Cochrane Australia

Systematic review of evidence on the clinical effectiveness of kinesiology

Report prepared by

Cochrane Australia

4 November 2024

Trusted evidence.

Informed decisions.

Better health.

Contents

In November 2020 Cochrane Australia was contracted by the National Health and Medical Research Council (NHMRC) to design and undertake the systematic review described in this report. This systematic review is one of several independent contracted evidence evaluations being undertaken to update the evidence underpinning the 2015 *Review of the Australian Government Rebate on Natural Therapies for Private Health Insurance* (2015 Review) by the Department of Health and Aged Care (Department). The design and conduct of the review were done in collaboration with the Office of NHMRC (ONHMRC), NHMRC's Natural Therapies Working Committee (NTWC) and the Department of Health and Aged Care's Natural Therapies Review Expert Advisory Panel (NTREAP). This report was endorsed by NTWC on 20 November 2024.

Copyright

Attribution

Use of images

Contact

To obtain information regarding NHMRC publications or submit a copyright request, contact: communications@nhmrc.gov.au.

Acknowledgments

Thanks to the members of the Department's NTREAP and NHMRC's NTWC for their advice and comments throughout the creation of this document. PRACI data was provided by Dr Amie Steel at UTS.

Membership and other details of the Panel and Committee can be found at:

https://www.health.gov.au/committees-and-groups/natural-therapies-review-expert-advisory-panel

https://www.nhmrc.gov.au/about-us/leadership-and-governance/committees/natural-therapies-working-committee

Plain language summary

What was the aim of the review?

The aim of this review was to examine the effects of specialised or energy kinesiology in preventing and/or treating injury, disease, medical conditions or preclinical conditions. Specialised or energy kinesiology is a non-invasive holistic therapy that uses manual muscle testing to assess imbalances expressed in the body. Drawing on the test responses, kinesiologists select individualised healing components from a wide variety of tools or modalities to facilitate the natural healing process. The term 'kinesiology' is also used in multiple ways that fall outside the scope of this review, referring to the science of human movement including physiotherapy, a specific therapeutic tool used in physiotherapy practice (kinesiology taping), and the 'applied kinesiology' techniques, used by chiropractors. This review was targeted for the Australian Government Department of Health and Aged Care (formerly Department of Health) to assist in their Natural Therapies Review, which was designed to determine whether certain natural therapies, including specialised kinesiology, have enough evidence of effectiveness to be considered re-eligible for private health insurance rebates. This review was not designed to be a complete review of all published studies that have evaluated the effects of specialised kinesiology, nor is it intended to inform decisions about whether an individual or practitioner should use specialised kinesiology.

Key messages

- We found one study evaluating the effects of Professional Kinesiology Practice (PKP) among people with chronic low back pain, comparing specialised kinesiology to (a) a treatment described as a "sham" that involved non-individualised manual muscle testing, and non-therapeutic application of correction points and conversation, and (b) a wait list control.
- The evidence is very uncertain about whether specialised kinesiology improves critical or important outcomes for people with chronic low back pain compared to either of these options.
- There are no studies among people with conditions for which specialised kinesiology is commonly sought or prescribed in Australia, such as other chronic or episodic pain, stress, anxiety and mood disorders, functional gastrointestinal disorders, sleep disorders, disorders of the thyroid gland or thyroid hormones system, or respiratory conditions.

What was studied in the review?

We looked for evidence from randomised trials and non-randomised studies to study the effect of specialised kinesiology on conditions and outcomes for which specialised kinesiology is commonly sought or prescribed in Australia. Accordingly, we planned a synthesis of evidence for the following population groups. These groups address the conditions for which specialised kinesiology is commonly sought or prescribed (1 to 6); and others of relevance to the Australian context (7).

1. chronic or episodic pain
    - musculoskeletal (e.g. low back, neck, arthritis)
    - headache disorders (e.g. tension-type headache)
    - dysmenorrhoea (period pain)
2. stress, anxiety and mood disorders
3. functional gastrointestinal disorders
4. sleep disorders (e.g. insomnia)
5. disorders of the thyroid gland or thyroid hormones system (e.g. hypothyroidism)
6. respiratory conditions (e.g. allergic rhinitis, asthma)
7. other conditions relevant to the Australian context if evidence was available

We were interested in the effects on outcomes broadly categorised as:

- pain
- physical function
- sleep quality
- fatigue
- health-related quality of life

- emotional functioning and mental health
- overall disease symptoms

The specific outcomes and measures selected for the synthesis were agreed through an independent prioritisation process, in which decisions were made without knowledge of the studies or study findings. Assessments of cost-effectiveness, safety and studies of healthy populations were not included in this review.

We were able to examine the effects of specialised kinesiology for low back pain in one included study.

We applied methods in the Cochrane Handbook for Systematic Reviews of Interventions [1] to search for, collate, appraise, and synthesise evidence. We then applied methods from the Grading of Recommendations Assessment, Development and Evaluation (GRADE) working group to interpret the synthesis results in a systematic and transparent way. GRADE is a method used to assess and describe how confident (or certain) we can be that the estimates of the effect (calculated by combining results from multiple studies or from single studies if that is the only evidence) reflect the true effects of the intervention. In deciding on our certainty (or confidence) in each result, we considered all relevant information collected in the review.

We use four levels to describe our certainty in the evidence.

High certainty	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty	We are moderately confident that the true effect is probably close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty	We have very little confidence in the estimate and the true effect is likely to be markedly different from the estimated effect. The evidence is too uncertain to provide an interpretation of the result.

Our methods were pre-specified in a publicly available protocol (PROSPERO ID CRD42024528900) that underwent independent review by methods specialists and was endorsed by the National Health and Medical Research Council's Natural Therapies Working Committee. The review is reported in accordance with the PRISMA 2020 statement [2, 3].

What were the main results of the review?

Following screening of 1785 citations and 25 reports, we included one randomised controlled trial in the review (Eardley 2013, [4]) which contributed results in four outcome domains. The trial was among 70 people with chronic low back pain randomised to either: Professional Kinesiology Practice (PKP); an intervention the trialists had designed to be a sham; or a wait list control. A citation for this study was also received in the public submissions. No eligible non-randomised studies were identified.

The evidence was very uncertain about the effects of specialised kinesiology compared with an intervention that involved non-individualised muscle testing and "sham" treatments on:

- pain
- physical function (disability)
- health-related quality of life
- emotional functioning and mental health

The evidence was very uncertain about the effects of specialised kinesiology compared with a wait list control on:

- pain
- physical function (disability)

The trialists measured, but did not report effects on health-related quality of life or emotional functioning and mental health for the wait list control group.

We did not identify any studies examining the effects of specialised kinesiology on other conditions, including those conditions for which specialised kinesiology is commonly sought or prescribed.

Implications for health policy and research

This review assessed the available evidence for specialised kinesiology to inform the Australian Government about health policy decisions for private health insurance rebates. The review did not cover all the reasons that people use specialised kinesiology, or the reasons practitioners prescribe specialised kinesiology and was not intended to inform individual choices about using specialised kinesiology.

We found a single small randomised controlled trial (70 participants) that evaluated the effects of specialised kinesiology compared to either an intervention described by the trialists as a "sham" or wait list control among people with chronic low back pain. The evidence from this trial is very uncertain about whether specialised kinesiology improves the critical outcomes of pain, physical function or health-related quality of life, and the important outcome of emotional functioning and mental health, for people with chronic low back pain. The one included study involved one session a week for 5 weeks, so it is difficult to conclude the effects for longer durations. The effects of stopping versus continuing to use specialised kinesiology are also unknown.

There were no studies among people with other conditions for which specialised kinesiology is commonly sought or prescribed, such as other chronic or episodic pain (including musculoskeletal pain, headache disorders and dysmenorrhoea), stress, anxiety and mood disorders, functional gastrointestinal disorders, sleep disorders, disorders of the thyroid gland or thyroid hormones system, or respiratory conditions. There were no studies that measured other outcomes for which specialised kinesiology is commonly sought or prescribed, such as sleep quality, fatigue or overall disease symptoms. One other systematic review of kinesiology was found, but the included studies were not eligible for this review, so the conclusions are not relevant. Studies published in a language other than English were to be listed, but not included in the assessment, however none were found.

Future research on the effectiveness of specialised kinesiology could be improved by ensuring the choice of comparators facilitates synthesis; either by including inactive controls (e.g. usual care delivered to both groups, sham interventions) or standardised active comparators. In designing trials, attention should be given to the power of the trial, implementing study design features that minimise the risk of bias, measuring outcomes that are well established and patient-relevant (e.g. as identified in consensus-based core outcome sets), reporting all measured outcomes, and ensuring trials are registered and reported in accordance with relevant reporting guidelines.

How up-to-date is the review?

Searches were conducted from the earliest date included in the databases until 15 February 2024. Studies published after this date are not included in this review.

Executive summary

Background

Specialised or energy kinesiology is a non-invasive holistic therapy that uses manual muscle testing to assess imbalances expressed in the body. Drawing on the test responses, kinesiologists select individualised healing components from a wide variety of tools or modalities to facilitate the natural healing process. The term 'kinesiology' is also used in multiple ways that fall outside the scope of this review, including referring to the science of human movement including physiotherapy, a specific therapeutic tool used in physiotherapy practice (kinesiology taping), and the 'applied kinesiology' techniques, used by chiropractors. The Australian Government Department of Health and Aged Care (via the National Health and Medical Research Council) commissioned a suite of independent evidence evaluations to inform the 2019-20 Review of the Australian Government Rebate on Private Health Insurance for Natural Therapies. This report is for one of the evaluations; a systematic review of randomised trials and non-randomised studies examining the effectiveness of specialised kinesiology in preventing and/or treating injury, disease, medical conditions or preclinical conditions. In 2015, an overview of systematic reviews conducted for the Australian Government found there was insufficient scientific evidence that specialised kinesiology was effective. The current systematic review considered primary evidence and a wider range of publication dates.

This information will be used by the Australian Government in deciding whether to reinclude specialised kinesiology as eligible for private health insurance rebates, after specialised kinesiology was excluded in 2019. This review was not designed to assess all the reasons that people use specialised kinesiology, or the reasons practitioners prescribe specialised kinesiology and was not intended to inform individual choices about using specialised kinesiology.

Objectives

Primary objective was to answer the following question:

1. What is the effect of *specialised kinesiology* compared to an inactive control (no intervention, sham, placebo, wait list control, or a co-intervention offered to both groups, or continuation of usual care) on outcomes for each underlying condition, pre-condition, injury or risk factor?

Secondary objectives related to the following questions:

2. What is the effect of *specialised kinesiology* compared to evidence-based treatments (active comparators) on outcomes for each underlying condition, pre-condition, injury or risk factor?
3. What evidence exists examining the effects of *specialised kinesiology* compared to other active comparators? (for inclusion in evidence inventory only, not the synthesis)

As per protocol, to be included in synthesis for objective 2, there must be studies suitable for conducting a synthesis. That is, at least two low risk of bias studies with comparable population, evidence-based comparator and outcomes. Where the criteria were not met, studies were included in the inventory.

Methods

This review was prospectively registered on the international prospective register of systematic reviews (PROSPERO ID CRD42024528900) and the methods pre-specified in a protocol published on the register. The methods were based on the Cochrane Handbook for Systematic Reviews of Interventions [1]. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was used to summarise and assess the certainty of evidence arising from this review [5-7]. The review is reported in accordance with the PRISMA 2020 statement [2, 3] which has been adopted by Cochrane.

The population groups and outcomes considered in the synthesis are identified in the final framework for the review that was agreed through the prioritisation process (see 3.5 Final framework).

Criteria for including studies in the review

Broad eligibility criteria were defined for including studies in the review, as summarised below.

- ***Types of study designs and comparisons***. Eligible studies were randomised controlled trials (RCTs) and non-randomised studies of interventions (NRSIs) comparing specialised kinesiology to (1) inactive controls (no intervention, sham, placebo, wait list control, or a co-intervention offered to both groups, or continuation of usual care) or (2) active comparators. Any co-intervention was eligible (i.e. pharmacological or non-pharmacological). Usual care comparators were eligible if there was an explicit statement that indicated that participants could continue to access their routine care or therapy (including self-care). Where a comparator labelled as 'usual care' involved a defined intervention (i.e. specific treatments and processes selected by the researchers), this was deemed to be either an active intervention (if restricted to the comparator group) or a co-intervention (if able to be accessed by both groups, e.g. continuation of a specific medication).
- ***Types of populations***. Any condition, pre-condition, injury or risk factor (excluding healthy participants without clearly identified risk factors for the condition specialised kinesiology was used to prevent).
- ***Types of outcomes***. Any patient-important outcome for which specialised kinesiology is indicated was eligible for the review. Outcome domains of interest were pain, physical function, sleep quality, fatigue, health-related quality of life, emotional functioning and mental health, and overall disease symptoms. Outcomes and measures for inclusion in the synthesis for each condition were agreed through the prioritisation process.
- ***Other criteria***. Studies in languages other than English were not eligible for synthesis but were to be listed in an appendix.

Search methods

We searched the Cochrane Central Register of Controlled Trials (Cochrane Library, Issue 2, 2024), MEDLINE, Embase, Emcare, AMED, CINAHL, Europe PMC, ClinicalTrials.gov and WHO International Clinical Trials Registry Platform on 15 February 2024. Searches were not limited by language, year of publication or publication status. The public was also invited by the Department to submit references for published research evidence.

Analytic framework for synthesis and prioritisation process

A staged process, designed to minimise bias in the review, was agreed *a priori* for determining which of the studies eligible for the review would be included in the synthesis (see Summary of methods, Figure 3.1). Through this process, The National Health and Medical Research Council's Natural Therapies Working Committee with input from the Department's Natural Therapies Review Expert Advisory Panel, prioritised outcomes proposed for the synthesis. As there was only a single eligible trial, population prioritisation did not occur. A framework for the synthesis was finalised prior to commencing data extraction. This framework defined the scope of the evidence synthesis and specified the synthesis questions and associated PICO (populations, interventions, comparators, outcomes) criteria for including studies in each synthesis (see Summary of methods, Figure 3.5.1).

Data collection and analysis

Screening of citations and full text reports was completed by two authors, independently. Data extraction and risk of bias assessment (ROB 2.0) was piloted for the suite of natural therapies studies by two authors to ensure consistency between reviewers, then completed by a single author and checked by a second.

Comparisons were based on the population and outcome domains (e.g. pain, falls, physical function (disability), health-related quality of life, and emotional functioning and mental health) specified in the analytic framework (Figure 3.5.1). Meta-analysis methods were not used as we only included a single study.

GRADE methods were used to assess certainty of evidence and summarise findings. For all results an interpretation was made about whether the observed effect was important (or not) and how certain we were about the finding (high, moderate, low or very low). Certainty accounted for concerns about bias (arising from the study included in and studies missing from the synthesis), how precisely the effect was estimated, and how directly the study in each synthesis addressed the synthesis question defined in the analytic framework. Inconsistency in the results across studies was not assessed as we only included a single study.

Main results

Following screening of 1785 citations and 25 full-text reports, one randomised controlled trial was included in the review, which contributed four outcomes to the comparison of specialised kinesiology versus a treatment described as a "sham" (non-individualised manual muscle testing, and non-therapeutic application of correction points and

conversation), and two outcomes to the comparison of specialised kinesiology versus wait list control. Three (3) studies were listed as awaiting classification as they were reported in abstract only (see Appendix C3). Eighty-seven (87) unique citations (not otherwise identified) were received from the public call for evidence, however none were eligible for inclusion in the review (see Appendix C2).

A complete description of the intervention components for the specialised kinesiology and the "sham" kinesiology intervention groups was not provided in the study reports. We could not confirm whether the "sham" content/protocol was sufficiently inactive to be combined with the wait list control group as per objective 1, or would be more appropriately categorised as an active intervention. Since this was the only study in this review, we considered it more informative to present the results separately for specialised kinesiology compared to either a "sham" intervention or wait list control. We used the terms reported by the trialists when describing comparator groups.

Effects of kinesiology

For people with low back pain the evidence is very uncertain about the effects of specialised kinesiology compared to "sham" kinesiology or wait list control.

The evidence was very uncertain about the effects of specialised kinesiology versus "sham" kinesiology among people with chronic low back pain (1 trial, 40 participants) on:

- pain
- physical function (disability)
- health-related quality of life
- emotional functioning and mental health.

The evidence was very uncertain about the effects of specialised kinesiology versus wait list control among people with chronic low back pain (1 trial, 37 participants) on:

- pain
- physical function (disability).

Limitations

Of the evidence contributing to the review

Limitations of the evidence were considered when interpreting each result by applying the GRADE approach. The overriding limitation is that there is a single trial with a small number of participants (70 randomised across the three conditions) contributing data, which led to imprecise effect estimates. In some cases, the imprecision was very serious, meaning that the result was compatible with both important benefit and important harm. We were also concerned about the methodological limitations of the study contributing to the synthesis, with all of the outcomes judged to be at high risk of bias or some concerns. In terms of missing results from the included study, it is unclear if the SF-36 measure was administered to participants in the wait list control group and not reported. Results from this measure would have contributed to the health-related quality of life and emotional functioning and mental health domains for this group. The trialists report both in the registry record and results paper that measures for pain (VAS), physical function (RMDQ), health-related quality of life (SF-36 physical dimension), and emotional functioning and mental health (SF-36 mental dimension) would be administered at week 12 (7 weeks after the end of the intervention), yet these results are also not reported for any of the groups. Given evidence of selective non-reporting of unfavourable/uninteresting results in general, selective non-reporting of trials cannot be ruled out.

Of the review process

In this review steps were taken to address potential limitations. We applied methods recommended in the Cochrane handbook for systematic reviews of interventions and the GRADE approach, as per the detailed protocol that was prospectively registered on PROSPERO after undergoing independent methodological review. The synthesis questions could not be fully specified at protocol stage. However, the final list of outcomes eligible for the review and questions to be addressed in the synthesis were determined through a pre-specified prioritisation process, performed by NTWC with input from NTREAP and without knowledge of the included studies or results of those

studies. An initial analytic framework for the review was included in the protocol to inform these decisions and propose a structure for the synthesis.

While data extraction for each study was performed by a single reviewer, the selection of outcomes and coding of studies for inclusion in the analysis was performed independently by a second experienced review author. All data were checked by a second experienced author. These steps minimised the risk of errors or misinterpretation. Risk of bias assessments were performed for each study by a single reviewer and checked by a second experienced author following detailed guidance developed for the review and training in the assessment of design features relevant to this review. Consistent with the protocol and the approach taken in other natural therapies reviews, we did not contact trialists for additional information.

Assessments of cost-effectiveness, safety and studies of healthy populations were out of scope.

Conclusions

Implications for health policy

We found a single small randomised controlled trial (70 participants) that evaluated the effects of specialised kinesiology compared to either an intervention described by the trialists as a “sham” or wait list control among people with chronic low back pain. The evidence from this trial is very uncertain about whether specialised kinesiology improves the critical outcomes of pain, physical function or health-related quality of life, and the important outcome of emotional functioning and mental health, for people with chronic low back pain. There were no studies among people with other conditions for which specialised kinesiology is commonly sought or prescribed, such as other chronic or episodic pain (including musculoskeletal pain, headache disorders and dysmenorrhoea), stress, anxiety and mood disorders, functional gastrointestinal disorders, sleep disorders, disorders of the thyroid gland or thyroid hormones system, or respiratory conditions. There were no studies that measured other outcomes for which specialised kinesiology is commonly sought or prescribed, such as sleep quality, fatigue or overall disease symptoms. One other systematic review of kinesiology was found, but the included studies were not eligible for this review, so the conclusions are not relevant. Studies published in a language other than English were to listed, but not included in the assessment, however none were found.

Implications for future research

Future research on the effectiveness of specialised kinesiology could be improved by ensuring the choice of comparators facilitates synthesis; either by including inactive controls (e.g. usual care delivered to both groups, sham interventions) or standardised active comparators. In designing trials, attention should be given to the power of the trial, adequately describing all trial arms, implementing study design features that minimise the risk of bias, measuring outcomes that are well established and patient-relevant (e.g. as identified in consensus-based core outcome sets), reporting all measured outcomes, and ensuring trials are registered and reported in accordance with relevant reporting guidelines.

1. Background

In 2015, the Australian Government conducted a *Review of the Australian Government Rebate on Natural Therapies for Private Health Insurance (2015 Review).* Underpinned by systematic reviews of evidence for each natural therapy, one of the findings from the 2015 Review was that there was insufficient evidence to reach any conclusion that (specialised or energy) kinesiology was effective. The National Health and Medical Research Council (NHMRC) has been engaged by the Department of Health and Aged Care (Department) to update the evidence underpinning the 2015 Review. This evidence evaluation of specialised kinesiology is one of a suite of independent contracted systematic reviews that will inform the *Review of the Australian Government Rebate on Private Health Insurance for Natural Therapies 2019-20* (2019-20 Review) [8].

This review focuses on specialised kinesiology. Specialised or energy kinesiology is a non-invasive holistic therapy that uses manual muscle testing to assess imbalances expressed in the body. Drawing on the test responses, kinesiologists select individualised healing components from a wide variety of tools or modalities to facilitate the natural healing process [9]. Specialised kinesiology originated from 'Touch for Health' kinesiology (T4H) which emerged in the 1970's as a simpler form of applied kinesiology that was intended for self-use outside the chiropractic and other health professions [10, 11]. Since then, a number of other systems of specialised, or energy, kinesiology have been developed based on a diverse range of energetic, counselling, education and healing concepts. Variants of specialised, or energy, kinesiology systems include Professional Kinesiology Practice (PKP), Three in One, Kinergetics, and integrative kinesiology [12, 13]. For the purposes of this review, we use the term ' specialised kinesiology' to refer to any specialised, or energy, kinesiology system or method.

In Australia, the main source of information about the rates of consultation with complementary medicine practitioners is a cross-sectional survey conducted as part of the Practitioner Research and Collaborative Initiative (PRACI) [14]. The 2017 PRACI survey of Australian adults found that about a third of all respondents (36%; 726/2025 respondents) had consulted at least one complementary practitioner in the last 12 months. Respondents were not asked whether they had consulted a kinesiology practitioner.

The term 'kinesiology' is also used in multiple ways that fall outside the scope of this review, referring to the science of human movement (i.e. the anatomical, physiological, biomechanical and psychological elements of movement), a specific therapeutic tool used in physiotherapy practice (kinesiology taping), and the 'applied kinesiology' techniques, developed by Dr George Goodheart DC in the 1960s to augment the standard methods of diagnosis used by Chiropractors, for which practitioners in Australia must hold a university qualification in a relevant healthcare discipline.

1.1 Description of the intervention

The Australian Kinesiology Association describes kinesiology as a non-invasive holistic therapy that uses manual muscle testing to assess imbalances expressed in the body (i.e. "anatomical, physiological and psychological stressors") [9]. From a description provided by Jensen 2012, "During a muscle test, a practitioner applies a force to one muscle or group of muscles, with a particular intent in mind. The muscle is then labelled "weak" or "strong" based on its ability to resist this force." [15]. Although specialised kinesiology is a derivative of Applied Kinesiology, the muscle testing techniques used in latter are highly systematised, requiring practitioners to follow a consistent protocol in order to meet requirements of the International College of Applied Kinesiology. The extent to which specialised kinesiology follows systematised protocols is unclear and such derivatives have been described as lacking 'one or more of the essential attributes' of Applied Kinesiology [16].

The muscle testing results inform the selection of individualised healing components from a wide variety of modalities by identifying "the elements which inhibit the body's natural internal energies" and accessing "the life enhancing potential within the individual" [9, 12][1]. Some examples of specialised kinesiology 'tools of the trade' are: Bach flower remedies; nutritional and/or dietary supplements and advice; acupressure; aromatherapy; posture,

[1] Definition approved by the Australian Kinesiology Association 1999, amended in 2006. https://aka.asn.au/what-is-kinesiology/

alignment and myofascial interventions; and more psychotherapeutic interventions, such as Emotional Freedom Techniques (EFT), Eye Movement Desensitisation and Reprocessing (EMDR), goal setting and visualisations (as identified by the Australian Kinesiology Association [17]). Variants of specialised, or energy, kinesiology systems include Professional Kinesiology Practice (PKP), Three in One, Kinergetics, and integrative kinesiology [12, 13]. For the purposes of this review, we use the term ' specialised kinesiology' to refer to any specialised, or energy, kinesiology system or method.

Mode of administration and dose

During a specialised kinesiology session, the practitioner uses manual muscle testing to identify blockages or imbalances. Healing modalities may then be selected and deployed in the session and/or discussed with the client for home use. Some specialised kinesiologists also offer online consultations, and describe using 'surrogate' muscle testing, where the practitioner tests themselves on behalf of the client to "identify any stressors, blockages and imbalances" [18]. Specialised kinesiology sessions can last from 30 to 90 minutes. Professional associations indicate that some clients only require a single session, whereas others require multiple sessions [19].

Practitioners of kinesiology and regulation

In Australia, specialised kinesiology is usually delivered by practitioners who have attended accredited specialised kinesiology training, ranging from entry-level courses through to Certificate IV (~450 hours), Diploma (1200 hours) and Advanced Diploma (2150 hours) levels. The Australian Institute of Kinesiologists Ltd (AIK) and the Australian Kinesiology Association (AKA) accredit Registered Training Organisations (RTOs), Modality Owners (MOs) or other practitioners to deliver workshop units and training courses in core specialised kinesiology and/or tools of the trade and/or associated health courses such as nutrition, anatomy, physiology, mind body medicine, communication and counselling. Both organisations offer varying levels of membership to specialised kinesiology practitioners based on participation in requisite accredited training and courses, coordinate continuing professional development programs, and have developed Codes of Ethics and Codes of Practice for their members [20, 21].

The practice and teaching of specialised kinesiology is not regulated by the Australian Health Practitioner Regulation National Law, which means there is no requirement for professional registration of practitioners of specialised kinesiology [22]. This is an important distinction between the forms of specialised kinesiology eligible for this review, and applied kinesiology for which practitioners in Australia must hold a university qualification in a relevant healthcare discipline that is eligible for registration under the Australian Health Practitioner Regulation National Law (e.g. chiropractic, osteopathy, physiotherapy or medicine) and have completed the study requirements to become a member of the International Board of Applied Kinesiology.

1.2 How kinesiology might work

Kinesiology professional associations and practitioners of a range of kinesiology systems describe engaging the electrical systems of the body during muscle testing as a form of biofeedback. It is thought that muscle testing identifies blockages or disruptions to energy flow throughout the body, allowing the practitioner and client to identify issues or challenges across mind, body or spirit. The muscle testing also indicates the tools needed to correct these imbalances, and so address or remediate the issues. The various tools and techniques described are said to target the body's structural, nutritional, electrical, chemical, mental, emotional or other energy systems. Each of these tools and techniques draws from a variety of philosophic and therapeutic approaches with their own proposed mechanisms of action [9, 12, 13, 23].

1.3 Description of conditions for which specialised kinesiology is used

The Australian Kinesiology Association states that "kinesiologists do not diagnose or treat any specific disorder, disease or symptom" [9]. However, specialised kinesiology is sought by people with many different health conditions. Respondents to an Australian survey of practitioners with a qualification in specialised kinesiology reported that they 'often' treated fatigue (19/19 respondents, 100%), digestive disorders / irritable bowel syndrome (94% / 72%), mental illness (84%), menstrual disorders (72%), insomnia/sleeping disorders (68%), thyroid complaints (61%), chronic pain (50%), recurrent infections (50%), and headache (42%) [24]. A majority of

respondents also reported that they sometimes or often treat arthritis, allergic rhinitis (hay fever), attention deficit hyperactivity disorder (ADHD)/autism, eczema and psoriasis, and asthma.

Australian professional organisations suggest specialised kinesiology as a treatment for stress and mental distress, pain, learning difficulties, cardiovascular issues, digestive issues, skin disorders, food allergies or intolerances and nutritional imbalances among other health conditions [9, 25].

1.4 Why it is important to do this review

This systematic review will inform the Australian Government's Natural Therapies Review 2019-20, which is evaluating evidence of the clinical effectiveness of 16 therapies (including specialised kinesiology). The conclusion from the evidence evaluation conducted on specialised kinesiology for the *2015 Review* was that there "is insufficient evidence from [systematic reviews] within this field to reach any conclusion regarding the effectiveness, safety, quality or cost-effectiveness of kinesiology" [26]. The evidence evaluation used overview methods, identifying a single systematic review published since April 2008 [12]. None the primary studies included in this systematic review were randomised controlled trials, and therefore no primary evidence was considered in the overview. In contrast to the 2015 kinesiology evidence evaluation, this review examined evidence from eligible primary studies published from database inception until the date of the last search for this systematic review. This approach searched for both new primary studies and those in areas that had not been addressed in a systematic review eligible for inclusion in the overviews conducted for the *2015 Review.*

2. Objectives

The overall objective of this systematic review was to examine the evidence for the clinical effectiveness of specialised kinesiology in preventing and/or treating injury, disease, medical conditions or preclinical conditions [8]. The review focused on outcomes (and underlying conditions) for which specialised kinesiology is commonly sought or prescribed in Australia, and to inform the 2019-20 Review of the Private Health Insurance rebate.

The questions for the review follow (framed as primary and secondary objectives).

Primary objective was to answer the following question

1. What is the effect of *specialised kinesiology* compared to an inactive control (no intervention, sham, placebo, wait list control, or a co-intervention offered to both groups, or continuation of usual care) on outcomes for each underlying condition, pre-condition, injury or risk factor?

Secondary objectives

2. What is the effect of *specialised kinesiology* compared to evidence-based treatments (active comparators) on outcomes for each underlying condition, pre-condition, injury or risk factor?
3. What evidence exists examining the effects of *specialised kinesiology* compared to other active comparators? (for inclusion in evidence inventory only, not the synthesis)

As per protocol, to be included in synthesis for objective 2, there must be studies suitable for conducting a synthesis. That is, at least two low risk of bias studies with comparable population, evidence-based comparator and outcomes. Where the criteria were not met, studies were included in the inventory. Decisions about the final synthesis questions and criteria for including studies in each synthesis were made through a staged prioritisation process (described in section 3.4). The prioritisation process aimed to align the questions addressed with priorities for the 2019-20 Review, ensure a consistent approach across the evidence evaluations of natural therapies (where appropriate), and make best use of available evidence. The outcomes considered in the synthesis are identified in the final framework for the review that was agreed through the prioritisation process (section 3.4). The final synthesis questions and criteria for including studies in each synthesis are presented in Figure 3.5.1.

3. Summary of methods

This review followed methods pre-specified in the protocol endorsed by the NTWC with input from NTREAP. The protocol was prospectively registered on the International prospective register of systematic reviews (PROSPERO ID CRD42024528900). The methods were based on the Cochrane Handbook for Systematic Reviews of Interventions [1]. The Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach was used to summarise and assess the certainty of evidence arising from this review [6, 7]. The review is reported in accordance with the PRISMA 2020 statement [2, 3].

A staged approach was taken to developing the questions and criteria for including studies in the synthesis (Figure 3.1). A summary of each stage is described in the methods that follow (see Appendices A and B for a complete description of methods; Appendix I for Abbreviations used in the report). The framework for the synthesis was finalised prior to commencing data extraction (Figure 3.1, panel 4). It defines the scope of the evidence synthesis and specifies the synthesis questions and associated PICO (population, intervention, comparator, outcome) criteria for including studies in each synthesis.

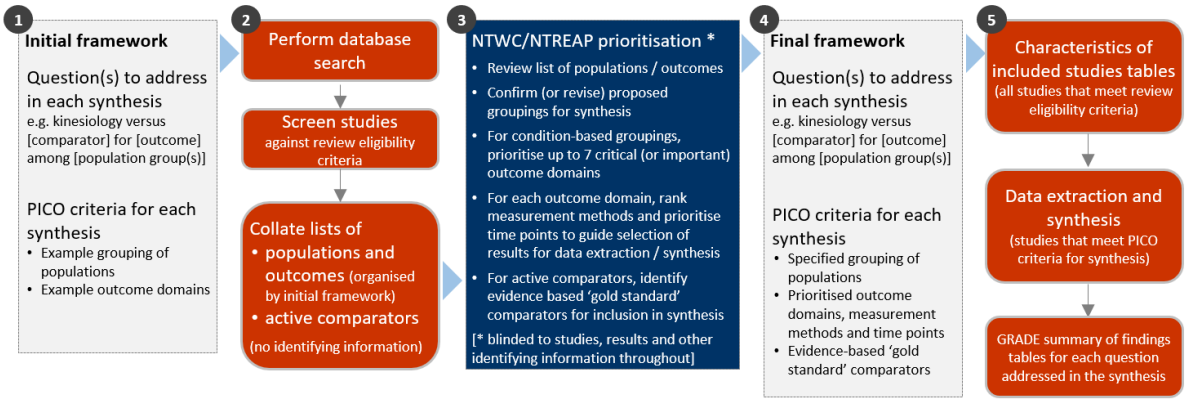


Fig 3.1 | Staged approach for developing the questions and analytic framework for this review.

3.1 Criteria for considering studies for this review

3.1.1 Types of studies

We included randomised controlled trials (RCTs) (including individually and cluster randomised, and cross-over trials) and controlled trials where there was an attempt to have some kind of 'randomisation' to groups (e.g. sequence generation based on alternation, dates (of birth or attendance at a clinic) and patient record numbers) [27]. Non-randomised studies of interventions (NRSIs) with certain design features were eligible (see Appendix A1.1.1). Historical case control, uncontrolled before-after studies, cross-sectional studies and case-control studies were ineligible.

Date and language restrictions. There were no restrictions on publication date. Potentially eligible studies published in languages other than English were eligible for the review but not the synthesis.

3.1.2 Types of participants

Studies involving participants with any disease, medical condition, injury, or preclinical condition were eligible for the review. This included healthy participants with clearly identified risk factors for a condition (evident from study eligibility criteria or baseline data) that specialised kinesiology was administered to prevent. There were no restrictions on age. Healthy populations seeking health improvement were excluded.

3.1.3 Types of interventions

For the purpose of this review, eligible interventions were specialised or energy kinesiology as per the description provided by NHMRC [28]:

A system that involves the use of manual muscle testing techniques

- "… to elicit a yes/no response in muscles via a strong/ weak bio-feedback mechanism … to reveal imbalances within the body; for example, sources of pain, allergies, and digestive and mental health disturbances", and
- "facilitate a person's natural healing process" by bringing "the root cause of any 'imbalance' to a person's conscious attention" and identifying tools needed to correct any imbalances (extracts from [28]).

The latter is an essential component that differentiates specialised or energy kinesiology from similar but ineligible interventions (see Excluded therapies below). The selected tools may include a wide range of interventions commonly considered to be 'tools of the trade' in specialised kinesiology (e.g. acupressure, aromatherapy, myofascial interventions).

Because of the potential challenge of distinguishing components of specialised or energy kinesiology systems from related modalities such as applied kinesiology, and the likelihood of identifying studies in which the defining techniques and principles of specialised or energy kinesiology systems are incompletely reported, studies were included if the therapy was described as a specialised or energy kinesiology system, or any of the named variants of this system (Touch for Health, Professional Kinesiology Practice (PKP), Three in One, Integrative Kinesiology).

Except for the specific exclusions below, specialised kinesiology interventions were eligible irrespective of the mode of delivery (face-to-face or virtual), the training or qualifications of the teacher or practitioner (except if the training was Professional Applied Kinesiology™ – see Excluded therapies), the setting in which specialised kinesiology is used, and the dose and duration of treatment.

Excluded therapies

1. **Applied kinesiology (Professional Applied Kinesiology™)**[2] refers to the original form of kinesiology that is used only as a diagnostic tool, not a treatment modality [16, 29]. While PAK is used to inform decisions about treatment, resulting treatments are not considered to be part of PAK, instead falling within the scope of practice of the registered health professionals that use kinesiology for diagnosis (mainly chiropractors). Nor is there a premise in PAK that the body can heal itself if the person is aware of what is needed to facilitate healing (i.e. awareness of the root cause of a condition will facilitate a person's healing process). Practitioners of Professional Applied Kinesiology™ (PAK) must be certified by the International Board of Applied Kinesiology (IBAK). A prerequisite for PAK certification is completion of a tertiary qualification that fulfils requirements for registration in a relevant health profession (e.g. chiropractic, osteopathy, physiotherapy or medicine). [16, 28, 29]
2. **Educational kinesiology (Edu-K)** is an educational, movement-based program, with Brain Gym® activities forming the core program [30].
3. **Kinesiology** as used to refer to human movement science in North America (especially in Canada), and related terms for practitioners of human movement science.
4. **Kinesiology taping** as in a specific method used mainly by physiotherapists.
5. **Kinesiotherapy** which is sometimes used to refer to "the main, active component of physiotherapy and a means of restoring the range of movement, improving muscle strength and endurance, improving movement coordination, increasing the aerobic capacity and inducing a global sensation of wellness" [31].
6. **Other systems that use kinesiology muscle testing** (e.g. Total Body Modification, PSYCH-K, Body talk).

Comparisons

1. Specialised kinesiology *versus* any inactive comparator ((no intervention, sham, placebo, wait list control, or a co-intervention offered to both groups, or continuation of usual care).

2. Specialised kinesiology *versus* evidence-based gold standard treatment(s)

[2] PAK is trademarked so that it can only be used by certified members of International College of Applied Kinesiology (ICAK) https://www.icaka.org.au/Applied-Kinesiology-Certification

3. Specialised kinesiology *versus* any active comparator (for inclusion in evidence inventory only, not the synthesis).

As per protocol, to be included in synthesis for objective 2, there must be studies suitable for conducting a synthesis. That is, at least two low risk of bias studies with comparable population, evidence-based comparator and outcomes. Where the criteria are not met, studies will be included in the inventory.

Any co-intervention was eligible (i.e. pharmacological or non-pharmacological). Usual care comparators were eligible if there was an explicit statement that indicated that participants could continue to access their routine care or therapy (including self-care). If a comparator labelled as 'usual care' involved a defined intervention (i.e. specific treatments and processes selected by the researchers), this was deemed to be either an active intervention (if restricted to the comparator group) or a co-intervention (if able to be accessed by both groups, e.g. continuation of a specific medication).

We excluded head-to-head comparisons of specialised kinesiology (e.g. comparison of different frequencies, durations or schedules; comparison of specialist kinesiology practitioner versus other health professional delivering specialised kinesiology). Active comparators were eligible for the review if pre-specified criteria for synthesis were met, i.e. comparable PICO criteria and at low risk of bias, however we did not identify any studies with active comparators.

3.1.4 Types of outcomes

Any patient-important outcome that aligned with the reasons why specialised kinesiology is sought by patients and prescribed by practitioners was eligible. Studies were included in the review irrespective of the outcome(s) measured, but the synthesis was limited to outcomes considered to be critical or important for each population group (see 3.4 for prioritisation of outcomes and 3.5 for final framework). Experience of care (e.g. satisfaction), safety, quality, and economic outcomes were excluded.

From each study, we selected one outcome per outcome domain for data extraction (results), risk of bias assessment and inclusion in the synthesis. In selecting outcomes for synthesis, we considered the outcome measure (any measure was eligible but a pre-specified hierarchy was applied to select the most relevant measure if multiple were available), timing of outcome measurement (first measure after end of specialised kinesiology intervention period) and suitability of data for analysis.

3.2 Search methods for identification of studies

We searched the Cochrane Central Register of Controlled Trials (Cochrane Library, Issue 2, 2024), MEDLINE, Embase, Emcare, AMED, CINAHL, Europe PMC, ClinicalTrials.gov and WHO International Clinical Trials Registry Platform on 15 February 2024. Searches were not limited by language, year of publication or publication status. The public was also invited by the Department to submit references for published research evidence.

3.3 Selection of studies

Two reviewers piloted guidance for title and abstract screening on a sample of 179 records (10%) to ensure the review eligibility criteria were applied consistently. Remaining records were then screened at title and abstract by a single reviewer. Reports were screened independently by two reviewers at full-text review stage with disagreements resolved by consensus among members of the review team. We documented the flow of studies through the review in a PRISMA diagram (Figure 4.1.1). Studies that did not meet the review eligibility criteria were excluded and the reason for exclusion was recorded at full-text screening.

3.4 Prioritisation of outcomes for the synthesis

Decisions about the final synthesis questions and criteria for including studies in each synthesis were made through the prioritisation process in Figure 3.1. The process was designed to minimise bias in the selection of results for inclusion in the synthesis while ensuring coverage of relevant populations and outcomes.

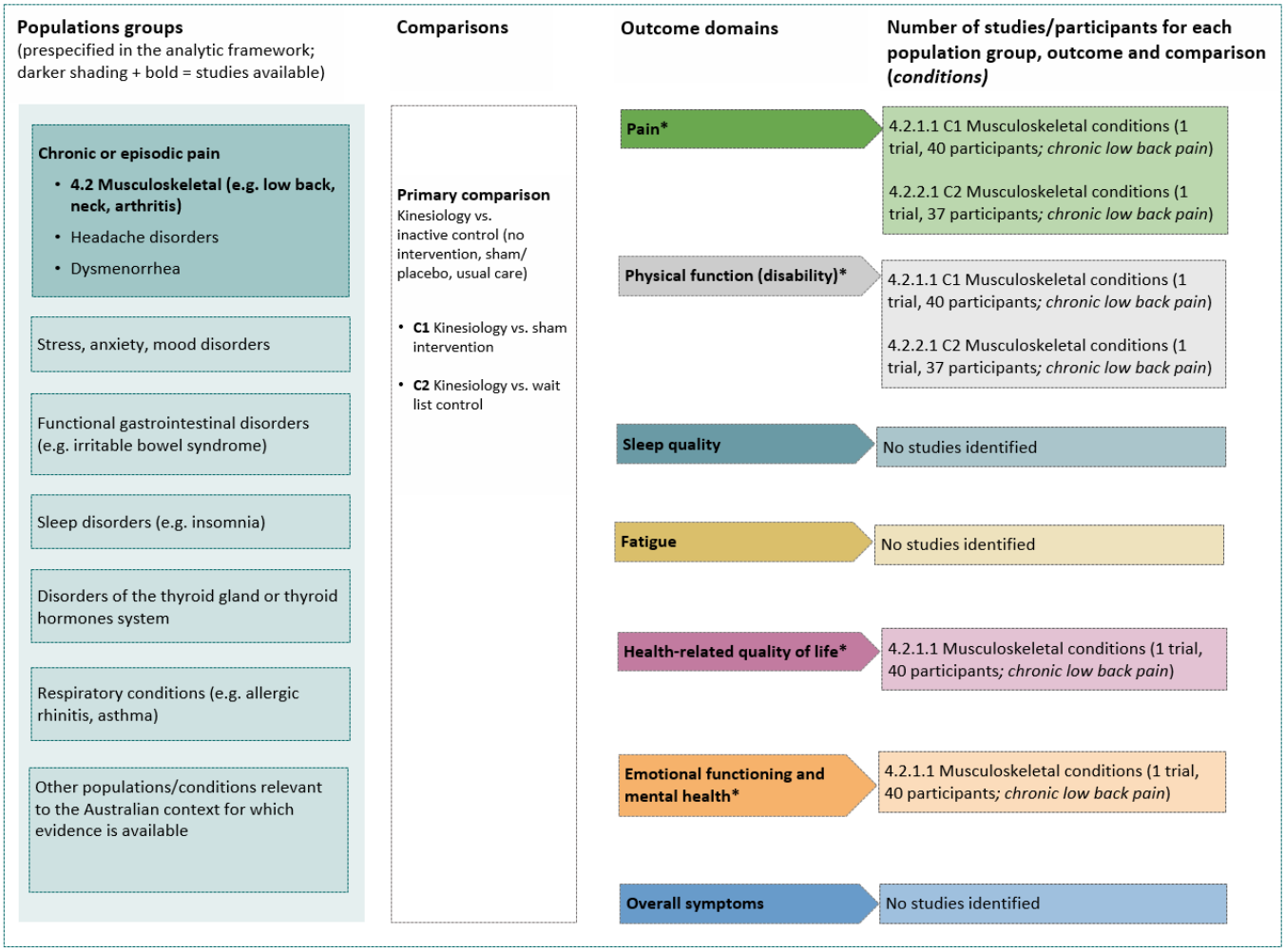
In brief, we screened studies against the review eligibility criteria and collated deidentified information about the populations and outcomes addressed in the included study (no bibliographic information, titles, details about the number of studies, participants, methodological quality or results). For each condition, NTWC, with input from NTREAP, rated outcome domains as critical, important or of limited importance. Within each outcome domain,

NTWC ranked the listed outcomes/measures for each domain to enable selection of the most relevant result from the study.

3.5 Final framework: synthesis questions and criteria for including studies in each synthesis

Figure 3.5.1, panel A shows the final analytic framework for the evidence summary and synthesis. The framework provides a guide to the structure of the synthesis and reporting of results (see caption for details).

Panel A. Evidence synthesis



Panel B. Outcome domains excluded from the evidence synthesis

Fig 3.5.1 | Final analytic framework for the review as agreed through the prioritisation process (Appendix A5). Panel A, columns 1 to 3 show the populations, comparisons and outcome domains eligible for the evidence synthesis. Column 4 shows the populations *(conditions)* and outcome domains for which studies were available for each comparison. Results are reported for each population in the section indicated in column 1. Study-level data and results are presented for each comparison in the Summary of Findings table indicated in column 4. Panel B shows outcome domain rated as of limited importance. * Outcome domain prioritised as critical.

3.6 Data extraction and management

3.6.1 Data extraction

Study data were collected and managed using REDCap electronic data capture tools [32, 33]. A two-step data extraction process was implemented wherein a senior author (MM) coded the study PICO to allocate studies for analysis according to the analytic framework and selected the outcome (result) for inclusion in each synthesis using pre-specified decision rules. Any queries from this stage were sent to the second senior author (SB) to review, with any disagreement resolved through consensus discussion. A senior author (MM) extracted study characteristics and quantitative data. A second senior author (SB) independently verified the study allocation for analysis and outcome selection, as well as the data. Steps taken to ensure the completeness, accuracy and consistency of data included pretesting the form and providing coding guidance, training, and feedback for data extractors. Quantitative data were reviewed by a biostatistician when queries arose.

3.6.2 Assessment of risk of bias in individual studies

We assessed the risk of bias in included studies using the revised Cochrane 'Risk of Bias' tools (RoB 2) for randomised trials [27, 34]. After piloting of the tool by senior authors (SB, MM, SM), we developed review-specific guidance for the suite of natural therapies reviews to ensure consistency between reviewers. This guidance had been used by the author team to assess over 200 natural therapies studies prior to application in the current review. One review author (MM) applied the tool to the selected results from the study following the RoB 2 guidance [27], and a second author (SM, SB) checked assessments. Supporting information and justifications for judgements for each domain (low, some concerns, high risk of bias) was recorded. We derived an overall summary of the risk of bias from each assessment, following the algorithm in the RoB 2 guidance as implemented in the Excel assessment tool [27].

3.6.3 Measures and interpretation of treatment effect

Given there was a single study included in the synthesis, we report the effect estimates (mean difference) exactly as reported by the triallists. Our interpretation was based on whether there was an important effect or not, using a minimal important difference (MID) for each outcome as the threshold for an important difference. The MIDs used were identified from primary studies validating MIDs or from systematic reviews of these validation studies. Where possible, we used sources that had been used in other natural therapies reviews for consistency of interpretation. If the effect estimate fell between the specified thresholds for important harm and important benefit (e.g. a mean difference of 0.5 points, where the threshold for an important effect was 1 point), the effect of specialised kinesiology was considered to be no different from the comparator. A mean difference above or below the threshold (e.g. >1 point or < -1 points) was interpreted as an important effect. We used the interpretation for each outcome as reported in the study, so positive values indicate benefit for some outcomes (an increase in health-related quality of life or emotional functioning and mental health) and harm for other outcomes (an increase in pain or disability).

3.7 Data synthesis

3.7.1 Summary of findings tables and assessment of certainty of the body of evidence

Separate comparisons were set up for each population group, comparator group and outcome domains agreed in the final framework (see Figure 3.5.1). For each result, one author (MM) used the GRADE approach to assess our certainty in whether there is an important effect (or not). In accordance with GRADE guidance [6, 35, 36], an overall GRADE of high, moderate, low or very low certainty is reported for each result based on whether there are serious, very serious, extremely serious or no concerns in relation to each of the following domains [5].

- **Risk of bias**. whether the studies contributing to each synthesis have methodological limitations that might lead to over (or under) estimation of the effect
- **Imprecision**. whether the confidence interval for the synthesised result crosses one or both of the thresholds for an important effect (e.g. an MID of 1 or -1) meaning that the result is compatible with different interpretations (e.g. the upper bound of the interval lies above 1 indicating 'an important effect' whereas the lower bound lies between -1 and 1 indicating 'little or no effect')
- **Inconsistency**. whether there is important, unexplained inconsistency in results across studies. Inconsistency was not assessed in this review, as only one study contributed results to each synthesis.

- **Indirectness**. whether there are important differences between the characteristics of studies included in each synthesis and the question we were seeking to address, such that the effects observed may not apply to our question (i.e. the applicability of the evidence).
- **Publication bias**. whether results missing from each analysis may bias the effect estimate because of selective non-reporting of results (or studies) that showed unfavourable effects

A summary of findings is tabulated for each of the inactive comparisons (C1 treatment described as a sham intervention and C2 wait list control). The summary of findings tables include:

- estimates of the effects of specialised kinesiology as reported by the trialists
- the overall GRADE (rating of certainty) and an explanation of the reason(s) for rating down (or borderline decisions) [37].
- the study design(s), number of studies and number of participants contributing data
- a plain language statement interpreting the evidence for each comparison and outcome, following GRADE guidance for writing informative statements (see 3.7.3 interpretation of findings) [38].

3.7.3 Interpretation of findings (evidence statements)

When interpreting results, we followed GRADE guidance for writing informative statements [38]. All interpretations are based on where the point estimate lies in relation to the pre-specified thresholds for an important effect (an important effect or not) and the direction of effect (beneficial or harmful). The certainty of evidence is communicated by qualifying the interpretation of effect (e.g. 'may' improve for low certainty). For example, 'specialised kinesiology may improve health-related quality of life' indicates that the point estimate lies above the threshold for important benefit (e.g. a MD >1) and that the evidence is of low certainty. For very low certainty evidence, we do not provide an interpretation of the result except to state 'The evidence is very uncertain about the effect of specialised kinesiology on outcome'. This is one of two options that GRADE provides for interpreting findings based on very low certainty of evidence. The decision not to interpret very low certainty results was made independently by the NTWC to ensure a consistent and clear interpretation of findings across Natural Therapy Review reports.

4. Results

4.1 Results of the search

The flow of studies through the review is summarised in Figure 4.1.1, the PRISMA flowchart.

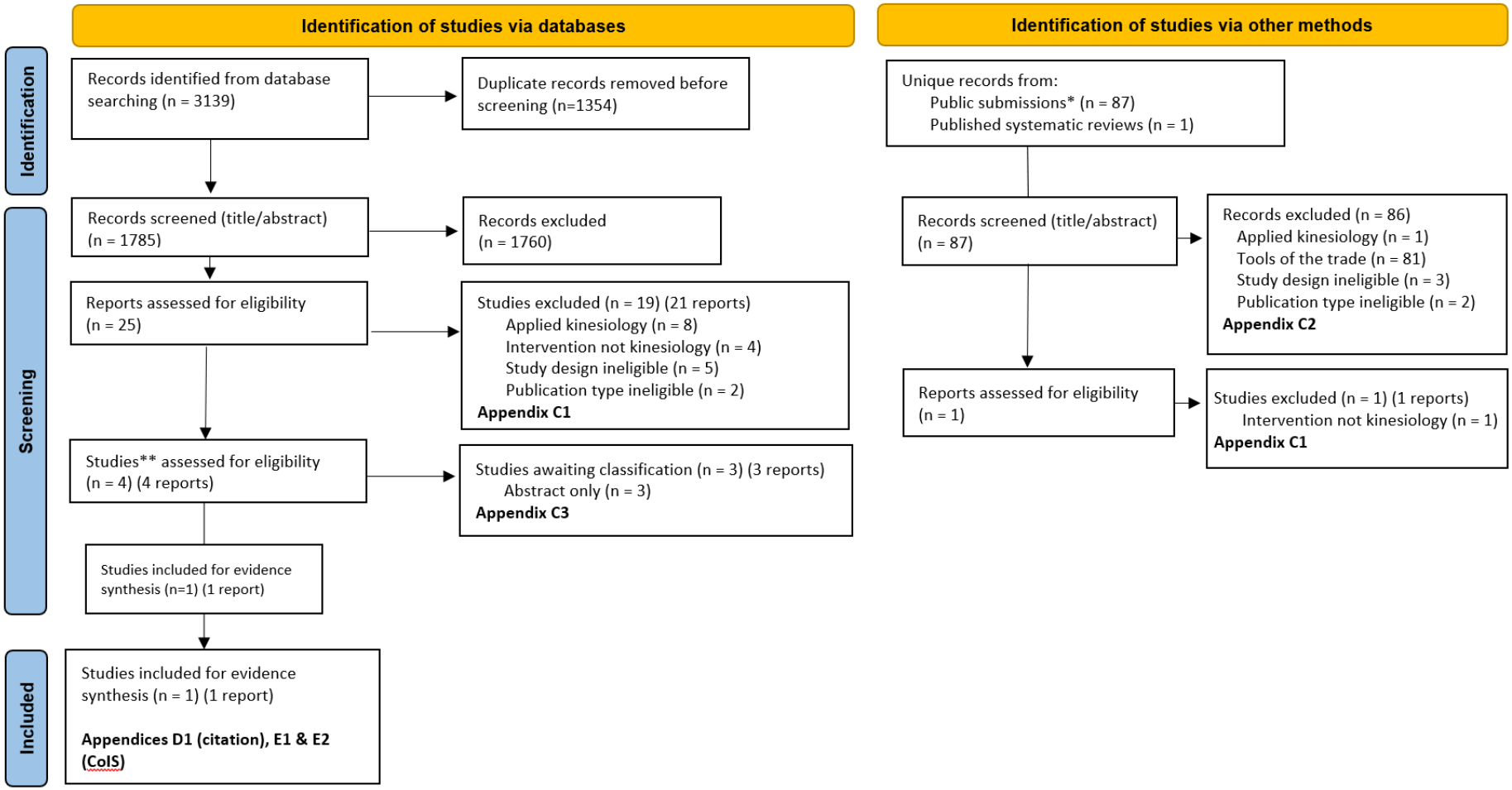


Fig. 4.1.1 | PRISMA diagram showing the flow of studies through the review. Studies are the unit of interest in the review. Each study could have multiple reports.

CoIS: characteristics of included studies. *see results section 'Public submissions'

Included studies

One study was included in this review [4]. Following screening of 1785 citations from the database searches, we retrieved 25 full text reports from which one study was included. No unique eligible studies were identified from other sources.

The included study was a randomised controlled trial that examined the effects of specialised kinesiology on outcomes for 70 people with chronic low back pain. This study compared specialised kinesiology to a "sham" intervention or wait list control.

The summary and synthesis of this study is reported in section 4.2 of the report.

There were no studies among people with other conditions for which specialised kinesiology is commonly sought or prescribed, such as other chronic or episodic pain (including musculoskeletal pain, headache disorders and dysmenorrhoea), stress, anxiety and mood disorders, functional gastrointestinal disorders, sleep disorders, disorders of the thyroid gland or thyroid hormones system, or respiratory conditions. There were also no studies of specialised kinesiology among people with other conditions or at risk of a condition (i.e. all eligible studies were included).

Excluded studies

After full-text screening, 20 studies (22 reports) were excluded from the review (Figure 4.1.1, Appendix C1 for list of excluded studies).

Studies awaiting classification

Following screening, 3 studies were categorised as awaiting classification because results were reported as an abstract only (Figure 4.1.1, Appendix C3 for study awaiting classification).

Studies in languages other than English

Our searches did not identify any potentially eligible studies published in languages other than English.

Ongoing and unpublished studies

Our search of trial registry entries from CENTRAL and ClinicalTrials.gov identified 133 unique records, of which only one appeared eligible for the review. This record was for the completed study included in the review [4].

Public submissions

Ninety-five (95) citations were received from the public and key stakeholders (via the Department), NTREAP and NTWC. Of these, 8 were retrieved by our search: one citation (Eardley 2013) was included in the review, and the other 7 citations were excluded at title and abstract screening. The remaining 87 citations were screened, and none were eligible. Citations and eligibility decisions for the 95 public submissions are reported in Appendix C2.

4.2 Musculoskeletal conditions

The study included in the evidence synthesis for people with musculoskeletal pain was among people with chronic low back pain.

Throughout the text, tables and plots, the outcomes are presented in the following order.

1. pain
2. physical function (disability)
3. health-related quality of life
4. emotional functioning and mental health

The included study did not report outcomes in the domains of sleep quality, fatigue or overall disease symptoms, but none of these outcomes were prioritised for this condition.

Characteristics of the included study

Brief characteristics of the study that compared Professional Kinesiology Practice (PKP) to an inactive control in people with chronic low back pain are summarised in Table 4.2.1. The outcome measure from which data were included is reported in Tables 4.2.1.1 and 4.2.2.1. For all results, the outcome selected for analysis was measured at the end of the intervention period (see Table 4.2.1). Full characteristics are reported for the included study in Appendix E1 (including a list of all outcome measures, details of which outcome was selected when multiple were available for an outcome domain, and the timing of outcome measurement in relation to intervention), and Appendix E2 (funding, conflicts of interest and ethics).

We report effect estimates for each outcome in the summary of findings tables (Tables 4.2.1.1 and 4.2.2.1) as reported by the trialists. The reported effect estimates for physical function (disability), health-related quality of life, and emotional functioning and mental health were adjusted for baseline and demographic variables.

Table 4.2.1 Brief characteristics of studies comparing specialised kinesiology to "sham" kinesiology or wait list control for people with chronic low back pain.

		Intervention				Outcome domains				
Study	**Population: condition (ICD-11 code)**	**Intervention period**	**Frequency**	**No. sessions & duration**	**Comparator(s)**	**Pain**	**Function (disability)**	**HR-QoL**	**EFMH**	**Measured**
Eardley 2013 UK	70 adults randomised across the three conditions with chronic low back pain (MG30.02 Chronic primary low back pain)	5 weeks kinesiology (Professional Kinesiology Practice protocol)	1 session/ week	5 [duration NR]	C1 "sham" kinesiology [standard muscle testing, non-standard corrective procedure, non-standard muscle re-check and non-therapeutic conversation]* C2 wait list	X ǂ	X ǂ	X ǂ	X ǂ	week 5

*schedule as per kinesiology group; ǂ outcomes confirmed as measured in registry entry

In Eardley 2013 there was minimal description of the individualised PKP treatment and no description of the PKP protocols, so it is not possible to determine exactly what was delivered to participants in the specialised kinesiology group. The trialists cite a practitioner database that is not publicly accessible for the PKP protocols. The comparator (C1) that was described as a "sham" kinesiology intervention included: standard muscle test assessment, application of sham correction points during the muscle testing protocol, non-standard re-check of muscles and non-therapeutic conversation. The trialists cite a pilot study that provides description of the "sham"

PKP intervention [39]. Table 4.2.2 provides an overview of the description of the "real" and "sham" PKP interventions adapted from the trial report and the pilot study. Consistent with the protocol and the approach taken in other natural therapies reviews, we did not contact trialists for additional information. Without a complete description of each group, it is not possible to confirm whether the "sham" content/protocol is sufficiently inactive to be labelled a "sham" or would be more appropriately categorised as an active intervention.

Table 4.2.2 Description of 'real' and 'sham' Professional Kinesiology Practice (PKP) interventions adapted from Eardley 2013 [4] and Hall 2008 [39]

'Real' kinesiology	**'Sham' kinesiology (Option B selected for use in Eardley 2013, non-standard corrective procedure)**

• Back examination – measurements of restriction and movement
• Muscle test assessment (standard Thie 14 muscle assessment with correction point location)
• Individualised PKP treatment with therapeutic conversation
  ○ selection from range of approx. 500 manual, psychological or other techniques, individualised from full range of procedures
  ○ for body reflex corrections: firm rotary digital pressure for approximately 10 seconds on specific areas
  ○ for head reflex corrections: light digital holding on specific points for up to 5 minutes
• Post check measures of restriction and movement
• Discuss changes with patient
• Determine self-administered techniques for maintenance
	• Back examination* – measurements of restriction and movement
	• Muscle test assessment*
	• Application of sham correction points during the muscle testing protocol* using non-standard technique
	  ○ body reflex corrections: light digital touch for 3-4 seconds)
	  ○ head reflex corrections: gentle tapping on traditional points for 10 seconds
	• Non-standard re-check of muscle
	• Non-therapeutic conversation
	
	* performed more slowly to approximate 40-60 minute 'real' kinesiology treatment duration

4.2.1 Kinesiology compared to "sham" kinesiology

Risk of bias in included trials

A summary of the judgements for each risk of bias domain and overall is presented in Figure 4.2.1.1 for each of the outcomes reported for the comparison of specialised kinesiology versus "sham" kinesiology. The complete assessments and judgements are reported in Appendix F.

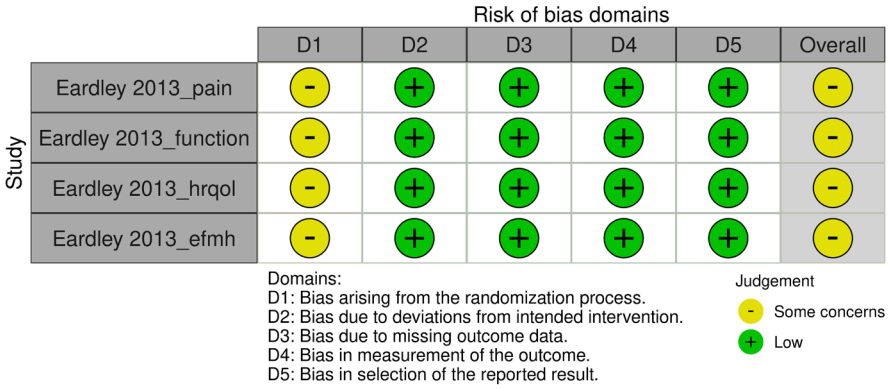


Fig 4.2.1.1 | Summary of the risk of bias assessments for the study contributing to the comparison of specialised kinesiology versus "sham" kinesiology in people with chronic low back pain. Each outcome for which the study

contributed results was assessed separately. Full details of each assessment, including the rationale for judgements, are reported in Appendix F.

Effects of kinesiology compared to "sham" kinesiology

The effects of specialised kinesiology compared to "sham" kinesiology in people with chronic low back pain are presented in Table 4.2.1.1 The certainty of evidence and factors that influenced our certainty in the evidence are presented and explained in the GRADE summary of findings table.

- *Included studies*. One study (Eardley 2013; 40 participants) contributes to the comparison of specialised kinesiology versus "sham" kinesiology.
- *Missing results*. There were no missing results from the included study for this comparison.
- *Ongoing studies*. There are no ongoing studies of specialised kinesiology versus "sham" kinesiology in people with chronic low back pain.

Chronic low back pain

Overall, the effect of specialised kinesiology versus "sham" kinesiology on the following outcomes is very uncertain for people with chronic low back pain (1 study, 40 participants):

- pain (very low certainty)
- physical function (disability) (very low certainty)
- health-related quality of life (very low certainty)
- emotional functioning and mental health (very low certainty)

Table 4.2.1.1 Summary of findings for the effect of specialised kinesiology versus "sham" kinesiology for chronic or episodic pain.

Outcomes** (population in included study)	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Interpretation (evidence statement)
	With "sham" kinesiology	**With kinesiology**				
Pain (people with chronic low back pain) assessed with: VAS Scale from: 0 to 100[a] (lower is better) follow-up: 5 weeks	The mean pain was 36 points	**Mean pain was 6.4 points lower** (14.6 points lower to 1.9 higher)[b]	-	40 (1 RCT)	⨁◯◯◯ Very low[c,d,e,f,g]	The evidence is very uncertain about the effect of specialised kinesiology on pain in people with chronic or episodic pain (chronic low back pain).
Physical function (disability) (people with chronic low back pain) assessed with: RMDQ Scale from: 0 to 24[h] (lower is better) follow-up: 5 weeks	The mean physical function (disability) was 4.9 points	**Mean physical function (disability) was 2.9 points lower** (5.8 lower to 0.1 lower)[b]	-	40 (1 RCT)	⨁◯◯◯ Very low[c,d,e,g,i]	The evidence is very uncertain about the effect of specialised kinesiology on physical function (disability) in people with chronic or episodic pain (chronic low back pain).
Health-related quality of life (people with chronic low back pain) assessed with: SF-36 physical dimension (higher is better) Scale from: 0 to 100[j] follow-up: 5 weeks	The mean health-related quality of life was 38.3 points	**Mean health-related quality of life was 3.2 points higher** (1.4 lower to 7.8 higher)[b]	-	40 (1 RCT)	⨁◯◯◯ Very low[c,d,e,g,k]	The evidence is very uncertain about the effect of specialised kinesiology on health-related quality of life in people with chronic or episodic pain (chronic low back pain).
Emotional functioning and mental health - emotional well-being (people with chronic low back pain) assessed with: SF-36 mental dimension (higher is better) Scale from: 0 to 100[j] follow-up: 5 weeks	The mean emotional well-being was 45.5 points	**Mean emotional functioning and mental health was 2.9 points lower** (8.9 lower to 3.1 higher)[b]	-	40 (1 RCT)	⨁◯◯◯ Very low[c,d,e,g,l]	The evidence is very uncertain about the effect of specialised kinesiology on emotional functioning and mental health - emotional well-being in people with chronic or episodic pain (chronic low back pain).
Other outcomes				(0 studies)	-	No studies reported on the important outcomes of sleep quality, fatigue, or overall symptoms for people with chronic or episodic pain conditions.

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). **CI:** confidence interval **MD:** mean difference **MID:** minimal important difference

****The thresholds used for an important difference** for each outcome were based on published values for a minimally important difference (MID). (1) **Pain**: MID of 20 mm on a 100 mm VAS from a study with people with low back pain [40], (2) **Physical function (disability):** MID of 2 points on 24-item RMDQ from a study with people with low back pain [41], (3) **Health-related quality of life**: MID of 2.6 points on SF-36 (physical dimension) from a systematic review of people with chronic neck pain [42], (4) **Emotional functioning and mental health**: MID range of 2 to 4 points on SF-36 for the general population [43].

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Explanations are provided for domains for which there is a downgrade or a borderline judgment. In line with GRADE guidance, we do not explain that there are no limitations unless the judgment was challenging (https://pubmed.ncbi.nlm.nih.gov/26796947/)

Explanations

a. VAS likely range 0-100; NR in Eardley 2013; registry record reports as VAS 0-10

b. Effect estimates are the adjusted mean difference between groups at follow-up as reported by the trialists. Pain: repeated measures analysis comparing mean difference of weekly VAS scores after 5 weeks of treatment. Physical function (disability), HR-QoL and emotional functioning and mental health: ANCOVA comparing means at week 5 for RMDQ, SF-36 physical, SF-36 emotional with scores adjusted for baseline and demographic variables.

c. Serious RoB (-1). Single study with some concerns

d. Inconsistency not assessed: single study

e. Serious indirectness (-1). Evidence from one small study in people with low back pain. Uncertain whether results apply to musculoskeletal conditions and other chronic or episodic pain conditions more generally.

f. No serious imprecision. Both the upper or lower limits of the 95% confidence interval (MD 14.6 mm lower to 1.9 mm higher) are compatible with little to no difference in pain (MID range -20 mm to 20 mm).

g. Publication bias strongly suspected (-1). The synthesis is based on 1 small study. There is previous evidence documenting the presence of reporting bias in trials of natural therapies, such that selective non-reporting is strongly suspected. No missing outcomes from studies included in the review, and no missing studies identified from registry entries or protocols.

h. RMDQ scale range assumed to be 0-24; NR in Eardley 2013; registry record reports 24-item RMDQ, scored as 0-24

i. Serious imprecision (-1). The 95% confidence interval crosses the threshold for a small but important reduction in disability (MID -2 points), so the result is compatible with important benefit (MD 5.8 points lower) and little to no difference (MD 0.1 points higher).

j. SF-36 physical and mental dimensions scale range assumed to be 0-100; NR in Eardley 2013, however cite Ware 1992, scored as 0-100

k. Serious imprecision (-1). The 95% confidence interval crosses the threshold for a small but important improvement in HR-QoL (MID 2.6 points), so the result is compatible with little to no difference (1.4 points lower) and important benefit (MD 7.8 points higher).

l. Very serious imprecision (-2). The 95% confidence interval crosses the threshold for both a small but important reduction in emotional well-being (MID -2 to -4 points) and is in the range for a small but important increase in emotional well-being (MID 2 to 4 points), so the result is compatible with important harm (MD 8.9 points lower) and important benefit (MD 3.1 points higher).

4.2.2 Kinesiology compared to inactive control (wait list)

Risk of bias in included trials

A summary of the judgements for each risk of bias domain and overall is presented in Figure 4.2.1.1 for each of the outcomes reported for the comparison of specialised kinesiology versus inactive control (wait list). The complete assessments and judgements are reported in Appendix F.

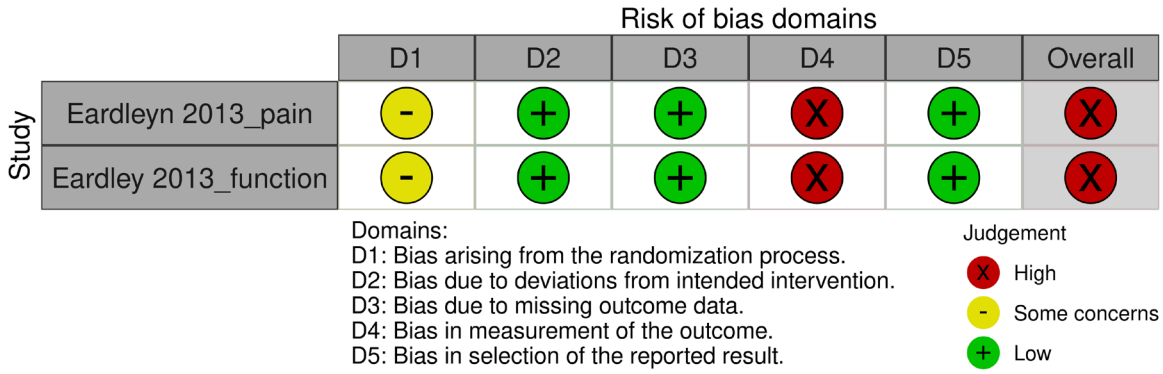


Fig 4.2.2.1 | Summary of the risk of bias assessments for the study contributing to the comparison of specialised kinesiology versus inactive control (wait list) in people with chronic low back pain. Each outcome for which the study contributed results was assessed separately. Full details of each assessment, including the rationale for judgements, are reported in Appendix F.

Effects of kinesiology compared to inactive control (wait list)

The effects of specialised kinesiology compared to an inactive control (wait list) in people with chronic low back pain are presented in Table 4.2.2.1 The certainty of evidence and factors that influenced our certainty in the evidence are presented and explained in the GRADE summary of findings table.

- *Included studies*. One study (Eardley 2013; 37 participants) contributes to the comparison of specialised kinesiology versus an inactive control (wait list).
- *Missing results*. It is unclear why SF-36 results were not reported for the wait list control group, or if the SF-36 was administered to these participants. SF-36 physical and mental scores were reported for the specialised kinesiology (and "sham" kinesiology intervention) groups. Table 1 of Eardley indicates the SF-36 would not be measured for the wait list group. However, Table 1 also indicates that the RMDQ would not be measured for the wait list group, yet RMDQ results are reported for the wait list group. The SF-36 results would have contributed to the health-related quality of life and emotional functioning and mental health analysis. We also note that the trialists report both in the registry record and results paper that the RMDQ, SF-36 and VAS would be administered at week 7 (2 weeks after the end of the intervention), yet these results are also not reported. This raises concerns about selective reporting of results for this study.
- *Ongoing studies*. There are no ongoing studies of specialised kinesiology versus an inactive control (wait list) in people with chronic low back pain.

Chronic low back pain

Overall, the effect of specialised kinesiology versus wait list control on the following outcomes is very uncertain for people with chronic low back pain (1 study, 37 participants):

- pain (very low certainty)
- physical function (disability) (very low certainty)

Table 4.2.2.1 Summary of findings for the effect of specialised kinesiology versus inactive control (wait list) for chronic or episodic pain.

Outcomes** (population in included study)	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Interpretation (evidence statement)
	With inactive control (wait list)	**With kinesiology**				
Pain (people with chronic low back pain) assessed with: VAS Scale from: 0 to 100[a] (lower is better) follow-up: 5 weeks	The mean pain was 57.7 mm[b]	**Mean pain was MD 18.3 mm lower** (27.7 lower to 8.8 lower)[c]	-	37 (1 RCT)[b]	⨁◯◯◯ Very low[d,e,f,g,h]	The evidence is very uncertain about the effect of specialised kinesiology on pain in people with chronic or episodic pain (chronic low back pain).
Physical function (disability) (people with chronic low back pain) assessed with: RMDQ Scale from: 0 to 24[i] (lower is better) follow-up: 5 weeks	The mean physical function (disability) was 10.1 points[b]	**Mean physical function (disability) was MD 9 points lower** (12.1 lower to 5.8 lower)[c]	-	37 (1 RCT)[b]	⨁◯◯◯ Very low[d,e,f,h,j]	The evidence is very uncertain about the effect of specialised kinesiology on physical function (disability) in people with chronic or episodic pain (chronic low back pain).
Other critical outcomes				(0 studies)	-	No studies reported on the critical outcomes of health-related quality of life or emotional functioning and mental health for people with chronic or episodic pain.
Other important outcomes				(0 studies)	-	No studies reported on the important outcomes of sleep quality, fatigue, or overall symptoms for people with chronic or episodic pain.

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI). **CI:** confidence interval; **MD:** mean difference **MID:** minimal important difference
****The thresholds used for an important difference** for each outcome were based on published values for a minimally important difference (MID). (1) **Pain**: MID of 20 mm on a 100 mm VAS from a study with people with low back pain [40], (2) **Physical function (disability):** MID of 2 points on 24-item RMDQ from a study with people with low back pain [41].

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect.

Explanations are provided for domains for which there is a downgrade or a borderline judgment. In line with GRADE guidance, we do not explain that there are no limitations unless the judgment was challenging (https://pubmed.ncbi.nlm.nih.gov/26796947/)

Explanations

a. VAS likely range 0-100; NR in Eardley 2013; registry record reports as VAS 0-10

b. Sample in analysis for wait list control group unclear. Likely n=17 (final re-randomised sample) as per Table 3 (baseline characteristics).

c. Effect estimates are as reported by trialists. Pain: repeated measures analysis comparing mean difference of weekly VAS scores after 5 weeks of treatment. Physical function (disability): ANCOVA comparing means at week 5 for RMDQ with scores adjusted for baseline and demographic variables.

d. Very serious RoB (-2). Single study at high risk of bias.

e. Inconsistency not assessed: single study

f. Serious indirectness (-1). Evidence from one small study in people with low back pain. Uncertain whether results apply to musculoskeletal conditions or other chronic or episodic pain conditions more generally.

g. Serious imprecision (-1). The 95% confidence interval crosses the threshold for a small but important reduction in pain (MID -20 mm), so the result is compatible with little to no difference (8.8 mm lower) and important benefit (MD 27.7 mm lower).

h. Publication bias strongly suspected (-1). The synthesis is based on 1 small study. There is previous evidence documenting the presence of reporting bias in trials of natural therapies, such that selective non-reporting is strongly suspected. No missing outcomes from studies included in the review, and no missing studies identified from registry entries or protocols.

i. RMDQ likely range 0-24; NR in Eardley 2013; registry record reports 24-item RMDQ, scoring 0-24

j. No serious imprecision. Both the upper and lower limits of the 95% confidence interval (MD 12.1 points lower to 5.8 points lower) are compatible with an important reduction in disability (MID -2 points).

5. Discussion

Summary of the main results

This review assessed the available evidence on specialised kinesiology to inform the Australian Government about health policy decisions for private health insurance rebates. This review was not designed to assess all the reasons that people use specialised kinesiology, or the reasons practitioners prescribe specialised kinesiology and was not intended to inform individual choices about using specialised kinesiology.

We found one study evaluating the effects of specialised kinesiology among people with chronic low back pain that was included in the evidence synthesis, comparing specialised kinesiology (Professional Kinesiology Practice) to a "sham" treatment or wait list control.

- Based on this study, the effect of specialised kinesiology on pain, function (disability), health-related quality of life, and emotional functioning and mental health among people with chronic low back pain is very uncertain.

Comparability of these findings with other systematic reviews

We identified one systematic review of kinesiology published in 2008. The Hall 2008 review included 22 studies, none of which were eligible for this review (either in a healthy population, the intervention was applied kinesiology or diagnostic test accuracy studies) [12], so the conclusions are not relevant to this review.

Overall completeness and applicability of evidence

Evidence evaluating the effects of specialised kinesiology is very sparse, and with no coverage of most of the conditions for which specialised kinesiology is commonly sought or prescribed. Six broad population groups were included in our analytic framework to cover commonly treated conditions: (1) chronic or episodic pain (incl. musculoskeletal pain, headache disorders and dysmenorrhoea, (2) stress, anxiety and mood disorders, (3) functional gastrointestinal disorders, (4) sleep disorders, (5) disorders of the thyroid gland or thyroid hormones system (e.g. hypothyroidism), and (6) respiratory conditions (e.g. allergic rhinitis, asthma).

We found one randomised trial among people with chronic low back pain. Studies examining the effects of specialised kinesiology for any other condition relevant to the Australian condition were eligible, but no other studies were found.

The included study measured pain, function (disability), health-related quality of life and emotional functioning and mental health. There were no studies measuring the critical or important outcomes of sleep quality, fatigue or overall disease symptoms.

The study included in the review was conducted in the UK in a private kinesiology clinic, using protocols from Professional Kinesiology Practice (PKP). We were unable to determine what was delivered to participants in the specialised kinesiology group from the trial report. Consistent with the protocol and the approach taken in other natural therapies reviews, we did not contact trialists for additional information. It is unclear whether the practice of PKP in the UK is similar to that in Australia, or to other systems of specialised or energy kinesiology. Overall, while the evidence may be applicable, it is far from complete.

Certainty of the evidence

Limitations of the evidence were considered when interpreting each result by applying the GRADE approach. The overriding limitation is that there is a single trial with a small number of participants contributing data, which led to imprecise effect estimates. In some cases, the imprecision was very serious, meaning that the result was compatible with both important benefit and important harm. We were also concerned about the methodological limitations of the study contributing to the synthesis, with all of the outcomes judged to be at high risk of bias or some concerns. In terms of missing results from the included study, it is unclear if the SF-36 measure was administered to participants in the wait list control group and not reported. Results from this measure would

have contributed to the health-related quality of life and emotional functioning and mental health domains for this group. The trialists also report both in the registry record and results paper that measures for pain (VAS), physical function (RMDQ), health-related quality of life (SF-36 physical dimension), and emotional functioning and mental health (SF-36 mental dimension) would be administered at week 7 (2 weeks after the end of the intervention), yet these results are not reported for any of the groups. Given evidence of selective non-reporting of unfavourable/uninteresting results in general, selective non-reporting of trials cannot be ruled out.

Potential biases in the review process

In this review steps were taken to address potential limitations. We applied methods recommended in the Cochrane handbook for systematic reviews of interventions and the GRADE approach, as per the detailed protocol that was prospectively registered on PROSPERO after undergoing independent methodological review. The synthesis questions could not be fully specified at protocol stage. However, the final list of outcomes eligible for the review and questions to be addressed in the synthesis were determined through a pre-specified prioritisation process, performed by NTWC with input from NTREAP and without knowledge of the included studies or results of those studies. An initial analytic framework for the review was included in the protocol to inform these decisions and propose a structure for the synthesis.

While data extraction for each study was performed by a single reviewer, the selection of outcomes and coding of studies for inclusion in the analysis was performed independently by a second experienced review author. All data were checked by a second experienced author. These steps minimised the risk of errors or misinterpretation. Risk of bias assessments were performed for each study by a single reviewer and checked by a second experienced author following detailed guidance developed for the review and training in the assessment of design features relevant to this review.

6. Conclusions

Implications for health policy

We found a single small randomised controlled trial that evaluated the effects of specialised kinesiology compared to either an intervention described by the trialists as a "sham" or wait list control among people with chronic low back pain (70 participants randomised across the three conditions). The evidence from this trial is very uncertain about whether specialised kinesiology improves the critical outcomes of pain, physical function or health-related quality of life, and the important outcome of emotional functioning and mental health, for people with chronic low back pain. There were no studies among people with other conditions for which specialised kinesiology is commonly sought or prescribed, such as other chronic or episodic pain (including musculoskeletal pain, headache disorders and dysmenorrhoea), stress, anxiety and mood disorders, functional gastrointestinal disorders, sleep disorders, disorders of the thyroid gland or thyroid hormones system, or respiratory conditions. There were no studies that measured other outcomes for which specialised kinesiology is commonly sought or prescribed, such as sleep quality, fatigue or overall disease symptoms. One other systematic review of kinesiology was found, but the included studies were not eligible for this review, so the conclusions are not relevant. Studies published in a language other than English were to be listed, but not included in the assessment, however none were found.

Implications for future research

Future research on the effectiveness of specialised kinesiology could be improved by ensuring the choice of comparators facilitates synthesis; either by including inactive controls (e.g. usual care delivered to both groups, sham interventions) or standardised active comparators. In designing trials, attention should be given to the power of the trial, adequately describing all trial arms, implementing study design features that minimise the risk of bias, measuring outcomes that are well established and patient-relevant (e.g. as identified in consensus-based core outcome sets), reporting all measured outcomes, and ensuring trials are registered and reported in accordance with relevant reporting guidelines.

7. Author contributions and declaration of interest

Max Murano[1]	Implemented and managed electronic systems for screening studies and data extraction, and associated work processes. Managed and coordinated study selection, selected studies, conducted data extraction and risk of bias assessments. Prepared material for the report and technical appendices, and led writing of the report and methods Appendix with other contributors (as described).
Steve McDonald[1]	Developed, wrote and implemented the search strategy. Screened studies for inclusion in the review and piloted data collection and risk of bias methods. Prepared material for the report and technical appendices. Wrote the search methods and results, and study selection methods.
Joanne McKenzie[2]	Wrote the analysis plan and method for reporting treatment effects. Designed the data collection form for quantitative results data.
Sue Brennan[1*] sue.brennan@monash.edu *(contact author)	Senior Evidence Officer responsible for oversight of the review. Led the design of the review and data extraction systems, and the implementation of risk of bias assessment. Performed data checking of extracted studies and cleaned data. Contributed to writing of the review report and methods Appendix.

[1] Cochrane Australia, Evidence Synthesis Qualitative & Implementation Methods Unit, School of Public Health and Preventive Medicine, Monash University

[2] Methods in Evidence Synthesis Unit, School of Public Health and Preventive Medicine, Monash University

Declarations of interest

All authors declare they have no financial, personal or professional interests that could be construed to influence the conduct or results of this systematic review.

Acknowledgements

Phoebe Nguyen[2], Kimberley Jones[3] and Annie Synnot[1] contributed to the development of the data extraction tool and review-specific risk of bias guidance through application in the first natural therapies review of aromatherapy (>200 studies).

[3] Indigenous Health Equity Unit, Melbourne School of Population and Global Health, University of Melbourne

Funding

This review is funded by the Australian Government Department of Health and Aged Care via the NHMRC, under Official Order 2021-22C021.

8. References

1. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page M, et al, editors. Cochrane Handbook for Systematic Reviews of Interventions version 6.1 (updated September 2020). Cochrane. Available from: www.training.cochrane.org/handbook 2020.
2. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi:10.1136/bmj.n71.
3. Page MJ, Moher D, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. PRISMA 2020 explanation and elaboration: updated guidance and exemplars for reporting systematic reviews. BMJ 2021;372:n160. doi:10.1136/bmj.n160.
4. Eardley S, Brien S, Little P, Prescott P, Lewith G. Professional kinesiology practice for chronic low back pain: single-blind, randomised controlled pilot study. Forschende Komplementärmedizin/Research in Complementary Medicine 2013;20(3):180-8.
5. Brennan SE, Johnston RV. Research Note: Interpreting findings of a systematic review using GRADE methods. Journal of Physiotherapy 2023. doi:https://doi.org/10.1016/j.jphys.2023.05.012.
6. Schünemann HJ, Higgins J, Vist GE, Glasziou P, Akl EA, Skoetz N, et al. Chapter 14: Completing 'Summary of findings' tables and grading the certainty of the evidence. In: Higgins J, Thomas J, Chandler J, Cumpston M, Li T, Welch V, editors. Cochrane Handbook for Systematic Reviews of Interventions. 2nd ed. Chichester (UK): John Wiley & Sons; 2019.
7. Schünemann HJ, Vist GE, Higgins J, Santesso N, Deeks JJ, Glasziou P, et al. Chapter 15: Interpreting results and drawing conclusions. In: Higgins J, Thomas J, Chandler J, Cumpston M, Li T, Welch V, editors. Cochrane Handbook for Systematic Reviews of Interventions. 2nd ed. Chichester (UK): John Wiley & Sons; 2019.
8. National Health and Medical Research Council. Statement of requirement: Evidence evaluations for review of natural therapies (tranche two). 2020
9. What is Kinesiology? [Internet] Kerrimuir, VIC: Australian Kinesiology Association Inc. https://aka.asn.au/what-is-kinesiology/ (2023). Accessed 2023 Mar 14.
10. About Touch For Health. [Internet]: International Kinesiology College. https://www.ikc.global/about-touch-for-health/ (2020). Accessed 2023 Dec 11.
11. What is Touch For Health? [Internet] Nampa, ID: Touch for Health Kinesiology Association. https://touchforhealth.us/about-touch-for-health/ (2023). Accessed 2023 Dec 11.
12. Hall S, Lewith G, Brien S, Little P. A review of the literature in applied and specialised kinesiology. Complementary Medicine Research 2008;15(1):40-6.
13. Grünenberg K, Hillersdal L, Walker HK, Boelsbjerg HB. Doing wholeness, producing subjects: Kinesiological sensemaking and energetic kinship. Body & Society 2013;19(4):92-119.
14. Steel A, McIntyre E, Harnett J, Foley H, Adams J, Sibbritt D, et al. Complementary medicine use in the Australian population: Results of a nationally-representative cross-sectional survey. Sci Rep 2018;8(1):17325. doi:10.1038/s41598-018-35508-y.
15. Jensen A. Muscle testing (kinesiology): panacea or placebo? The Conversation. 2012. [cited 2012 Dec 19]. https://theconversation.com/muscle-testing-kinesiology-panacea-or-placebo-11075.
16. Rosner AL, Cuthbert SC. Applied kinesiology: distinctions in its definition and interpretation. J Bodyw Mov Ther 2012;16(4):464-87. doi:10.1016/j.jbmt.2012.04.008.
17. Maine I, McIntyre M, Huynh P, Bullivant A. SUBMISSION: Natural Therapies Review Expert Advisory Panel 2019-20; Australian Government Department of Health; Citations for Published Scientific Research Studies; Tranche Two, Kinesiology. Australian Institute of Kinesiologists Ltd & Australian Kinesiology Association. 2020. https://aka.asn.au/evidence-based-research/. Accessed 2023 Mar 14
18. Inspire Freedom. Online Kinesiology Consultations. [Internet] Sydney, NSW. https://www.inspirefreedom.com.au/online-kinesiolgist/ (2024). Accessed 2024 Mar 18.
19. Kinesiology Session Structure. [Internet] Thirroul, NSW: Australian Institute of Kinesiologists Ltd. https://www.aik.org.au/experience_kinesiology.html (2022). Accessed 2023 Mar 14.
20. Kinesiology Training Pathways. [Internet] Kerrimuir, VIC: Australian Kinesiology Association Inc. https://aka.asn.au/kinesiology-training/ (2023). Accessed 2023 Mar 14.
21. Study kinesiology. [Internet] Thirroul, NSW: Australian Insitute of Kinesiologists Ltd. https://www.aik.org.au/study_kinesiology.html (2022). Accessed 2023 Mar 14.

22. Australian Health Practitioner Regulatory Association. Public consultation on clearer regulation of medical practitioners who provide complementary and unconventional medicine and emerging treatments. Available from: https://www.ahpra.gov.au/ Access date: 4 February 2021 2021;
23. Eardley S, Brien S, Little P, Prescott P, Lewith G. Professional kinesiology practice for chronic low back pain: single-blind, randomised controlled pilot study. Complementary Medicine Research 2013;20(3):180-8.
24. Steel A. PRACI Study: unpublished data. 2021.
25. Experience Kinesiology. [Internet] Thirroul, NSW: Australian Insitute of Kinesiologists Ltd. https://www.aik.org.au/experience_kinesiology.html (2022). Accessed 2023 Mar 14.
26. Australian Government Department of Health. Review of the Australian Government Rebate on Natural Therapies for Private Health Insurance. 2015.
27. Higgins JPT, Savovic J, Page MJ, Sterne JAC. Revised Cochrane risk-of-bias tool for randomized trials (RoB 2). Available from https://www.riskofbias.info/welcome/rob-2-0-tool/current-version-of-rob-2. Access date: 8 February 2021. 2019;
28. National Health and Medical Research Council. Kinesiology description developed in conversation with the National Health and Medical Research Council's Natural Therapies Working Committee Chair and the Department of Health's Natural Therapies Review Expert Advisory Panel (February 2020). 2020
29. International College of Applied Kinesiology (Australian Chapter). Professional Applied Kinesiology Certification Series. www.icaka.org.au Accessed 8 Nov 2023. https://www.icaka.org.au/Applied-Kinesiology-Certification (2023). Accessed 2023.
30. What is Brain Gym®? Educational Kinesiology (Edu-K). Robe, SA: Brain Gym® Australia. https://braingym.org.au/about/ (2024). Accessed 2024 Jun 18.
31. Dictionary of Rheumatology. Switzerland: Springer International Publishing; 2016.
32. Harris PA, Taylor R, Minor BL, Elliott V, Fernandez M, O'Neal L, et al. The REDCap consortium: Building an international community of software platform partners. J Biomed Inform 2019;95:103208. doi:10.1016/j.jbi.2019.103208.
33. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—A metadata-driven methodology and workflow process for providing translational research informatics support. J Biomed Inform 2009;42(2):377-81. doi:10.1016/j.jbi.2008.08.010.
34. Sterne JAC, Savovic J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. BMJ 2019;366:l4898. doi:10.1136/bmj.l4898.
35. Schunemann HJ, Brozek J, Guyatt G, Oxman AD, editors. Handbook for grading the quality of evidence and the strength of recommendations using the GRADE approach. Hamilton, Canada: McMaster University; 2013.
36. Zeng L, Brignardello-Petersen R, Hultcrantz M, Siemieniuk RAC, Santesso N, Traversy G, et al. GRADE guidelines 32: GRADE offers guidance on choosing targets of GRADE certainty of evidence ratings. Journal of clinical epidemiology 2021;137:163-75. doi:10.1016/j.jclinepi.2021.03.026.
37. Santesso N, Carrasco-Labra A, Langendam M, Brignardello-Petersen R, Mustafa RA, Heus P, et al. Improving GRADE Evidence Tables part 3: Guidance for useful GRADE certainty in the evidence judgments through explanatory footnotes. Journal of clinical epidemiology 2016. doi:10.1016/j.jclinepi.2015.12.006.
38. Santesso N, Glenton C, Dahm P, Garner P, Akl EA, Alper B, et al. GRADE guidelines: 26. informative statements to communicate the findings of systematic reviews of interventions. Journal of clinical epidemiology 2019. doi:https://doi.org/10.1016/j.jclinepi.2019.10.014.
39. Hall S, Lewith G, Brien S, Little P. An exploratory pilot study to design and assess the credibility of a sham kinesiology treatment. Forschende Komplementärmedizin/Research in Complementary Medicine 2008;15(6):321-6.
40. Ostelo RW, de Vet HC. Clinically important outcomes in low back pain. Best practice & research Clinical rheumatology 2005;19(4):593-607.
41. Stratford PW, Riddle DL. A Roland Morris Disability Questionnaire Target Value to Distinguish between Functional and Dysfunctional States in People with Low Back Pain. Physiother Can 2016;68(1):29-35. doi:10.3138/ptc.2014-85.
42. Lauche R, Langhorst J, Dobos GJ, Cramer H. Clinically meaningful differences in pain, disability and quality of life for chronic nonspecific neck pain–a reanalysis of 4 randomized controlled trials of cupping therapy. Complementary therapies in medicine 2013;21(4):342-7.
43. User's manual for the SF36v2 survey. Johnston, RI: Quality Metric Incorporated; 2011.