Return to work interventions for workers on sick leave due to musculoskeletal disorders.

Evaluation of motivational interviewing and a stratified vocational advice intervention

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Dissertation for the degree of philosophia doctor (PhD)
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Autumn 2022

OsloMet Avhandling 2022 nr 34

ISSN 2535-471X (trykket)
ISSN 2534-5414 (online)

ISBN 978-82-8364-431-9 (trykket)
ISBN 978-82-8364-458-6 (online)

OsloMet – storbyuniversitetet
Universitetsbiblioteket
Skriftserien
St. Olavs plass 4,
0130 Oslo,
Telefon (47) 64 84 90 00

Postadresse:
Postboks 4, St. Olavs plass
0130 Oslo

Trykket hos Byråservice

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Acknowledgements

I started work on this project in September 2018 at the Department of Physiotherapy at OsloMet. It has been a long and interesting journey with a few bumps along on the way (excuse the cliché). Fortunately, I have had help from a great team of people to reach the finish line. This has been a team effort and I have many to thank.

Firstly, many thanks to my supervisors for excellent support and supervision. Especially to my brilliant main supervisor *Britt Elin Øiestad*. Thank you for always being available for discussions, for giving constructive advice, and for valuing my opinions. I really appreciate that you always provide thorough and helpful feedback on my work in such short time. I could not have done this without you. I have been lucky to not only have one, but two wonderful supervisors. My co-supervisor *Kjersti Storheim* has also been a great support. I have been fortunate to receive supervision and help from someone with your experience and expertise. I also appreciate that you gave me the opportunity to work as a research coordinator at the Research and communication Unit for MSK Health (FORMI), making it possible to extend my PhD period. I have learned a lot from you both, and I value your professional and social support.

Many thanks to *Margreth Grotle* for planning, acquiring funding and leading the MI-NAV study, making this PhD project possible. Although you are not my co-supervisor you have acted as one, providing valuable guidance along the way. Thank you for introducing me to your contacts nationally and internationally and giving me the opportunity to cooperate with many talented researchers in the field.

I am very grateful to all that have contributed to the planning and organising of the MI-NAV study, and co-authors that have provided valuable input to the papers included in my thesis. *From the MI-NAV study team: Alexander Tingulstad*, for help with screening of abstracts for the mapping review, recruitment to the RCT and organising the mentoring of the SVAI physiotherapist. *Ida Løchting*, for help with the screening of papers for the mapping review, organising the recordings of the SVAI and MI sessions, conducting the fidelity evaluation of the MI intervention and help with the process evaluation of the SVAI. *Hedda Eik*, for help and guidance with the qualitative analyses for the process evaluation of the SVAI. *Tarjei Rysstad*, for organising the randomisation for the RCT and organising the registry data from NAV ready for analysis. *Anne Therese Tveter*, for organising the questionnaire data collection for the RCT. *Milada C. Småstuen*, for help and advice regarding the statistical analyses for the

RCT. *Rune Solli*, for help with recruiting participants to the RCT, transcribing the SVAI and MI recordings, and extracting data from the SVAI logs. *From our collaborators from the Norwegian Institute of Public Health*: *Rigmor Berg*, for methodological guidance and help related to the mapping review, and *Lien Nguyen* for conducting the literature searchers. *From our collaborators at NTNU: Gunnhild Bagøien* and *Roger Hagen*, for developing the MI intervention, training of the NAV caseworkers, and contributing to the MI fidelity evaluation. *Lene Aasdahl*, for advice on organising the NAV registry data. *From our collaborators at Keele University: Gail Sowden*, for help with developing the SVAI and providing training and mentoring for the SVAI physiotherapists. *Gwenllian Wynne-Jones* and *Nadine Foster*, for help with developing the SVAI and planning of the RCT. *From our collaborators at the NAV: Bjørn Are Hultman, Kari Paulsen, Jørgen Grøttan* and *Ola Thune* for help with planning the study, organising the recruitment of participants through the NAV directory, and providing the NAV registry data. *Ann Kristin Johnson* and *Solgunn Måløy*, for organising the provision of the MI intervention. *The patient engagement panel at Oslo University hospital*, and user representative *Astrid Torgersen Lunestad* for help during the planning of the study and customising the study materials provided to the participants. *Christine K. Monsen*, for mentoring of the NAV caseworkers and help with the MI fidelity evaluation. *Egil Fors*, *Nadine Foster*, and *Maurits van Tulder*, for contributing to the planning of the MI-NAV study and methodological advice. The *NAV caseworkers* and *physiotherapists*, for providing the interventions and giving valuable feedback during the study. I am also very grateful to all the *participants* who said yes to take part in the MI-NAV study.

I would also like to thank all the members of the *MUSK Health research group* and my *PhD fellows* at OsloMet for creating a social and supportive work environment. Thanks for constructive feedback on presentations, fruitful discussions, and social events. I have never felt alone during my time as a PhD student thanks to you all.

Finally, many thanks to my family and friends for all your support and encouragement along the way. Especially to my wonderful and patient wife *Lillian*. Thank you for always believing in me and supporting me when the road has been bumpy.

Summary

Background: Musculoskeletal (MSK) disorders are the leading contributor to disability worldwide, and account for a large proportion of sick leave in high-income countries. For most people with MSK disorders work and activity is positive for health and wellbeing. Long-term sick leave has large negative consequences for individuals, workplaces, and society. Many factors influence sickness absence, and despite decades of research efforts the evidence is still unclear regarding effective interventions to facilitate return to work (RTW).

Aim: The aim of this thesis was to evaluate two RTW interventions for people on sick leave with MSK disorders. Motivational interviewing (MI) and a stratified vocational advice intervention (SVAI).

Methods: The thesis includes three papers employing a variety of methods. The first paper was a systematic mapping review of the literature concerning MI to facilitate RTW for people with MSK disorders. We identified papers through systematic literature searches of 10 databases plus searches for grey literature. Papers were screened, critically assessed, and data were charted and synthesised according to recommended guidelines.

Paper II and III were based on data from a three-arm parallel pragmatic randomised controlled trial (RCT). The trial included workers on sick leave for at least 7 weeks, for ≥50% of their contracted work hours, due to MSK disorders. All participants received usual care (UC) from the Norwegian labour and Welfare Administration (NAV). One third were randomised to UC+MI and were offered two MI sessions from trained NAV caseworkers, and one third were randomised to UC+SVAI and were offered vocational advice and case management from trained physiotherapists. The SVAI was tailored according to risk of long-term sickness absence assessed at baseline, with the high-risk group offered 3-4 sessions and the low/medium-risk group 1-2 sessions. Paper II was a multimethod process evaluation of the implementation of the SVAI. We combined data from 148 intervention logs documenting the follow-up provided to each participant, recordings of 18 intervention sessions and minutes from 20 meetings with the physiotherapists. The log data were analysed with descriptive statistics. A qualitative content analysis was performed of the recordings, and we identified facilitators and barriers for implementation from the minutes.

Paper III evaluated the effectiveness on RTW of adding either MI or SVAI to UC. Demographic data from the participants were collected through baseline questionnaires, and registry data on sickness absence were obtained from the NAV. The primary outcome was the

number of sickness absence days over 6 months (measured as lost workdays). UC was compared to UC+MI and to UC+SVAI in two separate comparisons, using multiple linear robust regression and Man-Whitney Wilcoxon tests.

Results: Prior to conducting the MI-NAV RCT there was almost no research on the use of MI to facilitate RTW for people with MSK disorders. Our mapping review (paper I) only identified two studies, a RCT with high risk of bias found no effect of MI on RTW for disability pensioners with back pain, while a cluster RCT with low risk of bias found that MI increased RTW for workers with chronic MSK disorders. There was clearly a need for more research. This was the background for the MI-NAV trial. We enrolled 514 workers between April 2019 and October 2020 (174 in the UC arm, 170 in the UC+MI arm, and 170 in the UC+SVAI arm). The process evaluation of the SVAI (paper II) showed that 152 (89%) received the intervention. The main barrier for RTW described by the participants was fear of not being able to manage work. Overall, the SVAI was delivered in accordance with the protocol. However, some elements were not provided, including workplace meetings and face-to-face meetings with participants. Case management for the low/medium-risk group was hindered by the restricted number of sessions permitted according to the protocol. The evaluation of the effectiveness of adding MI or SVAI to UC (paper III), showed that both interventions reduced sickness absence days over 6 months. Median sickness absence was 62 days, (95% confidence interval (CI) 52 to 71) in the UC arm (*n*=171), 56 days (95% CI 43 to 70) in the UC+MI arm (*n*=169) and 49 days (95% CI 38 to 60) in the UC+SVAI arm (*n*=169). After adjusting for predefined potential confounding factors, the results showed 7 fewer days of sickness absence in both the UC+MI arm (95% CI -15 to 2), and the UC+SVAI arm (95% CI -16 to 1), compared to the UC arm. However, the differences were not statistically significant. Results from the sensitivity analyses indicated that the effectiveness of MI and SVAI was reduced by the COVID-19 pandemic.

Conclusions: The mapping review identified a large research gap on MI to facilitate RTW for people on sick leave with MSK disorders, justifying the need for the MI-NAV trial. The process evaluation showed that the SVAI was delivered in accordance with the protocol and was likely to be implementable in a Norwegian setting. Adding MI or SVAI to UC reduced sickness absence by 7 workdays over 6 months for workers on sick leave due to MSK disorders. Although the results were not statistically significant, this finding is promising and warrants further investigation.

Oppsummering (summary in Norwegian)

Bakgrunn: Muskel- og skjelettplager er svært utbredt og hovedårsaken til uførhet og sykefravær i industriland. For de fleste med muskel- og skjelettplager er aktivitet og arbeid positivt for helsa. Lange perioder med sykefravær har negative konsekvenser for individer, arbeidsplasser og samfunn. Mange faktorer påvirker sykefravær, og til tross for flere tiår med forskning, mangler vi effektive tiltak for å fremme retur til arbeid.

Mål: Målet for avhandlingen var å evaluere to tiltak for å fremme retur til arbeid for personer med muskel- og skjelettplager: motiverende intervju (MI) og et skreddersydd arbeidsrettet samtaletiltak (SVAI).

Metode: Avhandlingen består av tre artikler og er basert på flere ulike metoder. Den første artikkelen var en systematisk kartleggingsoversikt av litteraturen om MI for å fremme retur til arbeid for personer med muskel- og skjelettplager. Vi gjennomførte litteratursøk i 10 elektroniske databaser og i tillegg søkte vi etter grå litteratur. Deretter gikk vi gjennom artiklene, og vurderte relevante artikler for risiko for skjevheter, hentet ut data, og sammenfattet resultatene i henhold til anbefalte retningslinjer.

Artikkel II og III er basert på data fra en pragmatisk randomisert kontrollert studie (RCT) med tre parallelle armer. Vi inkluderte personer som var minst 50% sykmeldt i ≥ 7 uker på grunn av muskel- eller skjelettplager. Alle deltakerne fikk vanlig sykefraværsoppfølging fra NAV (UC). En tredjedel av deltakerne ble randomisert til MI og fikk i tillegg til UC to samtaler med en NAV-veileder med opplæring i MI. En tredjedel ble randomisert til SVAI og fikk UC i tillegg til samtaler med en fysioterapeut med opplæring i arbeidsrettet oppfølging. Oppfølgingen var tilpasset deltakerens risiko for langvarig sykefravær. De med høy risiko fikk 3-4 samtaler, mens de med lav eller middels risiko fikk 1-2 samtaler. Artikkel II var en prosessevaluering av implementeringen av SVAI. Vi brukte metodetriangulering der vi kombinerte kvantitative data om oppfølgingen av hver deltaker hentet fra 148 SVAI logger, kvalitative data fra opptak av 18 SVAI samtaler og referat fra 20 møter med fysioterapeutene. Data fra loggene ble analysert med deskriptiv statistikk. Vi gjorde en kvalitativ tematisk analyse av opptakene, og identifiserte faktorer som fremmet eller hemmet implementeringen av SVAI fra møtereferatene.

I den tredje artikkelen evaluerte vi effekten av å tilføye enten MI eller SVAI til UC på retur til arbeid. Demografiske data fra deltakerne ble samlet ved hjelp av spørreskjema, og vi hentet informasjon om sykefravær fra NAVs register. Hovedutfallsmålet var antall sykefraværsdager i løpet av 6 måneder (målt som tapte arbeidsdager). Vi utførte to separate analyser med robust multippel lineær regresjon og Man-Whithey Wilcoxon tester for å sammenligne UC med UC+MI, og for å sammenligne UC med UC+SVAI.

Resultater: Den systematiske kartleggingsoversikten (artikkel I) viste at det fantes lite forskning om bruk av MI for å fremme retur til arbeid for personer med muskel- og skjelettplager. Vi fant kun to studier. En RCT med høy risiko for skjevhet viste ingen effekt av MI på retur til arbeid for uføretrygdede med ryggplager, mens en klynge RCT med lav risiko for skjevhet viste derimot at MI fremmet retur til arbeid for personer med kroniske muskel- og skjelettplager. Vi konkluderte derfor med at det var behov for mer forskning på feltet. Dette var bakgrunnen for MI-NAV studien, som inkluderte 514 deltakere fra april 2019 til oktober 2020 (174 i UC-armen, 170 i UC+MI-armen og 170 i UC+SVAI-armen). Prosessevalueringen av SVAI (artikkel II) viste at 152 (89%) av deltakerne fikk SVAI. Den største hindringen for retur til arbeid beskrevet av deltakerne var frykt for ikke å klare å jobbe. SVAI ble stort sett levert i henhold til protokollen, men fysioterapeutene deltok ikke på møter på arbeidsplassen, og hadde ikke fysiske møter med deltakerne. Restriksjonene i antall samtaler fysioterapeutene kunne gi til deltakere med lav eller middels risiko for langvarig sykefravær, gjorde det vanskelig å samarbeide med andre aktører. Effektevalueringen (artikkel III) viste at å tilby MI og SVAI i tillegg til UC reduserte sykefraværsdager i løpet av 6 måneder for sykmeldte med muskel- og skjelettplager. Median antall sykefraværsdager var 62 dager (95% konfidensintervall (KI) 52 til 71) i UC-armen (n=171), 56 dager (95% KI 43 til 70) i UC+MI-armen (n=169), og 49 dager (95% KI 38 til 60) i UC+SVAI-armen (n=169). Etter å ha justert for mulige konfunderende variabler var det 7 færre sykefraværsdager i UC+MI-armen (95% KI -15 til 2) og i UC+SVAI-armen (95% KI -16 til 1), sammenlignet med UC-armen. Forskjellene var imidlertid ikke statistisk signifikante. Resultatene fra sensitivitetsanalysene tydet på at effekten av MI og SVAI ble redusert under COVID-19 pandemien.

Konklusjon: Kartleggingsoversikten (artikkel I) identifiserte et stort kunnskapshull om bruk av MI for å fremme retur til arbeid for personer med muskel- og skjelettplager. Prosessevalueringen (artikkel II) viste at SVAI ble levert i henhold til protokollen og trolig

kan gjennomføres i en norsk kontekst. Effektevalueringen (artikkel III) viste at MI og SVAI reduserte sykefraværsdager med 7 dager i løpet av 6 måneder sammenlignet med UC for sykmeldte med muskel- og skjelettplager. Selv om forskjellene ikke var statistisk signifikante er resultatene lovende.

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Funding

The Research Council of Norway funded the MI-NAV study, including this PhD project, through the program ‘Sickness absence, work, and health’(280431/GE). The Research Council was not involved in the design, management, analysis, interpretation, or dissemination of the MI-NAV study or this PhD thesis. Oslo Metropolitan University (OsloMet) provided administrative and academic support, office facilities and equipment, and funded two extra months of salary for my PhD period, to compensate for delays caused by the COVID-19 pandemic. The Norwegian Labour and Welfare Administration (NAV) provided administrative support for the MI-NAV study, resources used during the recruitment of trial participants, and staff to coordinate and provide one of the interventions in the trial. Researchers from The Norwegian Institute of public health provided methodological advice and conducted the searches of the electronic databases for the systematic mapping review included in this thesis.

List of papers

I. Aanesen F, Berg R, Løchting I, Tingulstad A, Eik H, Storheim K, Grotle M, Øiestad BE. (2021). Motivational Interviewing and Return to Work for People with Musculoskeletal Disorders: A Systematic Mapping Review. *J Occup Rehabil*, 31(1): 63-71. DOI: https://doi.org/10.1007/s10926-020-09892-0.

II. Aanesen F, Øiestad BE, Grotle M, Løchting I, Solli R, Sowden G, Wynne-Jones G, Storheim K, Eik H. (2021). Implementing a Stratified Vocational Advice Intervention for People on Sick Leave with Musculoskeletal Disorders: A Multimethod Process Evaluation. *J Occup Rehabil*, 32(2), 306–318. DOI: https://doi.org/10.1007/s10926-021-10007-6.

III. Aanesen F, Grotle M, Rysstad TL, Tveter AT, Tingulstad A, Løchting I, Småstuen MC, van Tulder M, Berg RC, Foster NE, Wynne-Jones G, Sowden G, Fors EA, Bagøien G, Hagen R, Storheim K, Øiestad BE. (2023). Effectiveness of Adding Motivational Interviewing or a Stratified Vocational Advice Intervention to Usual Case Management on Return to Work for People with Musculoskeletal Disorders: the MI-NAV Randomised Controlled Trial. *Occupational and Environmental Medicine*, 80(1), 42-50. DOI: http://dx.doi.org/10.1136/oemed-2022-108637

List of abbreviations

CI	Confidence Interval
CRISTIN	Research Information System in Norway
EU	European Union
GDPR	General Data Protection Regulation
ICPC-2	2nd edition of the International Classification of Primary Care
ITT	Intention to treat
MI	Motivational Interviewing
MID	Minimal important difference
MINT	Motivational Interviewing Network of Trainers
MITI 4	Motivational Interviewing Treatment Integrity version 4
MRC	The United Kingdom Medical Research Council
MSK	Musculoskeletal
NAV	Norwegian Labour and Welfare Administration
NTNU	Norwegian University of Science and Technology
OECD	Organisation for Economic Co-operation and Development
OsloMet	Oslo Metropolitan University
PhD	Doctor of Philosophy
RCT	Randomised Controlled Trial
RTW	Return to Work
SAP	Statistical Analysis Plan
SD	Standard Deviation
SVAI	Stratified Vocational Advice Intervention
TSD	Services for sensitive data at The University of Oslo
UC	Usual Case management for people on sick leave in Norway
UK	United Kingdom
SWAP	Study of Work and Pain
ÖMPSQ-SF	Örebro Musculoskeletal Pain Screening Questionnaire Short Form

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Introduction

Work is associated with health and wellbeing and is an important part of life and self-identity.[1-5] Work participation is important both for the individual and for society.[6] However, approximately 700 000 (21%) of people of working age in Norway were unemployed in 2017, and almost 50% of these received disability benefits.[7] Norway has a generous welfare system including comprehensive benefits,[8] administrated by The Norwegian Labour and Welfare Administration (NAV).[9] The goal of the NAV is to help people obtain work, and reduce the number of people on benefits.[9] Furthermore, NAV caseworkers are responsible for providing follow-up to people on sick leave, in cooperation with employers and health care professionals.[10] Sickness absence is high in Norway compared to other countries in the Organisation for Economic Co-operation and Development (OECD).[11] During 2019, sickness absence was almost 6% in people of working age.[12] Musculoskeletal (MSK) disorders and Mental health disorders jointly account for almost 60% of lost workdays due to sickness absence.[13] However, MSK disorders are by far the main cause of productivity loss, disability benefits and sickness absence in Norway,[14 15] and a large proportion of long-term sickness absence is due to MSK disorders.[16 17]

For most people with MSK disorders work and activity is helpful for recovery,[6] whilst long periods of sickness absence can be detrimental for wellbeing and hinder return to work (RTW).[1 2 6] However, the evidence is inconclusive regarding what constitutes an effective intervention to facilitate RTW.[18-20] Several systematic reviews have shown that it is important to involve the workplace in RTW interventions.[3 21-25] Furthermore, multi-domain interventions including work modification, health care provision and service coordination have shown promising results.[21 25] Workers with MSK disorders may be ambivalent about RTW, as they need to find ways to cope at work despite pain and disability.[3] Flexible interventions aimed at helping the worker solve ambivalence, and strengthen motivation and self-efficacy for RTW, may therefore be helpful. Experts have suggested Motivational Interviewing (MI) as a method to help people in the RTW process.[26 27] MI is a person-centred counselling style aimed at increasing motivation and self-efficacy for change,[28] and has been applied in a wide variety of settings.[29] MI is one of several methods used by the NAV, and many NAV caseworkers have received MI training.[30] However, there is sparce research evidence regarding the use of MI to facilitate RTW.[31 32] Another area where there is more research evidence is on the effectiveness of RTW coordinators.[33]

A recent systematic review found strong evidence that RTW coordinators and interventions aimed at identifying RTW barriers reduced sickness absence among people with MSK disorders and common mental health disorders.[33] One intervention including RTW coordination, has been developed to help workers with MSK pain overcome modifiable barriers to stay at work or RTW.[34 35] The intervention was effective in reducing sickness absence in the Study of Work And Pain (SWAP) trial in the United Kingdom (UK).[34] Norway has a different health and social system compared to the UK, and it is unclear if the SWAP intervention is suited for a Norwegian setting. Providing coordinators to all workers on sick leave in Norway would demand large resources, and may be unjustified given that approximately 80% of workers RTW during the first eight weeks of sick leave.[36] Screening to identify those at risk for long-term sick leave could make it possible to provide interventions in a more targeted way.[20 37] The SWAP intervention was delivered as stepped care, but it is not known if it could be effective provided as a stratified intervention, tailored according to risk for long-term sickness absence.

Tailored and flexible interventions are complex and can be challenging to implement.[38] Therefore, it is important to evaluate implementation fidelity, to determine the true effect of the interventions.[39] Many factors can influence how interventions are delivered in natural settings and impact the results.[40] Process evaluations provide information about implementation fidelity and how to implement interventions in other settings, should they be effective.[38] However, there exists few process evaluations of RTW interventions for people with MSK disorders.

On this background, the aim of this thesis was to evaluate two RTW interventions: MI and a stratified vocational advice intervention (SVAI), a modified version of the intervention from the SWAP trial. The specific objectives of this thesis were to evaluate: 1) the research literature concerning MI to facilitate RTW, 2) the implementation of the SVAI in a Norwegian setting, and 3) the effectiveness of adding MI or SVAI to usual case management (UC) on RTW for people on sick leave due to MSK disorders. The thesis includes a systematic mapping review of the literature concerning MI as a method to facilitate RTW for people with MSK disorders, and a pragmatic three arm parallel randomised controlled trial (RCT) including a process evaluation of the SVAI. The results of the thesis can inform researchers, practitioners, and policy makers about implementation and effect of RTW interventions for people on sick leave with MSK disorders and guide evidence-based practice.

Background

Musculoskeletal disorders

MSK disorders are a large and heterogeneous group of disorders affecting joints, bone and soft tissues.[41] In this thesis MSK disorders are defined as all disorders listed in section L of the 2nd edition of the International Classification of Primary Care (ICPC-2).[42] The most common MSK disorders include: back, neck and shoulder pain, injuries (fractures and sprains), arthritis and tendonitis.[41] Symptoms typically include pain, disability and reduced work ability.[41 43 44] Low back pain is the main contributor to the burden of MSK disorders and the prevalence of back pain is rising.[41 45 46] Between 1990 and 2019 the number of Disability Adjusted Life Years due to back pain increased with 47%.[47] In 2019 approximately 1.7 billion people suffered from MSK conditions globally.[48] More women than men report MSK disorders, and the prevalence is higher among people with lower levels of education.[46] MSK disorders are a large contributor to health care utilisation.[15] Among people of working age, one in five of all consultations with general practitioners in Norway were related to MSK conditions in 2019.[49]

MSK disorders are the leading cause of years lived with disability worldwide,[47] and the main cause of sickness absence and work disability in the European Union (EU).[44] Sickness absence is associated with a significant burden on individuals and economic costs to society, due to productivity loss, benefits and healthcare utilisation.[15 44 50 51] In the EU workforce, the one year self-reported prevalence of MSK is over 50%,[50] and estimates have shown that costs related to lost productivity due to MSK disorders could be as high as 2% of the gross domestic product.[44] Also in Norway MSK disorders are the main cause of sick leave,[36] accounting for more than 30% of certified sickness absence and approximately 40% of lost workdays between 2017 and 2020.[13] The prevalence of MSK disorder in the Norwegian workforce has increased from 60% to 68% during the last 20 years.[46] For most people with MSK disorders, staying active and at work is recommended,[6 52-54] and many manage to stay at work despite pain.[55-57] However, for some their MSK disorder reduces their ability to perform work related tasks, leading to work disability.

Factor associated with sick leave, work disability and return to work

Work disability, sick leave and RTW is influenced by interactions between individual, social and work related factors.[58 57] For example, a woman with an office job may be able to

perform her work despite having an ancle fracture, whilst it would be difficult for a nurse to do her job on crutches. Moreover, individuals that have received advice to be careful or worry that work could increase their pain, may not RTW despite being able to perform their work duties. Studies have shown that the severity of the health complaint, habits, attitudes, and factors at the workplace influence the decision to call in sick.[59-61] The impact of biological, psychological and social factors on an individual's ability to work has been illustrated by Loisel and colleagues in their biopsychosocial model (Figure 1).[58 62] The model shows that work disability is affected by interactions among the overall societal context, culture and politics, the welfare/compensation system, health care system, workplace and personal factors.[62]

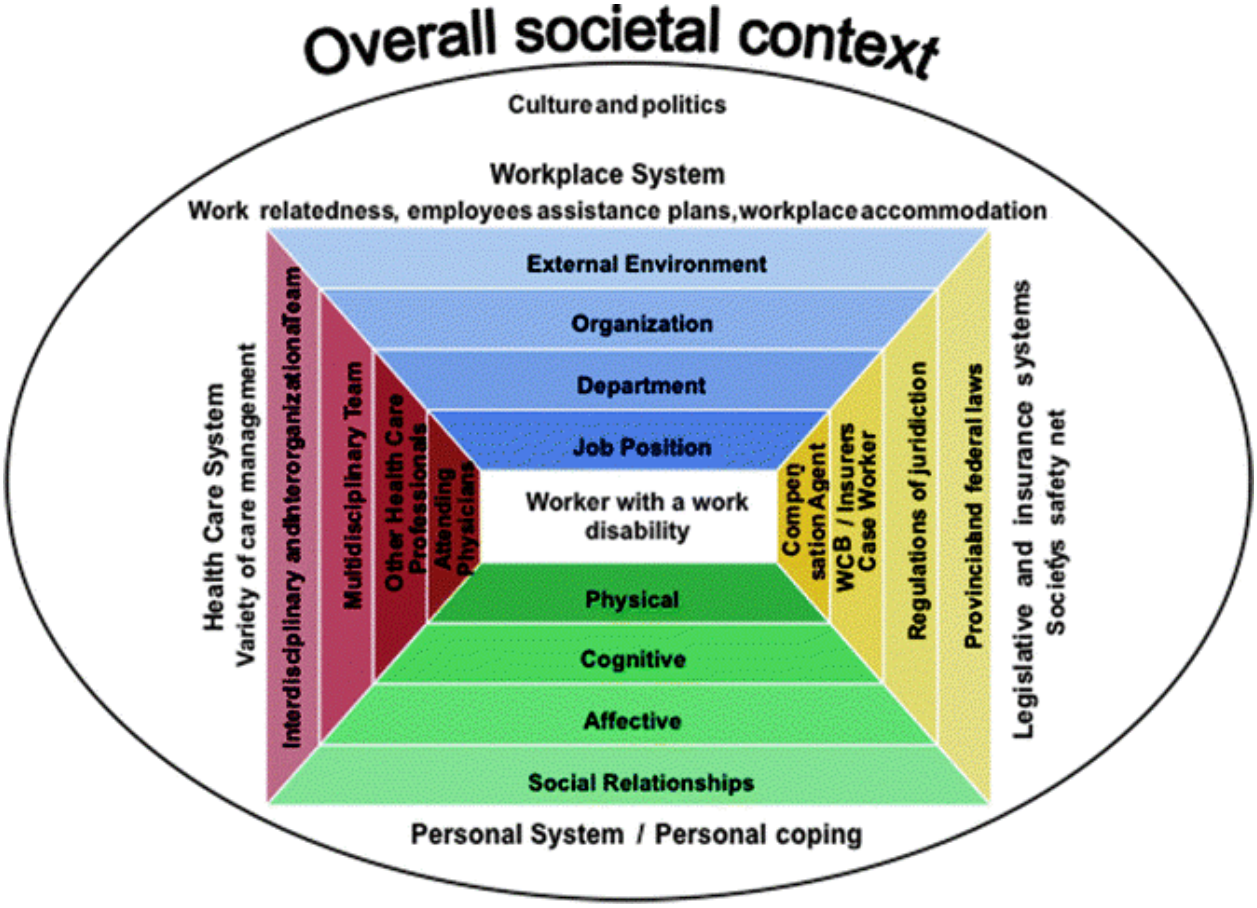

Figure 1. The Sherbrooke model of work disability, a biopsychosocial model of work disability for people with musculoskeletal pain (Loisel et. al. 2005). Reprinted with permission from Springer Nature.

Systematic reviews have identified several factors associated with increased sick leave and disability due to MSK disorders.[24 63 64] These factors include: higher age, being female, the severity of the condition (multiple pain sites, high pain severity, long pain duration and previous pain episodes), previous sickness absence and negative expectations about recovery.[24 63-66] Work and social factors associated with sick leave include physically demanding or repetitive work, high job demands, low job control, low employer support, role conflicts, and high levels of wage compensation.[46 64 67] A synthesis of qualitative research, exploring barriers to staying at work, identified five challenges experienced by workers with chronic MSK pain: 1) struggling to affirm credibility as a good worker, 2) mistrust from colleagues about being in pain, 3) difficulty in balancing live and work due to unpredictable symptoms, 4) a system focusing on healthcare and not on facilitating RTW, and 5) having to battle for legitimacy (from healthcare professionals and social security caseworkers).[4] Conversely, low perceived disability, low emotional stress, adjustment of daily activities, and work modifications, facilitated staying at work despite chronic MSK pain.[68] These findings illustrate the importance of the different elements described in the biopsychosocial model of work disability (Figure 1).[62]

Factors affecting RTW have been summarized by Cancelliere and colleagues in a best evidence synthesis of 56 systematic reviews (35 of the reviews included people with MSK disorders).[24] The results show that several personal factors are associated with RTW, including higher education and socioeconomic status. Furthermore, high self-efficacy, coping and optimistic expectations about recovery and RTW are associated with positive work outcomes.[24 69-77] The severity of the MSK condition, length of sickness absence and part-time sick leave is also associated with RTW.[24 25 78] High pain and disability levels are associated with negative RTW outcomes, whilst lower severity of the injury/disorder is associated with RTW.[24] Psychosocial factors related to a person's life and work situation are also important.[79 80] Studies have shown that a supportive work environment and work accommodations are associated with RTW, and can help people stay at work despite pain and disability.[61 70 78 80-82] However, there is inconclusive evidence regarding the effectiveness of job accommodations due to the lack of RCTs.[83] Knowledge about factors associated with disability and RTW have been used to develop screening tools to identify people at risk for long-term disability. [84-88]

Screening tools for predicting disability

Research on risk factors for chronic back pain led to the development of two screening tools, to improve identification of those at risk for developing persistent problems, and identify patient subgroups in need of early targeted interventions.[84-87] The first tool, The Örebro Musculoskeletal Pain Screening Questionnaire (ÖMPSQ), was developed by Linton and colleagues in 1998.[84] The ÖMPSQ was based on the flags framework, a psychosocial framework for assessing individual, workplace related, and psychosocial risk factors associated with chronic back pain.[89 90] The original 25 items version was later reduced to a short form (ÖMPSQ-SF), shown to have sufficient predictive ability for use in clinical and research settings.[91] The ÖMPSQ-SF assesses five psychosocial risk factors related to future disability: 1) self-perceived function, 2) pain experience, 3) distress, 4) fear-avoidance beliefs, and, 5) RTW expectancy.[91] Sum scores range from 1-100 points with higher scores indicating higher estimated risk of future work disability.[85]

A second screening tool for back patients, the STarT Back Tool, was developed by Hill and colleagues in 2008.[86] It is a brief tool with cut-off scores used to subgroup patients into 3 risk-groups, to guide the provision of matched treatment in primary care.[86] The tool was recently adapted as a generic screening tool, suitable for screening across MSK disorders (the Keele STarT MSK tool).[88 92] The adaptations were based on several systematic reviews showing that different MSK conditions share similar prognostic factors.[93-97] The Keele STarT MSK tool consists of 10 items assessing: pain intensity, pain self-efficacy, pain bothersomeness, disability, comorbid pain, expected duration of condition, self-perceived health, depression, fear avoidance and pain duration (during the last two weeks). Sum scores range from 0-12 points, with values from 0-4 points indicating low risk, 5-8 points indicating medium risk, and 9-12 points indicating high risk for poor prognosis.[88] The tool has demonstrated good validity and acceptable performance in predicting pain intensity and self-reported physical health after 6 months among patients with back, neck, knee, shoulder or multisite pain in UK primary care.[88]

These screening tools can be used to tailor interventions according to risk for long-term pain, and work disability. As people with different risk profiles seem to respond differently to RTW interventions, effective stratification could improve the overall effectiveness of RTW interventions.[20] Several studies have shown that screening combined with matched treatment can reduce disability, facilitate RTW, and reduce work absence for people with

musculoskeletal disorders.[37 98-101] Screening can be a way to target interventions to those who need most help in the RTW process.

Interventions to facilitate return to work

The term 'RTW intervention' is used in this thesis to mean all types of interventions aimed at helping people RTW. Numerous RTW interventions have been developed for people with MSK disorders, and several systematic reviews have been conducted to synthesis research in the field.[25] The reviews have focused on different types of RTW interventions and have shown diverging results.

Workplace interventions have been rated as highly useful by people on sick leave with MSK disorders.[102] The effectiveness of workplace interventions was investigated in a systematic review conducted by Cullen and colleagues in 2018.[21] The review included 19 RCTs, 7 non RCTs and 10 cohort studies evaluating workplace-based interventions for people with MSK disorders and pain-related conditions (26 studies), and mental health conditions (10 studies).[21] The results showed strong positive effects of multi-domain interventions (including work modification, health care provision and service coordination), on reducing time away from work for people with MSK conditions. Due to heterogeneity between the included studies the authors did not calculate pooled effect estimates.[21]

However, several meta-analyses were conducted in a Cochrane review from 2017, investigating the effect of RTW coordination programmes.[18] The review included 14 RCTs with workers on sick leave for at least 4 weeks due to mental health disorders (2 trials), or MSK disorders (12 trials). The pooled estimates showed no effect of RTW coordination on RTW. However, there was large heterogeneity between the studies making comparisons challenging.[18] Conversely, a more recent systematic review investigating the impact of RTW coordinators found strong evidence that work absence was reduced when workers had face-to-face contacts with a RTW coordinator.[33] The review included 7 RCTs, 4 cohort studies, 2 quasi experimental studies, and 1 cross sectional study, the majority of the studies included people with MSK disorders. Due to study heterogeneity a meta-analysis was not conducted.[33]

Heterogeneity was also a challenge in a systematic review investigating the effect of work-related interventions for people on sick leave for 1-24 months, published by The Norwegian institute of public health in 2021.[19] Twenty RCTs were included in the review, of which 14

included participants with MSK disorders. The pooled estimates did not show any benefit of multidisciplinary rehabilitation compared to usual care, or other active interventions.[19] However, the certainty of the evidence was weak due to large heterogeneity between the studies and methodological limitations.[19] Including heterogenous studies in meta analyses, can lead to questionable results.[103] Pooling results from studies conducted across different settings, including different intervention elements, study populations and varying methodological quality may not provide a useful summary of RTW interventions.[103] Due to this Wegrzynek and colleagues decided not to conduct a meta-analysis in their review of RTW interventions for workers with chronic pain.[20] The review showed that there was no conclusive evidence to support any specific RTW intervention for workers with chronic pain. However, multidisciplinary interventions tended to show better RTW results.[20] The results from the review by Wegrzynek et al. are in line with findings from two previous systematic reviews investigating RTW interventions for people with chronic conditions.[78 104] Furthermore, Wegrzynek and colleagues propose that identifying effective stratification to multidisciplinary treatments, could improve overall effectiveness of RTW interventions.[20]

Studies show that prolonged periods of sickness absence are associated with negative RTW outcomes,[25] and early interventions initiated within the first 6-12 weeks of sick leave have been recommended.[23-25 105 106] However, most people on sick leave do not need comprehensive interventions.[53] The importance of individual tailoring was emphasised by Costa and colleagues in a meta-review of RTW interventions, published in 2017.[25] The review included 26 systematic reviews, the majority including participants with MSK disorders.[25] Costa et al. concluded that high-intensive multidisciplinary vocational interventions may be needed in complex cases, and for individuals on long-term sick leave. Whilst low intensity workplace-based interventions may be more appropriate for workers in early stages of sick leave (<3 months) planning to RTW.[25]

Optimal tailoring of RTW interventions was also discussed in a recent narrative review by Aasdahl and Fimland,[106] examining if there is an optimal time for providing RTW interventions. The review included 16 RCT testing the effectiveness of RTW interventions for people with MSK disorders (published between 1992 and 2017). The authors advocate a stepped-care approach for RTW interventions for people with MSK disorders. Starting with low intensity interventions during the early phase of sick leave, before considering more comprehensive interventions (e.g., multimodal rehabilitation) for people struggling to RTW.[106] Low to moderate intensity interventions were also recommended as a first step, in a

recent systematic review investigating psychosocial RTW interventions.[107] The importance of tailoring RTW interventions was also underlined by the authors of a meta-ethnography synthesising results from 41 qualitative studies exploring RTW for people with chronic pain.[3] The authors proposed that RTW interventions should be individualised and focus on collaboration with the person on sick leave and their employer, to find ways to manage pain and make workplace adjustments if necessary.[3] These findings were further supported in a recent synthesis of qualitative evidence on studies regarding RTW for persons with MSK pain, conducted by Liedberg and colleagues.[79] The biopsychosocial model of work disability shows that many factors influence work disability,[62] and interaction between stakeholders is important. [62 79] However, communication between RTW stakeholders can be challenging, highlighting the need for case management.[62 108-111]

Case management

Several terms are used interchangeably in the research literature to describe case management and RTW coordination.[112 113] The definition of case management includes different elements according to setting and clinical practise.[114] In this thesis all activities to coordinate RTW and facilitate communication, collaboration, and coordination with RTW stakeholders is referred to as case management.

An intervention based on the principles of case management, was developed by researchers from Keele University and tested in the UK SWAP trial. It is a low intensity vocational advice intervention aimed at workers with MSK disorders, either struggling at work or on sick leave for less than 6 months.[34 35] Physiotherapists in primary care provided the intervention. They used the 'flags model' to identify obstacles to remaining at work or to RTW. Three main areas were discussed with the participants: 1) psychological or behavioural obstacles to working (beliefs about pain and illness behaviour), 2) work perceptions (beliefs about the physical and social impacts of work on health), and 3) contextual factors (work conditions and benefit entitlements).[34] The physiotherapists in the SWAP trial cooperated with the participants to develop a plan to address RTW obstacles, and manage health and work. The intervention was delivered as stepped-care, offering the first step to all (telephone contact), and stepping up to further follow-up only for those who required it (face-to-face meetings).[34] The intervention was cost-effective and reduced sickness absence by 5 days over 4 months compared to best usual primary care in the UK.[34] However, sickness absence follow-up in the UK differs from

the Norwegian system, so it is uncertain if the intervention will have the same effect in a Norwegian setting.

Sickness absence follow-up in Norway

The Nordic countries have strong welfare systems including health services and benefits for people who cannot work.[115] The welfare system has developed over time through social democratic policies known as 'the Nordic model'.[116] The Nordic model is based on cooperation between trade unions, employers' organisations, and the authorities, who all share an interest in ensuring high employment.[116] In Norway, these three parties have signed a letter of intent regarding a more inclusive working life (the IA agreement), aiming to provide all people the opportunity to work and reduce long-term sickness absence.[117]

Workers on sick leave in Norway are entitled to full wage replacement benefits for up to 12 months. The first 16 days are covered by the employer, the rest by the social security system administered through the NAV.[10] To be entitled to sickness benefits from the NAV a sick note is required, usually issued by a medical doctor.[10] Employers and employees are obliged to cooperate to try to prevent long-term sickness absence. During the first 6 months of sick leave the employer has the main responsibility for follow-up, and should make a follow-up plan in cooperation with the worker within the first four weeks of sick leave.[10] The plan should include information about the employee's work duties, workability, and possible work adaptations. Within week 8 of sick leave, the employee should start work-related activity (unless it is not possible due to medical reasons). If the worker is still on full-time sick leave after 8 weeks, the NAV may request documentation that work related activity is not possible.[10] The employer is responsible for arranging a dialogue meeting with the employee within week 7 of fulltime sick leave (unless it is clearly unnecessary). The purpose of the meeting is to prevent long-term sickness absence and discuss if workplace modifications are required. Within 6 months of sick leave the local NAV office is responsible for arranging a second dialogue meeting, including the employee, employer, and sick-leave certifier (if appropriate). The second dialogue meeting can be arranged earlier if requested by any of the parties.[10] NAV caseworkers use differing counselling methods when they provide case management to workers on sick leave, one of these methods is MI.[30] MI has been suggested as a suitable RTW intervention.[26 27 32 118 119]

Motivational Interviewing

MI is an intervention aimed at increasing motivation and self-efficacy for change.[28] MI was first described by Miller in 1983 as a method to help problem drinkers.[120] Although MI was developed from practical experiences with treating addictions,[28] it has been used to help people change behaviour in many different settings,[121 122] and for people with musculoskeletal disorders and chronic pain conditions.[123 124] According to Miller and Rollnick, MI is *'a collaborative, goal-oriented style of communication with particular attention to the language of change, designed to strengthen personal motivation for and commitment to a specific goal by eliciting and exploring the person's own reasons for change within an atmosphere of acceptance and compassion'*.[28] Miller and Rollnick underscored the importance of the relational component of MI, 'the MI spirit', an empathetic way of communicating with people based on partnership, acceptance and compassion, honouring the clients autonomy.[28 125] Specific communication skills are used in MI: asking open questions, affirming, reflecting, summarizing and providing information and advice with permission.[28] These technical MI components are used to reduce ambivalence and enhance 'change talk' (speech in favour of change and movement towards a goal[28]). Romano and Peters reviewed the MI literature to study the mechanisms of MI, and found that 'change talk' was associated with positive client outcomes and behaviour change across studies.[126] Four key MI processes are used to enhance behaviour change: 1) *engaging* to establishing a good working relationship, 2) *focusing* to develop and maintain a specific goal and direction in the conversation, 3) *evoking* the client's own motivation for change, and 4) *planning* to develop commitment to change and formulate an action plan.[28]

The compatibility between MI principles, and values and aims of vocational rehabilitation have been discussed in several theoretical papers.[26 127-129] Furthermore, a Delphi study conducted with 35 experts in vocational rehabilitation in the United States, recommended MI as a method to facilitate RTW.[27] Several qualitative studies have shown positive experiences of MI both from the perspective of caseworkers providing MI, and people on sick leave receiving MI.[130-133] However, there are few studies that have investigated the effectiveness of MI to facilitate RTW. A systematic review from 2017, commissioned by the NAV, identified only five studies of which one included participants with MSK disorders.[31] Overall, the review authors could not conclude about the effectiveness of MI on RTW due to the small amount of studies and low quality of evidence.[134] Another challenge has been securing fidelity to MI in trials, as the method can be difficult to master.[28 125] Gaining confidence to

provide MI has also been described as a challenge by caseworkers providing MI in a social security context.[30 131 132 135] Therefore, evaluation of intervention implementation is essential.

Implementation of return to work interventions

As work disability is influenced by many factors, RTW interventions are often complex,[136] and can be challenging to implement. According to the UK Medical Research Council (MRC) an intervention is complex if one or several of the following criteria are met: the intervention includes many components or targets a range of behaviours, a high level of skills is required from those delivering the interventions, many groups or settings are involved, or the intervention is delivered flexibly.[137] Research on complex interventions requires involvement of stakeholder (patients, practitioners and policy makers), to assess if the interventions are acceptable, implementable, cost-effective and transferable across settings.[137] These factors are important to inform policy decisions in real world settings,[137] in addition to information about the effectiveness of the intervention on relevant outcomes.

The MRC recommend conducting process evaluations of complex interventions, to explore the way interventions are implemented in trials.[38] Process evaluations are studies that aim to understand the functioning of an intervention, by examining implementation, mechanisms of impact and contextual factors influencing intervention delivery and outcomes (Figure 2).[138 139] Process evaluations can provide information about the internal, and external validity of study findings.[140] Integrating process and outcome data can improve our ability to interpret study findings,[141] and is important for reviewers comparing interventions across studies.[142] Furthermore, process evaluations can provide insights into why an intervention is successful, or why it fails to work, and how to replicate a successful intervention in other contexts.[38] This information is vital for practitioners and policymakers to guide evidence-based practice.[39 143]

Process evaluations have provided information about several barriers and facilitator for implementation of RTW interventions. Barriers include: problems with recruitment of participants,[144 145] lack of commitment of the patient's line manager,[144 146] interventions being too time consuming,[144 147] system-related barriers including administrative load and priorities, legal constraints and role uncertainties of intervention providers,[145 148 149] or programs being delivered to late in the sick leave period.[145] Factors that have been shown to facilitate implementation are: participant motivation and commitment,[146 147] commitment of the line managers,[146] participant confidence in the professionals providing the interventions,[147]

involvement of the participant in decision making,[147] and providing interventions in a group setting.[145] Furthermore, the importance of tailoring interventions has been emphasised.[145]

During the last three decades several frameworks have been developed for conducting process evaluations,[40 140 150 151] and assessing intervention fidelity.[39 152-154] Fidelity can be defined as the extent to which delivery of an intervention adheres to the protocol or program model.[155] Although the frameworks use different terminology, they all include elements related to how interventions are provided and received (study design, context, training, recruitment, reach, delivery, uptake, and maintenance). In the MI-NAV trial we have followed the MRC guidance for process evaluations illustrated in Figure 2.

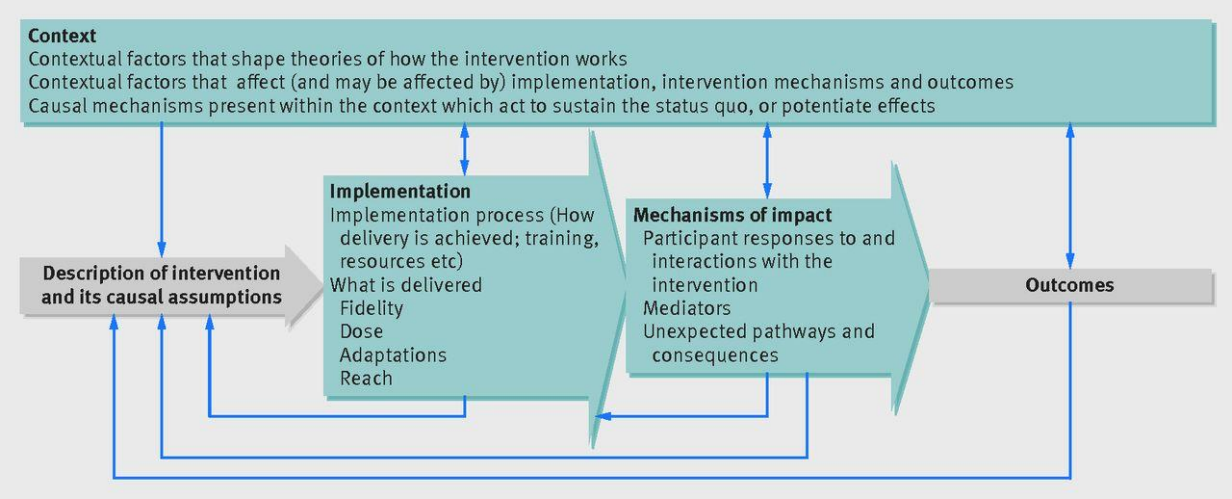

Figure 2. The MRC guidance for process evaluations.[40] The green boxes represent key functions of process evaluations and relationships among them.

To understand the possible mechanisms of impact of an intervention, we need to understand its causal assumptions. Therefore, to be able to evaluate RTW interventions, the theories about how the interventions work, should be made clear.[136]

Theoretical underpinning of return to work interventions

The two RTW interventions evaluated in this thesis are based on theories and models from social psychology, describing how personal and social factors interact to influence attitudes,

motivation and behaviour.[156] Several theories from social psychology may explain factors influencing RTW in persons on sick leave.[157]

One of these theories, often connected to MI, is The Transtheoretical Model (also known as the stages of change model) developed by Prochaska and DiClimente.[158-160] The Transtheoretical Model can be used to provide matched RTW interventions.[119 161] The model describes intentional behaviour change as progressing through six stages:[159] 1) *the precontemplation stage*, when people do not intend to act, and are often resistant and unmotivated to change behaviour; 2) *the contemplation stage*, where people intend to change behaviour. At this stage people are weighing the pros and cons of making the change, and often experience ambivalence; 3) *the preparation stage*, at this stage people have planned to act soon (within the next month); 4) *the action stage* when people have recently made a behavioural change, and 5) *the maintenance stage*, in which people are working to prevent relapse. This stage starts after approximately 6 months of maintaining the behaviour change and can last for several years, and 6) *the termination stage*, in which people have made a permanent change, have high self-efficacy and are sure they will not return to old behaviours.[158] People can go in and out of the different stages and may not follow them chronologically.[158] The processes of change used at each stage varies,[160] therefore interventions should be tailored according to motivational stage.[158] A second theory used to explain the mechanisms of MI and RTW interventions is self-determination theory.[162 163]

Self-determination theory is a theory of motivation developed by Deci and Ryan.[156 164] According to self-determination theory behaviour regulation can be described on a continuum ranging from external regulation (controlled) to true self-regulation (autonomous).[156] The self-determination theory describes three psychological needs related to autonomous motivation: 1) *the need for relatedness*, to have supportive social relationships; 2) *the need for autonomy*, to be the causal agent in our own life (self-determination), and 3) *the need for competence*, to be able to affect outcomes and experience mastery. Social environments and communication styles that support these three needs, increases autonomous motivation and helps a person develop self-regulation of behaviour, while controlling environments do the opposite and can lead to defensive behaviours.[156 165] Another theory of behaviour, emphasising the need for competence is social cognitive theory.

Social cognitive theory, was developed by Bandura and is a theory of self-regulation.[166] According to Bandura people regulate their behaviour through judgements about their capabilities (self-efficacy), their anticipations about the effect of their actions, and by

opportunities and constrains in the social environment. Self-efficacy determines coping behaviours, and persistence in the face of obstacles.[167] Bandura describes four properties of human agency that could be targeted by RTW interventions: 1) *intentionality* (people form plans and strategies for realising their plans); 2) *forethought* (people set goals and anticipate outcomes to guide and motivate them); 3) *self-reactiveness* (people evaluate their actions based on personal standards), and 4) *self-reflectiveness* (people make judgements about their own functioning and capabilities).[168] Social cognitive theory is a generic theory of self-regulation. Leventhal on the other hand, developed a theory specifically to explain self-management of illness: the common-sense model of self-regulation.[169] According to the model there are five areas that influence how we perceive and manage health threats: 1) *the type of illness* (perceived severity of condition); 2) *the timeline of illness* (acute vs. chronic); 3) *the consequences of illness*; 4) *the causes of illness*, and 5) *control of illness* (self-management or need for medical help). Illness perceptions and management is a dynamic process, shaped by knowledge and past experiences and can be influenced by information from health professionals and action plans for management.[169] These are factors that could be affected by RTW interventions. In addition to describing the theoretical underpinnings of RTW interventions, a clear description of RTW outcomes is important to evaluate RTW interventions.[170]

Return to work outcomes

RTW is both a process and an outcome, and can be measured in many ways.[171] A plethora of RTW outcomes have been used in trials, measured with a variety of tools, questionnaires and registry data, using various cut-off points and follow-up periods.[170] This has made it challenging for reviewers to synthesise research findings across studies.[18 21 78 170 172 173] A recent systematic review assessing work participation outcomes, identified 435 outcomes reported in 269 RCTs.[170] The authors grouped the outcomes into four categories: 1) *employment status* (e.g. working, work disability, job loss), 2) *absence from paid work* (e.g. short/long-term sick leave, RTW), 3) *at-work productivity loss* (e.g. productivity, presenteeism, job performance, work functioning, work ability), and 4) *employability* (e.g. working capacity, job coping, work ability, self-efficacy for RTW, intention to RTW, work hope). The majority of the RCTs included in the review used a primary outcome from the second category (absence from paid work).[170] However, work absence was measured in several ways. The most common measure was sick leave rate, a dichotomous outcome of the

proportion of people on sick leave. Sick leave duration was also commonly reported, measured as sickness absence days. However, it was often unclear if sickness absence was measured in working days or calendar days. Less common measures included time to RTW and RTW rate (the proportion of participants who resumed work). However, what qualified as RTW varied between trials.[170]

Based on findings from the systematic review, a survey was conducted recently among 71 authors and 28 reviewers from 21 different countries, investigating preferred methods for measuring work participation in trials.[172] The results showed that absenteeism and RTW were the most common outcomes used in trials and reviews. Authors preferred using registry data for measuring work participation, to reduce recall bias, however high-quality registry data were often unavailable. Sick leave duration in workdays was preferred by the reviewers as a measure of absenteeism, and most agreed that 12 months was ideal follow-up time.[172] Stakeholders were rarely consulted regarding choice of outcomes in trials.[170 172] Studies have shown that the relevance of different outcomes varies among RTW stakeholder (employers, employees, health professionals, social insurance workers).[171 174 175] Therefore, the study design, duration and choice of outcome should be considered in relation to the study objectives.[176 177]

Aims

The overall aim of this thesis was to evaluate two RTW interventions for people on sick leave due to MSK disorders in Norway. The interventions were MI and SVAI, provided in addition to UC for workers on sick leave.

Paper I

The aim of paper one was to map, evaluate and collate all types of empirical research on MI as a method to help people with MSK disorders RTW.

Paper II

The aim of paper two was to perform a process evaluation of the implementation of a SVAI for people on sick leave due to MSK disorders participating in the MI-NAV RCT.

Paper III

The aim of paper three was to assess if adding either MI or SVAI to UC resulted in a difference in sickness absence days over 6 months for workers with MSK disorders, on sick leave for at least 50% of their contracted work hours for at least 7 consecutive weeks.

Null hypotheses paper III:

1) There is no difference in number of sickness absence days between participants who received UC + *MI* compared to those who received UC alone over 6 months.
2) There is no difference in number of sickness absence days between participants who received UC + *SVAI* compared to those who received UC alone over 6 months.

Methods

The three papers presented in this thesis are all part of the MI-NAV study, a large research project funded by The Research Council of Norway, conducted by the MUSK health research group at OsloMet,[178] in cooperation with the NAV. The study commenced in 2018, and included three work packages investigating RTW for people on sick leave with MSK disorders applying multiple methodological approaches.[179 180] The aim of work package one was to describe current follow-up provided by the NAV for people on sick leave with MSK disorders (through a survey and focus group interview of NAV caseworkers[109]), and to conduct a systematic review of the literature on MI to facilitate RTW for people with MSK disorders.[180] Work package two was a prospective cohort study including workers on sick leave in the whole of Norway, conducted to investigate the accuracy of screening tools to identify people at high risk for prolonged sickness absence due to MSK disorders, and investigate factors associated with different risk profiles.[179] Work package three, included a three-arm parallel pragmatic RCT, aiming at assessing the effectiveness of adding MI or SVAI to UC on RTW for people on sick leave with MSK disorders. The first paper in this thesis is a systematic mapping review of research to inform the planning of the RCT in the MI-NAV study (part of work package one), whilst papers II and III are part of the evaluation of the RCT (work package three). The three papers are combined to evaluate MI and SVAI.

Philosophical underpinning

The thesis is based on a pragmatic world view, and the research questions have guided the choice of methods.[181-183] Pragmatism acknowledges an external world, independent from the human mind, and that phenomena are culturally constructed and individually interpreted.[184] According to the pragmatic philosophical tradition, epistemology and methodology should be viewed in terms of their practical value to solve problems.[184] Both positivism and interpretivism can be used to seek answers to different problems,[182] and qualitative and quantitative research methods can be combined.[181] In this thesis I have used multiple methods, making it possible to draw on the strengths and minimise the weaknesses of both qualitative and quantitative methods.[184] The research questions, and methods for each of the three papers are summarised in Table 1.

Table 1. Research questions and methods of papers I-III

Paper	I	II	III
Research question(s)	What research on MI as a method to facilitate RTW for individuals who are on sick leave due to MSK disorders exists, and what are the results of the research?	In the MI-NAV RCT: How was the SVAI delivered? What was delivered in the SVAI? What were the physiotherapists' experiences of delivering the SVAI?	Is there a difference between 1) UC and UC+MI *or* 2) UC and UC+SVAI in sickness absence days over 6 months follow-up among workers on sick leave due to a MSK disorder?
Design	Systematic mapping review.	Multimethod process evaluation.	Three-arm parallel pragmatic RCT.
Population /sample	People with MSK disorders, absent from work, receiving MI to facilitate RTW.	4 physiotherapists providing the SVAI. 148 participants receiving the SVAI.	514 employed workers on ≥50% sick leave for ≥7 weeks due to MSK disorders.
Data collection	Systematic literature searches of 10 electronic databases (1983-August 2019), hand searches of key journals, web pages and reference lists, cited reference searches, and communication with researcher in the field.	Data collected during the intervention period of the RCT: SVAI logs filled out by the physiotherapists. Audio recording of SVAI sessions. Meeting minutes from mentoring with the physiotherapists.	Self-report data from baseline questionnaires. National registry data from the NAV: 12 months prior to baseline, and from baseline to 6 months follow-up.
Data	Data from studies meeting the inclusion criteria (*n*=2).	SVAI logs (*n*=148). Audio recordings of SVAI sessions (*n*=18). Meeting minutes (*n*=20).	Baseline characteristics (*n*=514). Registry data on sickness benefits (*n*=509). *Primary outcome* (*n*=509): number of sickness absence days over 6 months.
Analyses	Systematic screening of search results, critical appraisal, data charting and synthesis of data from included studies.	Descriptive statistics of log data, descriptive content analysis of audio recordings, analysis of meeting minutes with analysis question: *What did the physiotherapists experience as facilitators and barriers when delivering the SVAI?*	Descriptive statistics of baseline characteristics. Robust multiple linear regression and Mann-Whitney Wilcoxon test for hypotheses testing.

MSK: musculoskeletal, RTW: return to work, n: number, RCT: randomised controlled trial, SVAI: stratified vocational advice intervention, MI: motivational interviewing, UC: usual case management, NAV: Norwegian Labour and Welfare Administration

Paper 1: Systematic mapping review

During the planning of the MI-NAV trial we needed information from previous studies regarding the use of MI to facilitate RTW for people with MSK disorders. To provide an overview of the research field, we performed a systematic mapping review (paper I). The review was conducted in accordance with the guidelines from the Cochrane Handbook for Systematic Reviews of Interventions,[185] and the five metohodolgocal steps for scoping reviews proposed by Arksey and O'Malley[186] (elaborated on by Levac and colleagues'[187]). Additionally, we assessed the quality of the included studies, as recommended by Daudt et. al.[188] Prior to running the literature searchers the protocol was published in the Current Research Information System in Norway (CRISTIN), project id: 635823 and on the MUSK health web page at OsloMet.[189 190]

Step 1: Identifying the research question

We were interested in results from process evaluations, qualitative studies, and mixed method studies, regarding the provision of MI in a RTW context, and results from quantitative studies assessing the effectiveness and cost effectiveness of MI to facilitate RTW for people with MSK disorders. This was the background for our broad research question: *What research on MI as a method to facilitate RTW for individuals who are on sick leave due to MSK disorders exists, and what are the results of the research?* We wanted to map all empirical studies on this topic and identify gaps in the literature.

Step 2: Identifying relevant studies

The search strategy was developed in cooperation with an information search specialist from the Norwegian Institute of public health. We conducted an initial limited search, to identify relevant subject headings and text words related to MI, RTW and sick leave. The search terms were used in tailored searches of ten electronic databases: MEDLINE (OVID), PsycINFO (OVID), EMBASE (OVID), Cochrane Library [CDSR, CENTRAL] (Wiley), CINAHL (EBSCO), Web of Science Core Collection [SCI-EXPANDED & SSCI] (Clarivate), Sociological Abstracts (ProQuest), Epistemonikos, SveMed+, and DARE & HTA (Centre for Reviews and Dissemination). Details of the literature searches are shown in Appendix I. The searches of the electronic databases were conducted by a search specialist, and quality checked by a second search specialist at the Norwegian Institute of public health. The first

search covered the period from 1983 (the year Miller first described the MI method) until February 2019 and was later updated in August 2019. In addition, I hand searched reference lists of the included papers, and all issues of the Motivational Interviewing Network of Trainers (MINT) bulletin. During April and May 2019, I conducted cited reference searches (in Web of science) of the included studies, searched relevant webpages, searched the Journal of motivational interviewing, training, research, implementation, practice (MITRIP), and contacted researchers in the field of MI for unpublished work (Appendix I).

Step 3: Study selection

The search results were imported into the citation management software EndNote (Clarivate Analytics, PA, USA) to remove duplicates, then all unique records were imported into the screening tool Rayyan QCRI. We were two researcher who independently screened abstracts and titles for eligibility, and screened selected studies in full text, using a pre-defined screening form (Table 2). There was only disagreement about inclusion of two studies during the initial screening, and agreement was reached by discussion and re-examination of the abstracts. There was no disagreement during the full text screening of the papers.

Table 2. Eligibility criteria for studies included in the systematic mapping review

To be included in the review the study should address: MI to facilitate RTW for individuals absent from work due to MSK disorders	
Population[a]:	Receivers of MI interventions: • MSK disorder main reason for work absence • On sick leave, receiving work assessment allowance, or disability pensions (part or full time) • Age 18-67 years Providers of MI interventions • Persons delivering MI to persons listed above
Concept:	MI provided as a solo intervention, or in combination with other interventions. MI could be delivered in group sessions, individual meetings or by telephone.
Context:	Any context where MI was being provided to facilitate RTW
Study design:	All types of empirical studies
Language:	English, French, German, Norwegian, Swedish, Danish

MI: motivational interviewing, RTW: return to work, MSK: musculoskeletal
[a] Studies were included if 50% of the study sample met the inclusion criteria, or if results were reported separately for participants meeting the inclusion criteria

Critical appraisal of the included studies

Critical appraisal of the studies was conducted independently by two researchers. As both the included studies were RCTs, we used the Cochrane risk of Bias tool. The tool includes six domains: *selection bias* (biased allocation to interventions due to inadequate random sequence generation or poor allocation concealment), *performance bias* (due to lack of blinding of participants and personnel), *detection bias* (due to lack of blinding of outcome assessors), *attrition bias* (due to incomplete outcome data), *reporting bias* (due to selective outcome reporting), and *other bias*.[185] Judgements of either 'low risk', 'high risk', or 'unclear risk' of bias were made for each domain, plus a total summary assessment for each study. We resolved differences in opinions trough re-examination of the studies and discussion.

Step 4: Charting the data

Data from the included studies were charted independently by two researchers, using a predesigned data extraction form. After testing the form, we revised it to include more information about study design, participation rate and dropout. The charted data included: name of first author and year of publication, country and context, study design and population, participation and dropout rate, follow-up period, description of the interventions and MI adherence/fidelity, outcomes, and results. To gather more information about the MI training and MI intervention in one of the included studies, the study authors were contacted.

Step 5: Collating, summarising, and reporting the results

We summarised the types and quality of the literature concerning MI as a method to facilitate RTW and collated the data from the included papers. The risk of bias assessment, and process and outcome data from the included studies, were presented narratively and in tables (a descriptive numeric summary was made of the extracted data). Furthermore, the studies were compared and discussed. The review was reported in accordance with the preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR).[191]

The MI-NAV randomised controlled trial

Paper II and III report results from the process and outcome evaluation of the MI-NAV RCT, described in the following section.

Study design and context

The MI-NAV trial was a three-arm parallel pragmatic RCT. The three intervention arms were: 1) *the UC arm* (control arm), receiving UC for people on sick leave in Norway, 2) *the UC+MI arm*, receiving UC plus MI provided by caseworkers from the NAV, 3) *the UC+SVAI arm*, receiving UC plus SVAI provided by physiotherapists (Figure 3). The trial was conducted in cooperation with the NAV directorate, and six local NAV offices from Vestfold County, and two NAV offices from the County of Telemark (Porsgrunn and Skien) in the South-East of Norway. The county of Vestfold had a population of 247 000 when the trial started,[192] including both towns and rural areas. Caseworkers from the eight NAV offices had not received systematic MI training prior to the trial. Eight physiotherapists, living or working in Vestfold and Telemark, were recruited to provide the SVAI. The physiotherapists delivered the SVAI in their spare time, independently from the NAV and their daily work responsibilities.

The first part of the trial was an internal pilot (lasting from April to August 2019). The pilot was conducted to test and improve procedures for recruitment, randomisation, and intervention delivery. Only two minor changes were made during the pilot (revision of the recruitment telephone script and changing the order of the questions in the SVAI conversation guide). Therefore, the 101 pilot participants were included in the evaluation of the main trial.

Participants

To be included in the trial, participants had to be between 18-67 years, employed in full or part-time positions, and on sick leave for at least 50% of their contracted working hours, for at least 7 consecutive weeks due to a MSK disorder (a diagnose from the L section of the ICPC-2). People with serious somatic or mental health disorders, pregnant women, those lacing an employer (unemployed, freelancers and self-employed workers), and people lacking sufficient Norwegian or English language skills to answer the questionnaires or communicate by telephone were excluded.

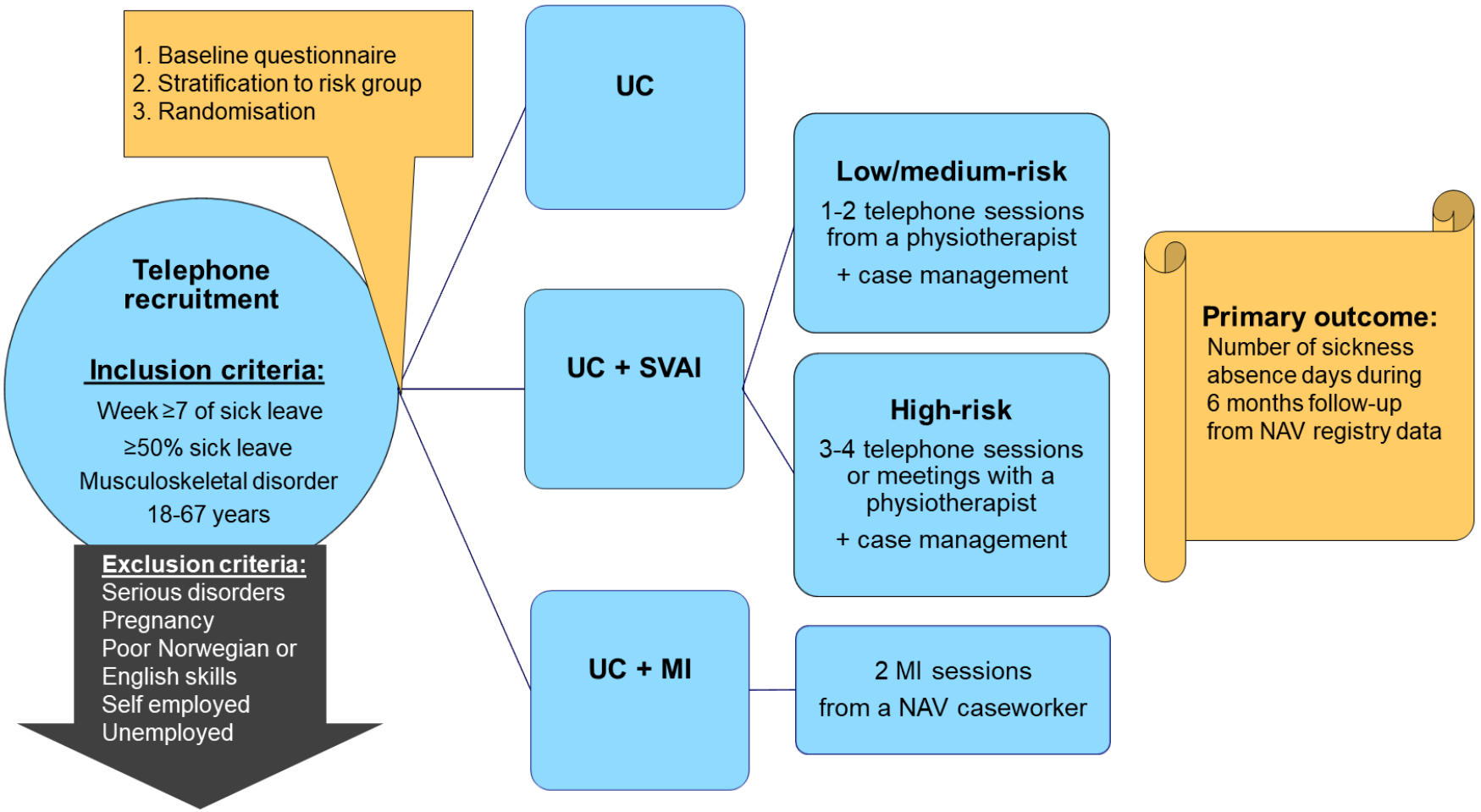

Figure 3. The MI-NAV trial. UC: usual case management, SVAI: stratified vocational advice intervention, MI: motivational interviewing, NAV: Norwegian Labour and Welfare Administration

Recruitment, stratification, and randomisation

Recruitment of trial participants was conducted by telephone, from the NAV directorate between April 2019 and October 2020, by a team of two PhD-students and one research assistant. We contacted workers in their 7th week of sick leave due to MSK diagnoses, affiliated to the eight participating NAV offices. Individuals who did not answer the telephone, received a text message informing that the NAV had tried to contact them about a research project, and they were contacted again on a later date. Workers meeting the inclusion criteria, were informed about the trial during the telephone conversation. Those interested in participating, received an electronic link by email to written information and an informed consent form. After signing the consent form, the participants answered the electronic baseline questionnaire. The information material and questionnaire were available in Norwegian and English, and paper versions were sent to those who preferred this.

Randomisation did not occur until after the baseline assessment and was concealed to those involved in the recruitment of participants. The baseline questionnaire, included the ÖMPSQ-SF[91] and the Keele STarT MSK Tool.[88 193] The ÖMPSQ and Keele Start MSK tool have been translated, culturally adapted and validated in Norwegian MSK populations.[193 194] The tools were used in combination to stratify participants to two risk groups for long-term sickness absence. The high-risk group included participants scoring ≥60 on the ÖMPSQ-SF and ≥9 on the Keele STarT MSK Tool, the low/medium-risk group included all other participants. The cut-off values were decided based on preliminary results from the cohort study in work package two of the MI-NAV study.[179] After stratification to risk groups, participants were randomly allocated to one of the three intervention arms (1:1:1 allocation within each stratum). A computer-generated allocation sequence was prepared by a statistician, uninvolved in the running of the trial. The sequence was only available to the person in charge of group allocation.

The MI and SVAI interventions as described in the protocol

All participants received UC for people on sick leave in Norway (described in the background section). Participant allocated to the UC+MI arm were offered MI, in addition to UC, and those allocated to the UC+SVAI were offered vocational advice and case management, in addition to UC. MI or SVAI should not be offered to participants who had RTW for >50% of their contracted work hours before the first session.

Motivational Interviewing (MI)

Prior to providing MI, 15 NAV caseworkers were offered 6 days of MI training from two experienced MI trainers: a clinical psychologist and a psychiatrist (the latter a member of the Motivational Interviewing Network of Trainers (MINT)). The training was conducted in three separate blocks (3 + 2 + 1 day). To give the caseworkers opportunity to practice their MI skills, there were 3-4 weeks between each block of training. The training consisted of a combination of MI theory and role play to practice MI skills. The caseworkers received a MI manual to facilitate RTW, developed for the trial. The manual was created by the two MI experts in charge of the MI training, in cooperation with NAV caseworkers involved in a similar trial conducted in Trondheim.[195] During the intervention period of the MI-NAV trial, the caseworkers were offered group mentoring, at a local NAV office, approximately every other month from a clinical psychologist (an experienced MI trainer and member of the MINT). In addition, the caseworkers could request individual feedback on audio recordings of MI sessions, provided by telephone from an independent MI analysis centre (KoRus Vest Bergen[196]).

The participants allocated to UC+MI were offered two MI sessions, at a local NAV office. The first session as soon as possible after inclusion in the study, and the second session approximately two weeks later. The sessions could last up to one hour. If participants had RTW before the last sessions, this session could be conducted via telephone. During the MI sessions the NAV caseworkers should build a collaborative relationship with the participants and increase motivation for RTW. According to the MI manual the caseworkers should use MI communication skills throughout the sessions (asking open questions, affirming, reflecting, summarising, and providing information and advice with permission). During the first session they used a MI tool called 'agenda mapping',[28] to explore the participants life situation whilst on sick leave. The caseworkers were not informed about the results from the baseline risk-assessment. However, they assessed the participants RTW readiness, and RTW self-efficacy (using the MI tools: 'importance ruler' and 'confidence ruler'). The intervention was tailored to the participants motivational stage, according to the stages of change model.[158] If the participant was ambivalent about change, the pros and cons of sick leave were explored. In the last MI session, the participants' work situation and previous RTW attempts were discussed. The caseworkers also provided information about relevant RTW support available from the NAV. If the participants were ready, an action plan for RTW was developed in cooperation with the participants during the last session. The NAV caseworkers wrote a

summary of each session, available for the participants on NAV's secure online communication platform.

Stratified vocational advice intervention (SVAI)

The SVAI was based on the vocational advice intervention in the SWAP trial, adapted to fit a Norwegian context, and to be provided as a stratified intervention. Eight physiotherapists were offered training in the SVAI, prior to providing the intervention. The SVAI course consisted of 3 + 2 days of training, provided by a consultant physiotherapist and work and health researcher from Keele University, in cooperation with physiotherapists and researchers from OsloMet. The SVAI course consisted of theory about sick leave follow-up in Norway, health and work, common barriers to RTW for people with MSK disorders, case management, and communication skills. During the course the physiotherapists learned to identify and address obstacles to RTW, and practised SVAI skills through role-play and discussions. A SVAI log including a semi-structured interview guide (with 15 core questions) and outline for an action plan was provided to the physiotherapists. The physiotherapists used the logs (one for each participant) to develop action plans, and document information from the SVAI conversations and follow-up provided to the participants. The physiotherapists also received an overview of common obstacles to RTW, with suggested actions for problem solving (Appendix II). The SVAI materials included leaflets about the project (for participants, employers, and health care professionals) containing evidence-based information about health and work. The materials were from the SWAP intervention, adapted to suit a Norwegian setting. Throughout the intervention period of the trial, the physiotherapists were offered online group mentoring session approximately every month. During the mentoring they discussed cases and received guidance on the provision of the SVAI. In addition, a Facebook group was created, to provide support between the mentoring sessions.

The participants allocated to the SVAI, received tailored follow-up according to their risk for long-term sickness absence. Participants in the low/medium-risk group were offered 1-2 telephone sessions. Participants in the high-risk group were offered 3-4 sessions, the first by telephone, the follow-up session should be provided either by phone or as face-to-face meetings (including a meeting at the workplace if needed). The sessions could last up to one hour. The first session was held as soon as possible after inclusion in the study. The timing of the follow-up sessions was tailored according to the participants' needs but should end if the participants had RTW in their contracted work hours for 4 consecutive weeks, or at week 26

of consecutive sick leave (when the NAV should convene the second dialogue meeting). During the SVAI sessions the physiotherapists assessed the participants work and health situation and identified barriers for RTW. They collaborated with the participants to set short and long-term goals for RTW, and to develop and implement an action plan. Furthermore, the physiotherapists provided evidence-based information about the management of MSK disorders, in the context of work, and supported problem-solving to overcome modifiable obstacles to RTW (by provision of information and advice, case management and action planning). Case management including coordination with RTW stakeholders, was conducted by the physiotherapists between the sessions if needed.

Sample size

The sample size calculation was conducted for the primary outcome of the trial: number of sickness absence days over 6 months calculated as lost workdays. A 10-day difference (two full work weeks) between UC and UC+MI or UC+SVAI was considered an important difference. We estimated needing 125 participants in each arm, based on a 10-day difference with an expected SD of 28 days and a statistical power of 80% with a customary 5% significance level and assuming two-sided hypotheses testing. The standard deviation (SD) was estimated based on results from the UK SWAP trial[34] and a trial by Linton and colleagues,[100] conducted in Sweden (with a similar welfare system to Norway). After adjustment for expected skewed data and anticipated 5% loss to follow-up, we decided to include 150 participants in each trial arm.

Involvement of stakeholders

Several important stakeholders were involved in the planning, running and evaluation of the MI-NAV trial, including consultants from the NAV directory's research department, and a patient engagement panel (with representatives from patient organisations for people with musculoskeletal disorders). The patient engagement panel provided feedback regarding the relevance of the research questions, and the importance of the MI-NAV study for people with MSK disorders. They also helped with developing the telephone script, used for recruiting participants, and with the wording of information materials provided to the trial participants (including information about the study, the informed consent form, and the SVAI information sheet). Furthermore, they contributed to the interpretation of the findings from the trial. In

addition, we collaborated with numerous researchers within the health and work research field throughout the MI-NAV study. Including researchers from the Norwegian University of Science and Technology (NTNU), The Norwegian Institute of Public Health, Oslo University Hospital, Keele University, Vrije University in Amsterdam and OsloMet.

Data collection

Baseline data

The participants answered baseline questionnaires covering: age, sex, education level, marital status, first language, height, weight, smoking, follow-up plan made by employer (yes/no), dialogue meeting with employer (yes/no), conflict with employer (yes/no), workability (assessed with a single question from the Work Ability Index (WAI), 0-10 scale),[197] work satisfaction (assessed with a single question from the original version of the ÖMPSQ, 0-10 scale[85]), physical activity in the previous week (assessed with a single question from the Musculoskeletal Health Questionnaire (MSK-HQ), 0-7 scale[198 199]), musculoskeletal health (assessed with the MSK-HQ, 0-56 scale[198 199]), and health literacy (assessed with the Health Literacy Scale Questionnaire 12 (HLS-Q12), 12-72 scale[200]), in addition to the Keele STarT MSK tool,[88 193] and the ÖMPSQ-SF.[91] For all scale variables, low values indicate low levels of the measured construct. Data on sickness absence days 12 months prior to baseline, was obtained from NAV registry data. Furthermore, we obtained anonymised registry data, from NAV from eligible candidates who did not enter the trial during the recruitment period covering sex, age, occupation, and contracted work hours. The data were collected for the recruitment period of the trial, from people on sick leave in the recruitment area (Vestfold and Telemark), and from the whole of Norway. The anonymised registry data were used to assess the representability of the study sample.

SVAI process data

We collected quantitative and qualitative data during the preparation and intervention period of the RCT regarding the context and implementation of the SVAI (Figure 4, and Figure 5).

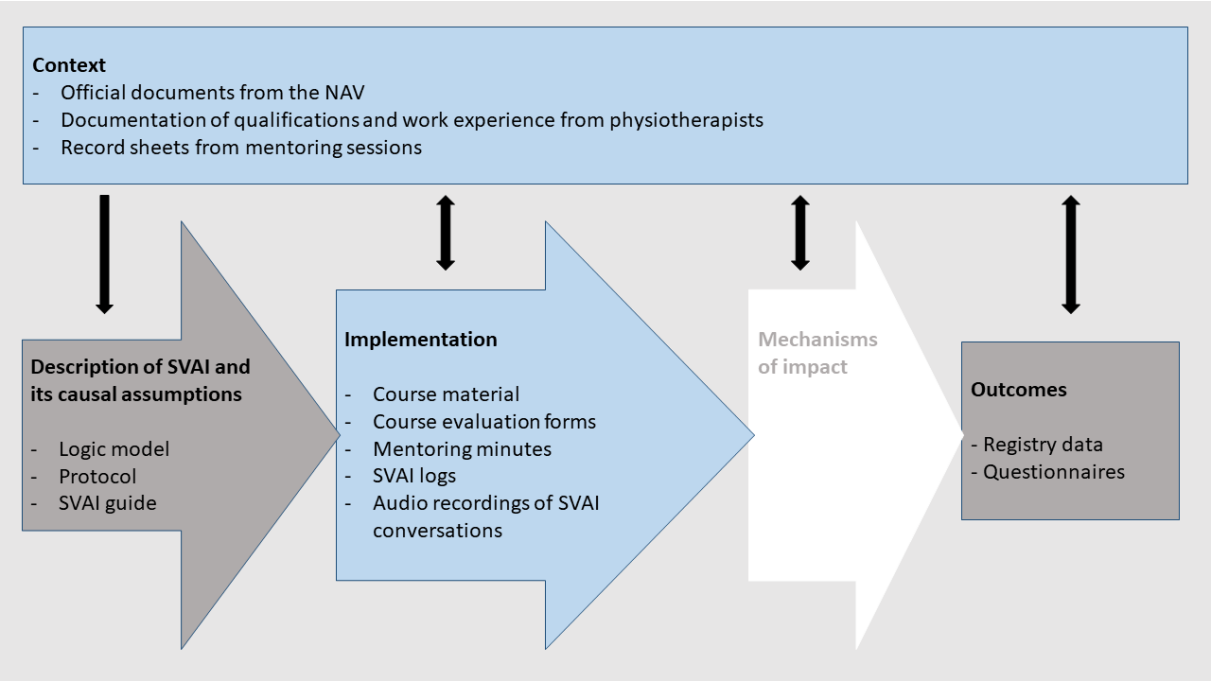

Figure 4. Sources of data for the SVAI process evaluation (blue boxes). NAV: Norwegian Labour and Welfare Administration, SVAI: stratified vocational advice intervention (mechanisms of impact will be evaluated in a future paper).

Following the SVAI course, the physiotherapists completed course evaluation forms and provided background information about age, sex, and work experience. Quantitative data were collected from the SVAI logs (completed by the physiotherapist for each participant). The information included: notes against the core questions (yes/no), number, length, and timing of the SVAI sessions, type of contact with the participant, developed action plan (yes/no), follow-up of action plan (yes/no), and type and number of contacts with stakeholders.

To assess the content of the SVAI conversations, audio recordings were made of the four main physiotherapists providing the SVAI. Four rounds of recordings were conducted throughout the intervention period of the trial. Recordings were made of sessions with 10% of the participants receiving the SVAI. We made 18 recordings of conversations with 15 participants (four from the high-risk group). The sample of participants was representative of the total SVAI cohort regarding age, sex, and occupation. Most recordings were of the first sessions, but some were made of follow-up sessions, including series of sessions with the same participant (Figure 5). During the trial, members of the study group wrote minutes documenting the content of the meetings with the physiotherapists.

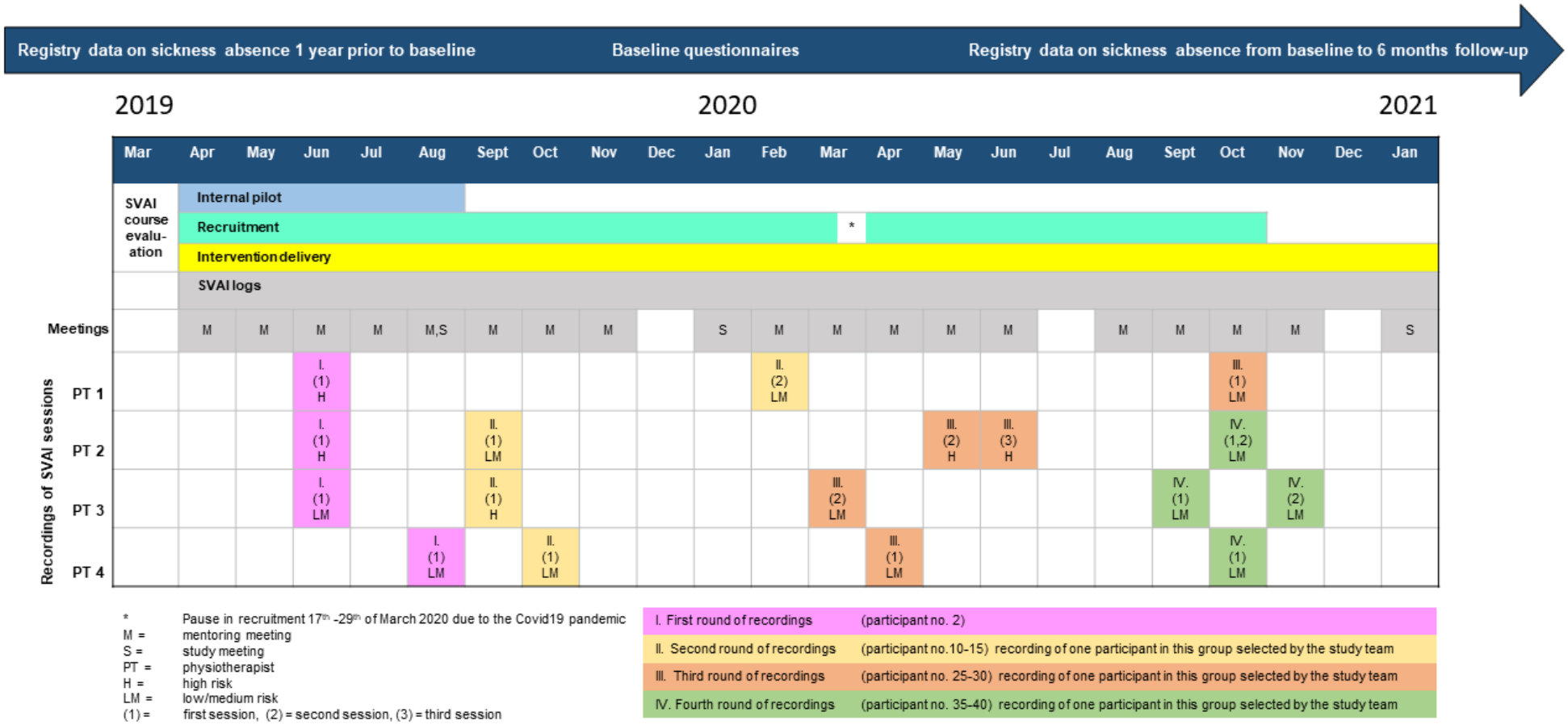

Figure 5. Data collection in the MI-NAV trial.[201]

Outcome variables

We obtained information on contracted work hours, sick leave, work assessment allowance, and disability pensions from baseline to 6 months follow-up, from national registry data (from the NAV). Time on sick leave was converted to time away from work, by accounting for the participants contracted work hours at baseline, and proportion of sick leave described on each sick note during the follow-up period. We included all sick notes, due to any type of health problems. Work assessment allowance, and increase in disability pensions from baseline, was also counted as sick leave. The main outcome was the number of sickness absence days, over 6 months, measured as lost workdays when working full-time (according to a 5-day working week). An example of the calculation is shown in Figure 6. Secondary outcomes are not evaluated in this thesis.

Participant X

Works part time 50%
Sick leave period from 1st of May to 30th of June
Gradual return to work from 1st of June

Sick leave	Start of sick leave period	End of sick leave period	Total days	Adjusted for work week	Adjusted for employment %	Adjusted for sick leave %
100%	1st of May	31th of May	31	× (**5** ÷ **7**) **=** 22.1	× **0.5 =** 11.05	× 1.0 = **11.05**
80%	1st of June	14th of June	14	× (**5** ÷ **7**) **=** 10	× **0.5 =** 5	x 0.8 = **4**
50%	15th of June	30st of June	16	× (**5** ÷ **7**) **=** 8	× **0.5 =** 4	x 0.5 = **2**
Primary outcome: sickness absence days over 6 months measured as lost workdays:						**17.05**

Figure 6. Example of calculation of the primary outcome

Data analyses

Qualitative analyses (paper II)

I conducted the analyses in cooperated with an experienced qualitative researcher (Hedda Eik). We are both trained physiotherapists, with experience from treating people with MSK disorders. I was involved in the development of the SVAI materials, and training and mentoring of the physiotherapists providing the SVAI. Hedda Eik had investigated UC provided by the NAV to people on sick leave with MSK disorders[109] (work package one in the MI-NAV study). However, she was not involved in the planning or conduction of the

RCT, or the development of the SVAI. Therefore, she did not know the physiotherapists providing the SVAI.

Audio recordings

We conducted a descriptive content analysis of the audio recordings of the SVAI sessions. The aim of the analysis was twofold: 1) to describe the main themes discussed by the participants in the SVAI conversations, 2) to assess the content of the vocational advice provided by the physiotherapists. The analysis was inspired by Braun and Clarke's framework for thematic analysis.[202] The software QSR Nvivo 12 was used to analyse the recordings, and develop a thematic description of the content of the entire data set, across the recorded sessions.

We followed the analytical steps described by Braun and Clarke.[202] First the audio-recordings were transcribed verbatim by a research assistant, and I checked the accuracy of the transcripts against the recordings. Both researchers read all the transcripts and listen to the recordings to get familiar with the data. During this phase, initial ideas for coding were noted. The coding was informed by the SVAI logic model, and the SVAI conversation guide, combined with inductive data driven coding. Separate codes were made for the information and advice provided by the physiotherapists. The first two transcripts were coded by both researchers together, and during this process we developed the codes further. Then I coded all the transcripts, and the second researcher checked the coding for agreement.

After the coding of the data was completed, I organised the codes into potential themes. First the initial themes were discussed with the second researcher, and later with other researchers from the study team (familiar with the recordings). The themes were refined during an iterative process of discussion and checking the themes against the coded data, and against the entire data set. Through this process we defined and named four overarching themes describing the essence of what the participants discussed, related to their health situation and RTW. Then we wrote an analytic narrative description of the data for the four themes. The final summary in paper II did not include data extracts, due to the journal's word limitation.

A summary of the information and advice provided by the physiotherapists during the SVAI sessions was included in the fidelity evaluation (combined with quantitative information from the SVAI logs). The content of the sessions was assessed against the SVAI logic model, conversation guide, and the intervention protocol.

Meeting minutes

The analysis of the minutes from the SVAI mentoring, and study meetings was guided by the analysis question: *What did the physiotherapist experience as facilitators and barriers when delivering the SVAI?* The facilitators and barriers described in each of the minutes were coded, summarised, and presented narratively in a table (including numbers to identify the meetings in which the barrier/facilitator had been mentioned). I conducted the coding and summary of the minutes. The second researcher read the minutes and checked if the summary represented the data.

Statistical analyses (paper II and III)

I conducted all the analyses in SPSS version 27 (paper II) or STATA MP version 16.1 (paper III). The choice of statistical methods was based on the research questions and the type of distribution of the analysed variables. All statistical tests were two-sided and a p-value of <0.05 was considered statistically significant. A statistical analysis plan (SAP) for the MI-NAV trial was written in accordance with guidelines,[203] and published before outcome data were available.[180] My main PhD supervisor and an experienced statistician quality checked the analyses for paper III. We were all masked to treatment allocation when analysing the results from the trial.

Descriptive statistics (paper II and III)

Data from the SVAI logs (paper II), and baseline characteristics of the trial participants (paper III) were presented using descriptive statistics. The distribution of the variables was investigated with histograms and the Shapiro-Wilk and skewness-kurtosis tests for normality (paper III). Continuous variables were described with means and SDs (if normally distributed), otherwise with medians and ranges. Categorical variables were presented as counts and percentages.

Group comparisons (paper III)

The analyses to test the hypotheses in paper III were conducted using the intention to treat (ITT) principle. However, due to the General Data Protection Regulation (GDPR), we could not collect registry data from participants who actively withdrew from the study. Therefore, five (1%) of the participants were not included in the ITT analyses. The primary analysis was conducted using robust multiple linear regression.[204] The primary outcome was entered as the dependent variable, and the trial arms and predefined possible confounding variables (sex, age, education level, employer follow-up, physical activity level, workability, musculoskeletal

health, and sickness absence days one year prior to baseline),[180] were entered as independent variables in the model. Normal probability plots, residual scatterplots and values for leverage, Cook's distance, and variance inflation factors were checked to judge if the assumptions for linear regression were met. The residuals for 'the number of sickness absence days prior to baseline' were skewed, therefore the variable was log-transformed. Due to the skewed distribution of the outcome variable and several outliers, we decided to conduct multiple robust linear regression, to reduce the effect of the outliers on the estimates.[204] The outliers were not excluded from the analysis.

Thirty (6%) of the participants had missing items on one or two of the possible confounding variables. To include them in the analysis we imputed missing values in 10 datasets, using multiple imputation by chained equations. We followed the guidelines described by White and colleagues.[205] First, we investigated the proportion and patterns of the missing data. Then, in the imputation model, we included the variables that: 1) predicted the incomplete variables, 2) predicted that the incomplete variables were missing, or 3) were part of the multiple robust regression model.[205] The missing items were imputed with logistic regression or predictive mean matching with ten donors.[206] In addition, we conducted a full case analysis, including only participants with no missing items.

An unadjusted ITT analysis was conducted using the Mann-Whitney Wilcoxon test, as the main outcome was not normally distributed. The Mann-Whitney Wilcoxon test is a nonparametric statistical test to compare mean ranks. Confidence intervals (CI) for the median value of sickness absence days (in each trial arm) were estimated with 10 000 bootstrap samples.

We conducted three unadjusted sensitivity analyses:

1) Excluding the pilot participants.
2) Excluding participants who had RTW for >50% of their contracted work hours one week after baseline (as the protocol stated that the MI and SVAI should not be delivered to participants who had RTW for >50% before the first session).
3) Excluding participants who had completed six months follow-up after the 12th of March 2020 (when the Norwegian government imposed restrictions due to the COVID-19 pandemic).

The first two sensitivity analyses were described in the SAP, the last sensitivity analysis was decided by the scientific board before the outcome data were available.

Ethical considerations

The MI-NAV study was assessed by The Regional Committee for Medical and Health Research Ethics[207] (2018/1326/REK sør-øst A). The Committee judged the study not to be subject to the act on medical and health research (ACT 2008-06-20 no. 44). The Norwegian Center for Research Data[208] approved the project (861249), and the trial was conducted in accordance with the Helsinki declaration and the GDPR. All participant data from the MI-NAV study was collected, stored and analysed safely through the services for sensitive data (TSD) at The University of Oslo.[209] Information from the SVAI logs and recordings were anonymised, so participants could not be identified. A participant number was used to connect the information from the questionnaires with the registry data. The participant list was stored in a separate area in TSD (only accessible to the project leaders). No sensitive information was included in communication with participants via email or text messages.

Workers on sick leave are in a vulnerable position, as they rely on sickness benefits from the NAV. It was important that they did not feel pressured to participate in the research project. Therefore, the patient engagement panel helped us with the wording of the trial information letter, consent form, and the telephone script used for recruitment. During the telephone recruitment, we emphasized that participation was voluntary, and had no consequences for sickness benefits or usual follow-up provided by the NAV. We also informed the workers that they could withdraw from the trial at any time, without any consequences. Furthermore, we underscored that the aim of the project was to improve the follow-up provided to people on sick leave. Separate informed consent was obtained for making audio recordings of the MI and SVAI sessions, making it possible to participate in the trial without consenting to the audio recordings. For participants in the SVAI arm, the physiotherapists asked for written informed consent before contacting stakeholders.

Summary of results

Paper I: Systematic mapping review of research on motivational interviewing to facilitate return to work for people with musculoskeletal disorders

The literature searches identified 1075 unique records. After screening of abstracts, we assessed 22 papers in full text. Only three papers from two different studies met our inclusion criteria. One study was a Norwegian RCT including 89 disability pensioners with back pain.[210] The study did not find any effect on RTW over one year of a brief intervention including MI (compared to usual follow-up from the social insurance and work office). We judged the study as having high risk of bias. The second study was a cluster RCT, conducted at a Canadian rehabilitation centre.[211 212] The study included 728 claimants with MSK disorders. The results showed that providing MI in addition to interdisciplinary rehabilitation increased RTW by 12% at discharge, for workers who were unemployed at baseline (p=0.03). Amongst workers employed at baseline, 5% fewer in the MI group had recurrence of any type of wage replacement benefits over one year, compared to the control group (p=0.04). The effect of the intervention was highest among the workers receiving MI from the most MI-adherent clinicians. This study was assessed as having low risk of bias. The mapping review identified a large research gap on the use of MI to facilitate RTW for people with MSK disorders.

Paper II: Process evaluation of the implementation of the stratified vocational advice intervention in the MI-NAV trial

Eight physiotherapists completed the SVAI course, but four withdrew early in the study due to other work commitments. Twenty meetings were held with the physiotherapists and members of the study team during the intervention period. Of the 514 participants included in the MI-NAV trial, 170 were allocated to the SVAI arm, and 152 (89%) received at least one SVAI session. All sessions were provided by telephone. During the sessions the participants described their *symptom burden*, how pain affected their lives and coping strategies for *managing symptoms*. The participants *relations with the workplace* varied. Some had received RTW support from their employers whilst others had little contact with the workplace and no

follow-up plan. The main barrier to RTW described by the participants was *fear of not being able to manage work*. Many worried that their symptoms would increase if they RTW to soon, and that they would not be able to do their work duties. The physiotherapists provided advice about managing MSK symptoms and RTW. Overall, the physiotherapists delivered the SVAI according to the protocol, and SVAI logic model. However, some intervention elements were poorly implemented including face-to-face sessions, workplace meetings, and coordination with RTW stakeholders. The main implementation barriers described by the physiotherapists, included lack of meeting facilities, and being restricted to providing two telephone sessions to the low/medium-risk group. The physiotherapists experienced the mentoring as supportive, and that they were able to build rapport with most participants over the telephone.

Paper III: Effectiveness of adding motivational interviewing or stratified vocational advice to usual case management on return to work for people on sick leave due to musculoskeletal disorders

Between April 2019 and October 2020, we enrolled 514 participants in the MI-NAV trial. Their median age was 49 years (range 24-66) and 57% were women. The follow-up rate on the primary outcome was 99% (*n*=509). Median number of sickness absence days was 62 days (95% CI 52 to 71) in the UC arm, 56 days (95% CI 43 to 70) in the UC+MI arm, and 49 days (95% CI 38 to 60) in the UC+SVAI arm. The difference in sickness absence days between the UC and UC+SVAI was statistically significant ($p<0.05$) in the crude analysis. The primary analysis (adjusted for: sex, age, education level, employer follow-up, physical activity level, workability, musculoskeletal health, and sickness absence days one year prior to baseline), showed that the UC+MI arm had 7 fewer days of sickness absence (95% CI -15 to 2) compared to the UC arm. The UC+SVAI arm also had 7 fewer days (95% CI -16 to 1) compared to the UC arm, in the adjusted analysis. The CIs were large indicating large variation in the data, and the differences were not statistically significant. The results were confirmed by our sensitivity analyses. However, both the MI and SVAI were more effective in reducing sickness absence for the participants who completed six-month follow-up prior to the COVID-19 pandemic (*n*=120).

Discussion

The discussion chapter will cover two main areas. First, I will discuss the results from the tree papers in relation to previous research and theory and consider possible mechanisms of impact of the MI and SVAI interventions. Secondly, methodological aspects of the studies will be critically discussed, including strengths, limitations, and possible sources of bias. The discussion will be related to the main aim of the thesis: to evaluate MI and SVAI provided as RTW interventions for people on sick leave with MSK disorders.

Discussion of main findings

Motivational interviewing and return to work

The systematic mapping review (paper I) revealed that there was almost no research on the use of MI to facilitate RTW for people with MSK disorders. This was surprising since MI has been recommended for vocational rehabilitation, [26 27 32 118] and MSK disorders account for a large proportion of sickness absence and disability.[16 17 36] The Norwegian RCT included in our review, had a small sample of disability pensioners with back pain.[210] The literature shows that the likelihood of RTW is reduced after long periods of absence,[6 25] and people on disability pensions may need considerable help to RTW.[25 213] In the Norwegian trial, MI was provided in a single group sessions and MI training and fidelity was not described.[214] Therefore, it is uncertain if the participants received a sufficient amount and quality of MI to conclude about the effectiveness of MI on RTW in this trial.[214 215] Although the Norwegian RCT did not show any effect of the intervention on RTW, the results are uncertain due to high risk of bias.[214] In contrast, the Canadian RCT included in the mapping review had a large sample and low risk of bias,[214] strengthening our confidence in the trial results. In the Canadian study MI was provided as individual face-to-face sessions, and MI adherence was monitored. The results showed that MI had a positive effect on RTW, and reduced sickness absence among people with MSK disorders.[211 212] Furthermore, the effect was strongest for the trial participants receiving MI from the most MI adherent clinicians.[211 212]

In addition to the Canadian study, a RCT not meeting the inclusion criteria of our review, showed positive effects of MI on reducing sickness absence among workers with MSK disorders in Sweden.[100] The RCT was conducted by Linton and colleagues at a Swedish occupational health care center.[100] The participants (n=140) had low back pain and could still be working, but had high risk of developing chronic pain (defined as scoring >40 points on

the ÖMPSQ-SH).[100] The intervention was provided over three sessions by clinical psychologists (two of the sessions included MI). It was a preventative intervention based on cognitive behavioural principles, to support self-management of pain in connection to work-related obstacles. In addition, the participants' supervisors were offered three intervention sessions, to create a supportive work environment and reduce workplace-related psychosocial risk-factors. The Swedish study showed that participants in the intervention group had 11 fewer days of sickness absence over six months, compared to the group receiving best current care (p=0.03).[100] Together, the results from the Canadian and Swedish study indicate that MI may help people with MSK disorders RTW, or stay at work despite MSK pain. These findings were further supported by the results from the MI-NAV trial (paper III). Although the addition of MI to UC in our trial did not have a statistically significant effect on sickness absence, the results were promising. Participants receiving MI+UC had 7 fewer days of sickness absence, compared to the UC arm, after adjusting for possible confounding variables. The 95% CI showed large variation in the data (-15 days to 2 days), making the results uncertain. However, our findings imply that MI can facilitate RTW for people with MSK disorders. This leads to the questions: how can MI help people in the RTW process? What are the mechanisms of impact?

To study mechanisms of impact it is recommended to conduct mediation analyses.[40] Two mediation analyses will be conducted in the MI-NAV trial. We will investigate if the effect of MI or SVAI on sickness absence is mediated by 'workability' or 'RTW expectancy'.[180] However, the results of these analyses are not yet available. Furthermore, the MRC recommend interviewing study participants, to investigate their responses to, and interactions with the interventions.[40] Unfortunately, we did not interview the participants in the MI-NAV trial. However, two qualitative studies from Sweden and Norway have interviewed people on sick leave receiving MI from social insurance caseworkers.[130 133] The participants in the Norwegian study had received the same MI intervention (provided by NAV caseworkers), as in the MI-NAV trial.[195] Combined, these studies included 30 participants on sick leave, mostly due to common mental health disorders. The results showed that the participants experienced the MI sessions as supportive in their RTW process, and described positive encounters with the caseworkers.[130 133] These findings are supported by results from a RCT conducted in the United States, showing that MI training can improve working alliance between clients and RTW caseworkers.[216] Several qualitative studies have shown that people with MSK disorders experience negative encounters with health care professionals and social

security caseworkers, and a feeling of not being believed and understood.[4 217 218] This was supported by the results of the mixed method study from work package one of the MI-NAV trial, showing that NAV caseworker found it challenging to help people on sick leave with unspecific MSK disorders, and that they were unsure what caused their sickness absence.[109] Receiving acceptance and understanding is important in the RTW process.[3 79 80] If the person on sick leave feels mistrusted, they may feel the need to prove that they are unable to work, which can be a barrier in the RTW process.[3 219] Therefore, the relationship between the person on sick leave and the caseworker is important.[79] Building a good working alliance with the client is one of the cornerstones in MI.[28] Furthermore, MI can support the three psychological needs promoting autonomous motivation, described by Deci and Ryan in the self-determination theory: the need for *relatedness, autonomy* and *competence*.[156]

Although MI is not based on a specific theory,[28 220] the principles of MI are compatible with self-determination theory.[162 165 221-223] The relational component of MI (the MI spirit), is characterised by a collaborative relationship between the client and MI counsellor, supporting the clients need for *relatedness*.[224] In the MI-NAV trial, the aim of the first MI session was to build a collaborative partnership between the NAV caseworkers and the participants, based on an emphatic understanding. This was done by exploring the participants' experience of their situation, and showing acceptance for their sick leave.[135] The participants in a similar study conducted in Trondheim (Norway), described that they received understanding for their need for sick leave, and that they developed a positive relationship with the NAV caseworkers providing the MI sessions.[133] Another cornerstone in MI is showing respect for the clients *autonomy*, by helping the clients identify their own reasons for changing behaviour, and avoiding attempts at persuasion or coercion.[28 221 224] The NAV caseworkers in our trial did not try to persuade the participants, instead they explored the participants ambivalence about RTW and their reasons for wanting to RTW.[135] Finally, in MI the need for *competence* is supported through increasing self-efficacy (by focusing on the client's strength and previous successes and helping them formulate realistic and achievable goals).[224] In the MI-NAV trial, the focus of the second MI session was to explore the clients previous experiences of RTW, provide information about help available through NAV, and help the participants develop action plans (if they were ready).[135] Together the elements of the two MI sessions may have increased the participants' autonomous motivation for RTW, explaining why the participants receiving UC+MI had fewer days of sickness absence compared to the group receiving UC

only. Another theory that can explain how the MI intervention facilitated RTW is The Transtheoretical Model (stages of change).[158]

MI can be used to help a person progress through the stages of change, and the NAV caseworkers in our trial were taught to adapt the MI intervention according to the participants' motivational stage.[135] For participants to advance from the *precontemplation* and *contemplation stages*, to the *preparation* and *action stage* of change, the pros of changing should increase, and the cons decrease.[158] MI is a good tool for helping a person in the *precontemplation* and *contemplation* stages explore ambivalence and build and amplify 'change talk'.[28 225] For participants who were ambivalent about RTW, the NAV caseworkers were instructed to explore positive and negative factors related to RTW. The caseworkers were trained to listen for change talk related to RTW, and enhance this through follow-up questions, reflections, and summaries. The aim was to increase the participant focus on the pros of making a change and increase their RTW self-efficacy. This could facilitate progress towards the *preparation* and *action* stages of change. For participants in the *preparation* stage, MI was used to increase commitment to change and develop an action plan for RTW.[135] Summarised, several studies have shown promising effects of MI on RTW for people with MSK disorders, and the self-determination theory and Transtheoretical Model can explain how the MI intervention may have helped the participants in the RTW process.

Implementation and effectiveness of the stratified vocational advice intervention on return to work

The SVAI process evaluation (paper II) showed that it was possible to implement the main elements of the SVAI in a Norwegian setting.[201] Moreover, the results from the outcome evaluation showed that adding SVAI to UC reduced sickness absence by 7 days over 6 months for workers on sick leave with MSK disorders (paper III). Our results are in line with the results from the SWAP trial,[34] indicating that the intervention is suited to a Norwegian and UK setting.

In the SWAP and the MI-NAV trial the interventions were provided by physiotherapists, and the follow-up was mainly by telephone.[34 201] Research evidence on eHealth interventions to facilitate work participation is sparce,[226] but several studies have shown that telephone-based interventions can be effective and acceptable for people with MSK disorders.[227 228] The

physiotherapists in the MI-NAV trial were able to build rapport with most participants over the telephone. However, when they experienced communication difficulties either because participants did not have Norwegian as their first language, or because participants were not motivated to RTW, they would have preferred face-to-face meetings. The physiotherapists' described several barriers to arranging face-to-face meetings. Firstly, according to the protocol, participants in the low/medium-risk group should only receive telephone sessions, and 77% of the participants were in the low/medium-risk group. Secondly, the lack of meeting facilities and restrictions implemented to reduce physical contact between people during the COVID-19 pandemic, made it difficult to arrange meetings with participants in the high-risk group. Studies have shown that face-to-face contact between RTW coordinators and workers can reduce work absence,[33] and the SVAI might have been more effective for some of the participants if they had received face-to-face meetings with the physiotherapist.

On the other hand, the physiotherapists experienced that the participants did not want them to attend workplace meetings. The most important communication during the RTW process is between the employee on sick leave and their employer.[229] In Norway, there are policies and guidelines to secure cooperation between employers and employees early in the sick leave period.[10] Therefore, there may be less need for help to arrange workplace meetings in Norway, compared to the UK. Results from two Norwegian studies showed no added benefit of telephone contact or meetings with employers during vocational rehabilitation.[230 231] However, the guidelines are not always followed, and NAV caseworkers, vocational rehabilitation clinicians and employers underscore the importance of liaising with RTW stakeholder to facilitate RTW in a Norwegian context.[109 219 232] The SVAI process evaluation showed that the physiotherapists rarely liaised with the participants' employers, general practitioners, or NAV caseworkers.[201] In the mentoring sessions, the physiotherapists described feeling insecure about discussing workplace modifications with employers, because they did not feel they knew the participants after only a few telephone conversations. They were also reluctant to step on the toes of other health care professionals. Liaison between RTW stakeholders can be challenging,[62 108-110] and the barriers described by the SVAI physiotherapists are commonly experienced.[108 149 233] The lack of liaison with stakeholders might have reduced the effectiveness of the SVAI. Coordination across the different areas affecting work disability is central according to the biopsychosocial model of work disability.[62] Previous studies have shown that cooperation between RTW stakeholders is important.[3 21-23 79 234] However, the SVAI elements that were delivered in the MI-NAV trial

mainly focused on the personal sphere of the biopsychosocial model. Personal factors, such as coping, self-efficacy, and recovery expectations are important for RTW.[24 69-72 76 79] These factors were targeted in the SVAI, and the mechanisms of impact may be explained through theories from social psychology.

Several of the SVAI elements are similar to the MI intervention, and the self-determination theory is also central to explain how the SVAI could have facilitated RTW.[156] Other relevant theories are Bandura's social cognitive theory and Leventhal's common sense model of self-regulation.[168 169] During the SVAI course the physiotherapists received training in communication (including MI communication skills), and the focus of the first SVAI session was to clarify how the participants perceived their work and health situation and identify RTW obstacles.[201] Emphatic communication about the participants' situation, could have supported their need for *relatedness*, described in the self-determination theory. Furthermore, several of the SVAI elements were aimed at improving the participants' *competence*. The physiotherapists provided advice and reassurance regarding health and work and helped the participants problem solve to overcome RTW barriers. The physiotherapists also provided *autonomy* support by collaborating with the participants to agree goals and plan RTW. Moreover, they helped the participants take charge of their own RTW process by advising them to contact relevant RTW stakeholders. According to social cognitive theory this could have increased the participants self-regulation of behaviour.[168]

The participants autonomous motivation for RTW, may have been supported by the physiotherapists' exploration of what the participants valued about their work. In the audio recordings, many of the participants emphasised their self-identity as a worker, and that they did not take lightly to sick leave. This is a common finding across several qualitative studies among people on sick leave.[2 4 235] The finding is not surprising, given social norms and the high value of work in our society.[3 79 235] It seems that during the SVAI conversation the participants were evaluating their actions against their personal standards. According to social cognitive theory, such self-monitoring is one of the processes of behaviour regulation.[168] Furthermore, the physiotherapists provided reassurance, advice, and evidence-based information about managing MSK symptoms in relation to work. In this way they may have strengthened the participants beliefs about their capabilities to RTW and their RTW self-efficacy, which is an important element of self-regulation of behaviour.[167]

The main barrier for RTW described by the participants was related to self-management of their MSK disorders in the context of work. Many were afraid that their symptoms would increase if they RTW to soon, or that they would not manage their work duties. This is in line with findings from previous studies.[3 236] According to Leventhal's common-sense model of self-regulation, how people perceive health threats is important for how they self-manage their illness.[169] In this respect the advice and reassurance provided by the physiotherapists may have been important for the participants' self-management of MSK symptoms, during the RTW process. A recent scoping review identified vocational advice and education to address RTW barriers, as important elements of work focused care provided by healthcare professionals to people with MSK disorders.[237] This was also emphasised by the patient representatives involved in the MI-NAV study. The patient representatives underscored the importance of receiving advice and support from a health professional with knowledge about MSK disorders, this has also been described by participants in various qualitative studies.[79] Several of the participants in the audio recordings of the SVAI sessions relied on advice from health professionals about when to RTW. The physiotherapists had competence and experience with MSK disorders and provided evidence-based advice to the participants regarding self-management of symptoms and RTW. The audio recordings of the SVAI sessions showed that the physiotherapists reassured the participants that work and activity was positive for health, and tried to reduce their fear avoidance behaviours. This may have supported the participants' self-efficacy for RTW, and reduced their fear that work constituted a health risk. Together this could have increased their RTW expectancy, which is associated with RTW.[76] Put together, the different elements of the SVAI could have facilitated RTW by changing the participants' illness perceptions and self-management of symptoms, and by strengthening their motivation, expectation and self-efficacy for RTW.

Methodological considerations

This section will start with a discussion of methodological considerations relevant to the mapping review (paper I), followed by methodological aspects related to the process evaluation and RCT (paper II and III).

Methodological aspects of the systematic mapping review

The systematic mapping review has several strengths. Firstly, we developed and published a detailed protocol prior to conducting the review.[189] Secondly, we were a large study team of researcher with experience from qualitative and quantitative research, and from conducting systematic reviews. This was a major strength during the review process. As recommended for scoping reviews, our research question was broad and we conducted comprehensive literature searches to scope the field of interest.[186-188] We decided not to include search terms related to MSK disorders or MSK pain, as this would have narrowed our search and increased the chance of not identifying relevant studies. Furthermore, the literature search was designed and conducted by an experienced information search specialist, and quality checked by a second search specialist from the Norwegian Institute of public health. Finally, the selection of studies, data charting, and quality appraisal of included studies, were conducted independently by two researchers, in accordance with guidelines for systematic reviews and scoping studies.[185-187]

Our review also had some limitations. Although our research question was broad, we only identified two studies addressing MI to facilitate RTW for people with MSK disorders. One of our inclusion criteria was that at least 50% of the study population had MSK disorders, or that results were described separately for people with MSK disorders. In some of the studies from the literature search, it was not possible to identify if 50% of the study population had MSK disorders, and consequently these studies were not included in the review. During the development of the research question, we discussed if we should include research on MI to facilitate RTW for people with other types of diagnoses. However, the study team decided against this because the aim of the review was to map research relevant to the MI-NAV trial. In hindsight, it might have been beneficial to include papers with mixed population of people with different diagnoses and present the results of these studies separately in the review. Mental health disorders and MSK disorders have a high level of comorbidity and a reciprocal relationship, each potentially worsening or causing the other.[238] They also share similar psychosocial factors influencing RTW.[70] Furthermore, they are the two most common causes of sickness absence and disability in Norway.[13] Therefore, it would have been relevant to present results of studies on MI to facilitate RTW for people with MSK disorders and mental health problems. A second study weakness is the limited searches for grey literature. More unpublished work might have been identified if we had contacted more researchers in the field, and searched databases for grey literature. Furthermore, our search strategy and initial

screening might not have captured all relevant studies. Papers were not included if MI was not mentioned in the title or abstract. After the review was published, we have come across a paper by Magnussen et al.[239] providing results from the three-year follow-up of the Norwegian RCT included our systematic mapping review, this paper did not mention MI in the title or abstract and consequently was not included in the review. However, the results from the three-year follow-up of the Norwegian study does not change the conclusion of our mapping review.

Involvement of stakeholders in the research process

To increase the relevance and quality of mapping reviews, it has been advocated to involve stakeholders in the review process.[187 240] Arksey and O'Malley describe consultation of stakeholders as an optional step in the review process.[186] The planning of our mapping review was informed by a systematic review from 2017 commissioned by the NAV, concerning MI as a method to facilitate RTW.[31] Although we did not formally consult stakeholders during the conduction of the mapping review, stakeholders were involved in the planning of the MI-NAV study. Furthermore, as recommended by the MRC,[137] stakeholders were involved throughout the planning and conduction of the RCT. This helped us ensure that the interventions were relevant and acceptable to those implementing and receiving the RTW interventions.

Fidelity assessment and intervention contamination

A strength of our trial is that we conducted fidelity evaluations to check if the interventions were delivered in accordance with the protocol.[135 201] Fidelity evaluations are important to assess internal validity and to provide guidelines for replication in other settings.[155] However, few previous trials have included evaluations of treatment adherence and fidelity of RTW interventions.[173] We did not conduct a fidelity evaluation of UC during the MI-NAV RCT. However, UC provided by NAV caseworkers, to people on sick leave with MSK disorders, was assessed in the study area shortly before the trial commenced.[109] The NAV offices participating in the RCT had not trained their caseworkers in MI prior to the trial, and only the caseworker providing the intervention received MI training and mentoring. Furthermore, the caseworkers were instructed not to use MI in usual follow-up of people on sick leave with MSK disorders, and to avoid discussing MI with their co-workers who had not received MI

training. The physiotherapists provided vocational follow-up to participants randomised to the SVAI arm only. This reduced the risk of intervention contamination.

The fidelity evaluation of the MI intervention was based on data from three rounds of audio recordings of MI sessions provided by the NAV caseworkers. A total of 21 recordings were made of sessions with 16 participants (13% of all participants receiving MI). Experienced MI analysts, from an independent MI analysis centre (KoRus Vest Bergen[196]), coded the recording using the Motivational Interviewing Treatment Integrity version 4 (MITI 4). The MITI 4 is a coding system for evaluating MI proficiency, used for assessing treatment integrity in clinical trials.[241] It has been psychometrically tested in multiple studies,[242] and provides reliable and valid indicators of MI practice.[241] However, the thresholds for MI proficiency suggested in the MITI 4 manual are based on expert opinion, and lack normative or other validity data.[243] Therefore, it is recommended to combine MITI with other data when assessing MI proficiency.[243] In the MI-NAV trial the three MI experts, in charge of the training and mentoring of the NAV caseworkers, assessed the audio recordings. They provided overall judgements of the caseworkers' MI competence, MI spirit (partnership, empathy, and autonomy support) and engagement of the participant (alliance, collaboration, and elicitation of change talk). Furthermore, they assessed adherence to the main elements of the MI manual.

The evaluations showed that the NAV caseworkers had high adherence to the MI manual, but low MI proficiency levels throughout the trial.[135] The MITI scorings did show gradual improvement from the first to the third round of recordings. In the first round (after 2-4 participants) the caseworkers average scores were below beginning MI proficiency levels on three of the four MITI competence measures, in round two (after 10-12 participants) the caseworkers had beginning MI proficiency on 50% of the measures, first in round four (after 15-20 participants) had they reached beginning proficiency levels on all the measures, and MI proficiency on one measure.[135] The results indicate that during the first part of the trial the sessions provided by the caseworkers did not meet MI standards. The NAV caseworkers received more MI training than is common in trials.[214 244] The training was conducted in accordance with recommendations and provided by experienced MI trainers.[135] However, several studies have shown that social insurance caseworkers need a large amount of training and practise to develop their MI skills.[30 131 132] Lack of training, confidence, and support in performing MI has been identified as challenges by practitioners, and can be a barrier for MI implementation.[30 131 132] MI fidelity is important for effectiveness of MI interventions.[215]

Therefore, the MI sessions may have been more effective in facilitating RTW if the caseworkers had more time to practise prior to providing the intervention to trial participants. Ideally, we should have certified the caseworkers MI proficiency levels before they provided the intervention to trial participants.[215] However, the results from the sensitivity analysis excluding the participants included during the pilot were similar to the ITT analyses.

The NAV caseworkers provided the MI sessions in addition to their usual case load (which increased during the COVID-19 pandemic), and this could have been an implementation barrier. Only 70% of the participants randomised to the MI arm received at least one MI session.[135] The average time from inclusion until the first MI session was three weeks, and the main reason for sessions not being provided was that participants had RTW for more than 50% of their contracted work hours prior to the first session. Other reasons were non-attendance by the participants or that the meetings were not arranged because either the participant or the NAV caseworker decided that MI was not needed. Due to restrictions following the COVID-19 pandemic, 22 of the MI sessions were delivered by telephone or video call.[135] However it is not likely that this affected the intervention effectiveness as 90% of the sessions were provided face-to-face. Furthermore, a systematic review has shown that telephone delivered MI can be effective.[245]

The fidelity evaluation of the SVAI was challenging because it was a new intervention, and there were no agreed fidelity criteria. It was difficult to set fidelity criteria as the SVAI was a flexible intervention, tailored according to the participants' needs. The SVAI included several elements, and we did not know which were the most important for intervention effectiveness, as this depended on the participants' RTW barriers. For example, a person who had not been in contact with their employer, might need help to arrange a workplace meeting. However, this would not be helpful for a person who had a good dialogue with their employer. It was up to the physiotherapists to decide what type of case management to provide, based on the participants' RTW barriers. Therefore, we did not develop a fidelity score for the process evaluation (paper II). Instead, we decided to conduct an overall assessment of fidelity, based on a combination of the data from the SVAI logs and the audio recordings of the SVAI sessions. The elements included in the fidelity evaluation, were decided in cooperation with researchers from Keele University (involved in the development of the vocational advice intervention in the SWAP trial). Together, the quantitative and qualitative data from the process evaluation provided a detailed picture of the intervention elements delivered by the physiotherapists. The protocolised required elements of the SVAI (the number and timing of

SVAI sessions, gathering information related to the 15 core questions in the conversation guide, and development and follow-up of action plans), were delivered with high degree of fidelity. However, several of the optional elements of the SVAI were not implemented (face-to-face sessions and workplace meetings), and there was little cooperation with RTW stakeholders. The audio recordings showed that the physiotherapists did advice the participants to contact relevant stakeholders if necessary. The physiotherapists also provided advice and reassurance regarding the management of MSK disorders in the context of work.

The fidelity evaluations have several limitations, including the lack of validated fidelity criteria. Ideally, recordings should have been made of all the intervention sessions and a random sample selected for analysis.[215] This would have reduced the chance that the physiotherapists and NAV caseworkers had higher intervention fidelity in the recorded sessions compared to the non-recorded sessions. However, it would have increased the burden on the intervention providers and trial participants. A second major limitation is that we did not conduct interviews with participants receiving MI or SVAI, due to time and budget limitations. Interviews with participants would have provided information about how they experienced the interventions, and if certain elements of the interventions were more helpful than others. This information would have been helpful for improving the interventions in future trials, and to provide insight into mechanisms of how the interventions facilitated RTW. However, interviews with participants and intervention providers were conducted in the SWAP trial[149] and in the trial in Trondheim, providing the same intervention as the MI-NAV trial.[30 133] The findings from these studies are relevant for the MI-NAV trial, and have been used in the interpretation our results.

Attention bias

In our trial we did not include a trial arm to control for attention bias. The participants randomised to the MI and SVAI received extra follow-up in addition to UC. The results of the adjusted analysis showed that the two RTW interventions had a similar effect on sickness absence over 6 months. Our trial design does not make it possible to conclude if it was the components of the MI and SVAI intervention that reduced sickness absence, or if the reduction was due to the extra follow-up provided early in the sick leave period. The trial conducted in Trondheim, testing the effectiveness of the same MI intervention as our trial, included a trial arm to control for attention bias.[195] In this arm the participants received two

sessions, without MI content, from NAV caseworkers in addition to UC. The results from the Trondheim trial will help with the interpretation of the findings in the MI-NAV trial, however these results are not available yet.

Stratification

One of the main differences between the intervention provided in the SWAP trial and the SVAI was that the SVAI was a stratified intervention whilst the SWAP intervention was provided as stepped care.[34 201] In both trials a median of two sessions were provided to the participants. However, in the MI-NAV trial the low/medium risk group could receive maximum two sessions and the high-risk group maximum four sessions. Whilst, in the SWAP trial the participants could receive more sessions if necessary. The participants in the two trials also differed. The participants in the MI-NAV trial had been on sick leave for at least 7 weeks, whilst in the SWAP trial only 30% of the participants were on sick leave or working fewer hours. Therefore, it is likely that the participants in the MI-NAV trial needed more RTW support compared to the SWAP participants. The physiotherapists providing the SVAI, did experience that the limited amount of sessions hindered case management, especially for the low/medium-risk group.[201] It might therefore have been preferable to stratify participants to a 'low-risk group' and a 'medium/high-risk group', and provide up to four SVAI sessions to participants with medium-risk of prolonged sick leave. Alternatively, to provide the intervention as stepped care with the possibility of offering more sessions to participants who needed more help to RTW.[53 106]

Data collection and main outcome

A major strength of our trial is that the main outcome is based on detailed registry data from the NAV. The data were complete, and had high validity as they were registered for administrative and economic reasons.[177] The problem of recall bias and performance bias was avoided by using registry data. Furthermore, data collection was conducted by external agents, not involved in the trial, reducing the risk of detection bias. The use of registry data made it possible to calculate sickness absence days for 99% of the participants included in the trial, and we were able to calculate actual time away from work. The measure provides an accurate account of lost workdays, which will be beneficial for the planned cost-effectiveness analyses of the interventions. Furthermore, we have included sickness absence due to all types

of diagnoses during the follow-up period. Therefore, if the participants received a sick note due to other causes than MSK disorders during the follow-up period, this was included in the outcome. We could have included only sick notes due to MSK diagnoses. However, the diagnosis on the sick note can vary for people with multiple health problems reducing the validity of the data. The calculation of our main outcome was similar to the method used in the study conducted in Trondheim,[195] providing the possibility to combine data from the two trials in future analyses.

Measuring sickness absence is complex and can be challenging as it can be quantified in several ways.[177] To provide a broader picture of sickness absence over time for the participants in the MI-NAV trial, we will evaluate several secondary RTW outcomes over 12 months follow-up.[180] In addition to the number of sickness absence days over 12 months, we will assess time until full sustainable RTW, defined as the first 4-week period of RTW without relapse. We will also assess the proportions of participants receiving sick leave benefits every month. The reason for including this outcome measure, is that recurrence of sickness absence is common after a period of RTW.[246 247] Combined, these RTW outcomes will provide a detailed understanding of RTW and sickness absence during one year of follow-up for the participants in our trial.

Data analyses

The qualitative analyses in the process evaluation (paper II) were conducted by several researchers in cooperation, strengthening the credibility of the findings.[248] I had the main responsibility for the analyses. My involvement in the development of the SVAI, and training and mentoring of the SVAI physiotherapists, is likely to have influenced the interpretation of the process data. I had written most of the meeting minutes, this helped me during the interpretation of the minutes. However, my involvement in the SVAI might have led me to focus on factors described in the SVAI logic model and conversation guide and pay less attention to other topics discussed by the participants. In addition, my acquaintance with the physiotherapists may have influenced my interpretation of the data. To balance the interpretation, a second researcher was involved in all the steps of the qualitative analyses. She did not know the physiotherapists and was not familiar with the SVAI, and therefore could provide an ‘outsider’ view. She helped me develop inductive data codes and to pay attention to all important themes discussed during the SVAI sessions.

The quantitative analyses in paper III were conducted in cooperation with my main supervisor and an experienced statistician. To reduce the risk of bias we were all masked to intervention allocation during the analyses. Furthermore, a SAP was published before 6 months follow-up data were available.[180] The SAP included hypotheses and planned analyses, in accordance with approved guidelines.[203 249] As recommended, we prespecified possible confounding variables to be controlled for in the multiple analysis based on the literature, not on significance testing of baseline differences between the intervention arms.[249 250] Prespecifying the analyses reduced the risk of bias due to 'data dredging', and secured that possible confounding variables associated with the outcome were included in the analysis.[250] However, several of the prespecified variables were not associated with the number of sickness absence days in our trial. Also, several of the possible confounders were evenly distributed in the three trial arms. Therefore, one could question the need for adjusting for these variables. Furthermore, we had not planned to include 'risk-group' as a covariate in the analysis. The reason was that the stratified randomisation procedure secured an even distribution of participants with high and low/medium risk in the three trial arms. However, the CONSORT guidelines recommend adjusting for stratification variables on the principle that the analysis strategy should follow the study design.[249] However, including 'risk group' in the multiple analysis did not alter the results.

Sample size and power

New sample size estimates were conducted for the RCT due to increased workload for the NAV during to the COVID-19 pandemic. Consequently, the sample size was reduced from 750 to 450. This resulted in reduced power, preventing us from comparing the UC+MI arm with the UC+SVAI arm. Power issues also hindered the possibility to conduct subgroup analyses for each risk-group. Unfortunately, we lacked comparable studies for the sample size calculation. Neither of the two studies identified in the mapping review (paper I) had sickness absence days over 6 months as an outcome measure.[214] Therefore, the sample size calculations were mainly based on results from the Swedish trial by Linton and colleagues.[100] In addition, results from the SWAP trial were used to estimate the SDs (although the SWAP trial measured sickness absence at 4 and 12 months). A minimal important difference (MID) has not been defined for sickness absence days over a 6-month period for RTW interventions. The decision to set 10 days as an important difference was a pragmatic choice, made by the trial leaders. Ideally, a MID should have been decided in cooperation with stakeholders,[251]

including workers on sick leave, employers and the NAV. As sickness absence has a high cost to individuals and society, a lower MID might have been preferable. However, a large sample size would have been needed to detect smaller difference between the control and intervention arms as statistically significant.[252] This was not feasible in the MI-NAV trial, because of reduced recruitment during the COVID-19 pandemic, and time and budget limitations. The mean differences in the primary outcome between UC and UC+MI or UC+SVAI were lower, and the SDs were lager that the values used for the power calculations. Together this resulted in low statistical power, reflected in the large CIs and lack of statistical significance. Post hoc power calculations showed that the MI-NAV trial had 35% power to detect a difference in number of sickness absence days between the control and MI arm, and 56% power to detect a difference between the control and SVAI arm (with a Student's t-test), given the observed mean and SDs in the three trial arms. Consequently, the probability for not detecting a statistically significant difference between the control and intervention arms was high, even if a difference truly existed (Type II error), which is a major limitation of our trial.

External validity

Another limitation of our trial is the low inclusion rate. We were only able to recruit 25% of those eligible, 14% of those contacted and 6% of the total potential sample for recruitment. Recruiting people on sick leave has also been a challenge in previous trials.[144 145 230 253 254] Unfortunately, the low inclusion rate makes it uncertain if the sample is representative of the population of people on sick leave with MSK disorders. The participants in our sample may have been more motivated to RTW compared to non-responders. This makes it uncertain if the trial results are generalisable to people less motivated to RTW. As theorised, the mechanisms of impact of both MI and SVAI on RTW could work through strengthening motivation and self-efficacy for RTW. Therefore, the interventions may be more effective for people with low motivation and RTW self-efficacy. MI could be especially suited for helping people in the precontemplation and contemplation stages of change. [119 161] However, people in the precontemplation and contemplation stages of change may have been underrepresented in our sample. It is not possible to assess RTW motivation or self-efficacy among non-responders. However, we were able to collect registry data on other factors associated with sick leave, from workers meeting the trial's inclusion criteria during the recruitment period. Anonymised data were collected for people on sick leave due to MSK disorders in the recruitment area in Vestfold and Telemark, and from the whole of Norway. These data

showed that our sample was representative of the target population regarding sex, age, and occupation. The distribution of MSK diagnoses in our sample was also comparable to the target population of workers on sick leave.

Unfortunately, the COVID-19 pandemic hit Norway during the recruitment period of the MI-NAV trial. During the pandemic the Norwegian government implemented wide-reaching COVID-19 containment strategies, to decrease physical contact between individuals. The strategies were implemented on the 12th of March 2020. Following COVID-19 many businesses had to shut down temporarily and workers were furloughed.[255] Consequently, the workload of the NAV increased during the pandemic. The NAV provided full wage compensation for workers on sick leave and partly compensated wages for workers who were furloughed or lost their jobs.[256] These strategies may have reduced the incentives to RTW for people on sick leave, working in businesses negatively affected by the restrictions. One third of the participants in the MI-NAV trial worked in sales and service industries, industries highly affected by the COVID-19 restrictions. The results of our sensitivity analysis, including only participants who had completed 6 months follow-up prior to the 12th of March 2020, indicated that the differences in sickness absence between UC and the UC+MI or UC+SVAI was three times higher before the COVID-19 pandemic. However, the results are uncertain due to the small sample size. Both the SVAI physiotherapists and the NAV caseworkers reported implementation barriers connected to the pandemic. It is therefore possible that the interventions would have been more effective if they had been implemented after the COVID-19 restrictions were lifted.

The COVID-19 pandemic illustrates how RTW is affected by contextual factors, including policies and insurance systems. Therefore, it may be difficult to generalise our findings to countries with other welfare systems.[78] However, our findings are in line with results from studies conducted in the UK, Canada, and Sweden,[34 100 211 212] suggesting that the two interventions can be effective in other settings. Furthermore, the pragmatic trial design, conducted in cooperation with the NAV and including people with all types of MSK disorders, increases the relevance and possibility for implementation of the interventions in real-world settings.[257] This was further supported by the findings from the process evaluation of the SVAI, showing that the SVAI was implemented in accordance to the protocol.[201]

Conclusions

This thesis evaluated two RTW interventions for workers on sick leave with MSK disorders, MI and SVAI.

The research literature regarding MI to facilitate RTW for people on sick leave with MSK disorders was scarce. Our systematic mapping review (paper I) only identified two RCTs, and no qualitative studies met our inclusion criteria. The two RCTs had varying quality and diverging results. However, one study with low risk of bias, showed that adding MI to interdisciplinary rehabilitation increased RTW for people on sick leave with MSK disorders attending a Canadian rehabilitation clinic. Clearly, more research was needed to determine if MI is a suitable method to facilitate RTW for people on sick leave due to MSK disorders.

To contribute to fill this research gap, we conducted a RCT investigating the effectiveness of adding MI or SVAI to UC for workers on sick leave due to MSK disorders, including fidelity and process evaluations of MI and SVAI. The process evaluation of the SVAI (paper II), showed that it was feasible to implement the intervention in a Norwegian setting. Overall, the SVAI was provided in accordance with the protocol and logic model. The physiotherapists helped the participants identify barriers for RTW and develop RTW goals and action plans to solve RTW obstacles. However, some of the intervention elements were not implemented, including face-to-face meetings and workplace meetings. The physiotherapists experienced that being limited to provide maximum two sessions to participants in the low/medium-risk group hindered case management.

The results of the RCT suggest that the MI and SVAI interventions facilitated RTW for people with MSK disorders (paper III). Participants receiving either MI or SVAI, in addition to UC, had 7 fewer days of sickness absence over 6 months compared to those receiving UC only. Furthermore, sensitivity analyses showed that the differences between UC and UC+MI or UC+SVAI were three times higher amongst participants who completed 6 months follow-up prior to the COVID-19 pandemic. However, the CIs were wide, and the differences were not statistically significant, making our results uncertain. Therefore, the interventions should be replicated in future trials, to investigate if they are more effective after the lifting of the COVID-19 restrictions.

Implications for practice and policy

The results from this thesis, along with the planned cost-effectiveness analyses of the interventions, will inform researchers, practitioners, and policy makers on RTW interventions for people on sick leave with MSK disorders. Our trial showed that MI, provided by NAV caseworkers, and SVAI, provided by physiotherapists, are promising interventions for helping people with MSK disorders RTW. This thesis increases the knowledge of RTW interventions provided in a Norwegian setting. Together with the results from a trial currently being conducted in Trondheim, this thesis provides a foundation for policy decisions regarding future implementation of MI and SVAI.

The NAV caseworkers and physiotherapists providing the interventions in the MI-NAV trial were highly dedicated and positive to the interventions. However, the motivation among intervention providers may vary if the interventions were to be implemented in non-trial settings. Furthermore, the amount of training and mentoring required by the NAV caseworkers to reach MI proficiency levels was considerable. Providing the same amount of training and follow-up within time and budget limitations at local NAV offices may be challenging, and this should be considered prior to implementation.

Furthermore, providing early follow-up to all persons on sick leave with MSK disorders would require large resources. One possibility that should be investigated in future trials, is to screen to identify those in need of extra follow-up from the NAV, and only provide MI to those at high-risk for long-term sickness absence. Another possibility is to investigate if the MI and SVAI interventions could be effective provided as stepped care. A potential barrier for the implementation of the SVAI in primary care, is that the local municipalities would bear the costs of providing the intervention, whilst the National Insurance scheme would save money on reduced sickness benefits. A possible solution could be to provide payments from the National Insurance scheme to physiotherapists providing the SVAI. The Norwegian Health Economics Administration (Helfo), is a system that could be suited for this purpose.

Sickness absence is costly and comes at a high burden to individuals, workplaces, and society. Both the MI and SVAI were low-intensive interventions compared to multidisciplinary, multi-modal vocational rehabilitation. The NAV and patient representatives involved in our trial were positive to the RTW interventions evaluated in this thesis. Therefore, one should consider including them as part of usual case management for people on sick leave with MSK disorder if the interventions are cost-effective.

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Appendixes

Appendix I, Search strategy systematic mapping review

INITIAL DATABASE SEARCHES

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to January 28, 2019
Date: 04.02.19
Records: 555

1	return to work/	1902
2	employment, supported/	1129
3	rehabilitation, vocational/	9272
4	sick leave/	5383
5	absenteeism/	8632
6	(sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*))).ti,ab,kf.	32519
7	or/1-6	47021
8	motivational interview/	1423
9	motivational interview*.ti,ab,kf.	3710
10	motivational enhancement.ti,ab,kf.	491
11	motivation/	61923
12	or/8-11	65053
13	7 and 12	691
14	exp animals/	22060973
15	humans/	17519806
16	14 not (14 and 15)	4541167
17	(news or editorial or comment).pt.	1275551
18	13 not (16 or 17)	683
19	limit 18 to yr="1983-current"	556
20	remove duplicates from 19	555

Database: PsycINFO 1806 to January Week 3 2019 (OVID)
Date: 04.02.2019
Records: 146

1	reemployment/	1325
2	supported employment/	1284
3	vocational rehabilitation/	5831
4	employee leave benefits/	1012

5 (sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*))).ti,ab,id. 14253
6 or/1-5 17196
7 motivational interviewing/ 2233
8 motivational interview*.ti,ab,id. 3449
9 motivational enhancement.ti,ab,id. 649
10 motivation/ 49511
11 or/7-1052905
12 6 and 11 162
13 limit 12 to yr="1983-Current" 146
14 remove duplicates from 13 146

Database: Embase 1974 to 2019 January 29 (OVID)
Date: 04.02.2019
Records: 54

1 *return to work/ 1235
2 *work resumption/ 1044
3 *vocational rehabilitation/ 4350
4 *medical leave/ 1793
5 *absenteeism/ 4939
6 (sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*))).ti,ab,kw. 39992
7 or/1-6 45353
8 motivational interviewing/ 3938
9 motivational interview*.ti,ab,kw. 5445
10 motivational enhancement.ti,ab,kw. 687
11 *motivation/ 24713
12 or/8-1131150
13 7 and 12 173
14 exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/ 25425730
15 human/ or normal human/ or human cell/ 19370012
16 14 not (14 and 15) 6108565
17 (news or editorial or comment).pt. 595619
18 13 not (16 or 17) 173
19 limit 18 to yr="1983-current"153

20 limit 19 to embase 55
21 remove duplicates from 20 54

Database: Cochrane Library (CDSR, CENTRAL & Cochrane Protocols)
Date: 04.02.2019
Records: 77

#1 [mh ^"return to work"] 189
#2 [mh ^"employment, supported"] 118
#3 [mh ^"rehabilitation, vocational"] 366
#4 [mh ^"sick leave"] 522
#5 [mh ^absenteeism] 465
#6 (sickleave* or sicklist* or (sick* NEXT (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical NEXT (absen* or leave*)) or certified NEXT absen* or (illness NEAR/2 (day* or absen*)) or (work NEAR/2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) NEAR/2 (return* or re-ent* or reent*)) or ((vocational or occupational) NEAR/1 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability NEXT (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* NEXT (compensation* or resumption*))):ti,ab 3575
#7 (2-#6-#6) 4098
#8 [mh ^"motivational interview"] 637
#9 (motivational NEXT interview*):ti,ab 2223
#10 "motivational enhancement":ti,ab 390
#11 [mh ^motivation] 4267
#12 {or #8-#11 6437
#13 #7 and #12 with Cochrane Library publication date Between Jan 1983 and Feb 2019, in Cochrane Reviews 2
#14 #7 and #12 with Publication Year from 1983 to 2019, in Trials 71
#15 (sickleave* or sicklist* or (sick* NEXT (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical NEXT (absen* or leave*)) or certified NEXT absen* or (illness NEAR/2 (day* or absen*)) or (work NEAR/2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) NEAR/2 (return* or re-ent* or reent*)) or ((vocational or occupational) NEAR/1 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability NEXT (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* NEXT (compensation* or resumption*))) 4768
#16 (motivational NEXT interview* or "motivational enhancement") 3184
#17 #15 and #16 in Cochrane Protocols 4
#18 #13 or #14 or #17 77

Database: CINAHL (EBSCO)
Date: 04.02.2019
Records: 209

S1 (MH Job Re-Entry) (5,453)
S2 (MH Rehabilitation, Vocational) (5,281)
S3 (MH "Employment, Supported") (949)
S4 (MH "Sick Leave") (4,249)

S5 (MH "Absenteeism") (4,013)
S6 TI ((sickleave* or sicklist* or (sick* W0 (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical W0 (absen* or leave*)) or certified W0 absen* or (illness N1 (day* or absen*)) or (work N1 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) N1 (return* or re-ent* or reent*)) or ((vocational or occupational) N0 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability W0 (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* W0 (compensation* or resumption*)))) OR AB ((sickleave* or sicklist* or (sick* W0 (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical W0 (absen* or leave*)) or certified W0 absen* or (illness N1 (day* or absen*)) or (work N1 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) N1 (return* or re-ent* or reent*)) or ((vocational or occupational) N0 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability W0 (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* W0 (compensation* or resumption*)))) (10,018)
S7 S1 OR S2 OR S3 OR S4 OR S5 OR S6 (22,132)
S8 (MH "Motivational Interviewing") (2,674)
S9 TI (motivational W0 interview* or "motivational enhancement") OR AB (motivational W0 interview* or "motivational enhancement") (2,832)
S10 (MH "Motivation") (31,513)
S11 S8 OR S9 OR S10 (34,865)
S12 S7 AND S11 [Limiters - Exclude MEDLINE records; Published Date: 19830101-20190204] 209

Database: Web of science (Clarivate)
Date: 04.02
Records: 21

1 TOPIC: ((sickleave* OR sicklist* OR "sickness ansence" OR "sickness allowance" OR "sickness allowances" OR "sickness benefit" OR "sickness benefits" OR "sickness certification" OR "sickness certifications" OR "sick day" OR "sick days" OR "sickness insurance" OR "sickness insurances" OR "sick leave" OR "sick leaves" OR "sick list" OR "sick lists" OR "sick listed" OR "sick listing" OR "sick listings" OR "medical ansence" OR "medical ansences" OR "medical leave" OR "medical leaves" OR "certified absence" OR "certified ansences" OR "illness day" OR "illness days" OR "illness ansence" OR "illness ansences" OR "work ansence" OR "work ansences" OR re-employ* OR reemploy* OR "return to work" OR "return-to-work" OR "returning to work" OR "back to work" OR "back-to-work" OR "vocational rehabilitation" OR "vocational reintegration" OR "vocational re-integration" OR "occupational rehabilitation" OR "occupational re-integration" OR "occupational reintegration" OR "supported employment" OR "disability ansence" OR "disability ansences" OR "disability allowance" OR "disability allowances" OR "disability benefit" OR "disability benefits" OR "disability insurance" OR "disability insurances" OR "disability leave" OR "disability leaves" OR "disability pension" OR "disability pensions" OR "workers compensation" OR "workers' compensation" OR "work resumption" OR "work resumptions")) 21,798

2 TOPIC: (("motivational interviewing" OR "motivational interview" OR "motivational interviews" OR "motivational enhancement")) 4,354
3 #2 AND #1 [Indexes=SCI-EXPANDED, SSCI Timespan=1987-2019] 21

Database: Sociological Abstracts (ProQuest)
Date: 04.02.2019
Records: 62

(MAINSUBJECT.EXACT("Vocational Rehabilitation") OR (sickleave* OR sicklist* OR (sick* PRE/0 (absen* OR allowance* OR benefit* OR certifi* OR day* OR insurance* OR leave* OR list*)) OR (medical PRE/0 (absen* OR leave*)) OR certified PRE/0 absen* OR (illness NEAR/1 (day* OR absen*)) OR (wORk NEAR/1 absen*) OR re-employ* OR reemploy* OR "back to wORk" OR ((wORk* OR job OR employment) NEAR/1 (return* OR re-ent* OR reent*)) OR ((vocational OR occupational) NEAR/0 (rehab* OR reintegration* OR re-integration*)) OR "suppORted employment" OR (disability PRE/0 (absen* OR allowance* OR benefit* OR insurance* OR leave* OR pension*)) OR (wORk* PRE/0 (compensation* OR resumption*)))) AND (MAINSUBJECT.EXACT("Motivation") OR Ti,AB,SU(motivational PRE/0 interview* OR "motivational enhancement")) [Limit applied: 1983-01-01 – 2019-01-31] 62

Database: SveMed+
Date: 04.02.2019
Records: 44

1 noexp:"Motivational Interviewing" 37
2 ("motivational interviewing" OR "motivational interview" OR "motivational interviews" OR "motivational enhancement") 44
3 #1 OR #2 44

Database: DARE (The Database of Abstracts of Reviews of Effects) & HTA (Health Technology Assessment)
Date: 31.01.2019
Records: 1

1 MeSH DESCRIPTOR return to work IN DARE,HTA 15
2 MeSH DESCRIPTOR employment, supported IN DARE,HTA 8
3 MeSH DESCRIPTOR rehabilitation, vocational IN DARE,HTA 28
4 MeSH DESCRIPTOR sick leave IN DARE,HTA 27
5 MeSH DESCRIPTOR absenteeism IN DARE,HTA 20
6 ((sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*)))) IN DARE, HTA 242
7 #1 OR #2 OR #3 OR #4 OR #5 OR #6 269

8 MeSH DESCRIPTOR Motivational Interviewing IN DARE,HTA 27
9 (motivational interview*) IN DARE, HTA 111
10 (motivational enhancement) IN DARE, HTA 9
11 MeSH DESCRIPTOR Motivation IN DARE,HTA 121
12 #8 OR #9 OR #10 OR #11 210
13 #7 AND #12 1

Database: Epistemonikos
Date: 04.02.2019
Records: 2

(sickleave* OR sicklist* OR "sickness absence" OR "sickness allowance" OR "sickness allowances" OR "sickness benefit" OR "sickness benefits" OR "sickness certification" OR "sickness certifications" OR "sick day" OR "sick days" OR "sickness insurance" OR "sickness insurances" OR "sick leave" OR "sick leaves" OR "sick list" OR "sick lists" OR "sick listed" OR "sick listing" OR "sick listings" OR "medical absence" OR "medical absences" OR "medical leave" OR "medical leaves" OR "certified absence" OR "certified absences" OR "illness day" OR "illness days" OR "illness absence" OR "illness absences" OR "work absence" OR "work absences" OR re-employ* OR reemploy* OR "return to work" OR "return-to-work" OR "returning to work" OR "back to work" OR "back-to-work" OR "vocational rehabilitation" OR "vocational reintegration" OR "vocational re-integration" OR "occupational rehabilitation" OR "occupational re-integration" OR "occupational reintegration" OR "supported employment" OR "disability absence" OR "disability absences" OR "disability allowance" OR "disability allowances" OR "disability benefit" OR "disability benefits" OR "disability insurance" OR "disability insurances" OR "disability leave" OR "disability leaves" OR "disability pension" OR "disability pensions" OR "workers compensation" OR "workers' compensation" OR "work resumption" OR "work resumptions") AND ("motivational interviewing" OR "motivational interview" OR "motivational interviews" OR "motivational enhancement")

UPDATED DATABASE SEARCHES

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to August 13, 2019
Date: 14.08.2019
Records: 568

#	Searches	Results
1	return to work/	2111
2	employment, supported/	1147
3	rehabilitation, vocational/	9319
4	sick leave/	5530
5	absenteeism/	8786
6	(sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-	

	ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*))).ti,ab,kf.	33318
7	or/1-6	48004
8	motivational interview/	1561
9	motivational interview*.ti,ab,kf.	3910
10	motivational enhancement.ti,ab,kf.	505
11	motivation/	63754
12	or/8-1167095	
13	7 and 12	703
14	exp animals/	22518938
15	humans/	17910345
16	14 not (14 and 15)	4608593
17	(news or editorial or comment).pt.	1322044
18	13 not (16 or 17)	695
19	limit 18 to yr="1983-current"	568

Database(s): Embase 1974 to 2019 August 13
Date: 14.08.2019
Records: 57

#	Searches	Results
1	*return to work/	1433
2	*work resumption/	1049
3	*vocational rehabilitation/	4405
4	*medical leave/	1853
5	*absenteeism/	5057
6	(sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*))).ti,ab,kw.	41713
7	or/1-6	47130
8	motivational interviewing/	4357
9	motivational interview*.ti,ab,kw.	5854
10	motivational enhancement.ti,ab,kw.	709
11	*motivation/	25720
12	or/8-1132663	
13	7 and 12	181
14	exp animals/ or exp invertebrate/ or animal experiment/ or animal model/ or animal tissue/ or animal cell/ or nonhuman/	26317806
15	human/ or normal human/ or human cell/	20098939
16	14 not (14 and 15)	6277136
17	(news or editorial or comment).pt.	627658
18	13 not (16 or 17)	181

19	limit 18 to yr="1983-current"	161
20	limit 19 to embase	58
21	remove duplicates from 20	57

Database: PsycINFO 1806 to August Week 1 2019
Date: 14.08.2019
Records: 150

#	Searches	Results
1	reemployment/	1380
2	supported employment/	1333
3	vocational rehabilitation/	5891
4	employee leave benefits/	1039
5	(sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*))).ti,ab,id.	14502
6	or/1-5	17470
7	motivational interviewing/	2294
8	motivational interview*.ti,ab,id.	3551
9	motivational enhancement.ti,ab,id.	658
10	motivation/	50429
11	or/7-1053935	
12	6 and 11	166
13	limit 12 to yr="1983-Current"	150
14	remove duplicates from 13	150

Database: CINAHL (EBSCO)
Date: 14.08.2019
Records: 217

S1	(MH Job Re-Entry)	(5,453)
S2	(MH Rehabilitation, Vocational)	(5,281)
S3	(MH "Employment, Supported")	(949)
S4	(MH "Sick Leave")	(4,249)
S5	(MH "Absenteeism")	(4,013)
S6	TI ((sickleave* or sicklist* or (sick* W0 (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical W0 (absen* or leave*)) or certified W0 absen* or (illness N1 (day* or absen*)) or (work N1 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) N1 (return* or re-ent* or reent*)) or ((vocational or occupational) N0 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability W0 (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* W0	

(compensation* or resumption*)))) OR AB ((sickleave* or sicklist* or (sick* W0 (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical W0 (absen* or leave*)) or certified W0 absen* or (illness N1 (day* or absen*)) or (work N1 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) N1 (return* or re-ent* or reent*)) or ((vocational or occupational) N0 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability W0 (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* W0 (compensation* or resumption*)))) (10,018)

S7 S1 OR S2 OR S3 OR S4 OR S5 OR S6 (22,132)

S8 (MH "Motivational Interviewing") (2,674)

S9 TI (motivational W0 interview* or "motivational enhancement") OR AB (motivational W0 interview* or "motivational enhancement") (2,832)

S10 (MH "Motivation") (31,513)

S11 S8 OR S9 OR S10 (34,865)

S12 S7 AND S11 [Limiters - Exclude MEDLINE records; Published Date: 19830101-20190131] 217

Database: Cochrane Library (CDSR, CENTRAL & Cochrane Protocols)
Date: 14.08.2019
Records: 87

ID Search Hits

#1 [mh ^"return to work"] 202

#2 [mh ^"employment, supported"] 122

#3 [mh ^"rehabilitation, vocational"] 373

#4 [mh ^"sick leave"] 540

#5 [mh ^absenteeism] 477

#6 (sickleave* or sicklist* or (sick* NEXT (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical NEXT (absen* or leave*)) or certified NEXT absen* or (illness NEAR/2 (day* or absen*)) or (work NEAR/2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) NEAR/2 (return* or re-ent* or reent*)) or ((vocational or occupational) NEAR/1 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability NEXT (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* NEXT (compensation* or resumption*))):ti,ab 4859

#7 {or #1-#6} 5387

#8 [mh ^"motivational interview"] 695

#9 (motivational NEXT interview*):ti,ab,kw 3298

#10 "motivational enhancement":ti,ab 446

#11 [mh ^motivation] 4442

#12 (39-#11-#11) 7518

#13 #7 and #12 with Cochrane Library publication date Between Jan 1983 and Feb 2019, in Cochrane Reviews 2

#14 #7 and #12 with Publication Year from 1983 to 2019, in Trials 81

#15 (sickleave* or sicklist* or (sick* NEXT (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical NEXT (absen* or leave*)) or certified NEXT absen* or (illness NEAR/2 (day* or absen*)) or (work NEAR/2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or

employment) NEAR/2 (return* or re-ent* or reent*)) or ((vocational or occupational) NEAR/1 (rehab* or reintegration* or re-integration*)) or "supported employment" or (disability NEXT (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* NEXT (compensation* or resumption*))) 5939

#16 (motivational NEXT interview* or "motivational enhancement") 3853

#17 #15 and #16 in Cochrane Protocols 4

#18 #13 or #14 or #17 87

Database: Web of Science (Clarivate)
Date: 14.08.2019
Records: 23

1 TOPIC: ((sickleave* OR sicklist* OR "sickness ansence" OR "sickness allowance" OR "sickness allowances" OR "sickness benefit" OR "sickness benefits" OR "sickness certification" OR "sickness certifications" OR "sick day" OR "sick days" OR "sickness insurance" OR "sickness insurances" OR "sick leave" OR "sick leaves" OR "sick list" OR "sick lists" OR "sick listed" OR "sick listing" OR "sick listings" OR "medical ansence" OR "medical ansences" OR "medical leave" OR "medical leaves" OR "certified absence" OR "certified ansences" OR "illness day" OR "illness days" OR "illness ansence" OR "illness ansences" OR "work ansence" OR "work ansences" OR re-employ* OR reemploy* OR "return to work" OR "return-to-work" OR "returning to work" OR "back to work" OR "back-to-work" OR "vocational rehabilitation" OR "vocational reintegration" OR "vocational re-integration" OR "occupational rehabilitation" OR "occupational re-integration" OR "occupational reintegration" OR "supported employment" OR "disability ansence" OR "disability ansences" OR "disability allowance" OR "disability allowances" OR "disability benefit" OR "disability benefits" OR "disability insurance" OR "disability insurances" OR "disability leave" OR "disability leaves" OR "disability pension" OR "disability pensions" OR "workers compensation" OR "workers' compensation" OR "work resumption" OR "work resumptions")) 21,798

2 TOPIC: (("motivational interviewing" OR "motivational interview" OR "motivational interviews" OR "motivational enhancement")) 4,354

3 #2 AND #1 [Indexes=SCI-EXPANDED, SSCI Timespan=1987-2019] 23

Database: Sociological Abstracts & Social Services Abstracts
Date: 14.08.2019
Records: 118

(MAINSUBJECT.EXACT("Vocational Rehabilitation") OR (sickleave* OR sicklist* OR (sick* PRE/0 (absen* OR allowance* OR benefit* OR certifi* OR day* OR insurance* OR leave* OR list*)) OR (medical PRE/0 (absen* OR leave*)) OR certified PRE/0 absen* OR (illness NEAR/1 (day* OR absen*)) OR (wORk NEAR/1 absen*) OR re-employ* OR reemploy* OR "back to wORk" OR ((wORk* OR job OR employment) NEAR/1 (return* OR re-ent* OR reent*)) OR ((vocational OR occupational) NEAR/0 (rehab* OR reintegration* OR re-integration*)) OR "suppORted employment" OR (disability PRE/0 (absen* OR allowance* OR benefit* OR insurance* OR leave* OR pension*)) OR (wORk* PRE/0 (compensation* OR resumption*)))) AND (MAINSUBJECT.EXACT("Motivation") OR

Ti,AB,SU(motivational PRE/0 interview* OR "motivational enhancement")) AND pd(19830101-20190814)

Database: SveMed+
Date: 14.08.2019
Records: 44

1 noexp:"Motivational Interviewing" 37
2 ("motivational interviewing" OR "motivational interview" OR "motivational interviews" OR "motivational enhancement") 44
3 #1 OR #2 44

Database: DARE (The Database of Abstracts of Reviews of Effects) & HTA (Health Technology Assessment)
Date: 31.01.2019
Records: 1

1 MeSH DESCRIPTOR return to work IN DARE,HTA 15
2 MeSH DESCRIPTOR employment, supported IN DARE,HTA 8
3 MeSH DESCRIPTOR rehabilitation, vocational IN DARE,HTA 28
4 MeSH DESCRIPTOR sick leave IN DARE,HTA 27
5 MeSH DESCRIPTOR absenteeism IN DARE,HTA 20
6 ((sickleave* or sicklist* or (sick* adj (absen* or allowance* or benefit* or certifi* or day* or insurance* or leave* or list*)) or (medical adj (absen* or leave*)) or certified absen* or (illness adj2 (day* or absen*)) or (work adj2 absen*) or re-employ* or reemploy* or "back to work" or ((work* or job or employment) adj2 (return* or re-ent* or reent*)) or ((vocational or occupational) adj1 (rehab* or reintegration* or re-integration*)) or supported employment or (disability adj (absen* or allowance* or benefit* or insurance* or leave* or pension*)) or (work* adj (compensation* or resumption*)))) IN DARE, HTA 242
7 #1 OR #2 OR #3 OR #4 OR #5 OR #6 269
8 MeSH DESCRIPTOR Motivational Interviewing IN DARE,HTA 27
9 (motivational interview*) IN DARE, HTA 111
10 (motivational enhancement) IN DARE, HTA 9
11 MeSH DESCRIPTOR Motivation IN DARE,HTA 121
12 #8 OR #9 OR #10 OR #11 210
13 #7 AND #12 1

Database: Epistemonikos
Date: 14.08.2019
Records: 1 Systematic Review

(sickleave* OR sicklist* OR "sickness absence" OR "sickness absences" OR "sickness allowance" OR "sickness allowances" OR "sickness benefit" OR "sickness benefits" OR "sickness certification" OR "sickness certifications" OR "sick day" OR "sick days" OR "sickness insurance" OR "sickness insurances" OR "sick leave" OR "sick leaves"

OR "sick list" OR "sick lists" OR "sick listed" OR "sick listing" OR "sick listings" OR "medical absence" OR "medical absences" OR "medical leave" OR "medical leaves" OR "certified absence" OR "certified absences" OR "illness day" OR "illness days" OR "illness absence" OR "illness absences" OR "work absence" OR "work absences" OR re-employ* OR reemploy* OR "return to work" OR "return-to-work" OR "returning to work" OR "back to work" OR "back-to-work" OR "vocational rehabilitation" OR "vocational reintegration" OR "vocational re-integration" OR "occupational rehabilitation" OR "occupational re-integration" OR "occupational reintegration" OR "supported employment" OR "disability absence" OR "disability absences" OR "disability allowance" OR "disability allowances" OR "disability benefit" OR "disability benefits" OR "disability insurance" OR "disability insurances" OR "disability leave" OR "disability leaves" OR "disability pension" OR "disability pensions" OR "workers compensation" OR "workers' compensation" OR "work resumption" OR "work resumptions") AND ("motivational interviewing" OR "motivational interview" OR "motivational interviews" OR "motivational enhancement")

REFERENCE SEARCHES

Date	Article	Search method	Total hits	Studies screened in full text
25.04.19	Magnussen et. al. 2007	Cited reference search, Web of science	18	Britt et. al. 2018. Motivational Interviewing to Promote Employment.
25.04.19	Magnussen et. al. 2007	Screened reference list of article.	34	No additional relevant studies
01.05.19	Park et.al. 2017	Cited reference search, Web of science	5	No additional relevant studies
01.05.19	Park et.al. 2017	Screened reference list of article.	27	No additional relevant studies
01.05.19	Gross et.al. 2017	Cited reference search, Web of science	3	No additional relevant studies
01.05.19	Gross et.al. 2017	Screened reference list of article.	38	No additional relevant studies

OTHER SOURCES

Date	Database/web page/other resource	Description of search method	Studies screened in full text
17.01.19	The Norwegian Labour and Welfare Administration (NAV) webpages https://www.nav.no	Searched all the different areas of the web pages	No relevant studies
01.05.19	https://motivationalinterviewing.org	Searched all the different areas of the web pages. Found a list made by Miller: "Controlled Clinical Trials Involving Motivational Interviewing", went through the list.	No additional relevant studies

20.05.19	Journal: MITRIP, motivational interviewing, training, research, implementation, practice http://www.mitrip.org	Search words: 'return to work', 5 hits 'back to work', 16 hits 'vocational rehabilitation' 0 hits 'sick leave' 1 hit 'sick*', 1 hit 'disability', 0 hits 'musculoskeletal disorder*', 0 hits 'supported employment,' 0 hits	No additional relevant studies
20.05.19	Google news search: https://news.google.com/search?q=%22motivational+interviewing%22&hl=en-US&gl=US&ceid=US:en	"motivational interviewing", 100 hits "motivational interview", 71 hits	No additional relevant studies
20.05.19	Google search	"Motivational interviewing and return to work", looked at page 1-5 from the search (50 first hilts). One relevant book chapter by Mark P. Jensen: 'Motivational Interviewing to Enhancing Return to Work' from 'Handbook of Return to Work' (2016) Looked thorough reference list, no relevant studies found.	No additional relevant studies
24.05.19	Search of newsletter for MINT trainers: MINT Bulletin/ Motivational Interviewing Newsletter: Updates, Education and Training (MINUET) *https://motivationalinterviewing.org/bulletin*	Hand searches of all the newsletters that have been published (1994-2009).	Manthey, T. 2009.Training MI in a Vocational Rehabilitation Context. *MINT Bulletin. 2009;15 (1)*
March-august 2019	Researchers in the field of MI.	Sent e-mails to the following researchers asking if they knew of relevant ongoing studies, or unpublished studies: Wiiliam R. Miller, Roger Hagen, Gunnhild Bagøyen, Anne Høiby, Lise Cecilie Kleppe, Blanka Støren-Vazcy, Martin Inge Standal, Vegard Stolsmo Foldal, Douglas P. Gross, Liv Magnussen, Liv Strand, Jan Skouen, Hege Eriksen, Nicolette Sheridan.	No additional relevant studies

Appendix II, Action sheet for the SVAI physiotherapists

OBSTACLES AND ACTIONS **Identify potential obstacles and actions during phone call and write them down in the action plan.** **ASK FOR CONSENT BEFORE CONTACTING OTHER STAKEHOLDERS (HEALTHCARE PROFESSIONALS, EMPLOYERS OR NAV CASEWORKER)**	
POTENTIAL OBSTACLES	**SUGGESTED ACTIONS FROM SVAI PHYSIOTHERAPIST**
High severity of symptoms/health condition. Comorbid health is a potential obstacle to RTW. Delays in health care. Lack of work focus to health care.	- Ask if participant is taking his/her medication as prescribed by their GP. - Suggest that worker makes appointment to see GP. - Contact health care providers in order to: a) suggest an appointment/investigation b) expedite an appointment c) ensure the HCP facilitates RTW d) post evidence based information to the health care provider
Current physical functioning not compatible with RTW.	- Suggest that participant sees a physiotherapist, if necessary help to set up appointment. - Do values based goal setting.
Avoiding activities. Unhelpful beliefs about health and work.	- Provide reassurance to participant regarding hurt and harm. - Advises the participant about how to gradually increase activity and exercise and return to avoided activities. - Send leaflet with evidence based information to participant. - Provide evidence based information, advice and reassurance to address knowledge gaps, misconceptions or unhelpful beliefs verbally.
Current day/night rest and sleep pattern not compatible with working.	- Provide verbal information about sleep. - Inform participant about online resource to deal with sleep disturbance: https://helsenorge.no/sykdom/sovnproblemer/gode-rad-for-bedre-sovn https://psykologiskveiledning.com/
Doesn't value work sufficiently to RTW.	- Use motivational interviewing to help the participant decide whether to RTW or not. - Explore and built the value of work. - Convey positive but realistic messages about their ability to work now or in the future. - Encouraged participant to be pro-active in taking steps to resolve the situation.

Lack of or unsupportive contact with the workplace. Other workplace issues.	- Suggest that participant makes contact with employer. - Take direct contact with employers if participant needs help with this. - Arrange and attend meeting between SVAI physiotherapist, worker and employers. - Inform the NAV caseworker about the worksite meeting/visit if NAV caseworker is involved in the case.
Lack of a RTW plan.	- Support participant to develop RTW plan with employers. - Build participant self-efficacy to collaborate with employer to make RTW plan, e.g. help make a list of what they want to discuss with employer, roleplay meeting etc - Liaise with participant and employer in developing RTW plan.
Poor implementation of RTW plan.	- Review RTW plan with participant. - Ask participant to liaise with employers to commence already agreed RTW plan. - Discuss with participant how they will work with employers to stick to plan, review plan, modify plan and seek help early, if needed. - Liaise with participant and employer to implement existing plan.

CONSORT 2010 checklist of information to include when reporting a randomised trial*

Section/Topic	Item No	Checklist item	Reported on page No
Title and abstract			
	1a	Identification as a randomised trial in the title	p. 1
	1b	Structured summary of trial design, methods, results, and conclusions (for specific guidance see CONSORT for abstracts)	p. 5-6
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale	p. 7-8
	2b	Specific objectives or hypotheses	p. 8
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio	p. 8
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons	Appendix III
Participants	4a	Eligibility criteria for participants	p. 9
	4b	Settings and locations where the data were collected	p. 9
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered	p. 10-12 Table 1
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed	p. 13-14
	6b	Any changes to trial outcomes after the trial commenced, with reasons	No changes
Sample size	7a	How sample size was determined	p. 14-15
	7b	When applicable, explanation of any interim analyses and stopping guidelines	n.a.
Randomisation:			
Sequence generation	8a	Method used to generate the random allocation sequence	p. 10
	8b	Type of randomisation; details of any restriction (such as blocking and block size)	p. 10
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned	p. 10

Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions	p. 9-10
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how	p. 15
	11b	If relevant, description of the similarity of interventions	
Statistical methods	12a	Statistical methods used to compare groups for primary and secondary outcomes	p. 15-16
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses	p. 16
Results			
Participant flow (a diagram is strongly recommended)	13a	For each group, the numbers of participants who were randomly assigned, received intended treatment, and were analysed for the primary outcome	p. 17 Figure 1
	13b	For each group, losses and exclusions after randomisation, together with reasons	p. 17 Figure 1
Recruitment	14a	Dates defining the periods of recruitment and follow-up	p.9 Appendix II
	14b	Why the trial ended or was stopped	
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group	Table 1
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups	Table 1-4
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval)	Table 4
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended	
Ancillary analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory	Table 3
Harms	19	All important harms or unintended effects in each group (for specific guidance see CONSORT for harms)	p.17
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses	p.28-29
Generalisability	21	Generalisability (external validity, applicability) of the trial findings	p.28
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence	p.25-29
Other information			
Registration	23	Registration number and name of trial registry	p.6
Protocol	24	Where the full trial protocol can be accessed, if available	p.9
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders	p. 3

CONSERVE Checklists

CONSERVE-CONSORT Extension: [25.03.2022]					
Item	**Item Title**	**Description**			**Page No.**
I.	Extenuating Circumstances	Describe the circumstances and how they constitute extenuating circumstances.			17
II.	Important Modifications	a. Describe how the modifications are important modifications.			Appendix III
		b. Describe the impacts and mitigating strategies, including their rationale and implications for the trial.			Appendix III
		c. Provide a modification timeline.			17
III.	Responsible Parties	State who planned, reviewed and approved the modifications.			17
IV.	Interim data	If modifications were informed by trial data, describe how the interim data were used, including whether they were examined by study group, and whether the individuals reviewing the data were blinded to the treatment allocation.			
CONSORT Number and Item		For each row, if important modifications occurred check "direct impact" and/or "mitigating strategy" and describe the changes in the trial manuscript or supplement. Check "no change" for items that are unaffected in the extenuating circumstance.			**Page No.**
		No Change	**Impact***	**Mitigating Strategy****	
1	Title and abstract	x			
2	Introduction	x			
3	Methods: Trial Design	x			
4	Methods: Participants	x			
5	Methods: Interventions		x	x	p.20 Appendix III
6	Methods: Outcomes	x			
7	Methods: Sample Size		x	x	Appendix III
8-10	Methods: Randomisation	x			
11	Methods: Blinding	x			
12	Methods: Statistical methods	x			
13	Results: Participant flow	x			
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15	Results: Baseline data	x			
16	Results: Numbers analysed	x			
	Results: Outcomes and estimation	x			

18	Results: Ancillary analyses		x	x	Appendix III Table 3 p.23-24
19	Results: Harms	x			
20	Discussion: Limitations		x	x	p.29
21	Discussion: Generalisability	x			
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24	Other information: Protocol	x			
25	Other information: Funding	x			

*Aspects of the trial that are directly affected or changed by the extenuating circumstance and are not under the control of investigators, sponsor or funder.
**Aspects of the trial that are modified by the study investigators, sponsor or funder to respond to the extenuating circumstance or manage the direct impacts on the trial.

Paper I

Aanesen F, Berg R, Løchting I, Tingulstad A, Eik H, Storheim K, Grotle M, Øiestad BE. (2021). Motivational Interviewing and Return to Work for People with Musculoskeletal Disorders: A Systematic Mapping Review. *J Occup Rehabil*, 31(1): 63-71. DOI: https://doi.org/10.1007/s10926-020-09892-0.

Journal of Occupational Rehabilitation (2021) 31:63–71
https://doi.org/10.1007/s10926-020-09892-0

REVIEW

Motivational Interviewing and Return to Work for People with Musculoskeletal Disorders: A Systematic Mapping Review

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Published online: 30 April 2020

Abstract

Purpose There is limited knowledge about motivational interviewing (MI) for people on sick leave with musculoskeletal disorders. Hence, our objective was to investigate *what research on MI as a method to facilitate return to work for individuals who are on sick leave due to musculoskeletal disorders exists, and what are the results of the research? Methods* We systematically searched MEDLINE, PsycINFO, EMBASE, Cochrane Library, CINAHL, Web of Science, Sociological Abstracts, Epistemonikos, SveMed + and DARE & HTA (covering 1983 to August 2019). We also searched the MINT bulletin and relevant web pages. Eligibility criteria: empirical studies investigating MI and return to work for people with musculoskeletal disorders. Two authors independently screened the records, critically appraised the studies and charted the data using a data extraction form. *Results* The searches identified 1264 records of which two studies were included. One randomized controlled trial (RCT) found no effect of MI on return to work for disability pensioner with back pain (n = 89, high risk of bias), while a cluster RCT found that MI increased return to work for claimants with chronic musculoskeletal disorders (n = 728, low risk of bias). *Conclusions* This mapping review identified a huge gap in research on MI to increase return to work for individuals with musculoskeletal disorders. *Registration* Current Research Information System in Norway, project id: 635823 (https://app.cristin.no/projects/show.jsf?id=635823).

Keywords Motivational interviewing · Return to work · Musculoskeletal diseases · Sick leave · Systematic review

Introduction

Musculoskeletal disorders affecting joints, bone and soft tissues are the leading cause of disability worldwide [1]. Neck and back pain, osteoarthritis and inflammatory diseases, osteoporosis, bursitis, tendonitis and fibromyalgia are most common [2]. The disorders often have fluctuating symptoms which can reduce work ability [3]. For people living with musculoskeletal disorders long periods of sickness absence can be detrimental for wellbeing and hinder return to work, while work and activity can aid recovery [4].

Work participation is dependent upon several social, workplace-related and individual factors [5, 6]. Many different coordinated return to work programmes have been developed to address these factors such as tailored work rehabilitation, case management and collaborative care. These programmes include an assessment of the workers' needs in order to make a return to work plan. The worker can receive a variety of tailored interventions such as medical interventions, education, workplace ergonomics and case management to assist in their return to work. The interventions are usually coordinated and provided by different professions such as physiotherapists, occupational therapists, social workers, psychologists and physicians. Some of the interventions also involve the employer [7]. A Cochrane review from 2017 investigating the effects of return to work coordination programmes versus usual practice on return to work outcomes, including 14 RCTs, showed small to no benefits of such programmes. The evidence from the

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s10926-020-09892-0) contains supplementary material, which is available to authorized users.

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review was low to moderate due to imprecision and substantial heterogeneity between the studies [7].

Motivational interviewing (MI) has been suggested as a suitable method in vocational rehabilitation [8–10]. MI is a person-centred counselling style for addressing ambivalence and strengthen motivation, by exploring the person's own reasons for change [11]. Miller and Rollnick developed MI for the treatment of addictions and define it as 'a collaborative, goal-oriented style of communication with particular attention to the language of change' [11] (p. 29). MI is associated with small to medium effect sizes across a variety of behaviour outcomes [11]. The method has been used to support behavioural change for people with different conditions, including musculoskeletal disorders [12] and chronic pain [13]. MI could be a suitable tool to improve working alliance between caseworkers and people on sick leave [14]. This might be especially important for people suffering from unspecific musculoskeletal disorders who often face mistrust and scepticism related to their health problems [3, 15, 16]. The results from a systematic review from 2017 investigating the effectiveness of MI to facilitate return to work suggested that MI may be an effective intervention, although the authors could not draw any conclusions due to few studies and low quality of the evidence [17]. Five studies were identified in the review, including persons with psychiatric conditions, HIV-positive, drug-involved offenders and people with low back pain. The review included controlled studies and interrupted time series studies.

Several recent publications show that there is a growing interest in MI in vocational rehabilitation [10, 18]. However, it is unclear what evidence exists related to the use of MI to help people with musculoskeletal disorders return to work. We need an updated review of the study field in order to define future research priorities. The review should include both quantitative and qualitative research, as qualitative research can give information about barriers and facilitators to implementing MI for people with musculoskeletal disorders. Thus, the objective of this review was to map all types of empirical research on MI as a method to help people with musculoskeletal disorders return to work. Our research question was: *What research on MI as a method to facilitate return to work for individuals who are on sick leave due to musculoskeletal disorders exists, and what are the results of the research?*

Method

Design

We followed the guidelines in the Cochrane Handbook for Systematic Reviews of Interventions [19] and the methodological steps for mapping reviews proposed by Arksey and O'Malley [20] and Levac et al. [21]. The systematic mapping review is reported in accordance with the preferred reporting items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR) [22].

Eligibility Criteria

Included studies had to address MI as a method to facilitate return to work for individuals on sick leave or disability pension due to a musculoskeletal disorder. All types of empirical studies were included if they were published after 1983 (the year Miller first described the MI method). Studies were included if at least 50% of the study sample had musculoskeletal disorders, or if results were presented separately for people with these diagnoses. We also wanted to include studies on those giving MI to facilitate return to work for individuals on sick leave with musculoskeletal disorders. Detailed inclusion and exclusion criteria are described in Table 1.

Searches

An information search specialist developed and performed the searches in collaboration with two of the review authors (RB and FA). The search was from 1983 to February 2019, and updated in August 2019. We searched the following electronic databases: MEDLINE (OVID), PsycINFO (OVID), EMBASE (OVID), Cochrane Library (CDSR, CENTRAL) (Wiley), CINAHL (EBSCO), Web of Science Core Collection (SCI-EXPANDED & SSCI) (Clarivate), Sociological Abstracts (ProQuest), Epistemonikos, SveMed+, DARE & HTA (Centre for Reviews and Dissemination). We used different search terms and synonyms for 'motivational interviewing', 'return to work' and 'sick leave'. To identify all eligible studies (including studies with mixed populations), we avoided search terms related to musculoskeletal disorders. We did not apply any methodology search filters or language restrictions in the searches. The first author hand searched all issues of the MINT bulletin (the newsletter for MI trainers), searched the journal: motivational interviewing, training, research, implementation, practice (MITRIP) https://www.mitrip.org, the MINT webpage: https://motivationalinterviewing.org and The Norwegian Labour and Welfare Administration (NAV) webpage: https://www.nav.no. We also contacted William Miller and other researchers in the field of MI, to identify ongoing studies or unpublished work. Cited reference searches were performed in Web of science and reference lists of the included papers were hand searched for relevant cited literature by the first author. A detailed description of the search strategy in the databases and other sources is presented in Supplementary material: Appendix I.

Table 1 Eligibility criteria

Participants[a]	*Receivers of MI interventions:* Musculoskeletal disorders main reason for work absence On sick leave (part or full time), receiving work assessment allowance or disability pensions Age group: 18–67 years *Performers of MI interventions*: Person with MI-training using MI to facilitate return to work for participants described above
Concept	MI given as a solo intervention, or in combination with other interventions MI could be given in group sessions, individual meetings or by phone
Context	Any context where MI was being delivered
Study design	All types of empirical studies
Language	English, French, German, Norwegian, Swedish, Danish

MI motivational interviewing

[a]Studies were included if 50% of the study population met the inclusion criteria, or if results were reported separately for participants that met the inclusion criteria

Study Selection

The information search specialist imported all the search results from the different databases into the citation management software EndNote (Clarivate Analytics, PA, USA) and removed duplicates. All unique records were imported into the screening tool Rayyan QCRI. Two authors (AT and FA) independently screened abstracts and titles for eligibility, using a pre-designed screening form. Selected studies were screened in full text by two authors separately (IL and FA). At both screening levels, disagreements were resolved by discussion and re-examination of the papers. Figure 1 shows the flow diagram of the study selection process.

Data Charting and Critical Appraisal

Two authors (MG and FA) independently charted the data from the studies using a predesigned data extraction form. We tested the form and revised it to include more information about study design, participation rate and dropout. The following data were charted from each study: name of first author, year of publication, country, study design, context, study sample/population, participation rate, dropout rate,

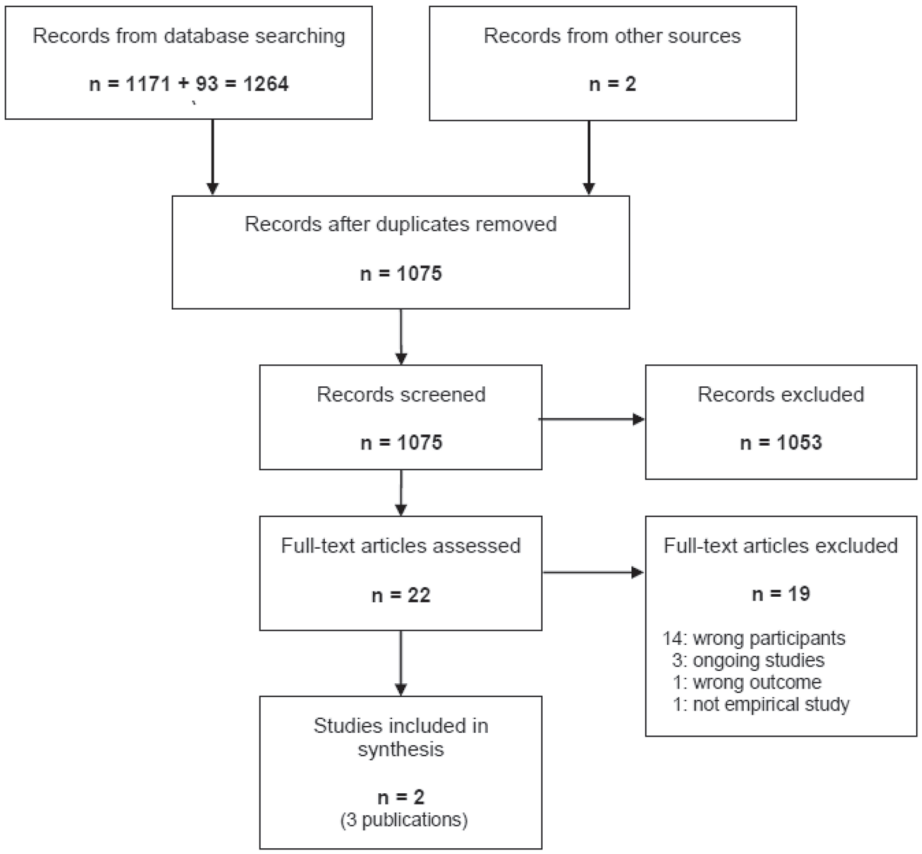

Fig. 1 Flow diagram of screening process

follow-up period, description of interventions, MI adherence and fidelity, primary and secondary outcomes and results. When data were missing, we contacted study authors to retrieve data.

The included studies were critically appraised by two authors (BEØ and FA) independently, using study specific appraisal checklists [23]. As the only studies meeting the inclusion criteria were RCTs, we used the Cochrane Risk of Bias tool [24]. The judgements of 'low risk', 'high risk' or 'unclear risk' were made for the domains: selection bias, performance bias, detection bias, attrition bias, reporting bias and other bias. We also made a total summary assessment for each study. Papers using data from the same study were appraised as one. Differences in opinion were solved through discussion and re-examination of the studies.

We synthesized the data from the included studies and presented the results narratively and in tables.

Results

Search Results

The searches identified 1264 records, of which 1262 were identified through the database searches, one through cited reference searches in Web of science and one through hand searches of the MINT bulletin (Supplementary material: Appendix I). After duplicates were removed, 1075 records remained, and 1053 of these were excluded after screening of titles and abstracts (Fig. 1). Of the 22 publications examined in full-text, 14 were excluded either because less than 50% of the study population had musculoskeletal disorders, or because the proportion of people with these types of disorders in the study sample was not described. Three ongoing studies were excluded due to no published results; one was excluded because it did not have return to work as an aim for the MI intervention, and one because it lacked empirical data (Supplementary material: Appendix II). Three papers from two studies met the inclusion criteria.

Characteristics of Included Studies

Two of the papers described a Canadian cluster RCT by Gross et al. [25], and Park et al. [26], including 728 claimants, injured at work, with chronic musculoskeletal conditions in different parts of the body. The third paper described a Norwegian RCT by Magnussen et al. including 89 disability pensioners with back pain [27] (Table 2). The two studies included 817 participants, with an average age between 45 and 49 years of whom 60% were male.

Both studies investigated the effect of MI on return to work, in combination with other interventions. In the Norwegian study, MI was provided as part of a brief group intervention and compared to usual follow-up from the social insurance and work office. The MI was aimed at helping the participants focus on their strength and capacities, identify barriers for returning to work, and search for ways to succeed in returning to work. In the Canadian study, the comparison group received usual follow-up, consisting of an individually tailored restoration program at a workers' compensation rehabilitation facility. The experimental group received individual MI conversations in addition to usual follow-up. The clinicians providing the MI were trained to listen for signs of ambivalence and to offer MI to those who were ambivalent about behaviour change. The clinicians decided the number and duration of the MI sessions (Table 2).

In the Norwegian study, a psychologist gave MI during a three-hour group session (information obtained from study author). There was no fidelity or adherence measurements related to the delivery of MI in this study nor any description of the psychologists MI competence. The clinicians giving the intervention in the Canadian study were occupational therapists and exercise therapist who had received 3 days of MI training by qualified MI instructors. They were given monthly coaching sessions during the intervention period. The clinicians completed an MI adherence checklist for each claimant. The checklist included registration of the fundamental processes used in MI and identification of a target behaviour for the MI session. Totally, MI was given to 26% of the claimants in the experimental group (Table 2).

Critical Appraisal

We rated the Norwegian study as having high risk of bias mainly due to lack of blinding of participants and intervention providers, small sample size and high drop out in the intervention group. The Canadian study was rated as having low risk of bias (Table 3).

Main Findings from the Studies

The results from the Norwegian study showed no effect on work related outcomes at 1-year follow-up [27]. Only one person in the MI group and two in the comparison group had returned to work at one-year follow-up. There was no statistically significant difference in being in a return to work process between the MI group and the control group (Table 4).

Results from the Canadian study showed that 12.1% more of the claimants, who were unemployed at baseline, had returned to work at discharge in the MI group compared to those receiving usual care only ($p = 0.03$). There were no statistically significant difference in return to work between the MI group and the comparison group among those employed at baseline. At one-year follow-up,

Table 2 Study characteristics

Author (year) Context	Sample size Population	Design Participation Drop-out	Interventions	MI training and fidelity
Magnussen (2007)	N = 89	RCT	*Experimental:*	Not described
No description of setting Norway	Disability pensioners with back pain Disability pension > 1 year, mean 8 years 65% women Mean age 49 (SD 5.4) years Range 36–56 years	Random assignment of participants *Experimental:* 45 participants *Comparison:* 44 participants Participation: 21% Dropout: *Experimental:* n = 4 *Comparison:* n = 0 16 did not complete the intervention but were included in the analyses	Brief vocational intervention programme: 2 × 3 h. group sessions (5–11 in group) 2 h. information about spinal problems + pain mechanisms 1 h. information from social insurance and work office 3 h. MI Medical examination and assessment of work ability by physician and nurse Follow-up from work office for those motivated to RTW *Comparison:* Usual follow-up from social insurance and work office	
Park et al. (2018) Gross et al. (2017) Workers' compensation rehabilitation facility Canada	N = 728 Claimants with chronic musculoskeletal conditions Mean duration: 234 days 63% men Mean age 45 (SD 12.2) years 73% employed Moderate pain levels Moderate disability	Cluster RCT Random assignment of 12 clinicians: *Experimental:* (367 participants) 4 occupational therapists, 2 exercise therapists *Comparison:* (361 participants) 2 occupational therapists, 4 exercise therapists Participation: 802 claimants assessed, 74 excluded: co-morbid conditions (n = 12) noncompliance/ non compensable medical reasons (n = 32) attended program < 5 days (n = 30) No dropout of included clinicians or participants	*Experimental:* Usual care at rehab centre + individual MI sessions number of sessions decided by clinicians (not reported) duration of MI session from 10–50 min *Comparison:* Usual care at rehab centre: Interdisciplinary rehabilitation to improve work abilities (4–6 weeks) Individually tailored functional restoration program including: exercise, graded activity, RTW planning, educational workshops and individual counselling (3–5 days per week, up to 4 h per day)	MI training: 3 full-day sessions + monthly coaching MI fidelity: Completion of MI adherence checklist: MI given to 96 of 367 claimants (26%) range: 4–56%

RTW return to work, *MI* motivaiontal interviewing

claimants in the MI group who were unemployed at baseline received 8 days more of partial temporary disability benefits than the comparison group (p = 0.02), indicating that more claimants in the MI group had returned to modified work duties. The claimants in the MI group, who were employed at baseline, had 4.6% less recurrence of any type of benefits than the comparison group (p = 0.04) [25]. The effects in the Canadian study were significantly higher among the claimants of the MI adherent clinicians compared to the non-adherent clinicians. All the workers who were employed at baseline and treated by the MI adherent clinicians had returned to work at discharge. Among the claimants who were unemployed at baseline, three times as many of the clients who were treated by the MI adherent clinicians returned to work, compared to those receiving usual follow-up (Table 4).

Discussion

This is the first systematic mapping review of the evidence of MI to facilitate return to work for people with musculoskeletal disorders. We identified only three published papers from two RCTs. The RCTs had inconsistent results regarding the effect of MI on return to work for people with chronic musculoskeletal disorder. This is in line with previous systematic reviews which have shown that there are few studies on MI for people with chronic pain [13] and musculoskeletal disorders [12]. A meta-review from 2018 found moderate quality of evidence of the effectiveness of MI in promoting physical activity for people with chronic health conditions [28], while a systematic review from 2016 found small to moderate short-time effects of MI on treatment adherence and pain reduction for people with chronic

Table 3 Risk of bias

Bias	Judgement	Support for judgement
Magnussen et al. [27], *randomized controlled trial*		
Random sequence generation (selection bias)	Low	Computer-generated random list
Allocation concealment (selection bias)	Low	Concealed random allocation
Blinding of participants and personnel (performance bias)	High	Not possible to blind participants and personnel
Blinding of outcome assessment (detection bias)	Low	Primary outcome 1: reduced disability pensions from register data from National Insurance office
	Unclear	Primary outcome 2: being in a return to work process Self-reported outcome on posted questionnaire, no information about blinding of assessment
Incomplete outcome data (attrition bias)	Unclear	Unclear if data were collected for dropouts
Selective reporting (reporting bias)	Low	No published protocol, report results for all given outcomes
Other bias	High	Only 29/45 completed the intervention Small sample size No description of MI training or fidelity measurement
Summary assessment	High	Plausible bias that seriously weakens confidence in the results because of lack of blinding of participants and personnel, small sample size, low compliance to intervention and unsure fidelity to MI intervention
Gross et al. [25] *and Park et al.* [26], *cluster randomized control trial*		
Random sequence generation (selection bias)	Low	Clinicians were randomly allocated to intervention group or control group using a computerized random number generator
Allocation concealment (selection bias)	Unclear	No information given regarding allocation concealment
Blinding of participants and personnel (performance bias)	High	Not possible to blind participants and personnel Participants were unaware of the study and group membership
Blinding of outcome assessment (detection bias)	Low	Data were collected from Workers' Compensation Board Alberta claims database by blinded outcome assessors
Incomplete outcome data (attrition bias)	Low	Available outcome measures for 100% of sample at time of discharge and during 1-year follow-up
Selective reporting (reporting bias)	Unclear	All primary outcomes reported, no report of secondary outcomes described in protocol Protocol registered retrospectively
Other bias	Low	No other bias identified
Summary assessment	Low	Plausible bias is unlikely to alter the results Not possible to blind participants and personnel, but the main outcome is not likely to be influenced by lack of blinding

pain [13]. Currently, there is limited evidence for the use of MI for people with musculoskeletal disorders due to the small amount and varying quality of studies [12].

There were several methodological differences across the two RCTs included in this mapping review. The Norwegian study included disability pensioners who had been away from work for an average of 8 years. In order to return to work after several years of absence, the disability pensioners might have to retrain and spend time searching for jobs [29]. At the one-year follow-up, twice as many in the experimental group reported being in a return to work process [27]. Some of these participants may have returned to work if the study follow-up period was longer. In addition, the study had a small sample size and only 64% in the intervention group completed the intervention. The study also lacked a description of the MI competence of the psychologist providing the intervention. For MI to be effective, the clinician should build a good working alliance [11] and elicit and amplify the persons change talk [30]. This may be challenging to accomplish during a single group session of MI even for a trained psychologist. Finally, MI was only one of several components of the brief group intervention, making it impossible to separate the effects of MI from the rest of the intervention.

In the Canadian study 73% of the study population were still employed at baseline and the mean time away from work for all the participants was less than one year. Among the claimants who were employed at baseline, there was a very high return to work rate both in the MI group and in the comparison group. This could have resulted in a ceiling

Table 4 Main findings

Paper	Results from primary outcomes
Magnussen et al. (2007)	**Reductions in disability pensions**[r] (range in reductions: 4–42%)
	Experimental group: n = 1 (2%), comparison group: n = 2 (4.5%), non-attendees: n = 4 (1%), *ns*
	In RTW process at one year follow up[s]
	Experimental group: n = 10 (22%), comparison group: n = 5 (11%) RR 1.96 (95% CI 0.73–5.26)
	Power calculations: power of difference: 19%. Absolute risk reduction: 11. Number needed to treat: 9.2 (95% CI 3.4, Inf)
Park et al. (2018)	**RTW at discharge**[r]
	Claimants unemployed at baseline:
	Experimental group: 21.6% RTW, comparison group: 9.5% RTW (p = 0.03)
	MI adherent clinicians[a]: 33.3% RTW, non-adherent clinicians: 18.0% RTW, comparison group: 9.5% RTW (p < 0.01)
	Multivariable analysis adjusting for: age, sex, annual salary, marital status, pain intensity, disability and therapist cluster: OR for RTW in experimental group compared to comparison group: 2.64 (95% CI 0.69–10.14)
	Claimants employed at baseline:
	Experimental group: 97.1% RTW, comparison group: 94.1% RTW, *ns*
	MI adherent clinicians[a]: 100% RTW, non-adherent clinicians: 96.3% RTW, comparison group: 94.1% RTW (p = 0.03)
	Multivariable analysis adjusting for: age, sex, annual salary, marital status, pain intensity, disability and therapist cluster: OR for RTW in experimental group compared to comparison group: 2.50 (95% CI 0.68–9.14)
Gross et al. (2017)	**Number of days receiving wage replacement benefits in the follow-up year**[r]
	Claimants unemployed at baseline:
	Partial temporary disability benefits: experimental group: 8.2 days (SD 28.1), comparison group: 0.2 days (SD 1.5) (p < 0.001)
	Multivariable analysis adjusted for age, sex, previous claims, preinjury annual salary, self-rated disability and pain intensity: B 0.15 (95% CI 0.01–0.30)
	Percent of clients receiving partial temporary disability benefits: MI adherent clinicians[a]: 18.7%, non-adherent clinicians: 5.2%, comparison: 0.2% (p = 0.001)
	Claimants employed at baseline:
	Job search allowance: experimental group 3.1 days (SD 13.6), comparison group: 1 day (SD 7.9) (p = 0.01)
	Recurrence of wage replacement benefits in the follow up year[r]
	Claimants employed at baseline:
	Recurrence of any type of wage replacement benefits: experimental group: 4.5% recurrence, comparison group: 9.1% recurrence (p = 0.04)
	Multivariate analysis adjusted for age, sex, previous claims, preinjury annual salary, self-rated disability and pain intensity: OR for recurrence of wage replacement benefits in comparison group compared to experimental group: 2.01 (95% CI 0.96–4.21)
	MI adherent clinicians[a]: 2.9% recurrence, non-adherent clinicians: 5.2% recurrence, comparison group: 9.1% recurrence (p = 0.02)
	Recurrence of partial temporary disability benefits: experimental group 2.9% recurrence, comparison group: 7.7% recurrence (p = 0.02)
	Multivariable analysis adjusted for age, sex, previous claims, preinjury annual salary, self-rated disability and pain intensity: OR for recurrence of partial temporary disability benefits in comparison group compared to experimental group 2.69 (95% CI 1.12–6.46)
	MI adherent clinicians[a] 0% recurrence, non-adherent clinicians: 4.0% recurrence, comparison group: 7.7% recurrence (p = 0.002)

[r] = registry data, [s] = self-report, *RTW* return to work, *ns* not statistically significant difference, *RR* relative risk

[a]Clinicians documented MI use on adherence checklists

effect, making it hard to detect any benefit of the MI intervention. In addition, only one fourth of the claimants in the experimental group received MI, which could have reduced the effectiveness of the intervention. Subgroup analyses showed that the effects on return to work in the MI group were highest among the claimants of the most MI adherent clinicians. This was the case both at discharge and at one-year follow-up among all the workers [25, 26]. The results suggest that the MI intervention might have been more effective if adherence had been higher among the clinicians. In the Canadian study the experimental group received MI in addition to usual follow-up, while the comparison group received usual follow-up only. We can

therefore assume that MI contributed to the larger effect in the intervention group.

Surprisingly, the searches did not identify qualitative studies investigating how people with musculoskeletal disorders experience receiving MI to help them return to work, or how people who deliverer MI to people with musculoskeletal disorders experience the intervention. There are, however, several qualitative studies from the Swedish Dirigo project. In this project insurance officials were trained in MI to facilitate return to work for people on sick leave. Although these studies included people with all types of diagnoses, the results may be relevant for people with musculoskeletal disorders. Andersen and colleagues interviewed fourteen people on long term sick leave (mainly with mental disorders) about their experiences from the Dirigo project. The informants had positive experiences of MI because they felt the method helped them get to know themselves better, and become aware of opportunities for work and studies. They also felt that the insurance officials were making an effort to get to know them and their situation [31]. Two studies by Stahl and colleagues, from the same project, interviewed insurance officials in charge of following up people on sick leave [32, 33] and a study by Secker and Margrove investigated employment support workers experiences of MI [34]. These studies showed that the professionals were positive to MI and found it helpful in their work. However, they emphasized the need for support and ongoing assessment of MI skills in order to become confident in practicing MI and able to use the method in their work with clients. Lack of training, confidence and support in performing MI are common challenges reported by practitioners [33, 35].

Despite comprehensive literature searches by an experienced search specialist, one limitation of this review is that we might have missed grey literature. A strength of this review is its focus on musculoskeletal disorder as they are the main cause of disability. Another strength is the broad search strategy and inclusion criteria making it possible to include all relevant studies in the mapping review.

The current review has shown that there is a lack of research on MI for people with musculoskeletal disorders. In order to assess the effectiveness of MI on return to work for people with musculoskeletal disorders, we need more high-quality intervention studies. The studies should include adequate MI training for the persons delivering the intervention and assessment of their MI skills [13]. There appears to be increasing research interest in the use of MI in vocational rehabilitation. This review identified three ongoing trials including both qualitative and quantitative studies, and 14 publications on the use of MI in vocational rehabilitation for mixed populations of people with different conditions.

Although MI has been recommended as a method in vocational rehabilitation [10], the recommendations seem to be based primarily on theoretical papers describing the compatibility between MI, and aims and values in vocational rehabilitation [9, 18, 35, 36]. The current review has revealed a huge research gap on the use of MI to facilitate return to work for people with musculoskeletal disorders. Only two efficacy studies of variable methodological quality, with conflicting results were available. Hence, more studies should be conducted before MI is implemented as a method to increase return to work for patients on sick leave with musculoskeletal disorders.

Acknowledgements Open Access funding provided by OsloMet - Oslo Metropolitan University. Information search specialist Lien Nguyen helped develop and performed all the searches in the electronic databases.

Author Contributions Margreth Grotle and Rigmor Berg had the idea for this article. Lien Nguyen and Fiona Aanesen performed the literature searches. Alexander Tingulstad, Ida Løchting and Fiona Aanesen screened the articles. Britt Elin Øiestad and Fiona Aanesen critically assessed the included articles. Margreth Grotle and Fiona Aanesen extracted data from the included studies. Fiona Aanesen drafted the paper and all authors critically revised the paper before approving publication.

Funding The Research Council of Norway, Project ID number: 280431.

Compliance with Ethical Standards

Conflict of interest Fiona Aanesen, Rigmor Berg, Ida Løchting, Alexander Tingulstad, Hedda Eik, Kjersti Storheim, Margreth Grotle and Britt Elin Øiestad declare that they have no conflict of interest.

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Paper II

Aanesen F, Øiestad BE, Grotle M, Løchting I, Solli R, Sowden G, Wynne-Jones G, Storheim K, Eik H. (2022). Implementing a Stratified Vocational Advice Intervention for People on Sick Leave with Musculoskeletal Disorders: A Multimethod Process Evaluation. *J Occup Rehabil*, 32(2), 306–318. DOI: https://doi.org/10.1007/s10926-021-10007-6.

Journal of Occupational Rehabilitation (2022) 32:306–318
https://doi.org/10.1007/s10926-021-10007-6

Implementing a Stratified Vocational Advice Intervention for People on Sick Leave with Musculoskeletal Disorders: A Multimethod Process Evaluation

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Accepted: 23 September 2021 / Published online: 4 October 2021

Abstract

Purpose To perform a process evaluation of a stratified vocational advice intervention (SVAI), delivered by physiotherapists in primary care, for people on sick leave with musculoskeletal disorders participating in a randomised controlled trial. The research questions concerned how the SVAI was delivered, the content of the SVAI and the physiotherapists' experiences from delivering the SVAI. *Methods* We used qualitative and quantitative data from 148 intervention logs documenting the follow-up provided to each participant, recordings of 18 intervention sessions and minutes from 20 meetings with the physiotherapists. The log data were analysed with descriptive statistics. A qualitative content analysis was performed of the recordings, and we identified facilitators and barriers for implementation from the minutes. *Results* Of 170 participants randomised to the SVAI 152 (89%) received the intervention and 148 logs were completed. According to the logs, 131 participants received the correct number of sessions (all by telephone) and 146 action plans were developed. The physiotherapists did not attend any workplace meetings but contacted stakeholders in 37 cases. The main themes from the recorded sessions were: 'symptom burden', 'managing symptoms', 'relations with the workplace' and 'fear of not being able to manage work'. The physiotherapists felt they were able to build rapport with most participants. However, case management was hindered by the restricted number of sessions permitted according to the protocol. *Conclusion* Overall, the SVAI was delivered in accordance with the protocol and is therefore likely to be implementable in primary care if it is effective in reducing sick leave.

Keywords Vocational rehabilitation · Musculoskeletal diseases · Sick leave · Return to work · Process evaluation

Introduction

Musculoskeletal disorders include injuries and disorders affecting joints, bones and soft tissues [1] and are major contributors to years lived with disability worldwide [2]. In Norway, musculoskeletal disorders are the main cause of sick leave and are associated with a significant burden on individuals and economic costs to society [3]. Sick leave is influenced by several factors such as individual health and coping strategies, healthcare provision, social security systems and workplace factors [4–8], and vocational interventions should aim to identify and overcome individual obstacles to return to work (RTW) [8, 9]. Cullen and colleagues [10] reviewed intervention and cohort studies on the effectiveness of workplace interventions on RTW and recommended multi-domain interventions including work modification, health care provision and service coordination. In a meta-ethnography, Grant and

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colleagues [8] identified common barriers to RTW for people with chronic pain. They proposed that RTW interventions should be individualised and focus on collaboration with the person on sick leave and their employer, to find ways to manage pain at the workplace. Moreover, they suggested that interventions could be delivered by case managers located in primary health care [8].

An individually tailored RTW intervention delivered by case managers in primary care was effective in reducing work absence, compared to best current care for people with musculoskeletal pain in the UK [the Study of Work And Pain (SWAP) trial] [11, 12]. The intervention included advice about health and work, service coordination and stepped care. However, the intervention has not been tested in countries with other health and welfare systems. Therefore, we developed a stratified vocational advice intervention (SVAI), suitable for Norway, based on the SWAP intervention. The SVAI was delivered by physiotherapists in primary care, to people on sick leave with musculoskeletal disorders participating in a randomised controlled trial (RCT) in Norway (the MI-NAV study) [13]. The SVAI meets the Medical Research Councils (MRC) criteria for complex interventions as it is individually tailored and potentially involves cooperation with several stakeholders [14]. The MRC recommend performing process evaluations of complex interventions [14] to provide information about the intervention delivery and contextual factors that may influence the study results [14–16]. Integrating process and outcome data can provide insights into why an intervention is successful or why it fails to work and whether it is feasible to implement the intervention in daily practice [17–19]. The overall aim of this study was to perform a process evaluation of the delivery of the SVAI in the MI-NAV study. Our research questions were:

1. How was the SVAI delivered?
    (a) What training and resources were provided to the physiotherapists who delivered the SVAI?
    (b) How many of the eligible study participants received the SVAI?
2. What was delivered in the SVAI?
    (a) What was discussed in the SVAI conversations?
    (b) Which elements of the SVAI were delivered?
    (c) Was the SVAI delivered in accordance with the protocol and logic model?
3. What were the physiotherapists' experiences of delivering the SVAI?

Methods

The process evaluation is a multimethod study using both qualitative and quantitative process data to answer the different research questions [20]. We followed the MRC guidance for process evaluations of complex interventions [15] including a description of: *adaptations* made to the intervention, *training* and *resources* provided, *reach* (how many in the target group received the intervention), *dose* (how much of the different elements of the intervention was delivered) and *fidelity* (the extent to which the intervention was delivered according to the protocol) [15]. The results of the study are reported in accordance with the reporting criteria for the development and evaluation of complex interventions in health care (CReDECI 2) [21].

The MI-NAV Study

The MI-NAV study included a randomised controlled trial (RCT) with three arms in which all participants received usual follow-up from the Norwegian Labour and Welfare Administration (NAV). In addition, participants in the intervention arms received either motivational interviewing (MI) delivered by NAV caseworkers or the SVAI delivered by physiotherapists. The RCT was conducted in the South-East of Norway and has been described in detail in the study protocol [13] and at ClinicalTrials.gov (identifier: NCT03871712). Figure 1 shows an overview of the trial with the inclusion and exclusion criteria. The results of the outcome assessments, economic evaluations and mediation analyses of the SVAI and MI will be reported later. The Regional Committee for Medical and Health Research Ethics reviewed the study protocol and concluded that the study did not require approval, as it does not generate new health research (2018/1326/REK sør-øst A). The study was approved by the Norwegian Centre for Research Data (identifier: 861249) and conducted according to the Helsinki declaration and the General Data Protection Regulation. Participation was voluntary and did not influence sick leave benefits. Written informed consent was obtained from all participants prior to inclusion, and an additional consent was obtained to make recordings of the intervention sessions.

Interventions

Usual Follow-Up

In Norway, employees with certified sick leave are entitled to full wage replacement for up to 1 year. The first 16 days are covered by the employer, the rest by the National Insurance Scheme administered by the NAV [22]. According to the

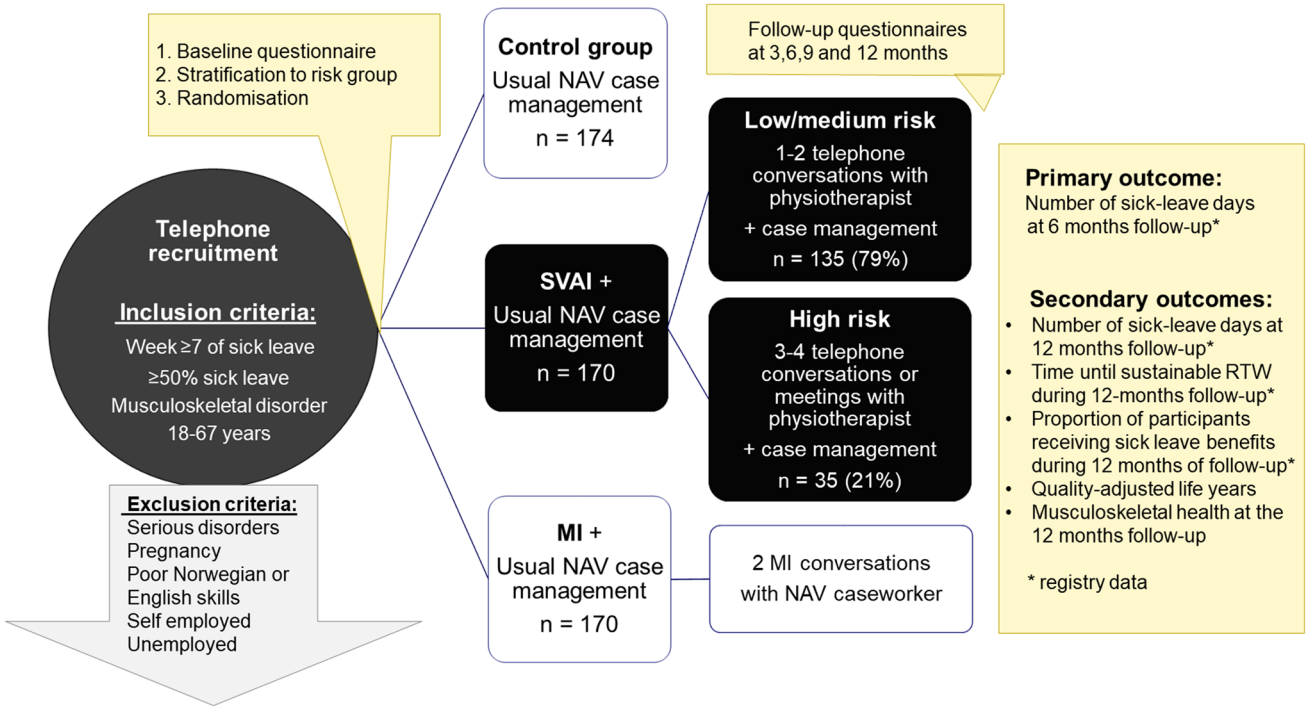

Fig. 1 Illustration of the MI-NAV study. The black boxes describe the stratified vocational advice intervention (SVAI). *NAV* Norwegian Labour and Welfare Administration, *MI* motivational interviewing, *RTW* return to work

NAV's guidelines, the employer and employee have the main responsibility for the sick leave follow-up and should meet and make a follow-up plan within 4 weeks of the start of sick leave [22, 23]. Also, the employer is responsible for arranging a dialogue meeting with the employee within 7 weeks of the start of sick leave [23]. Within 26 weeks of the start of sick leave, the local NAV office is responsible for organizing a second dialogue meeting with the employee, the employer and the sick-leave certifier (when necessary) [23]. The NAV can also arrange a third dialogue meeting to assess the need for work-related measures within one year of sick leave [23].

Stratified Vocational Advice Intervention (SVAI)

The SVAI is an adaptation of the vocational advice intervention developed for the SWAP trial [12]. The intervention emphasizes the identification and problem solving of modifiable health and work-related obstacles to RTW [12]. The main adaption made to the intervention in the MI-NAV study was that the participants were stratified into two risk groups before random allocation (low/medium or high-risk for long-term sick leave) [13] and follow-up was customised according to risk group. Whereas, the SWAP intervention was delivered as stepped care and follow-up was increased (stepped up) depending on the participant's needs [11]. Recruitment and inclusion criteria also differed between the two trials. In the SWAP trial the participants were recruited through their general practitioner (GP) and could have shorter sickness absence or still be at work (but struggling) [11]. In the MI-NAV trial participants were on sick leave for ≥ 7 weeks and self-employed workers were not included, as the evaluation of the SWAP trial showed that the vocational advice was less helpful for this group [24]. Another reason for excluding self-employed workers was that they receive extra follow-up from the NAV [25]. Reasons for excluding participants on short time sick leave were that subgroup analyses from the SWAP trial showed that the intervention was most effective for participants with ≥ 10 days of sickness absence compared to those with shorter absence [11]. Also, more than 80% of all people on sick leave in Norway RTW before week eight of the sick leave period [26].

The SVAI was a low intensity intervention consisting of case management provided by trained physiotherapists. The physiotherapists received a detailed manual on how to deliver the SVAI, and were asked to follow a semi-structured conversation guide including 15 core questions to clarify the participants' current health and work situation (Appendix 1). According to the MI-NAV study protocol, the low/medium risk group should be offered 1–2 phone calls (lasting up to one hour) to identify obstacles to RTW, provide evidence-based advice on the management of musculoskeletal pain (in the context of work), support problem solving to overcome modifiable obstacles to RTW, collaboratively agree goals for

RTW and develop and implement an action plan. The high-risk group should be offered 3–4 sessions with the physiotherapist, the first by telephone and the remaining sessions either by phone or as face-to-face meetings, including an optional worksite meeting. The content of the SVAI sessions was the same for the two risk groups. In addition, the physiotherapists should facilitate communication, collaboration and coordination with stakeholders and signpost to other services if necessary. The duration of the follow-up period was flexible but should end by week 26 of the participants' sick leave, as this is when the NAV becomes more involved in the sick leave follow-up. The treatment targets, intervention components and theoretical underpinnings of the SVAI are described in the SVAI logic model (Appendix 2).

Training of the Physiotherapists Delivering the SVAI

The training in the SVAI was a 3 + 2-day course led by one of the authors (GS). The course consisted of presentations, discussions and role-play covering topics such as: sick leave follow-up in Norway, the relationship between health and work, communication skills, identifying and addressing obstacles to RTW (through the provision of information and advice, problem solving, goal setting, case management and action planning). The study team held online mentoring sessions with the group of physiotherapists every month during the intervention period (except December and July, due to holidays). In addition, three meetings were held to discuss the study proceedings with the entire study group (including caseworkers and administrators from the NAV) (Fig. 2).

Resources

The physiotherapists were given a summary aide memoir of possible actions to support the participants to overcome common obstacles to RTW. They also had online sources of information about pain management, mental health, sleep, social work issues, sick leave benefits and follow-up from the NAV. In addition, they had three types of leaflets with information about the study and evidence-based information about work and health. The physiotherapists could distribute the leaflets to participants, employers and health care professionals if the participants consented.

Collection of Process Data

The data were collected before and during the intervention period of the MI-NAV study (Fig. 2). The physiotherapists filled out evaluation forms from the SVAI training and provided information about their work experience. To obtain information about the content of the SVAI sessions, audio recordings were made of telephone conversations between the 4 main intervention deliverers and 10% of the study participants who received the SVAI. The physiotherapists were asked to record conversations at regular intervals during the intervention period (Fig. 2), and to fill in information in an

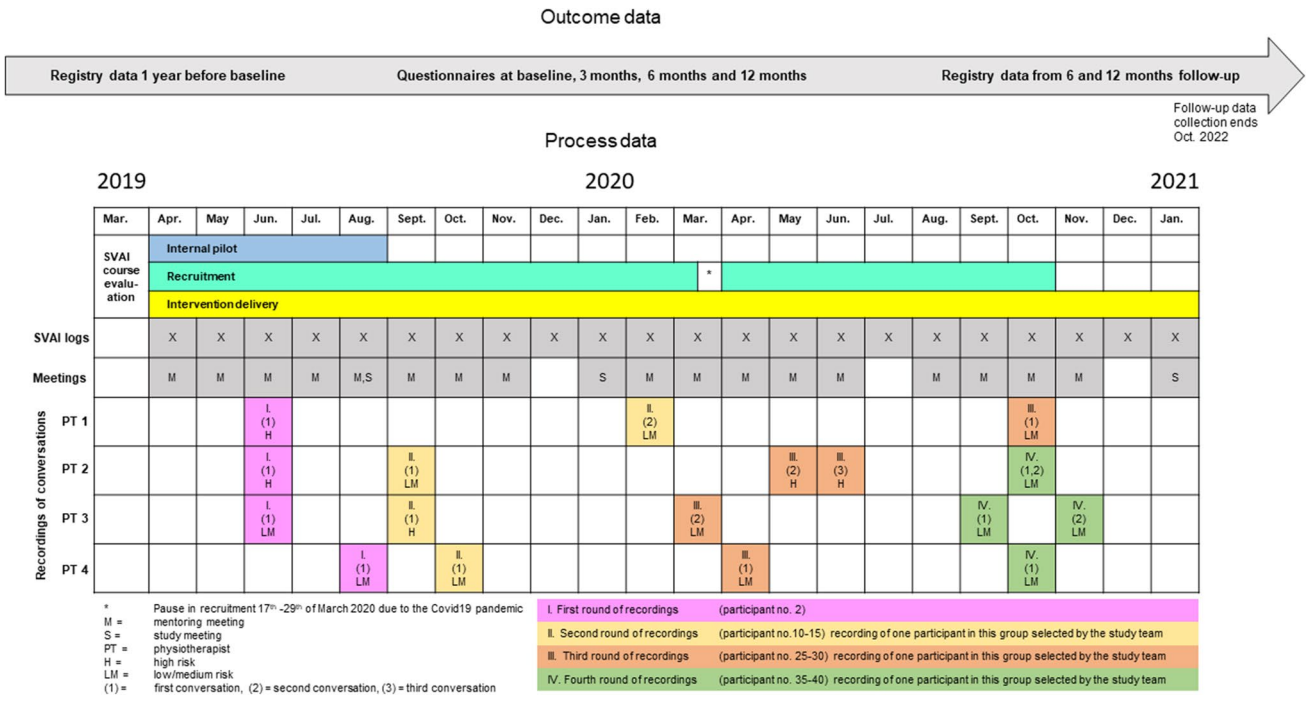

Fig. 2 Timeline for recruitment and data collection in the MI-NAV Study

intervention log every time they had contact with a participant (one log per participant). The physiotherapists used the logs to document the participants' responses to questions about their current work and health situation and obstacles to RTW. The logs also included information about number, length and types of contact with the participants, action plans and type of case management provided. Information concerning the physiotherapists' experiences from delivering the SVAI was gathered from minutes from mentoring meetings and meetings with the entire study group.

Data Analysis

The qualitative analyses were performed by two of the authors (FA and HE). The recordings of the SVAI sessions were transcribed verbatim, and a descriptive content analysis of the conversations was performed, inspired by Braun and Clarke's framework for thematic analysis [27], using the software QSR Nvivo 12. First, we listened to the recordings and read the transcripts to get familiar with the data, then the data were coded, and themes were developed from the coded data. The quantitative data from the SVAI logs were analysed with descriptive statistics including frequencies, percentages, means and median values using SPSS version 27. The data from the analyses were combined to describe fidelity to the SVAI, including an appraisal of whether the conversations covered the core topics in the conversation guide and whether the intervention elements described in the logic model and protocol were delivered by the physiotherapists. Additionally, we assessed if the time until the first contact, the number and length of the sessions and the development of RTW goals and action plans were performed in accordance with the protocol. The analysis of the mentoring and meeting minutes was guided by the analytical question: 'What did the physiotherapists experience as facilitators and barriers when delivering the SVAI?' All the analyses of the process data were performed prior to the outcome evaluation of the trial.

Results

Recruitment and Reach

Researchers employed by the NAV directorate contacted workers on sick leave by telephone. Eligible participants wanting to take part in the study received a link to study information and signed informed consent forms, before answering the baseline questionnaire. Participants scoring ≥ 9 on the Keele STarT MSK tool [28] and ≥ 60 on the Örebro MSK Pain Screening Questionnaire Short Form [29] were stratified to the high-risk group, and those with lower scores on one or both of the questionnaires were stratified to the low/medium risk group [13]. A total of 514 participants (25% of all eligible candidates) were included in the trial between April 2019 and October 2020. The first phase of the study was an internal pilot to test study practicalities. As only minor changes were made during the pilot, the pilot participants (n = 101) were included in the main trial. In total, 170 participants were randomised to the SVAI, 135 (79%) in the low/medium risk group and 35 (21%) in the high-risk group. Eighteen participants did not receive the SVAI: eight had RTW > 50% before the first phone call, five could not be reached, three were not contacted, one had been on sick leave for more than 26 weeks before the intervention commenced, and one withdrew from the study. The remaining 152 participants (89%) received the SVAI.

Training and Background of the Physiotherapists

The course evaluations showed that all but one of the physiotherapists felt they had the skills to help participants identify and overcome obstacles to RTW, after finishing the SVAI training course. However, several of the physiotherapists would have liked more practice in conducting the SVAI conversations, especially the follow-up conversations. Eight physiotherapists completed the SVAI training (2 men, 6 women), but four withdrew early in the study due to other work commitments. The four remaining physiotherapists were all women aged between 28–45 years with 4–21 years of work experience in primary care. These four physiotherapists provided the SVAI to 95% of the participants (30–40 participants each).

Recordings of the SVAI Sessions

Characteristics of the Study Participants in the Recordings

During the study, 18 recordings were made of conversations with 15 different participants, nine women and six men, mean age 48.6 years (range 35 to 63). Four were in the high-risk group and eleven in the low/medium risk group. Ten were blue-collar workers, three worked in the health sector and two had office jobs. They had a range of musculoskeletal conditions in different anatomical areas of the body. The sample was representative of the total SVAI cohort regarding age, sex and occupation, however 6% more were in the high-risk group.

Main Themes Discussed by the Participants in the Recorded SVAI Sessions

The participants' descriptions of their health situation were related to two main themes, the first theme was *'symptom burden'*. Pain was their main symptom and it affected their lives in many ways. They avoided certain activities and

movements that aggravated their pain such as sitting, walking or lifting. For many the pain affected their sleep, was associated with fatigue and limited their ability to work and be social. The second theme was '*managing symptoms'*. The participants used different coping strategies such as using medication and different aids. Several emphasised the importance of finding a balance between activity and rest, and that the sick leave gave them the opportunity to exercise and time to get treatment. Many were searching for a diagnosis and had spent a long time waiting for health examinations and treatments. They described a feeling of standing still and that improvement was slow.

There were also two main themes related to RTW. The first was '*relations with the workplace'*. Most of the participants were satisfied with their work situation and wanted to return to their pre-sick leave hours of work and workplace. The amount of contact they had with the workplace varied. Some reported having regular, supportive contact with their employer and an effective follow-up plan in place. Others had a plan that was not being implemented, and some had received little support from their workplace and had no follow-up plan. The options for modified work (e.g. hours, roles, responsibilities, tasks) varied. Some had received support to commence modified work whilst others found it difficult to modify, either because of the nature of their work or because they perceived their employers as being unwilling to help. The second theme related to RTW was *'fear of not being able to manage work'*. The main obstacle to RTW described by the participants was that they were afraid they would not be able to manage to do their work and that their symptoms or health problems would increase if they RTW too soon. Some felt they would not manage to RTW because of the intensity of their pain and fatigue. They found it difficult to combine working with engaging in exercise and treatment because they spent all their energy at work. Some had been told by health care professionals to take time to recover before they RTW and several wanted reassurance that it was safe to RTW with their health problems.

Information from the Intervention Logs

The physiotherapists completed logs for 148 (97%) of the participants who received the SVAI, of these 114 (77%) were in the low/medium risk group and 34 (23%) in the high-risk group. The data from the SVAI logs are presented in Tables 1 and 2. All the follow-ups were provided over the telephone, the mean number of conversations was 2.0 (SD 0.5) in the low/medium risk group and 3.1 (SD 0.9) in the high-risk group. In total, the physiotherapists had documented contact with other stakeholders in 25% of the

Table 1 Description of the intervention elements delivered by the physiotherapists

Variable	All participants (%)	Low/medium risk group (%)	High risk group (%)
n (%)	148 (100)	114 (77)	34 (23)
Number of phone sessions			
1	13 (9)	12 (11)	1 (3)
2	106 (71)	96 (84)	10 (29)
3	10 (7)	1 (1)	9 (27)
4	19 (13)	5 (4)	14 (41)
Action plans	146 (99)	112 (98)	34 (100)
Information leaflets distributed			
To participant	8 (5)	3 (3)	5 (15)
To employer	7 (5)	3 (3)	4 (12)
To health care professionals	3 (2)	2 (2)	1 (3)
Contact with stakeholders [a]	37 (25)	23 (20)	14 (41)
Employer	4 (3)	1 (1)	3 (9)
NAV	4 (3)	1 (1)	3 (9)
General practitioner	2 (1)	1 (1)	1 (3)
Physiotherapist	25 (17)	15 (13)	10 (29)
Other health care professionals [b]	12 (8)	10 (9)	2 (6)
Several stakeholders [c]	10 (7)	5 (4)	5 (15)

The data presented in the table are from the SVAI logs

NAV Norwegian Labour and Welfare Administration

[a]Any type of contact including arranging an appointment for the participant

[b]Mainly professionals from Healthy Life Centres, providing help with lifestyle changes

[c]Cooperated with two different stakeholders

Table 2 Timing and duration of the SVAI follow-up and number of core questions with information

Variable	n	All participants		Low/medium risk group		High risk group	
		Mean (SD)	Median (min–max)	Mean (SD)	Median (min–max)	Mean (SD)	Median (min–max)
Days until first contact	120	**2.2** (2.9)	**1** (0–13)	**2.3** (3.1)	**1** (0–13)	**1.7** (2.3)	**0** (0–7)
Days until first session	124	**5.8** (4.5)	**5** (0–36)	**6.0** (4.8)	**5** (0–36)	**5.2** (3.1)	**5** (1–13)
Intervention period (*days*)	123	**50.0** (27.0)	**42** (4–128)	**42.4** (21.0)	**39** (4–108)	**73.8** (29.9)	**74** (20–128)
Duration of sessions (*min.*)							
First	145	**47.1** (15.4)	**45** (20–90)	**45.6** (14.1)	**45** (20–90)	**52.2** (18.5)	**45** (30–90)
Second	116	**26.9** (12.6)	**25** (5–75)	**26.3** (12.5)	**25** (5–75)	**28.7** (12.9)	**30** (5–60)
Third	24	**29.2** (13.2)	**30** (15–75)	**35.0** (22.9)	**30** (20–75)	**27.6** (9.6)	**30** (15–45)
Fourth	12	**26.3** (12.8)	**25** (10–45)	**30.0** (18.0)	**35** (10–45)	**25.0** (11.7)	**20** (15–45)
Information on core questions [a]	148	**14.1** (1.0)	**14** (9–15)	**14.1** (1.0)	**14** (9–15)	**14.3** (0.8)	**15** (12–15)

Mean and median values are given in bold

Mean and median values are included in the table as the variables were not normally distributed

The data presented in the table are from the SVAI logs

(min-max) (minimum-maximum), *min.* minutes

[a]Information noted against the core questions from the conversation guide (maximum 15)

logs, 23 (20%) in the low/medium risk group and 14 (41%) in the high-risk group. The contacts were primarily referrals to treating physiotherapists or professionals working in "healthy life centres" (providing help with lifestyle changes).

Fidelity to the Protocol

The protocol stipulated that the physiotherapists should contact participants within 7 days after randomisation, this occurred in 94% of cases, and 95% of the conversations lasted 60 min or less, in keeping with the protocol. In total, 89% of the participants received the correct number of conversations. However, 32% in the high-risk group received less than three conversations and 5% in the low/medium risk group received more than two conversations. The main reason for this was that 18 participants were stratified to the wrong risk group by error. Seven with high-risk were wrongly classified to the low/medium risk group and eleven with low/medium risk were wrongly classified to the high-risk group.

All the SVAI logs had documented information against ≥ 9 of the 15 core questions in the conversation guide (mean 14.1, SD 1.0) (Table 2). The information most often missing from the logs (41% missing) was the participants' contact with the NAV. Data from the content analysis of the recorded sessions, showed that the physiotherapists predominantly provided information and reassurance regarding self-management of symptoms and musculoskeletal ill health and tried to reduce the participants' fear avoidance behaviours. This included information about body structures, normal age-related changes and factors that could affect the pain experience. The physiotherapists emphasised the importance of physical activity and suggested a gradual increase in activity. Additionally, they advised several of the participants to seek physiotherapy treatment or to contact their GP. In some cases, they stepped out of their role as vocational advisers and provided advice to participants as clinical physiotherapists. Concerning RTW, they advised the participants to stay in contact with their workplace and to make a follow-up plan with their employer or to revise the plan if needed. They also gave the participants information about their rights in terms of requesting dialogue meetings with their employer and the NAV. However, the physiotherapists did not attend any workplace meetings and rarely liaised with the participants' employer, GP or the NAV (Table 1). The recordings showed that the physiotherapists suggested a gradual RTW to many of the participants, primarily involving starting with fewer hours of work and building this up over time. If the participants were struggling with certain tasks, they recommended that they discuss this with their

employers and explore options for modified work. They also gave reassurance that it was safe to RTW and that it was normal for symptoms to temporarily increase as they RTW or increased their workload. The physiotherapists discussed RTW goals with the participants and made action plans. This was confirmed in the SVAI logs where 93% of the logs included descriptions of work goals (short-term goals, long-term goals or both). Only two logs did not include an action plan (Table 1), and 94% of the action plans included notes to show that the plan had been reviewed.

Experiences from Delivering the SVAI

Twenty meetings were held with the physiotherapists where they discussed cases and experiences from delivering the SVAI (Fig. 2). Overall, the meetings had high attendance from the four main intervention deliverers. Table 3 gives an overview of the facilitators and barriers for implementation discussed during the mentoring. The main facilitator described by the physiotherapists was the mentoring, while the main barrier was being restricted to providing two telephone sessions for the low/medium risk group. Additionally, the lack of meeting facilities made it difficult to arrange face-to-face meetings. As half of the physiotherapists withdrew from the study, the remaining four had to cover a large geographical area and did not have meeting facilities close to the participants. We made some changes during the pilot study in response to the physiotherapists' feedback. For example, simplifying the conversation guide and taking action to increase recruitment to the trial. To increase the focus on RTW, the order of the questions in the guide was changed so that questions regarding work came first. A NAV

Table 3 The physiotherapists experiences from delivering the SVAI

Facilitators/positive experiences	Barriers/challenges
• The phone-conversations went well and it was easy to build rapport with most participants over the phone (5, 6, 20) • The help, advice and support provided in the SVAI appeared to be appreciated by the participants (4, 5, 7, 11, 12, 13, 20) • The physiotherapists perceived it as an advantage that they were independent from the NAV (7, 19) • Having been training as physiotherapists was an asset when giving the participants advice and reassurance about musculoskeletal symptoms (19) • The questions in the conversation guide gave the participants the opportunity to describe many aspects of their situation (6) • The support, advice and information provided during the mentoring sessions was helpful (3, 5, 9, 10) • A shared digital forum (facebook group) made it easy for the physiotherapists to cooperate and share tips between mentoring (7) • The physiotherapists appreciated receiving feedback on the sessions they recorded and learnt from listening to their own recordings of sessions with participants (13, 14)	• Slow recruitment of participants at some points in the study (1, 3, 11, 13, 14, 15) • Challenges in becoming familiar with the conversation guide because it included several overlapping questions (1, 6) • It was difficult to build rapport over the phone with people who were not motivated to RTW and with participants who did not have Norwegian as their first language (3, 11, 12) • There were some problems getting hold of participants (12) • The lack of meeting locations and long distances that participants would have had to travel to meeting locations was a barrier to arrange face-to-face meetings (1, 16) • Participants did not want workplace meetings or did not want the physiotherapists to attend workplace meetings (10, 12, 16, 20) • The physiotherapists did not feel comfortable contacting the participants employers because they did not feel they knew their situation well enough to discuss the work related issues with employers (19, 20) • The limit on the numbers of phone calls allowed made it difficult to help some participants in the low/medium risk group (3, 6, 16, 19) • It was challenging to understand what RTW support the NAV might have been able to provide and often the participants did not fit the criteria for the NAV's schemes (9, 10, 11, 18) • It was hard to determine what health care to recommend to participants (2, 3, 13, 20) • It was difficult to encourage RTW or increased activity when the participant had received advice from other health care professionals to be careful/stay on sick leave (7, 12, 15, 20) • The physiotherapists did not feel comfortable questioning the treatment provided by other health care professionals (6, 10) • It was not possible to send information to participants by email or text message due to The General Data Protection Regulation (6, 10) • There were several barriers related to the Covid19 pandemic: less access to health care, many workplaces were closed, jobs were at risk and participants in the risk groups for getting seriously ill from Covid19 were afraid to get infected if they RTW (12, 13, 14, 15) • In a few cases the physiotherapists felt the participants were in the wrong risk group (2, 17, 20)

NAV = Norwegian Labour and Welfare Administration, RTW = return to work

The data presented in the table are from the meeting minutes. The numbers refer to the meetings were the topic was discussed. The meetings are numbered in chronological order (1 = first meeting etc.)

caseworker participated in one of the mentoring sessions to answer questions regarding benefits from the NAV.

Discussion

The physiotherapists received 5 days of training before delivering the SVAI and attended monthly mentoring meetings during the intervention phase of the RCT. Of the 170 participants randomised to the SVAI, 89% received the intervention. All the sessions were by telephone and covered the main topics in the conversation guide. The SVAI was mainly delivered in accordance with the protocol. However, the physiotherapist experienced that the restricted number of sessions permitted for the low/medium risk group hindered case management.

Despite an overall good fidelity to the SVAI, there were some of the intervention elements that were not delivered. Firstly, no face-to-face meetings were held. This was due to the lack of suitable meeting facilities and social distancing protocols implemented on the 13th of March 2020 by the Norwegian government, following the Covid-19 pandemic. Furthermore, most of the participants were in the low/medium risk group and therefore should not have face-to-face meetings. Although the physiotherapists felt they were able to build rapport with most participants over the telephone, they would have preferred to have face-to-face conversations with participants for whom Norwegian was a second language, as they found it more challenging to communicate with these participants. They also thought that having a face-to-face meeting would have made it easier to establish a good rapport with participants who were not motivated to RTW. As nonverbal communication is restricted during telephone conversations the lack of face-to-face meetings could reduce the quality of the communication, and might compromise the effectiveness of the SVAI for some participants. However, several studies have shown that patient satisfaction with remote management is high across a broad range of interventions [30], and that telephone follow-up is equivalent to face-to-face interventions for improving physical function and pain for people with musculoskeletal disorders [30, 31].

A second element that was poorly implemented in the SVAI was stakeholder collaboration. The physiotherapists had few contacts with important stakeholders such as GPs and employers and did not attend workplace meetings. In the SWAP trial the physiotherapists were located in GP practices and collaborated with the GPs [11, 24], however they had few contacts with employers and only attended one workplace meeting [11]. Communication between RTW stakeholders can be challenging [4, 32–34], and many of the barriers described by the SVAI physiotherapists are commonly experienced in vocational rehabilitation [32, 35]. Information from the mentoring minutes showed that the SVAI physiotherapists did not have confidence to contact employers, because they did not feel that they were in a position to discuss workplace modifications. In addition, several of the physiotherapists reported that participants did not want them to attend workplace meetings. The lack of communication with the employers may have reduced the potential effectiveness of the SVAI, as workplace factors can influence sick leave and RTW [4, 8]. Although several systematic reviews have underscored the importance of including the workplace in RTW interventions [7, 8, 10, 36, 37], two Norwegian studies did not find any added benefit on RTW of workplace meetings [38] or telephone conversations with employers [39]. One explanation for the lack of benefit could be that Norwegian employers and employees on fulltime sick leave are required to cooperate and make a follow-up plan [23]. Nevertheless, several of the participants in the MI-NAV Study had not had meetings with their employer, demonstrating that the guidelines and policies are not always followed. This is in line with findings from a recent study involving NAV caseworkers who experienced that employers rarely used the follow-up plans [33]. Furthermore, NAV caseworkers [33] and clinicians working in occupational rehabilitation clinics in Norway [40] have underscored the importance of liaising with GPs, employers and other stakeholders during the RTW process.

Although liaison with employers is important to facilitate RTW, many of the SVAI participants were unsure how to manage their musculoskeletal disorders. The main barrier to RTW described by the participants was fear that RTW would aggravate their symptoms, which is in line with findings from previous studies [8]. This highlights the need for evidence based input from health care professionals about the health benefits of good work [41, 42], and advice regarding fitness for work [42]. The SVAI physiotherapists felt that their clinical background was an asset when providing advice about the management of musculoskeletal disorders and reassurance that RTW was not harmful. Although it may be helpful for RTW coordinators to have knowledge about health conditions, they should address work issues rather than medical issues [43, 44]. Interviews with the physiotherapists in the SWAP trial showed that they gave advice on the management of musculoskeletal pain when they felt unsure about how to help resolve work difficulties [24]. This was also the case for the physiotherapists providing the SVAI. Therefore, having a background as a physiotherapist may be both an asset and a challenge when the role is to support people with musculoskeletal disorders to RTW. Furthermore, studies investigating competencies of RTW coordinators show that it is important to have knowledge of the legal rights and responsibilities of workers, workplace policies and insurance systems related to sick leave and RTW [43–45]. However, the physiotherapists delivering the SVAI

found it difficult to get an overview of the RTW support available through the NAV. Therefore, it could be beneficial if the physiotherapists had a mentor working in the national insurance system to help with questions regarding work related laws, regulations and RTW schemes and benefits. Nevertheless, it is important that the physiotherapists are independent from the NAV, as workers on sick leave may be reluctant to disclose information that might affect decisions regarding sick leave benefits, if they believe clinicians are working for the national insurance system [40].

Strengths and Limitations

This multimethod process evaluation was performed in accordance with the MRC guidelines. By combining several qualitative and quantitative data sources we could describe different aspects of the delivery of the SVAI in the RCT. The qualitative data from the recordings provided detailed insight into the content that was delivered in the SVAI sessions, and the quantitative data from the logs provided information about the dose and type of follow-up provided to almost all the participants receiving the SVAI. Another strength of the study is that the qualitative data were analysed by two researchers, and that all the analyses were performed before the outcome evaluation of the trial and have therefore not been influenced by the results of the RCT.

Although we had recordings of conversations with 10% of the participants receiving the SVAI, it would have been preferable to have recorded all the conversations and then drawn a random sample for analysis. However, this was not possible as not all the participants consented to being recorded, it would also have increased the burden on the physiotherapists. Another limitation is that we did not conduct interviews with the study participants due to limited resources. Therefore, we lack information about the acceptability or helpfulness of the SVAI to participants. However, this process evaluation builds on the data from the evaluation of the SWAP trial where researchers conducted interviews with study participants as well as with the vocational advisers and GPs involved in the study [24].

Conclusions

The results of this process evaluation show an overall good fidelity to the SVAI and the sessions included most of the elements from the SVAI logic model. However, some elements of the intervention were not implemented including face-to-face meetings and meetings at the workplace. The physiotherapists providing the SVAI rarely contacted employers, GPs or the NAV. The process evaluation suggests that it would be feasible to implement the SVAI in primary care if it is effective in helping people with musculoskeletal disorder to RTW. To improve future implementation, one should consider increasing the number of sessions allowed between the physiotherapists and participants with low to medium risk of long-term sick leave, or to deliver the intervention as stepped care. It would also be important to ensure conveniently located meeting facilities.

Appendix 1: Core Questions from the SVAI Conversation Guide

Topics	Core questions
Work situation	Start of current sick leave (date)
	Percent of sick leave (at first consultation)
	Can you describe your current work situation?
Identify and address RTW obstacles	How are your symptoms affecting your ability to work?
	What are your main concerns about RTW?
	Have you had a dialogue meeting with your employer?
	What contact have you had with the NAV?
	Has your employer made a RTW plan?
	How happy are you with your work and workplace?
	What could be done at the workplace to help you RTW or increase your work hours?
Goal setting	Short term work goal
	Long term work goal
Health situation	Could you please tell me briefly about the main health problem that you are struggling with at the moment?
	How is your health condition affecting your day to day?
	Can you describe any treatment you are receiving or have received for your condition?

Appendix 2: Logic Model: Stratified Vocational Advice Intervention (SVAI)

Treatment targets	Elements of the SVAI intervention	Theoretical underpinning
PERSONAL **Health** - Not accessing timely and appropriate healthcare - Poor co-ordination, communication and co-operation between health and other stakeholders **Psychosocial** *Cognitions*: - Unhelpful beliefs about health and work - Low RTW self-efficacy *Emotions:* - Anxiety about RTW - Anger/frustrations with workplace *Behaviours:* - Low levels of physical activity and participation in everyday life - Sleep pattern incompatible with work **OCCUPATIONAL/ORGANISATIONAL** - Suboptimal amount and nature of contact with the sick-listed employee - Excessive stressors at work and/or suboptimal ability of employee to respond adaptively to stress - Poor communication between internal workplace stakeholders - Lack of work adjustments/transitional arrangements - Lack of or poorly devised RTW plan - Poor implementation of RTW plans	**ASSESSMENT** To clarify the current health and work situation and any obstacles to RTW **EXPLORE THE VALUE OF WORK** To increase RTW motivation **PROBLEM SOLVING** To identify and overcome modifiable obstacles to RTW **Case management:** to facilitate communication, collaboration and coordination with stakeholders (e.g. to liaise with GP/HCP to facilitate referrals, agree on RTW plans and goals, to encourage contact with the workplace, to facilitate work modifications (if needed) and to set up and conduct worksite meetings **Education**: facilitate an evidence based understanding of symptoms and ill health in the context of work, understand the RTW process and options and address unhelpful beliefs or knowledge gaps **Advice and reassurance:** increase confidence to RTW, improve sleep quality and quantity and restore work consistent awake/sleep pattern **Graded activity/exposure:** promote active self-management, reduce fear-avoidance behaviour, behavioural re-activation, graded RTW (hours/ tasks/responsibilities) **Workplace modification:** temporary or permanent **Signposting to other services:** obtain assistance with work related issues (e.g. bullying or harassment), or wider social issues (e.g. debt, wage replacement benefits, housing) or obtain help with changing job/employer **Goal setting:** to identify and agree RTW and other goals, commit to agreed goals, to monitor progress, and provide feedback and encouragement to increase motivation and adherence **RTW planning and implementation:** to develop a written action plan, provide support, monitor progress and problem solve difficulties	**SOCIAL COGNITIVE THEORY** - Beliefs about capabilities of RTW - Beliefs about health consequences of performing the behaviour - Skills: instructions on how to perform a behaviour: development, competence, ability, practice - Behavioural regulation: action planning and self-monitoring to change actions **SELF-DETERMINATION THEORY** - Support *intrinsic motivation* to RTW by exploring what the participant value about their work - *Relatedness:* clarify situation from the participants' perspective. Facilitate communication with the workplace - *Competence* to RTW: provide education, advice, reassurance, problem solve and support participant to develop/use skills to overcome RTW barriers - *Autonomy support:* collaborate closely with participant to agree goals, plan RTW and empower the participant to take direct action **THE COMMON-SENSE MODEL OF SELF REGULATION** - Identify participants' beliefs about their health problems, treatment and management strategies - Improve knowledge about health and work, reduce fear avoidance and promote active self-management

RTW return to work, *GP* general practitioner, *HCP* health care professionals.

Acknowledgements We are very grateful to the participants, physiotherapists, NAV and everyone in the MI-NAV study team who have contributed to the study.

Author Contribution MG was responsible for funding acquisition for the MI-NAV study and MG, BEØ, KS, IL, FA, GS and GWJ contributed to the planning of the RCT. MG, GS, GWJ, BEØ and FA were involved in the development of the SVAI intervention. GS, FA, BEØ and MG were responsible for the training and mentoring of the physiotherapists providing the SVAI. FA, BEØ, MG, HE, IL, KS, GS and GWJ contributed to the planning of the process evaluation. IL organised the recording of the SVAI sessions. RS transcribed the audio recordings and extracted data from the SVAI logs. FA and HE performed the qualitative analyses and FA performed the quantitative analysis. The first draft of the manuscript was written by FA. All authors critically revised and commented on the previous versions of the manuscript and read and approved the final manuscript.

Funding Open access funding provided by OsloMet - Oslo Metropolitan University. This study was funded by The Research Council of Norway, The Norwegian Labour and Welfare Administration (NAV), Oslo Metropolitan University and The Norwegian Fund for Post-Graduate Training in Physiotherapy.

Data Availability To avoid breaching participant confidentiality the datasets generated and analysed during the current study will not be made publicly available.

Code Availability Not applicable.

Declarations

Conflict of interest Gwenllian Wynne-Jones sits on the editorial board of the Journal of Occupational Rehabilitation. Authors Fiona Aanesen, Hedda Eik, Margreth Grotle, Ida Løchting, Rune Solli, Gail Sowden, Kjersti Storheim and Britt Elin Øiestad declare that they have no conflicts of interest.

Ethical Approval The Regional Committee for Medical and Health Research Ethics for health research has assessed the MI-NAV study protocol and concluded that the study did not need approval as it does not generate new health research (2018/1326/REK sør-øst A). The Norwegian Center for Research Data has approved the project (861249). The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. The trial was registered at ClinicalTrials.gov on the 12th of March 2019 (identifier: NCT03871712).

Informed Consent Written informed consent was obtained from all individual participants prior to inclusion in the study.

Consent for publication Not applicable.

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Paper III

Aanesen F, Grotle M, Rysstad TL, Tveter AT, Tingulstad A, Løchting I, Småstuen MC, van Tulder M, Berg RC, Foster NE, Wynne-Jones G, Sowden G, Fors EA, Bagøien G, Hagen R, Storheim K, Øiestad BE. (2023). Effectiveness of Adding Motivational Interviewing or a Stratified Vocational Advice Intervention to Usual Case Management on Return to Work for People with Musculoskeletal Disorders: the MI-NAV Randomised Controlled Trial. *Occupational and Environmental Medicine*, 80(1), 42-50.
DOI: http://dx.doi.org/10.1136/oemed-2022-108637

OPEN ACCESS

Original research

Effectiveness of adding motivational interviewing or a stratified vocational advice intervention to usual case management on return to work for people with musculoskeletal disorders: the MI-NAV randomised controlled trial

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► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/oemed-2022-108637).

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Received 2 September 2022
Accepted 26 October 2022
Published Online First 25 November 2022

ABSTRACT

Objectives To evaluate if adding motivational interviewing (MI) or a stratified vocational advice intervention (SVAI) to usual case management (UC), reduced sickness absence over 6 months for workers on sick leave due to musculoskeletal disorders.

Methods We conducted a three-arm parallel pragmatic randomised controlled trial including 514 employed workers (57% women, median age 49 (range 24–66)), on sick leave for at least 50% of their contracted work hours for ≥7 weeks. All participants received UC. In addition, those randomised to UC+MI were offered two MI sessions from social insurance caseworkers and those randomised to UC+SVAI were offered vocational advice from physiotherapists (participants with low/medium-risk for long-term sickness absence were offered one to two sessions, and those with high-risk were offered three to four sessions).

Results Median sickness absence was 62 days, (95% CI 52 to 71) in the UC arm (n=171), 56 days (95% CI 43 to 70) in the UC+MI arm (n=169) and 49 days (95% CI 38 to 60) in the UC+SVAI arm (n=169). After adjusting for predefined potential confounding factors, the results showed seven fewer days in the UC+MI arm (95% CI −15 to 2) and the UC+SVAI arm (95% CI −16 to 1), compared with the UC arm. The adjusted differences were not statistically significant.

Conclusions The MI-NAV trial did not show effect on return to work of adding MI or SVAI to UC. The reduction in sickness absence over 6 months was smaller than anticipated, and uncertain due to wide CIs.

Trial registration number NCT03871712.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Two previous trials have tested the effect of motivational interviewing (MI), to facilitate return to work (RTW), for people with musculoskeletal disorders, with conflicting results.

⇒ One previous trial has shown that a low intensity vocational advice intervention, reduced sickness absence by 5 days over 4 months for workers with musculoskeletal disorders in the UK.

WHAT THIS STUDY ADDS

⇒ The MI-NAV trial showed that adding MI or a stratified vocational advice intervention (SVAI) to usual case management resulted in a non-statistically significant reduction in sickness absence over 6 months for workers on sick leave due to musculoskeletal disorders in Norway.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ The MI and SVAI interventions should be replicated in future trials, powered to detect smaller differences between groups. Prior to conducting new trials, a minimal important difference for RTW outcomes should be decided through involvement of patients and other stakeholders.

To cite: Aanesen F, Grotle M, Rysstad TL, *et al*. *Occup Environ Med* 2023;**80**:42–50.

INTRODUCTION

Musculoskeletal disorders are the main contributors to years lived with disability worldwide.[1] In Norway, musculoskeletal disorders are the main cause of sick leave,[2] and are associated with a significant burden on individuals and economic costs to society.[3] Work disability and sick leave are influenced by healthcare, individual, social and work-related factors.[4] To address the large burden related to sick leave, effective individually-tailored

interventions targeting barriers to return to work (RTW) are needed.[5]

One intervention recommended in vocational rehabilitation is motivational interviewing (MI).[6] MI is a person-centred counselling style aimed at increasing motivation for change.[7] MI has been successful in increasing treatment adherence for people with musculoskeletal disorders[8] and chronic pain conditions,[9] and can be effective when provided as a brief intervention.[10] However, there is sparse evidence on the effectiveness of MI to facilitate RTW.[11 12]

Another intervention to help workers with musculoskeletal disorders to RTW, was developed and tested in the Study of Work And Pain (SWAP) trial in the UK.[13] The vocational advice intervention was based on the principles of case management to help participants overcome obstacles to RTW.[13] The SWAP intervention was offered to patients with musculoskeletal disorders consulting in general practices, who were struggling at work or on sick leave for less than 6 months.

Providing interventions to all workers on sick leave is extremely resource demanding, and may not be justified in a Norwegian context given that approximately 80% of the workers RTW during the first 8 weeks of sick leave.[2] The optimal time window for providing vocational interventions for people with musculoskeletal disorders seems to be between weeks 8 and 12 of sick leave.[14]

It is not known if the SWAP intervention could be effective when delivered as a stratified intervention, tailored according to risk for long-term sickness absence. Therefore, we aimed to assess if adding either MI or a stratified vocational advice intervention (SVAI) to usual case management (UC) reduced sickness absence days over 6 months, for workers with musculoskeletal disorders on sick leave for more than seven consecutive weeks. We conducted two independent comparisons:

1. UC compared with UC+MI.
2. UC compared with UC+SVAI.

METHOD

Design

The MI-NAV trial was a three-arm, pragmatic randomised controlled trial (RCT) with 6 months follow-up, including an internal pilot. We conducted the trial in cooperation with the Norwegian Labour and Welfare Administration (NAV). The methods have been reported previously in the study protocol,[15] in the process evaluation of the SVAI,[16] and in the fidelity evaluation of the MI intervention.[17] The Norwegian Centre for Research Data approved the project (861249), and the trial was conducted in accordance with the Helsinki declaration and the General Data Protection Regulation (GDPR). The trial is reported according to the Consolidated Standards of Reporting Trials extension statement for reporting multi-arm trials,[18] and CONSORT and SPIRIT Extension for RCTs Revised in Extenuating Circumstanses, (CONSERVE).[19]

Participants

Participants were workers aged 18–67 years, employed full-time or part-time, on sick leave with musculoskeletal disorders for at least 50% of their contracted work hours for at least seven consecutive weeks. We included workers diagnosed with musculoskeletal disorders listed in the second edition of the International Classification of Primary Care (ICPC-2).[20] We excluded: those with serious somatic or mental health disorders affecting their work ability and in need of specialised treatment (eg, cancer, psychotic disorders), pregnant women, unemployed, freelancers and self-employed workers and those lacking sufficient Norwegian or English language skills to answer the questionnaires or communicate by telephone.

Recruitment, stratification and randomisation

From April 2019 to October 2020 workers on sick leave due to musculoskeletal disorders were phoned from the NAV directorate. Every week the recruiters received lists of workers in week seven of sick leave, affiliated to eight NAV offices in South-Eastern Norway. Eligible candidates were informed about the trial and assured that participation was voluntary and did not affect sick leave benefits or UC provided by the NAV. Workers who agreed to participate received an electronic link to written information about the trial, an electronic informed consent form and the baseline questionnaire.

We used the Örebro Musculoskeletal Pain Screening Questionnaire Short Form (ÖMPSQ-SF),[21] and the Keele STarT MSK Tool,[22 23] to stratify the participants into two risk groups of long-term sick leave (described in online supplemental appendix 1). Participants with ≥9 on the Keele STarT MSK Tool and ≥60 on the ÖMPSQ-SF were stratified to a 'high-risk group', all others were stratified to a 'medium/low-risk group'. After stratification to the risk-group, participants were randomly allocated (1:1:1 allocation within each stratum of low/medium and high-risk). Group allocation was concealed for the recruitment staff. A statistician (MCS), with no involvement in the running of the trial, prepared a computer-generated allocation sequence for each risk-group, only available for the person in charge of group allocation (TLR).

Interventions

The interventions are described in detail in online supplemental appendix 1, and in the published fidelity and process evaluation.[16 17] All participants were offered UC for people on sick leave in Norway. In Norway, workers on sick leave are entitled to full wage replacement benefits for up to 12 months. The first 16 days are covered by the employer, the rest by the social security system administered through the NAV. In addition, participants randomised to the UC+MI arm were offered two face-to-face sessions of MI from a NAV caseworker. The first session was delivered at a local NAV office as soon as possible after inclusion, and the second session was held 2 weeks later. The participants in the UC+SVAI arm were offered vocational advice and case management from physiotherapists. Those stratified to the low/medium-risk group were offered one to two telephone sessions. Participants in the high-risk group were offered three to four sessions. The first session was held as soon as possible after inclusion. The duration of the follow-up period was flexible but ended when the participant reached 6 months of consecutive sick leave or had RTW in his/her contracted work hours for four consecutive weeks.

Training and fidelity evaluation

The MI training was a 6-day course provided by a clinical psychologist (RH) and psychiatrist (GB). The caseworkers were offered group mentoring from another psychologist, every other month during the intervention period. All were experienced MI trainers. In addition, the caseworkers could request individual feedback based on submitted recordings of MI sessions. The eight main caseworkers providing the MI were all women, aged between 27 and 65 years, with 2–20 years of work experience. The SVAI training was a 5-day course provided by a consultant physiotherapist and work and health researcher (GS). The

physiotherapists were offered online group mentoring approximately every month during the intervention period. The four main physiotherapists providing the SVAI were all women, aged between 28 and 45 years, with 4–21 years of work experience.

To assess the fidelity of the MI and SVAI, we recorded intervention sessions of approximately 10% of the participants receiving the interventions. In addition, the physiotherapists documented the follow-up they provided for each participant in an intervention log. The recordings of the MI sessions were scored by an independent MI analysis centre using the Motivational Interviewing Treatment Integrity code.[24]

Data collection

We obtained data from national registries including information on: sick leave benefits, sick leave certificates, disability pensions and contracted work hours. The primary outcome was the number of sickness absence days over 6 months defined as lost workdays. In Norway, people may combine part-time disability pensions with work. Therefore, any increase in disability pensions from baseline was also counted as sick leave. To convert time on sick leave to actual time away from work we accounted for the participants' contracted work hours and the amount of sick leave. This was summed up and converted to lost workdays, according to a 5-day working week when working full-time.

The participants completed a questionnaire at baseline covering: age, gender, education level, marital status, first language, height, weight, smoking, follow-up from employer (yes/no), conflict with employer (yes/no), work ability (single question from the Work Ability Index, 0–10 scale),[25] work satisfaction (single question from the original version of the ÖMPSQ, 0–10 scale[26]), physical activity in the previous week (single question from the Musculoskeletal Health Questionnaire (MSK-HQ), 0–7 scale[27 28]), musculoskeletal health (MSK-HQ, 0–56 scale[27 28]), health literacy (Health Literacy Scale Questionnaire 12, 12–72 scale[29]) and self-rated health (EuroQol Visual Analogue Scale 0–100), in addition to the Keele STarT MSK tool,[22 23] and the ÖMPSQ-SF.[21] For all scale variables, low values indicate low levels of the construct. To assess the representativeness of the trial sample, we obtained anonymised registry data covering sex, age, occupation, and contracted work hours from all eligible candidates.

Sample size

The sample size calculation was conducted for the number of sickness absence days over 6 months. There is no agreed minimal important difference for this outcome described in the literature. Therefore, we based the power calculations on results from trials evaluating similar interventions for people with musculoskeletal disorders (the UK SWAP trial,[13] and a trial conducted in Sweden with a similar welfare system to Norway[30]). Based on these trials we anticipated a difference of 10 days (two full work weeks) over 6 months between UC and UC+MI or UC+SVAI, with an expected SD of 28 days. Given a statistical power of 80% and a two-tailed 5% significance level, we estimated needing 125 participants in each arm. After adjustment for expected skewed data and 5% loss to follow-up we estimated needing to include 150 participants in each trial arm.

Data analyses

Analyses were performed in accordance with the published statistical analysis plan,[15] in Stata/MP V.16.1 by the first and last author (FA and BEØ) and a statistician (MCS) masked to treatment allocation. We performed descriptive statistics on all data and investigated the distributions of the variables with histograms and the Shapiro-Wilk and skewness-kurtosis tests for normality.

Analyses of differences in the primary outcome

The primary intention-to-treat (ITT) analysis was conducted using robust multiple linear regression, with sickness absence days as the dependent variable. We entered the 'trial-arms' and possible confounders (predefined in the statistical analysis plan[15]) as independent variables. To include participants with missing values, 10 data sets were imputed using multiple imputations by chained equations, following the guidance by White and colleagues.[31] Auxiliary variables included in the imputation model were: duration of sick leave at baseline, Keele STarT MSK risk group, ÖMPSQ-SF risk group, work satisfaction and self-rated health. We checked normal probability plots, residual scatterplots and values for leverage, Cook's distance and variance inflation factors to see if the assumptions for linear regression were met. If necessary, variables were log-transformed.

In addition, we conducted a complete case analysis. Unadjusted analyses of the differences in median and mean sickness absence days were investigated with Mann-Whitney Wilcoxon tests and t-tests. We conducted 10 000 bootstrap samples to estimate 95% CIs for the median value of sickness absence days in each trial arm.

All the statistical tests were two-sided and a p value<0.05 was regarded as statistically significant. We did not adjust for multiple comparisons as the trial evaluated the difference between UC+MI and UC+SVAI versus UC separately,[18] and a single model was used for the multiple analyses.

Sensitivity analyses

Three unadjusted sensitivity analyses were performed: (1) excluding the participants recruited during the internal pilot, (2) excluding participants who had RTW for >50% of their contracted work hours 1 week after baseline (as the protocol stated that the MI and SVAI should not be delivered to participants who had RTW for >50% before the first session), (3) a moderation analysis to test if the COVID-19 pandemic moderated the effectiveness of MI or SVAI. The analysis was conducted using robust multiple linear regression including 'trial arms', and a variable indicating if the 6-month follow-up was completed before or after the government-imposed restrictions due to the COVID-19 pandemic, plus interaction terms between these two variables.

Patient involvement

Patient representatives with various musculoskeletal disorders were involved in the planning of the trial. They provided guidance related to the relevance, aim and conduct of the trial and helped with the wording of the information provided to trial participants.

RESULTS

Enrolment

A total of 514 workers participated in the trial. An overview of enrolment and flow of participants is shown in online supplemental appendix 2 and figure 1. No major changes were made during the pilot phase, and the pilot participants (n=101) were included in the analyses. Recruitment was halted between 12 March 2020 and 30 March 2020 due to COVID-19 containment strategies, and we made some minor trial modifications (listed in online supplemental appendix 3). Five participants withdrew

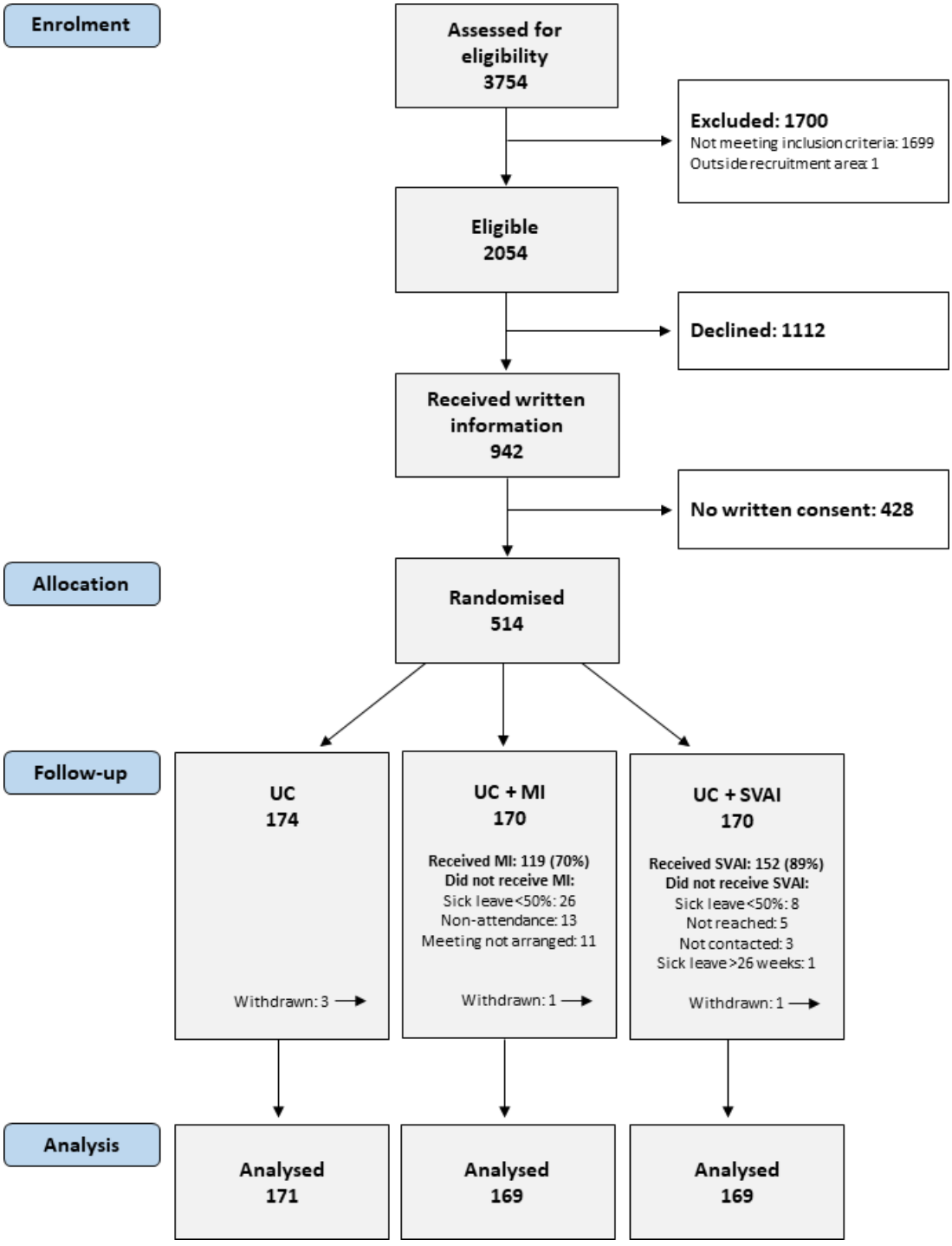

Figure 1 Flow chart of inclusion and follow-up of trial participants. MI, motivational interviewing; SVAI, stratified vocational advice intervention; UC, usual case management.

from the trial. Due to the GDPR, we could not obtain registry data from withdrawals, leaving 509 (99%) participants for the ITT analyses. No adverse events were reported during the trial.

Baseline characteristics of the participants

Baseline characteristics are summarised in table 1. The median age of participants was 49 years (range 24–66 years) and 57% were women. Totally, 341 participants (66%) worked in full-time positions, and 315 (62%) were on full sick leave at baseline. Overall, the baseline characteristics were similar across the three trial arms. The trial sample was representative regarding age, sex and occupation compared with all eligible candidates (online supplemental appendix 4).

Intervention delivery

The number of sessions and duration of the MI and SVAI interventions are listed in table 2. Following the COVID-19 pandemic 22 (10%) of the MI sessions were provided by telephone or video call. All the SVAI sessions were provided by telephone and none of the physiotherapists attended workplace meetings.

Table 1 Baseline characteristics of participants

Characteristic	Missing n (%)	UC (n = 174)	UC+MI (n = 170)	UC+SVAI (n = 170)
Age (years), median (IQR)		49 (40–55)	49 (41–56)	49 (41–56)
Women, n (%)		94 (54)	99 (58)	100 (59)
Married/living with partner, n (%)	1 (0.2)	120 (69)	119 (70)	119 (70)
Norwegian as first language, n (%)	2 (0.4)	151 (87)	154 (91)	145 (86)
Education, n (%)				
Compulsory education		21 (12)	14 (8)	20 (12)
High school		92 (53)	95 (56)	84 (49)
College or university <4 years		40 (23)	46 (27)	49 (29)
College or university ≥4 years		21 (12)	15 (9)	17 (10)
Health literacy* (12–72), median (IQR)	49 (10)	51 (44–60)	53 (45–59)	52 (44–59)
Smokers, n (%)		39 (22)	35 (21)	36 (21)
Body mass index (kg/m^2), median (IQR)	13 (3)	28 (24–31)	27 (24–31)	27 (24–31)
Days of physical activity previous week, n (%)	1 (0.2)			
0 days		65 (37)	54 (32)	64 (38)
1-2 days		46 (26)	43 (25)	39 (23)
3-4 days		38 (22)	45 (27)	41 (24)
5-7 days		25 (14)	27 (16)	26 (15)
Musculoskeletal health† (0–56), mean (SD)	21 (4)	27 (9)	27 (8)	27 (8)
Work ability‡ (0–10), median (IQR)	3 (0.6)	2 (0–5)	3 (1–5)	3 (0–5)
ÖMPSQ-SF§ (≥60), n (%)		65 (37)	55 (32)	59 (35)
Keele STarT MSK tool (0–12)				
High risk (≥9), n (%)		61 (35)	49 (29)	48 (28)
Medium risk (5–8), n (%)		85 (49)	86 (51)	98 (58)
Low risk (<5), n (%)		28 (16)	35 (21)	24 (14)
High-risk for long-term sick leave¶, n (%)		38 (22)	36 (21)	35 (21)
Work satisfaction** (0–10), median (IQR)	1 (0.2)	8 (6–9)	8 (7–9)	8 (6–9)
In conflict with employer, yes n (%)	4 (0.8)	6 (3.5)	5 (3.0)	14 (8.3)
Followed-up by employer, n (%)	7 (1)			
No follow-up		65 (38)	72 (44)	72 (43)
Dialogue meeting or follow-up plan		64 (37)	53 (32)	65 (38)
Dialogue meeting and follow-up plan		44 (25)	40 (24)	32 (19)
White-collar workers, n (%)		58 (33)	56 (33)	61 (36)
Blue-collar workers, n (%)		116 (67)	114 (67)	109 (64)
Work, n (%)				
Full-time		120 (69)	110 (65)	111 (65)
Part-time 50–99% of full work hours per week		39 (22)	53 (31)	48 (28)
Part-time <50% of full work hours per week		15 (9)	7 (4)	11 (6)
Graded disability pension††, yes n (%)	5 (1)	15 (9)	12 (7)	9 (5)
Sickness absence days previous year (work days‡‡), median (IQR)	5 (1)	38 (30–50)	35 (31–50)	36 (26–50)
Duration of consecutive sick leave at baseline (calendar days), median (IQR)	5 (1)	51 (50–55)	51 (50–55)	51 (49–56)
Sick leave at baseline, n (%)	5 (1)			
Full-time sick leave		103 (60)	109 (65)	103 (61)
Sick leave 50–99% of contracted work hours		65 (38)	54 (32)	63 (37)
Sick leave <50% of contracted work hours		3 (2)	6 (4)	3 (2)
Area of body pain, n (%)	14 (3)			
Lower limb		6 (4)	18 (11)	15 (9)
Upper limb		30 (18)	30 (18)	30 (18)
Neck		12 (7)	12 (7)	10 (6)
Back		34 (20)	42 (25)	43 (26)
Multisite pain		12 (7)	8 (5)	10 (6)
Joint disorders		20 (12)	13 (8)	10 (6)
Fractures		14 (8)	16 (10)	11 (7)
Other		40 (24)	26 (16)	38 (23)

The distribution was skewed for all continuous variables, except for the MSK-HQ.
*Measured with the Health Literacy Scale Questionnaire.
†Measured with the Musculoskeletal Health Questionnaire (MSK-HQ).
‡Measured with a single question from the Work Ability Index.
§ÖMPSQ-SF: The Örebro MSK Pain Screening Questionnaire Short Form (0–100).
¶High-risk group in the MI-NAV trial: ≥60 on the ÖMPSQ-SF and ≥9 on the Keele STarT MSK Tool.
**Work satisfaction: 0=not satisfied at all, 10=totally satisfied.
††Individuals who work part-time and receive a graded disability pension.
‡‡Lost workdays due to sick leave, adjusted for work hours per week and amount of sick leave.
MI, motivational interviewing; n, number of participants; SVAI, stratified vocational advice intervention; UC, usual case management.

Primary outcome

Three participants did not have any sickness absence from baseline to 6 months follow-up (some participants were late in answering the baseline questionnaire and had RTW before inclusion in the trial) (figure 2). Thirteen participants reached the maximum amount of sickness absence possible during the follow-up period (131 days). The distribution of sickness absence days from baseline to 6 months follow-up was skewed in all three trial arms.

Unadjusted analyses

The UC+MI arm had 6 fewer median days of sick leave compared with the UC arm (not statistically significant (ns)) and the mean difference was 7 fewer days (95% CI −16 to 2) (ns) (table 3). The UC+SVAI arm had 13 fewer median days of sick leave compared with the UC arm (p=0.04), the mean difference

Table 2 Summary of delivery of MI and SVAI

	UC+MI (n=170)	UC+SVAI (n=170)
Received intervention, n (%)	119 (70)	152 (89)
Number of sessions*, n (%)		
One session	3 (2)	13 (8)
Two sessions	106 (62)	106 (62)
Three sessions	n.a.	10 (6)
Four sessions	n.a.	19 (11)
Days until first session*, mean (SD)	21 (13)	6 (5)
Intervention period* (days), mean (SD)	36 (17)	50 (27)
Intervention period low/medium-risk group	n.a.	42 (21)
Intervention period high-risk group	n.a.	74 (30)
Duration of first session† (min), median (IQR)	41 (26–45)	45 (35–60)
Duration of follow-up sessions‡ (min), median (IQR)	46 (45–49)	25 (20–30)

*We did not have data on 4 of the participants receiving SVAI and 10 participants receiving MI.
†We only had data from 15 MI sessions.
‡We only had data from 6 MI sessions.
%, per cent of participants randomised to the intervention arm; MI, motivational interviewing; n, number; n.a., not applicable; SVAI, stratified vocational advice intervention; UC, usual case management.

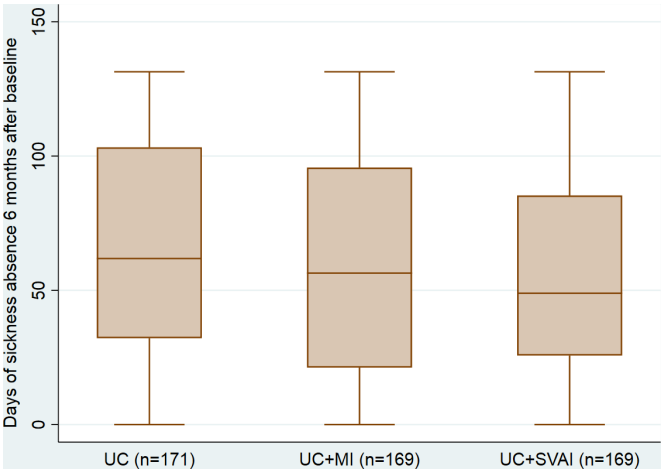

Figure 2 Distribution of sickness absence days (median, IQR and range) for participants in each of the trial arms. MI, motivational interviewing; SVAI, stratified vocational advice intervention; UC, usual case management.

was 9 fewer days (95% CI −17 to −0.1) (p=0.04) compared with UC (table 3).

Adjusted analyses

The assumptions for linear regression were met apart from several outliers. We conducted robust linear regressions to reduce the outliers' effect on the estimates (table 4). The primary imputed analysis (n=509) showed that the UC+MI arm had 7 fewer days of sickness absence (95% CI −15 to 2) compared with UC (ns). The UC+SVAI arm also had 7 fewer days (95% CI −16 to 1) compared with the UC arm (ns). In the complete case analysis (n=479) the difference was 9 fewer days for both the UC+MI arm (95% CI −18 to −0.4) and the UC+SVAI arm (95% CI −18 to −0.7), compared with the UC arm (p<0.05).

Sensitivity analyses

We only observed minor differences in the sensitivity analyses compared with the ITT analysis (table 3). The interaction terms in the moderation analysis to test if the COVID-19 moderated the effect of MI or SVAI had large CIs and were not statistically significant.

DISCUSSION

Principal findings

The MI-NAV trial showed a 7-day reduction in sickness absence over 6 months of adding either MI or SVAI to UC, for workers on sick leave due to musculoskeletal disorders. However, the results were estimated with low precision reflected in wide CIs, the differences were smaller than anticipated and not statistically significant.

The MI intervention compared with previous studies

Although our findings were not statistically significant, they are in line with findings from a Canadian cluster RCT, indicating that MI could reduce sickness absence among people with musculoskeletal disorders.[32 33] In the Canadian trial MI was added to interdisciplinary rehabilitation at a rehabilitation centre, and reduced the recurrence of wage replacement benefits by 5% over 12 months for employed workers.[32] In the Canadian study MI was provided by occupational and exercise therapists.[32 33] However, the role of a NAV caseworker differs from a healthcare professional and they do not have medical training. A recent study, interviewing workers on sick leave who had received MI from NAV caseworkers, showed that although the workers had negative expectations to the NAV (because of their role as gatekeepers to sickness benefits), they developed a good relationship to the NAV caseworkers and experienced the MI sessions as positive and helpful in the RTW process.[34] Similar findings have been shown among workers on sick leave in Sweden,[35] and an RCT from the USA has shown that MI training can improve working alliance between clients and RTW counsellors.[36]

The NAV caseworkers in our trial provided the MI in addition to their usual workload. This may explain the long duration from baseline until the first MI session, and was the main reason that 30% of the participants in the MI arm did not receive MI. Four caseworkers dropped out during our trial due to an otherwise high workload or lack of MI experience.[17] The evaluation of the 21 recorded MI sessions from the MI-NAV trial revealed that although the NAV caseworkers had high adherence to the MI guideline, they had low MI proficiency levels throughout the trial.[17] This is in line with findings from a similar Norwegian study.[37] These factors may have reduced the effectiveness of the MI intervention in our study.

The SVAI compared with previous studies

The results from the MI-NAV trial support the findings of the SWAP trial indicating that vocational advice could reduce sickness absence among workers with musculoskeletal disorder. However, our results were not statistically significant after adjusting for possible confounders. The SWAP trial showed a reduction of 5 days of sickness absence over 4 months of adding a vocational advice intervention to best current primary care in the UC.[13] In both trials the vocational intervention was provided

Table 3 Unadjusted analyses. Sickness absence days over 6 months, comparison between UC and UC+MI or UC+SVAI

	UC			UC+MI			UC+SVAI		
	n	Mean (SD)	Median (95% CI)	n	Mean (SD)	Median (95% CI)	n	Mean (SD)	Median (95% CI)
ITT	171	66 (41)	62 (52–71)	169	59 (41)	56 (43–70)	169	**57*** (38)	**49*** (38–60)
Low/medium-risk group	135	63 (41)	58 (48–69)	133	55 (41)	45 (29–61)	134	55 (37)	48 (37–59)
High-risk group	36	76 (40)	79 (60–97)	36	73 (42)	71 (52–90)	35	66 (40)	61 (33–90)
Sensitivity analysis 1	137	66 (41)	62 (49–74)	139	58 (41)	57 (43–71)	132	58 (39)	53 (41–65)
Sensitivity analysis 2	163	68 (40)	65 (57–74)	158	62 (41)	59 (47–71)	154	59 (37)	54 (43–65)

ITT, intention-to-treat analysis (five missing: three in UC arm, one in UC+MI arm, one in UC+SVAI arm).
Sensitivity analysis 1: excluding pilot participants.
Sensitivity analysis 2: excluding participants who returned to work ≥50% within 1 week after baseline.
*Statistically significant difference (p<0.05) compared with UC only,tested with t-test or Mann-Whitney Wilcoxon test.
95% CI, 95% confidence interval (estimated with 10 000 bootstrap resamples); MI, motivational interviewing; n, number of participants in analysis; SVAI, stratified vocational advice intervention; UC, usual case management.

Table 4 Robust linear regression analyses. Estimation of differences in sickness absence days over 6 months between UC and UC+MI or UC+SVAI

	Unadjusted ITT analysis (n=509)			Adjusted complete case analysis* (n=479)			Adjusted primary ITT analysis with imputations*† (n=509)		
Variable	Coef. B	95% CI		Coef. B	95% CI		Coef. B	95% CI	
UC+MI	−7.3	−16.6	1.9	**−9.2‡**	**−17.9**	**−0.4**	−6.6	−15.0	1.8
UC+SVAI	**−9.3‡**	**−18.5**	**−0.1**	**−9.4‡**	**−18.0**	**−0.7**	−7.0	−15.4	1.4
Sex, male				11.2‡	3.8	18.7	11.8‡	4.6	19.1
Age				−0.1	−0.4	0.3	−0.0	−0.4	0.3
Secondary school§				2.6	−9.6	14.8	1.9	−9.7	13.5
Higher education <4 years§				2.8	−10.3	16.0	2.9	−9.7	15.5
Higher education ≥4 years§				−11.0	−26.9	4.9	−10.3	−25.4	4.8
Meeting or follow-up plan¶				−7.2	−15.3	0.9	−5.6	−13.5	2.2
Meeting and follow-up plan¶				−5.0	−14.4	4.4	−3.5	−12.6	5.7
Physical activity 1–2 days**				0.7	−8.8	10.1	1.1	−8.1	10.3
Physical activity 3–4 days**				6.5	−3.2	16.3	3.5	−4.1	18.0
Physical activity 5–7 days**				8.1	−3.3	19.5	7.0	−4.1	18.0
Work ability††				−3.5‡	−5.0	−2.1	−3.8‡	−5.2	−2.4
Musculoskeletal health‡‡				−0.8‡	−1.3	−0.3	−0.7‡	−1.2	−0.02
Sickness absence days previous year§§				19.5‡	13.1	25.8	19.1‡	12.9	25.3

n, number of participants in analysis (ITT analysis: UC n=171, UC+MI n=169, UC+SVAI n=169, complete case analysis: UC n=158, UC+MI n=157, UC+SVAI n=159)
*Multiple robust linear regression analyses adjusted for predefined possible confounding factors.
†Values for missing on the independent variables were imputed with multiple imputations by chained equations with 10 imputations. Imputations were not conducted for the five missing outcome values.
‡p<0.05.
§Education: dummy variables compared with compulsory education.
¶Follow-up from employer, dummy variables compared with no follow-up.
**Physical activity 1 week prior to baseline, dummy variables compared with no physical activity.
††Measured with single question from the Work Ability Index (0–10).
‡‡Measured with the Musculoskeletal Health Questionnaire (0–56).
§§Number of days away from work due to sickness absence 12 months prior to baseline, logarithmic transformed variable.
Coef., Coefficient.; ITT, intention-to-treat; MI, motivational interviewing; SVAI, stratified vocational advice intervention; UC, usual case management.

by physiotherapists mostly by telephone, and a median of two sessions was provided. However, the SVAI was delivered as stratified care with one to two sessions provided for the low/medium-risk group, and three to four sessions for the high-risk group. The SWAP intervention, on the other hand, was delivered as stepped care, with the possibility of providing more sessions if necessary. In the SWAP trial 57% of the participants were doing their usual job, while the participants in the MI-NAV trial had been on sick leave for more than seven consecutive weeks. Therefore, the participants in our trial might have needed more RTW support, compared with the workers in the SWAP trial and it might have been preferable to deliver the intervention as stepped care (with the possibility of providing more sessions to participants who needed more help to RTW).

Although the SVAI was mainly delivered according to protocol, some intervention elements were poorly implemented.[16] The physiotherapists did not attend workplace meetings or arrange face-to-face meetings with participants. They also had few contacts with important RTW stakeholder such as NAV caseworkers, employers and general practitioners.[16] Previous studies have shown that cooperation between RTW stakeholders is important,[38] and the physiotherapists limited liaison with stakeholders may have reduced the effectiveness of the SVAI in our trial.[16]

Strengths and limitations of the MI-NAV trial

The multi-arm RCT design made it possible to compare two additional interventions with a single UC arm, optimising the use of limited research resources.[39] We obtained detailed national registry data for 99% of the trial participants and conducted thorough fidelity evaluations. To reduce the risk of intervention contamination, the NAV offices had not trained their caseworkers in MI prior to the trial. The caseworkers were instructed not to use MI in usual follow-up of people on sick leave with musculoskeletal disorders. The physiotherapists delivering the SVAI only provided vocational follow-up to participants randomised to the SVAI arm.

Our trial had limitations in addition to those previously discussed. First, we had a low inclusion rate of 25% of those eligible. However, registry data showed that our sample was representative of the larger population regarding important factors associated with sick leave (sex, age and occupation). Furthermore, there is no agreed minimal important difference for sickness absence. A 7-day difference may be considered an important effect. However, our trial was not powered to detect this difference as statistically significant. Large variability in the data may also have reduced the statistical power of our trial. Another limitation is that the trial was not powered to perform subgroup analyses to detect possible differences in effects of adding MI or SVAI to UC for the low/medium-risk group and the high-risk group separately, or to compare UC+MI with UC+SVAI. This would have required an unrealistically large sample size. The participants in the UC+MI arm and the UC+SVAI arm received more follow-up compared with participants in the UC arm. Therefore, we cannot rule out that it was the extra follow-up and not the intervention elements that facilitated RTW. This will be controlled for in a recent RCT using the same MI intervention as the MI-NAV trial.[40] Lastly, possible intervention contamination from the NAV caseworkers was not evaluated in the process evaluation of the trial. However, the risk for contamination with the UC arm was low since NAV caseworkers usually do not convene a meeting with workers during the first 6 months of sick leave.

CONCLUSION

Adding MI or SVAI to UC for workers on sick leave for at least 7 weeks due to musculoskeletal disorders, reduced sickness absence by an average of 7 workdays over 6 months. The differences were not statistically significant, and the results were uncertain due to wide CIs. Efforts should be made to improve implementation of the MI and SVAI in future trials, and it might be preferable to provide the interventions as stepped care. The acceptability of the MI and SVAI to those providing and receiving the interventions should be investigated.

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Acknowledgements We are very grateful to all who have contributed to the study: the study participants, the stratified vocational advice intervention (SVAI) physiotherapists, Norwegian Labour and Welfare Administration (NAV) caseworkers and the patient engagement panel at Oslo University Hospital. We would like to thank user representative Astrid Torgersen Lunestad, the NAV directorate by Bjørn Are Hultman, Kari Paulsen, Ann Kristin Johnson, Solgunn Måløy, Jørgen Grøttan and Ola Thune, our collaborators at Norwegian University of Science and Technology, especially Lene Aasdahl for advice on organising the registry data, motivational interviewing (MI) supervisor for the NAV caseworkers Christine K Monsen, research assistant Rune Solli responsible for recruitment, collaborator in the MI and SVAI evaluation Hedda Eik and all other collaborators in the MI-NAV study.

Contributors MG and EF had the idea for the MI-NAV trial and wrote the funding application. MG, EF, BEØ, GW-J, NEF, MWvT and KS were involved in designing the trial. BEØ was responsible for organising the randomised controlled trial. FA and AT were responsible for cooperation with the patient engagement panel, recruitment of participants and physiotherapists and organisation of the SVAI mentoring. GS, GW-J, FA, AT, BEØ and MG developed the SVAI materials. GS was responsible for the SVAI training and contributed to the mentoring of the SVAI physiotherapists. GB and RH designed the MI intervention, wrote the MI guideline, developed the MI training material and were responsible for the initial training of the NAV caseworkers. IL organised the audio recordings of the intervention sessions. AT was responsible for the data collection from the questionnaires. TLR was responsible for the randomisation process and organised the registry data. MCS, FA and BEØ were responsible for the data analyses. The first draft of the manuscript was written by FA. All authors critically revised and commented on the manuscript drafts and read and approved the final manuscript. FA and BEØ are guarantors for the study and accept full responsibility for the work and conduct of the study. The corresponding author FA attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Funding Funding was granted by governmental organisations. The Research Council of Norway was the main funder of the trial (grant no. 280431) and had no role in the design, data collection, analysis, reporting or dissemination of the trial. The Norwegian Labour and Welfare Administration and Oslo Metropolitan University contributed with personnel, infrastructure and coordination of the trial.

Competing interests None declared.

Patient consent for publication Not applicable.

Ethics approval The Regional Committee for Medical and Health Research Ethics assessed the trial according to the ACT 2008-06-20 no.44: Act on medical and health research and decided that it did not need approval from the Committee (2018/1326/REK sør-øst A). Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request. Requests to access data should be addressed to the last author: brielo@oslomet.no. Anonymised individual participant data (including data dictionary) will be available on request, from January 2023 to December 2028, to researchers who provide a methodologically sound scientific proposal that has been approved by an ethics committee and by the scientific board of the MI-NAV study.

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APPENDIX 1: INTERVENTIONS IN THE MI-NAV TRIAL

Usual case management (UC) according to guidelines from the Norwegian Labour and Welfare Administration (NAV)

All Norwegian citizens and people working in Norway are entitled to health care through the Norwegian National Insurance Scheme. Workers on sick leave are entitled to full wage replacement benefits for up to 12 months. The first 16 days are covered by the employer, the rest by the social security system administered through the NAV. To be entitled to sickness benefits from the NAV a sick note is required, usually issued by a medical doctor. Employers and employees are obliged to cooperate to try to prevent long-term sickness absence. During the first six months of sick leave the employer has the main responsibility for follow-up and should make a follow-up plan in cooperation with the worker within the first four weeks of sick leave. The plan should include information about the employee's work duties, workability, and possible work adaptations. Within week eight of sick leave, the employee should start work-related activity (unless it is not possible due to medical reasons). If the worker is still on full-time sick leave after eight weeks, the NAV may request documentation that work related activity is not possible. The employer is responsible for arranging a dialogue meeting with the employee within week seven of fulltime sick leave (unless it is clearly unnecessary). The purpose of the meeting is to prevent long-term sickness absence and discuss if workplace modifications are required. Within six months of sick leave the local NAV office is responsible for arranging a second dialogue meeting, including the employee, employer, and sick-leave certifier (if appropriate). The second dialogue meeting can be arranged earlier if requested by any of the parties.

Motivational interviewing (MI) according to the protocol

The MI intervention was a replication of an intervention, evaluated in a Norwegian trial conducted concurrently in Trondheim (Aasdahl et al. 2018). MI is a practical tool for counselors developed by William Miller and Stephen Rollnick to help people change. It is rooted in the person-centered approach of Carl Rogers and is inspired by several social and behavioral models. MI is based on the principle that people have the resources within themselves to change (self-determination theory). Motivation for change is activated through the person`s own change talk.

The participants randomised to the UC+MI arm were offered two face-to-face sessions of MI from NAV caseworkers, in addition to UC. The sessions could last up to one hour. The first session was delivered at a local NAV office as soon as possible after enrolment in the study, and the second session was held 2 weeks later. The NAV caseworkers followed a MI guideline developed for return to work (RTW) by Gunnhild Bagøien (a psychiatrist and member of the motivational interviewing network of trainers) and Roger Hagen (a clinical psychologist). The guideline was based on MI principles to build a collaborative relationship with the participants, including communication skills such as asking open-ended questions, providing reflections, and summaries to evoke and enhance change talk. In the first session, an agenda was set in cooperation with the participant through 'agenda mapping' (the participant decided the agenda for the conversation from a menu of topics, based on what they considered to be most relevant for their situation). The participants' readiness to return to work was assessed (using the MI tools: 'importance ruler' and 'confidence ruler'), and the intervention was tailored according to motivational stage (stages of change). If the participant

was ambivalent about RTW, the pros and cons of sickness absence were explored in an accepting and compassionate manner. In the second session, the participant's current work situation, obstacles to RTW and previous attempts at RTW were discussed. The caseworkers provided information about available RTW support from the NAV in a MI-consistent manner. If the participant was ready for RTW, the NAV caseworker offered to help them develop an action plan for RTW. Summaries of each session were made available to the participants on the NAV's secure online communication platform.

Stratified vocational advice intervention (SVAI) according to the protocol

Stratification

We used the 10-item version of the Örebro Musculoskeletal Pain Screening Questionnaire Short Form (ÖMPSQ-SF) (Linton et al 2011), and the 10-item Keele STarT MSK Tool (Dunn et al. 2021), to stratify the participants into two risk groups of long-term sick leave. Participants with ≥9 on the Keele STarT MSK Tool and ≥60 on the ÖMPSQ-SF were stratified to a 'high-risk group', all others were stratified to a 'medium/low-risk group'. The cut-off points were based on preliminary data from a prospective cohort study conducted as part of the MI-NAV project. The preliminary results from this cohort study showed that the combination of these tools had the greatest accuracy in distinguishing between short versus long-term sick leave in workers on sick leave due to musculoskeletal disorders in Norway (unpublished results). The ÖMPSQ-SF assesses five psychosocial risk factors related to future disability: 1) self-perceived function, 2) pain experience, 3) distress, 4) fear-avoidance beliefs, and 5) RTW expectancy. Sum scores range from 1-100 points with higher scores indicating higher estimated risk of future work disability. The Keele STarT MSK tool consists of 10 items assessing: pain intensity, pain self-efficacy, pain bothersomeness, disability, comorbid pain, expected duration of the condition, self-perceived health, depression, fear avoidance and pain duration (during the last two weeks). Sum scores range from 0-12 points, with values from 0-4 points indicating low risk, 5-8 points indicating medium risk, and 9-12 points indicating high risk for poor prognosis.

Intervention

The SVAI was a modified version of an intervention developed for the SWAP trial (Sowden et al. 2019). The theoretical underpinning of the intervention was social cognitive theory, self-determination theory and the common-sense model of self-regulation (Aanesen et al. 2021).

The participants stratified to the low/medium-risk group were offered up to two telephone sessions. The sessions could last up to one hour. Participants in the high-risk group were offered three to four sessions, the first by telephone, the remaining sessions either by telephone or face-to-face, including an optional workplace meeting. The first session was held as soon as possible after the baseline assessment. The duration of the follow-up period was flexible but ended when the participants reached 6 months of consecutive sick leave or had RTW in their contracted work hours for 4 consecutive weeks. During the first session, the physiotherapists followed a semi-structured conversation guide with open-ended questions to clarify the participants' work and health situation and identify obstacles to RTW. During the sessions, the physiotherapists provided evidence-based advice on the management of musculoskeletal disorders and supported problem-solving to overcome modifiable obstacles to RTW. The follow-up provided by the physiotherapists was tailored according to the participants' needs and individual RTW barriers. They collaborated with the participants to decide goals for RTW, developed and implemented action plans, facilitated communication,

collaboration and coordination with stakeholders and signposted to other services if necessary.

Information leaflet for participants receiving SVAI

Research study aiming to help sick listed people with musculoskeletal disorders back to work

The research study is led by researchers from the MUSK health research group at Oslo Metropolitan University, OsloMet. The aim of the study is to find ways to help people who are sick-listed with musculoskeletal disorders. The study will test two different types of dialogue based interventions. All participants will receive usual follow up from NAV in addition to the interventions given in the study. They can also receive medical treatment from other health care professions during the trial if they wish.
You can find more information about the study on the following link:
https://www.muskhealth.com/minav3

Vocational advice from physiotherapist

You have agreed to participate in the study and have been randomly assigned to receive vocational advice from a physiotherapist. The physiotherapist will discuss topics related to your health and work situation and try to help you get back to work.
The physiotherapist does not have any connection to the NAV or your employer.
Confidentiality: The physiotherapist is bound by law to follow high standards of confidentiality and can't share information with your employer or the NAV without your consent.

What can the physiotherapist do?

- Discuss concerns you have regarding health and work.
- Help you make a return to work plan.
- Identify barriers for returning to work.
- Suggest actions to help you return to work, e.g. suggest adaptions to your work situation, give advice regarding treatment, and how to cope with your health problems.

If you consent the physiotherapist can also:

- Collaborate with you doctor or other health care professionals.
- Collaborate with your employer.

What can you do to get back to work sooner?

- Keep in contact with your workplace and colleagues. You and your employer are responsible for making a follow up plan. Your employer is also responsible for making adaptions to your work if this is necessary for you to be able to return. Your duty is to collaborate with your employer to make this possible.

- Talk to your doctor or physiotherapist about how they can help you get back to work. You know your work best. Discuss which parts of your job you can do with your health problem. Ask for treatment designed to get you ready for work.
- Gradually increase your activity level. Start with the activities you find easy, and do a bit more each day. You will have good days and bad days. Try to keep active also on the bad days. Vary between rest and activity. It is common to have set backs - so don't give up!

Evidence based information about work and health

- Research shows that in general work is good for mental and physical health. Work is important for self-esteem and quality of life.
- Being absent from work can have negative effects for health and wellbeing.
- Musculoskeletal disorders are very common and all of us suffer these kinds of problems at some time in our life.
- The pain can be very distressing and may make life difficult, but there is usually no serious disease or lasting damage. Most episodes end quickly, though some symptoms may continue or come back from time to time.
- We have good evidence that returning to work as soon as possible helps recovery, and is the best way to avoid long-term sickness absence.

There are many unhelpful myths about health and work, which can cause unnecessary fear and uncertainty:

1. *Common health problems are caused by work.* Usually they are not. Everyone has these kinds of problems. Some type of work can make the symptoms feel worse, but usually work does not cause the problem.
2. *Work will make my condition worse:*
   Most people with musculoskeletal disorders can continue working. In many cases going back to work can help you feel better.
3. *You should not go back to work until you are fully recovered:*
   Usually the opposite is true. Work can be part of treatment. Getting back to work and activity can help you recover. Adjustments to your work can make it possible to return to work sooner.
4. *A sick certificate means that you must not work:*
   A sick certificate is not an order from your doctor to stay away from work, it only means you are entitled to sick pay. You can return to work as soon as you are ready.

Conversation guide for the SVAI physiotherapists

INTRODUCTION		
Suggested introduction in first telephone contact My name is … I am a physiotherapist from the MI NAV research project, am I talking to….. ? Is this a good time to talk? IF NO: Make new appointment. IF YES: Thank you for participating in our study. Could you please tell me your address and date of birth? Is it OK that I tell you a bit about the research project and the part of the study you have been assigned to? The research project is led by researchers from the MUSK health research group at OsloMet (Oslo Metropolitan University). The aim of the study is to find ways to improve follow-up for people who are on sick leave with musculoskeletal disorders. In the study we are testing two different interventions and compare these to usual follow-up from the NAV. I am calling you because you are in the group who will get help from a physiotherapist trained to give vocational advice. **My job is to help you get back to work, but I do not have any connection with the NAV or with your employer.** Do you have any questions regarding this? During our conversation today I wish to get to know your situation and any problems you have regarding returning to work. **I am bound by law to keep anything you tell me confidential and can't share information with NAV or your employer without your consent.** I know that you have answered a questionnaire for this project, but I don't have access to your answers. Is it OK if I ask you some questions regarding your health and your situation at home and at work?		
CLARIFY CURRENT WORK AND HEALTH SITUATION		
Ask open questions and use reflection to build rapport and clarify the participants health and work situation. Gather information regarding all the questions in red on this form, the rest of the questions can be asked when appropriate/if you need more information. Write notes for every topic. You do not need to follow the order of the form, but you should cover all the topics during the conversation		
WORK SITUATION		
Sick-listed date	**% sick listed**	**End of sick certificate**
Can you describe your current work situation? • *What is your current occupation/title?* • *What are your contracted hours of work? (contract work %, days and hours at work, shift pattern)* • *Do you usually work more than your contracted hours?* • *Do you usually work overtime?* • *What does a typical day at work for you look like?/ What does your job involve? (Physical job demands, emotional and cognitive job demands).*		
IDENTIFY OBSTACLES TO RETURN TO WORK		
Use open ended questions, reflection and summarising to identify obstacles to return to work. Note any identified obstacles in the action plan.		
How are your symptoms /condition affecting your ability to work? • *What do you think about working with your present pain/ symptoms?*		

- *Are you worried about any repeat episodes of symptoms/problems once you return to work*?
- *How do you feel about the prospect of returning to work at some point?*

What are your main concerns about RTW?

- *What would make RTW difficult now*?
- *Are there stressful elements to your job that might be difficult when you first return to work*?
- *Aside from your symptoms are there any other reasons why it would be difficult to RTW now*?

Have you had a dialogue meeting with your employer?

- Meeting held
- Meeting planned

What other contact have you had with work since you have been off sick?

What contact have you had with NAV?

Has your employer made a return-to-work plan?
Has the plan been sent to the person who gave you the sick note?
How is the plan working?

- *What are they doing at work to help*?
- *Have you discussed with your employers when you might return to work or start working more*?
- *When do you think you will go back to work/start working more hours*?
- *Do you have an occupational health service at work*?
- *Have you had involvement with them*?

How happy are you with your work and workplace?

- *How would you describe your relationship with your colleagues and employer*?
- *Did you have any conflicts with your employer or co-workers before you were sick listed*?
- *What kind of response do you expect from co-workers and supervisors when you return*?
- *Is your job at risk*?
- *Do you enjoy your job*?
- *What is it that you value about working or your job*?
- *What else does work do for you/ do you get from work*?
- *Why did you choose the job/career you did*?
- *How important to you is it to get back to work*?

OVERCOMING OCCUPATIONAL OBSTACLES TO RTW

Collaborate with the worker to problem solve and overcome obstacles (see separate obstacles and actions sheet). Note any actions in the action plan.

What could be done at the workplace to help you return to work/increase your work hours?

- *What elements / hours of your job are you already doing?*
- *What elements / hours do you think you could manage now?*
- *Are you doing lighter or modified hours or duties?*
- *Do you expect your work could be modified temporarily so you could return to work sooner? Are you able to build back into work gradually? Are light duties an option?*
- *How many hours do you think you could manage to begin with?*
- *When do you think you could start?*

Short term work goal

Long term work goal

Appendices, The MI-NAV trial

HEALTH SITUATION

Could you please tell me briefly about the main health problem that you are struggling with at the moment?

- *When did this episode of pain start?*
- *Have you had any previous episodes?*
- *Do you think there is a high risk of your current pain becoming persistent?*
- *Do you have any other important health problems?*
- *What do you think has caused your health problem?*
- *Is your pain related to an injury? Was it an injury/accident at work? Is there a litigation case or insurance claim related to the accident?*

How is your health condition affecting you day to day?

- *Are you avoiding doing anything or particularly struggling with anything?*
- *How are you sleeping?*
- *How well do you feel you are managing at the moment?*
- *What do you think would help you better manage your symptoms/ condition?*
- *How is the situation affecting your mood?*

Can you describe any treatment you are receiving or have received for your condition?

- *Ongoing treatment.*
- *Previous treatment.*
- *Are you waiting for any appointments, tests or treatments?*
- *Do you think you should be having any tests or treatment for your symptoms/condition?*
- *Do you feel you understand your condition and any treatment you are receiving?*
- *What contact have you had with the person who gave you your sick note since you were sick listed?*
- *Is anyone else helping you with your health problem?*

FAMILY SITUATION

- *Do you live alone or with somebody?*
- *Do you have any children?*
- *How old are they?*
- *Is there anything going on at home or to do with your current circumstances that would make it difficult to RTW now*?
- *What arrangements might need to be made at home in order to help you return to work*? *(carer, childcare, transport etc?)*

Action sheet for the SVAI physiotherapists

OBSTACLES AND ACTIONS

Identify potential obstacles and actions during phone call and write them down in the action plan.

ASK FOR CONSENT BEFORE CONTACTING OTHER STAKEHOLDERS (HEALTHCARE PROFESSIONALS, EMPLOYERS OR NAV CASEWORKER)

POTENTIAL OBSTACLES	SUGGESTED ACTIONS FROM SVAI PHYSIOTHERAPIST
High severity of symptoms/health condition. Comorbid health is a potential obstacle to RTW. Delays in health care. Lack of work focus to health care.	- Ask if participant is taking his/her medication as prescribed by their GP. - Suggest that worker makes appointment to see GP. - Contact health care providers in order to: a) suggest an appointment/investigation b) expedite an appointment c) ensure the HCP facilitates RTW d) post evidence based information to the health care provider
Current physical functioning not compatible with RTW.	- Suggest that participant sees a physiotherapist, if necessary help to set up appointment. - Do values based goal setting.
Avoiding activities. Unhelpful beliefs about health and work.	- Provide reassurance to participant regarding hurt and harm. - Advises the participant about how to gradually increase activity and exercise and return to avoided activities. - Send leaflet with evidence based information to participant. - Provide evidence based information, advice and reassurance to address knowledge gaps, misconceptions or unhelpful beliefs verbally.
Current day/night rest and sleep pattern not compatible with working.	- Provide verbal information about sleep. - Inform participant about online resource to deal with sleep disturbance.
Doesn't value work sufficiently to RTW.	- Use motivational interviewing to help the participant decide whether to RTW or not. - Explore and built the value of work. - Convey positive but realistic messages about their ability to work now or in the future. - Encouraged participant to be pro-active in taking steps to resolve the situation.
Lack of or unsupportive contact with the workplace. Other workplace issues.	- Suggest that participant makes contact with employer. - Take direct contact with employers if participant needs help with this. - Arrange and attend meeting between SVAI physiotherapist, worker and employers. - Inform the NAV caseworker about the worksite meeting/visit if NAV caseworker is involved in the case.

Appendices, The MI-NAV trial

Lack of a RTW plan.	- Support participant to develop RTW plan with employers. - Build participant self-efficacy to collaborate with employer to make RTW plan, e.g. help make a list of what they want to discuss with employer, roleplay meeting etc - Liaise with participant and employer in developing RTW plan.
Poor implementation of RTW plan.	- Review RTW plan with participant. - Ask participant to liaise with employers to commence already agreed RTW plan. - Discuss with participant how they will work with employers to stick to plan, review plan, modify plan and seek help early, if needed. - Liaise with participant and employer to implement existing plan.

APPENDIX 2: RECRUITMENT OF PARTICIPANTS TO THE MI-NAV TRIAL

Year	**2019** Internal pilot[#]									**2020**			Cov.[¤]						
Month	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar 1-11**	**Mar 12-31**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**
Recruited	11	17	17	34	31	33	65	50	15	46	34	28	4	22	14	4	7	24	37	21
Total	11	28	45	79	110	143	208	258	273	319	353	381	385	407	421	425	432	456	493	514

[#] Internal pilot including the first 101 participants

¤ Cov. COVID-19 containment strategies were implemented by the Norwegian government on the 12th of March 2020 and recruitment was halted between 12-30 of March

Aanesen F, *et al. Occup Environ Med* 2022;0:1–9. doi: 10.1136/oemed-2022-108637

APPENDIX 3: TRIAL MODIFICATIONS DUE TO THE COVID-19 PANDEMIC IMPLEMENTED AFTER THE 12TH OF MARCH 2020, Planned by the trial team and reviewed and approved by the scientific board

Modification	Reason for modification	Consequence of modification
The MI intervention may be delivered by telephone or video call, rather than in-person only.	The Norwegian government implemented wide-reaching COVID-19 containment strategies on the 12th of March 2020 to decrease physical contact between individuals.	22 (10%) MI sessions were delivered by telephone or video call, 203 sessions were delivered in-person.
New sample size calculations were made, and the sample size reduced from 750 to 450 participants.	The sample size had to be reduced to make it possible to complete the trial due to increased workload for the NAV.	Not possible to compare the MI and SVAI interventions head-to-head due to reduced power.
Sensitivity analysis to test if the COVID-19 pandemic moderated the effectiveness of the MI or SVAI compared to UC.	The sensitivity analysis was conducted to investigate if the COVID-19 pandemic affected the trial results.	An exploratory analysis was conducted.

MI: motivational interviewing
SVAI: stratified vocational advice intervention

Appendix 4: BASELINE CHARACTERISTICS OF PARTICIPANTS IN THE MI-NAV TRIAL, ELIGIBLE INDIVIDUALS IN THE RECRUITMENT AREA AND IN THE WHOLE OF NORWAY

Registry data	**MI-NAV trial**	**Recruitment area ¤**	**Norway ¤**
	n = 514	*n* = 6329	*n = 140259*
Women, n (%)	293 (57)	3334 (53)	75412 (54)
Age, mean (SD)	48 (10)	47 (12)	46 (12)
Occupations, *n* (%)			
Legislator, senior officials, managers	9 (2)	448 (7)	9175 (7)
Professionals	94 (18)	918 (15)	22438 (16)
Technicians, associate professionals	30 (6)	653 (10)	14872 (11)
Clerks	41 (8)	395 (6)	8806 (6)
Service, shop and market sales workers	175 (34)	1835 (29)	39839 (28)
Agricultural, forestry and fishery workers	6 (1)	51 (1)	1474 (1)
Craft and related trade workers	63 (12)	847 (13)	17542 (13)
Plant and machine operators, assemblers	64 (13)	606 (10)	14108 (10)
Elementary occupations	31 (6)	565 (9)	11694 (8)
Armed forces and unspecified	1 (0.2)	11 (0.2)	311 (0.2)
Work, *n* (%)			
Full time: 100%	120 (69)	3788 (60)	87209 (62)
Part time: 50-99%	39 (22)	1339 (21)	27786 (20)
Part time: <50%	15 (9)	1202 (19)	25264 (18)

¤ Persons on sick leave for seven consecutive weeks for more than half of their contracted work hours due to a musculoskeletal disorder during the recruitment period of the MI-NAV Study: 5th of April 2019 to 14th of October 2020
n: number
SD: standard deviation

APPENDIX I: INTERVENTIONS IN THE MI-NAV TRIAL

Usual case management (UC) according to guidelines from the Norwegian Labour and Welfare Administration (NAV)

All Norwegian citizens and people working in Norway are entitled to health care through the Norwegian National Insurance Scheme. Workers on sick leave are entitled to full wage replacement benefits for up to 12 months. The first 16 days are covered by the employer, the rest by the social security system administered through the NAV. To be entitled to sickness benefits from the NAV a sick note is required, usually issued by a medical doctor. Employers and employees are obliged to cooperate to try to prevent long-term sickness absence. During the first six months of sick leave the employer has the main responsibility for follow-up and should make a follow-up plan in cooperation with the worker within the first four weeks of sick leave. The plan should include information about the employee's work duties, workability, and possible work adaptations. Within week eight of sick leave, the employee should start work-related activity (unless it is not possible due to medical reasons). If the worker is still on full-time sick leave after eight weeks, the NAV may request documentation that work related activity is not possible. The employer is responsible for arranging a dialogue meeting with the employee within week seven of fulltime sick leave (unless it is clearly unnecessary). The purpose of the meeting is to prevent long-term sickness absence and discuss if workplace modifications are required. Within six months of sick leave the local NAV office is responsible for arranging a second dialogue meeting, including the employee, employer, and sick-leave certifier (if appropriate). The second dialogue meeting can be arranged earlier if requested by any of the parties.

Motivational interviewing (MI) according to the protocol

The MI intervention was a replication of an intervention, evaluated in a Norwegian trial conducted concurrently in Trondheim (Aasdahl et al. 2018). MI is a practical tool for counselors developed by William Miller and Stephen Rollnick to help people change. It is rooted in the person-centered approach of Carl Rogers and is inspired by several social and behavioral models. MI is based on the principle that people have the resources within themselves to change (self-determination theory). Motivation for change is activated through the person`s own change talk.

The participants randomised to the UC+MI arm were offered two face-to-face sessions of MI from NAV caseworkers, in addition to UC. The sessions could last up to one hour. The first session was delivered at a local NAV office as soon as possible after enrolment in the study, and the second session was held 2 weeks later. The NAV caseworkers followed a MI guideline developed for return to work (RTW) by Gunnhild Bagøien (a psychiatrist and member of the motivational interviewing network of trainers) and Roger Hagen (a clinical psychologist). The guideline was based on MI principles to build a collaborative relationship with the participants, including communication skills such as asking open-ended questions, providing reflections, and summaries to evoke and enhance change talk. In the first session, an agenda was set in cooperation with the participant through 'agenda mapping' (the participant decided the agenda for the conversation from a menu of topics, based on what they considered to be most relevant for their situation). The participants' readiness to return to work was assessed (using the MI tools: 'importance ruler' and 'confidence ruler'), and the intervention was tailored according to motivational stage (stages of change). If the participant

was ambivalent about RTW, the pros and cons of sickness absence were explored in an accepting and compassionate manner. In the second session, the participant's current work situation, obstacles to RTW and previous attempts at RTW were discussed. The caseworkers provided information about available RTW support from the NAV in a MI-consistent manner. If the participant was ready for RTW, the NAV caseworker offered to help them develop an action plan for RTW. Summaries of each session were made available to the participants on the NAV's secure online communication platform.

Stratified vocational advice intervention (SVAI) according to the protocol

Stratification

We used the 10-item version of the Örebro Musculoskeletal Pain Screening Questionnaire Short Form (ÖMPSQ-SF) (Linton et al 2011), and the 10-item Keele STarT MSK Tool (Dunn et al. 2021), to stratify the participants into two risk groups of long-term sick leave. Participants with ≥9 on the Keele STarT MSK Tool and ≥60 on the ÖMPSQ-SF were stratified to a 'high-risk group', all others were stratified to a 'medium/low-risk group'. The cut-off points were based on preliminary data from a prospective cohort study conducted as part of the MI-NAV project. The preliminary results from this cohort study showed that the combination of these tools had the greatest accuracy in distinguishing between short versus long-term sick leave in workers on sick leave due to musculoskeletal disorders in Norway (unpublished results). The ÖMPSQ-SF assesses five psychosocial risk factors related to future disability: 1) self-perceived function, 2) pain experience, 3) distress, 4) fear-avoidance beliefs, and 5) RTW expectancy. Sum scores range from 1-100 points with higher scores indicating higher estimated risk of future work disability. The Keele STarT MSK tool consists of 10 items assessing: pain intensity, pain self-efficacy, pain bothersomeness, disability, comorbid pain, expected duration of the condition, self-perceived health, depression, fear avoidance and pain duration (during the last two weeks). Sum scores range from 0-12 points, with values from 0-4 points indicating low risk, 5-8 points indicating medium risk, and 9-12 points indicating high risk for poor prognosis.

Intervention

The SVAI was a modified version of an intervention developed for the SWAP trial (Sowden et al. 2019). The theoretical underpinning of the intervention was social cognitive theory, self-determination theory and the common-sense model of self-regulation (Aanesen et al. 2021).

The participants stratified to the low/medium-risk group were offered up to two telephone sessions. The sessions could last up to one hour. Participants in the high-risk group were offered three to four sessions, the first by telephone, the remaining sessions either by telephone or face-to-face, including an optional workplace meeting. The first session was held as soon as possible after the baseline assessment. The duration of the follow-up period was flexible but ended when the participants reached 6 months of consecutive sick leave or had RTW in their contracted work hours for 4 consecutive weeks. During the first session, the physiotherapists followed a semi-structured conversation guide with open-ended questions to clarify the participants' work and health situation and identify obstacles to RTW. During the sessions, the physiotherapists provided evidence-based advice on the management of musculoskeletal disorders and supported problem-solving to overcome modifiable obstacles to RTW. The follow-up provided by the physiotherapists was tailored according to the participants' needs and individual RTW barriers. They collaborated with the participants to decide goals for RTW, developed and implemented action plans, facilitated communication,

collaboration and coordination with stakeholders and signposted to other services if necessary.

Information leaflet for participants receiving SVAI

Research study aiming to help sick listed people with musculoskeletal disorders back to work

The research study is led by researchers from the MUSK health research group at Oslo Metropolitan University, OsloMet. The aim of the study is to find ways to help people who are sick-listed with musculoskeletal disorders. The study will test two different types of dialogue based interventions. All participants will receive usual follow up from NAV in addition to the interventions given in the study. They can also receive medical treatment from other health care professions during the trial if they wish.
You can find more information about the study on the following link:
https://www.muskhealth.com/minav3

Vocational advice from physiotherapist

You have agreed to participate in the study and have been randomly assigned to receive vocational advice from a physiotherapist. The physiotherapist will discuss topics related to your health and work situation and try to help you get back to work.
The physiotherapist does not have any connection to the NAV or your employer.
Confidentiality: The physiotherapist is bound by law to follow high standards of confidentiality and can't share information with your employer or the NAV without your consent.

What can the physiotherapist do?

- Discuss concerns you have regarding health and work.
- Help you make a return to work plan.
- Identify barriers for returning to work.
- Suggest actions to help you return to work, e.g. suggest adaptions to your work situation, give advice regarding treatment, and how to cope with your health problems.

If you consent the physiotherapist can also:

- Collaborate with you doctor or other health care professionals.
- Collaborate with your employer.

What can you do to get back to work sooner?

- Keep in contact with your workplace and colleagues. You and your employer are responsible for making a follow up plan. Your employer is also responsible for making adaptions to your work if this is necessary for you to be able to return. Your duty is to collaborate with your employer to make this possible.

- Talk to your doctor or physiotherapist about how they can help you get back to work. You know your work best. Discuss which parts of your job you can do with your health problem. Ask for treatment designed to get you ready for work.
- Gradually increase your activity level. Start with the activities you find easy, and do a bit more each day. You will have good days and bad days. Try to keep active also on the bad days. Vary between rest and activity. It is common to have set backs - so don't give up!

Evidence based information about work and health

- Research shows that in general work is good for mental and physical health. Work is important for self-esteem and quality of life.
- Being absent from work can have negative effects for health and wellbeing.
- Musculoskeletal disorders are very common and all of us suffer these kinds of problems at some time in our life.
- The pain can be very distressing and may make life difficult, but there is usually no serious disease or lasting damage. Most episodes end quickly, though some symptoms may continue or come back from time to time.
- We have good evidence that returning to work as soon as possible helps recovery, and is the best way to avoid long-term sickness absence.

There are many unhelpful myths about health and work, which can cause unnecessary fear and uncertainty:

1. *Common health problems are caused by work.* Usually they are not. Everyone has these kinds of problems. Some type of work can make the symptoms feel worse, but usually work does not cause the problem.
2. *Work will make my condition worse:*
   Most people with musculoskeletal disorders can continue working. In many cases going back to work can help you feel better.
3. *You should not go back to work until you are fully recovered:*
   Usually the opposite is true. Work can be part of treatment. Getting back to work and activity can help you recover. Adjustments to your work can make it possible to return to work sooner.
4. *A sick certificate means that you must not work:*
   A sick certificate is not an order from your doctor to stay away from work, it only means you are entitled to sick pay. You can return to work as soon as you are ready.

Conversation guide for the SVAI physiotherapists

INTRODUCTION		
Suggested introduction in first telephone contact My name is … I am a physiotherapist from the MI NAV research project, am I talking to….. ? Is this a good time to talk? IF NO: Make new appointment. IF YES: Thank you for participating in our study. Could you please tell me your address and date of birth? Is it OK that I tell you a bit about the research project and the part of the study you have been assigned to? The research project is led by researchers from the MUSK health research group at OsloMet (Oslo Metropolitan University). The aim of the study is to find ways to improve follow-up for people who are on sick leave with musculoskeletal disorders. In the study we are testing two different interventions and compare these to usual follow-up from the NAV. I am calling you because you are in the group who will get help from a physiotherapist trained to give vocational advice. **My job is to help you get back to work, but I do not have any connection with the NAV or with your employer.** Do you have any questions regarding this? During our conversation today I wish to get to know your situation and any problems you have regarding returning to work. **I am bound by law to keep anything you tell me confidential and can't share information with NAV or your employer without your consent.** I know that you have answered a questionnaire for this project, but I don't have access to your answers. Is it OK if I ask you some questions regarding your health and your situation at home and at work?		
CLARIFY CURRENT WORK AND HEALTH SITUATION		
Ask open questions and use reflection to build rapport and clarify the participants health and work situation. Gather information regarding all the questions in red on this form, the rest of the questions can be asked when appropriate/if you need more information. Write notes for every topic. You do not need to follow the order of the form, but you should cover all the topics during the conversation		
WORK SITUATION		
Sick-listed date	**% sick listed**	**End of sick certificate**
Can you describe your current work situation? • *What is your current occupation/title?* • *What are your contracted hours of work? (contract work %, days and hours at work, shift pattern)* • *Do you usually work more than your contracted hours?* • *Do you usually work overtime?* • *What does a typical day at work for you look like?/ What does your job involve? (Physical job demands, emotional and cognitive job demands).*		
IDENTIFY OBSTACLES TO RETURN TO WORK		
Use open ended questions, reflection and summarising to identify obstacles to return to work. Note any identified obstacles in the action plan.		
How are your symptoms /condition affecting your ability to work? • *What do you think about working with your present pain/ symptoms?*		

- *Are you worried about any repeat episodes of symptoms/problems once you return to work*?
- *How do you feel about the prospect of returning to work at some point?*

What are your main concerns about RTW?

- *What would make RTW difficult now*?
- *Are there stressful elements to your job that might be difficult when you first return to work*?
- *Aside from your symptoms are there any other reasons why it would be difficult to RTW now*?

Have you had a dialogue meeting with your employer?

- Meeting held
- Meeting planned

What other contact have you had with work since you have been off sick?

What contact have you had with NAV?

Has your employer made a return-to-work plan?
Has the plan been sent to the person who gave you the sick note?
How is the plan working?

- *What are they doing at work to help*?
- *Have you discussed with your employers when you might return to work or start working more*?
- *When do you think you will go back to work/start working more hours*?
- *Do you have an occupational health service at work*?
- *Have you had involvement with them*?

How happy are you with your work and workplace?

- *How would you describe your relationship with your colleagues and employer*?
- *Did you have any conflicts with your employer or co-workers before you were sick listed*?
- *What kind of response do you expect from co-workers and supervisors when you return*?
- *Is your job at risk*?
- *Do you enjoy your job*?
- *What is it that you value about working or your job*?
- *What else does work do for you/ do you get from work*?
- *Why did you choose the job/career you did*?
- *How important to you is it to get back to work*?

OVERCOMING OCCUPATIONAL OBSTACLES TO RTW

Collaborate with the worker to problem solve and overcome obstacles (see separate obstacles and actions sheet). Note any actions in the action plan.

What could be done at the workplace to help you return to work/increase your work hours?

- *What elements / hours of your job are you already doing?*
- *What elements / hours do you think you could manage now?*
- *Are you doing lighter or modified hours or duties?*
- *Do you expect your work could be modified temporarily so you could return to work sooner? Are you able to build back into work gradually? Are light duties an option?*
- *How many hours do you think you could manage to begin with?*
- *When do you think you could start?*

Short term work goal

Long term work goal

Appendixes, The MI-NAV trial

HEALTH SITUATION

Could you please tell me briefly about the main health problem that you are struggling with at the moment?

- *When did this episode of pain start?*
- *Have you had any previous episodes?*
- *Do you think there is a high risk of your current pain becoming persistent?*
- *Do you have any other important health problems?*
- *What do you think has caused your health problem?*
- *Is your pain related to an injury? Was it an injury/accident at work? Is there a litigation case or insurance claim related to the accident?*

How is your health condition affecting you day to day?

- *Are you avoiding doing anything or particularly struggling with anything?*
- *How are you sleeping?*
- *How well do you feel you are managing at the moment?*
- *What do you think would help you better manage your symptoms/ condition?*
- *How is the situation affecting your mood?*

Can you describe any treatment you are receiving or have received for your condition?

- *Ongoing treatment.*
- *Previous treatment.*
- *Are you waiting for any appointments, tests or treatments?*
- *Do you think you should be having any tests or treatment for your symptoms/condition?*
- *Do you feel you understand your condition and any treatment you are receiving?*
- *What contact have you had with the person who gave you your sick note since you were sick listed?*
- *Is anyone else helping you with your health problem?*

FAMILY SITUATION

- *Do you live alone or with somebody?*
- *Do you have any children?*
- *How old are they?*
- *Is there anything going on at home or to do with your current circumstances that would make it difficult to RTW now*?
- *What arrangements might need to be made at home in order to help you return to work*? *(carer, childcare, transport etc?)*

Appendixes, The MI-NAV trial

Action sheet for the SVAI physiotherapists

OBSTACLES AND ACTIONS

Identify potential obstacles and actions during phone call and write them down in the action plan.

ASK FOR CONSENT BEFORE CONTACTING OTHER STAKEHOLDERS (HEALTHCARE PROFESSIONALS, EMPLOYERS OR NAV CASEWORKER)

POTENTIAL OBSTACLES	SUGGESTED ACTIONS FROM SVAI PHYSIOTHERAPIST
High severity of symptoms/health condition. Comorbid health is a potential obstacle to RTW. Delays in health care. Lack of work focus to health care.	- Ask if participant is taking his/her medication as prescribed by their GP. - Suggest that worker makes appointment to see GP. - Contact health care providers in order to: a) suggest an appointment/investigation b) expedite an appointment c) ensure the HCP facilitates RTW d) post evidence based information to the health care provider
Current physical functioning not compatible with RTW.	- Suggest that participant sees a physiotherapist, if necessary help to set up appointment. - Do values based goal setting.
Avoiding activities. Unhelpful beliefs about health and work.	- Provide reassurance to participant regarding hurt and harm. - Advises the participant about how to gradually increase activity and exercise and return to avoided activities. - Send leaflet with evidence based information to participant. - Provide evidence based information, advice and reassurance to address knowledge gaps, misconceptions or unhelpful beliefs verbally.
Current day/night rest and sleep pattern not compatible with working.	- Provide verbal information about sleep. - Inform participant about online resource to deal with sleep disturbance.
Doesn't value work sufficiently to RTW.	- Use motivational interviewing to help the participant decide whether to RTW or not. - Explore and built the value of work. - Convey positive but realistic messages about their ability to work now or in the future. - Encouraged participant to be pro-active in taking steps to resolve the situation.
Lack of or unsupportive contact with the workplace. Other workplace issues.	- Suggest that participant makes contact with employer. - Take direct contact with employers if participant needs help with this. - Arrange and attend meeting between SVAI physiotherapist, worker and employers. - Inform the NAV caseworker about the worksite meeting/visit if NAV caseworker is involved in the case.

Appendixes, The MI-NAV trial

Lack of a RTW plan.	- Support participant to develop RTW plan with employers. - Build participant self-efficacy to collaborate with employer to make RTW plan, e.g. help make a list of what they want to discuss with employer, roleplay meeting etc - Liaise with participant and employer in developing RTW plan.
Poor implementation of RTW plan.	- Review RTW plan with participant. - Ask participant to liaise with employers to commence already agreed RTW plan. - Discuss with participant how they will work with employers to stick to plan, review plan, modify plan and seek help early, if needed. - Liaise with participant and employer to implement existing plan.

Appendixes, The MI-NAV trial

APPENDIX II: RECRUITMENT OF PARTICIPANTS TO THE MI-NAV TRIAL

Year	**2019** Internal pilot[#]					**2020**							Cov.[¤]						
Month	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar 1-11**	**Mar 12-31**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**
Recruited	11	17	17	34	31	33	65	50	15	46	34	28	4	22	14	4	7	24	37	21
Total	11	28	45	79	110	143	208	258	273	319	353	381	385	407	421	425	432	456	493	514

[#] Internal pilot including the first 101 participants

¤ Cov. COVID-19 containment strategies were implemented by the Norwegian government on the 12th of March 2020 and recruitment was halted between 12-30 of March

Aanesen F, *et al. Occup Environ Med* 2022;0:1–9. doi: 10.1136/oemed-2022-108637

APPENDIX III: TRIAL MODIFICATIONS DUE TO THE COVID-19 PANDEMIC IMPLEMENTED AFTER THE 12TH OF MARCH 2020, Planned by the trial team and reviewed and approved by the scientific board

Modification	Reason for modification	Consequence of modification
The MI intervention may be delivered by telephone or video call, rather than in-person only.	The Norwegian government implemented wide-reaching COVID-19 containment strategies on the 12th of March 2020 to decrease physical contact between individuals.	22 (10%) MI sessions were delivered by telephone or video call, 203 sessions were delivered in-person.
New sample size calculations were made, and the sample size reduced from 750 to 450 participants.	The sample size had to be reduced to make it possible to complete the trial due to increased workload for the NAV.	Not possible to compare the MI and SVAI interventions head-to-head due to reduced power.
Sensitivity analysis to test if the COVID-19 pandemic moderated the effectiveness of the MI or SVAI compared to UC.	The sensitivity analysis was conducted to investigate if the COVID-19 pandemic affected the trial results.	An exploratory analysis was conducted.

MI: motivational interviewing
SVAI: stratified vocational advice intervention

Appendix IV: BASELINE CHARACTERISTICS OF PARTICIPANTS IN THE MI-NAV TRIAL, ELIGIBLE INDIVIDUALS IN THE RECRUITMENT AREA AND IN THE WHOLE OF NORWAY

Registry data	**MI-NAV trial**	**Recruitment area ¤**	**Norway ¤**
	n = 514	*n* = 6329	*n = 140259*
Women, n (%)	293 (57)	3334 (53)	75412 (54)
Age, mean (SD)	48 (10)	47 (12)	46 (12)
Occupations, *n* (%)			
Legislator, senior officials, managers	9 (2)	448 (7)	9175 (7)
Professionals	94 (18)	918 (15)	22438 (16)
Technicians, associate professionals	30 (6)	653 (10)	14872 (11)
Clerks	41 (8)	395 (6)	8806 (6)
Service, shop and market sales workers	175 (34)	1835 (29)	39839 (28)
Agricultural, forestry and fishery workers	6 (1)	51 (1)	1474 (1)
Craft and related trade workers	63 (12)	847 (13)	17542 (13)
Plant and machine operators, assemblers	64 (13)	606 (10)	14108 (10)
Elementary occupations	31 (6)	565 (9)	11694 (8)
Armed forces and unspecified	1 (0.2)	11 (0.2)	311 (0.2)
Work, *n* (%)			
Full time: 100%	120 (69)	3788 (60)	87209 (62)
Part time: 50-99%	39 (22)	1339 (21)	27786 (20)
Part time: <50%	15 (9)	1202 (19)	25264 (18)

¤ Persons on sick leave for seven consecutive weeks for more than half of their contracted work hours due to a musculoskeletal disorder during the recruitment period of the MI-NAV Study: 5th of April 2019 to 14th of October 2020
n: number
SD: standard deviation