' study limitations

The authors commented that the lack of a randomised control group impacted on the internal validity of the study. They attempted to address this by using two valid but independent measures of treatment adherence and comparing the participants to a national reference group and a small group of non-participants. The authors suggested that future research could consider the effect of patient education within psychologically based interventions, to address high attrition rates and follow-up high-risk participants.

Discussion

The objective of this systematic review was to provide a detailed overview of the application and effectiveness of MI within musculoskeletal conditions. Due to the variation in delivery modality (telephone, face to face, assessment/feedback, within treatment) musculoskeletal condition (low back pain, chronic pain, fibromyalgia, osteoporosis) and type of MI application (TTM-based motivational counselling, Motivational Enhancement Therapy, Preparation for Pain Management Intervention, exercise-based MI or the ScriptAssist Telephonic Counselling Program) it was not possible to provide direct comparative interpretations on delivery modality, musculoskeletal condition or type of motivational intervention.

Quality and effectiveness of studies

While the Down and Black (1998) checklist highlighted a number of study-specific features, described in the results section, there were also commonalities located across studies. The studies did not report any principal confounders at the onset of investigation or whether there were any adverse effects as a consequence of the intervention. In terms of external validity it is not possible to accurately understand how representative the findings were and whether they could be generalised to the population participants were derived from. With the exception of Vong et al. (2011) studies did not or it was not possible to determine whether participants and those measuring the main outcomes were blinded to the intervention, it was also not possible to determine whether compliance with the intervention was reliable.

The authors provided some salient comments regarding methodology. In terms of a TTM-based motivational counselling approach for individuals with low back pain (Leonhardt et al., 2008) they suggest a need to provide a representative study, as well as use objective non-self report measures in order to reliably assess validity of findings. Vong et al. (2011) noted that limited follow-up restricts understanding of the long-term impact of their application of Motivational Enhancement Therapy (MET) for individuals with low back pain and due to exclusion of psychiatric problems, can not comment on those individuals that have low back pain with depression or anxiety. For both Ang et al. (2007) and Cook et al. (2007) the lack of a comparative or control group limit the validity of the findings due to concerns regarding internal validity. While Habib et al. (2005) noted excluding individuals with chronic conditions characterised by fluctuations between remission and recurrent acute phases, as well as ensuring treatment fidelity to MI is maintained. These methodological issues mean it is not possible to draw firm conclusions regarding the outcomes of these studies.

While there are limitations in methodological quality within the studies assessed, the literature does reflect an interest in MI and how it can be applied to musculoskeletal health. This interest can be observed within Osteoporosis (Gleeson et al., 2009) Pain (Jensen, 1996, 2000, 2002b, 2006; Kerns & Habib, 2004; Kerns, Bayer & Findley, 1999; Novy, 2004; Okifuji & Ackerlind, 2007; Osborne, Raichle & Jensen, 2006; Sanders, Donahue & Kerns, 2007; Turk, Swanson & Tunks, 2008) Fibromyalgia (Gowans & deHueck, 2006; Jones, Burckhardt & Bennett, 2004) and Arthritis (Hammond, 2003). It was also noted that the findings from this systematic review did not locate any research specifically aimed at understanding the impact of MI within musculoskeletal health for children or young people.

Training

While it is not possible to speculate on the relationship between training provision and outcome due to variations across studies, with the exception of limited descriptive information from Habib et al. (2005) “psychologists trained in Motivational Interviewing” (p. 51) and Cook et al. (2007) “call center nurses trained in MI and cognitive-behavioural techniques” (p. 446), variations were observed with regards to training provider, duration and competency. Supervision was not mentioned as a component of training for the physical therapists (Vong et al., 2011) while the interviewer within the Ang et al. (2007) study received weekly supervision with a clinical psychologist and the nurses in the Leonhardt et al. (2008) study received between one to three supervision sessions (profession unknown). Current research suggests that the most effective methods for training and learning MI include a combination of traditional workshops followed by extended coaching and clinical supervision, additionally clinical sessions can be coded to identify strengths and areas for improvement (<http://www.motivationalinterview.org/trainers/trainers.html>).

Intervention fidelity

There was a level of variation across included studies in terms of intervention fidelity. Ang et al. (2007) described how supervision sessions were used to assess fidelity to treatment in terms of participant’s progress, the evaluation of techniques and audio taping interviews to critique component of MI. Within the Habib et al. (2005) study, a random sample of 50% of the tapes of each interview were checked for adherence to treatment protocols by a senior clinical psychologist experienced in motivational interviewing. While Leonhardt et al. (2008) described that one to three supervision sessions were provided, there was no mention of whether intervention fidelity was monitored or assessed within them. Similarly, Cook et al. (2007) and Vong et al. (2011) did not describe any form of fidelity measurement. These factors raise concerns about the quality and efficacy of MI delivered within these studies and reflects a lack of documentation regarding the fidelity of MI delivery noted within the literature (Hetteema et al., 2005).

Conclusion

This systematic review has provided an understanding of the current evidence-base, as well as the diverse nature and applications upon which MI can be utilised within

musculoskeletal health. It has highlighted the need for well designed RCT's that are suitability powered to measure the effectiveness of MI within musculoskeletal health. There is also variation across studies in terms of training provider, duration and competency, as well as variation to fidelity of MI across interventions. Future studies may consider the application of MI for children and young people with musculoskeletal conditions in terms of direct applications to the condition (regimen self-management) or lifestyle changes (e.g. diet, exercise) as well as for adult populations.

In terms of clinical practice, the evidence at the point of conducting the systematic review is limited predominantly because of methodological factors and specific applications of MI within particular areas of musculoskeletal health. Future research currently being undertaken may provide much needed evidence to clarify the status of utilising MI within musculoskeletal conditions.

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