Project Pilates for preventing and treating health conditions: an evidence evaluation

> **Prepared for** National Health and Medical Research Council

NHMRC | Natural Therapies Working Committee Canberra ACT 2601

# CONFIDENTIAL

Appendices A to C prepared by Health Technology Analysts Pty Ltd

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# **Report information**

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## **Dates**

This technical report and accompanying evidence evaluation report received approval from the National Health and Medical Research Council (NHMRC) Natural Therapies Working Committee (NTWC) on 11 August 2021.

The protocol for the evidence evaluation was approved by the NHMRC NTWC on 25 May 2020.

## **History**

NHMRC were engaged by the Department of Health and Aged Care (Department) to update the evidence underpinning the 2015 Review of the Australian Government Rebate on Natural Therapies for Private Health Insurance (2015 Review) (1). The seven natural therapies to be reviewed in the first tranche are naturopathy, Pilates, Rolfing, shiatsu, Tai Chi, Western herbalism and yoga. These therapies are among those excluded from the private health insurance rebate as of 1 April 2019.

To support NHMRC in their evidence review, Health Technology Analysts (**HT**Analysts) were engaged to conduct a systematic review of the evidence of clinical effectiveness of Pilates. Eligible studies received from the Department's public call for evidence, the Department Natural Therapies Review Expert Advisory Panel (NTREAP) and NTWC were also to be included in the evidence evaluation.

This technical report was developed by **HT**Analysts in conjunction with NHMRC, NTWC, and NTREAP. It provides the appendices and supplementary data related to an evidence valuation of the effect of Pilates for preventing and treating health conditions. The main body of evidence is presented in the evidence evaluation report. All associated materials have been developed in a robust and transparent manner in accordance with relevant best practice standards (2-5).

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# List of abbreviations

| BRISA  | Regional Base of Health Technology Assessment Reports of the Americas                          |
|--------|--|
| CINAHL | Cumulative Index to Nursing and Allied Health Literature                                       |
| COMET  | Core Outcome Measures in Effectiveness Trials  |
| GRADE  | Grading of Recommendations Assessment, Development and Evaluation                              |
| ICD-11 | International Statistical Classification of Diseases and Related Health Problems 11th Revision |
|        | WHO Version (2021)   |
| ITT    | Intention-to-treat   |
| NHMRC  | National Health and Medical Research Council   |
| NRSI   | Non-randomised study of an intervention  |
| NSAIDs | Nonsteroidal anti-inflammatory drugs   |
| NTREAP | Natural Therapies Review Expert Advisory Panel   |
| NTWC   | Natural Therapies Working Committee  |
| OR     | Odds ratios  |
| РАНО   | Pan American Health Organization   |
| PICO   | Population, Intervention, Comparator, Outcome  |
| PP     | Per protocol   |
| PRISMA | Preferred Reporting Items for Systematic Reviews and Meta-Analyses                             |
| RCT    | Randomised controlled trial  |
| RoB    | Risk of bias   |
| RR     | Risk ratios  |
| SR     | Systematic review  |
| SD     | Standard deviation   |
| TIDIER | Template for Intervention Description and Replication  |

# Appendix A Searching, selection criteria and screening

## A1 Search methods

This appendix documents the search strategy used to inform the systematic review on the effect of Pilates for preventing and treating any health condition.

## **A1.1 Electronic searches**

The literature search strategy was developed in Ovid (for Embase, MEDLINE and Emcare) based on the key element of research question (i.e. the intervention). The search was not limited by population or outcome, but rather by study type; with methodological filters for identifying RCTs and NRSIs and exclusions for other publication types based on filters that were developed in-house and published previously (6).

In developing the search strategy, we appraised and adapted the relevant search strategies provided in the 2015 review; with recent SRs identified in the scoping report and studies suggested by the NTWC also reviewed to identify other potentially relevant search concepts. Terms or concepts proven not suitable were removed and other terms added.

No date, language or geographic limitations were applied when conducting the search of English language databases. Non-English databases were not searched.

The strategy was adapted to suit the required syntax for the following electronic bibliographic databases:

- Embase (via Ovid)
- MEDLINE (via Ovid)
- Cochrane Central Register of Controlled Trials (via Cochrane Library)
- Emcare (via Ovid) coverage of all nursing specialty areas
- PsycINFO (via Ovid) coverage of behavioural science and mental health
- AMED (via Ovid) coverage of Allied and Complementary Medicine
- PEDro coverage of physiotherapy
- CINAHL (via EBSCOHost) Cumulative Index to Nursing and Allied Health Literature
- SPORTDiscus (via *EBSCOHost*) coverage of exercise physiology, medicine, biomechanics, coaching, counselling, psychology and sports medicine
- PubMed (limited to in-process citations and citations not indexed in MEDLINE) to retrieve citations not yet indexed in OVID
- Pan American Health Organization (PAHO) Virtual Health Library (VHL) including Lilacs (Health information from Latin America and the Caribbean countries), PAHO IRIS (institutional repository for information sharing), and BRISA (Regional Base of Health Technology Assessment Reports of the Americas)

Details of the search strategy and results for each database are provided in Appendix A5.

## A1.2 Other resources

Reference lists of studies identified in priority populations were checked to identify any additional studies not identified through searches of the primary databases. The public was also invited by the Department to submit references for published research evidence (not examined in the 2015 Review). Grey literature was not eligible for inclusion.

## A1.3 Publication date

The literature was searched up to 21 June 2020. There were no limitations on publication date. This was to minimise bias, and to maintain the integrity of the systematic review process.

Studies that were published (or submitted to the Department) after the literature search date were to be listed within the '*Studies Awaiting Classification*' table of the evaluation report and a brief statement about the study and its potential impact on the overall conclusions of the evidence review was to be included under relevant sections of the review (e.g., '*Overall completeness and applicability of evidence'*).

No studies were identified or submitted after the literature search date.

## A1.4 Studies published in languages other than English

The literature search, as well as the Department's call for evidence, was not limited by language of publication. Studies in languages other than English could be identified via the English-language databases listed in Appendix A4.4, however databases in languages other than English were not searched.

For pragmatic reasons, potentially eligible studies published in languages other than English were documented via a process outlined in Appendix A8.6 and were listed within the '*Studies Awaiting Classification*' table of the technical report (Appendix C7.5).

## A2 Search strategy

The search strategy was developed in-house for the Ovid interface and was adapted to suit EBSCO*Host*, the Cochrane Library and PubMed (limited to in-process citations and citations not indexed in MEDLINE).

## Concept: Study design limits (RCTs, NRSIs, not animals)

1. exp comparative study/ or comparative study.mp. or exp clinical trial/ or clinical trial.mp. or randomized controlled trial.mp. or randomi?ed controlled trial.mp. or exp randomised controlled trial/ or exp randomization/ or randomization.mp. or randomi?ation.mp. or exp single blind procedure/ or single blind procedure.mp. or exp double blind procedure/ or double blind procedure.mp. or exp triple blind procedure/ or triple blind procedure.mp. or exp crossover procedure/ or crossover procedure.mp. or exp placebo/ or placebo\*.mp. or random\*.mp. or rct.mp. or single blind.mp. or single blinded.mp. or exp prospective study/ or prospective study.mp.

2. exp clinical study/ or exp case-control study/ or exp family study/ or exp longitudinal study/ or exp retrospective study/ or exp cohort analysis/ or (cohort adj1 stud\*).mp. or (case-control adj1 stud\*).mp. or (exp prospective study/ not randomi?ed controlled trials.mp.) or (follow up adj1 stud\*).mp. or (observational adj1 stud\*).mp. or (epidemiologic\* adj1 stud\*).mp. or (cross sectional adj1 stud\*).mp.

- 3. case report/
- 4. (editorial or letter or comment or historical article).pt.
- 5. (animals/ or nonhuman/) not humans/
- 6.3 or 4 or 5

#### **Concept: Pilates**

| 7. Exercise Movement | Techniques/ |
|----------------------|-------------|
|----------------------|-------------|

(MeSH term to be used for MEDLINE)

(Emtree term to be used for Embase and Emcare)

8. exp pilates/

9. pilates.af.

10. or/7-9

Note: The addition of reformer, trapeze, mat, Wunda chair, or Barrels did not alter the number of hits

**Concept: evidence hierarchy for screening** 11. (10 AND 1) NOT 6

12. (10 AND 2) NOT 6

## **Ovid syntax**

Exp explodes controlled vocabulary term (i.e. includes all narrower terms in the hierarchy)
\* denotes a term that has been searched as a major subject heading
/ denotes controlled vocabulary terms (EMTREE)
\$ truncation character (unlimited truncation)
\$n truncation limited to specified number (n) of characters (e.g. time\$1 identifies time, timed, timer, times but not timetable)
\* truncation character (unlimited truncation)
? substitutes any letter (e.g. oxidi?ed identifies oxidised and oxidized)
adjn search terms within a specified number (n) of words from each other in any order
.ti. limit to title field
.ti,ab. limit to title and abstract fields
.kw,ti,ab. limit to keyword, title and abstract field
.pt limit to publication type

## **CINAHL syntax**

\* truncation character (unlimited truncation)

# wildcard character will replace 1 or 0 characters (e.g. f#etus will retrieve fetus and foetus)

? wildcard character will replace one character (e.g. wom?n will retrieve women and woman)

MH - Search the exact CINAHL® subject heading; searches both major and minor headings

MH"heading"+ Search an exploded subheading

TI search title fields

TX all text

AB search abstract fields

Nn – Proximity "near" operator will find a result if the terms are within a certain number (n) words of each other, regardless of the order in which they appear. (e.g. eating N5 disorders for results that contain eating disorders, as well as mental disorders and eating pathology.)

PT limit to publication type

#### **PubMed syntax**

\* truncation character (unlimited truncation)
[TI] limit to title field
[TIAB] limit to title and abstract fields
[EDAT] date citation added to PubMed
[SB] PubMed subset

#### AND pubmednotmedline[sb] added to the last line of search string

The PubMed search was restricted to records that are not indexed for MEDLINE (i.e. in-process citations and citations from journals (or parts of journals) that are not currently MEDLINE-indexed). The search comprises free-text terms only and replicates the free-text sets in the Embase search (converted from the Ovid syntax).

## A3 Search results

This appendix documents the results of the literature search and screening for a systematic review on the effect of Pilates for preventing and treating any health condition. The literature search strategy was developed and conducted as described in Appendix A.

## A3.1 Ovid

The search for RCTs and NRSIs via Ovid was conducted on 21 June 2020.

Databases searched were as follows:

- Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to June 19, 2020
- Embase 1947 to 2020 June 19
- Ovid Emcare 1995 to 2020 week 25
- APA PsycInfo 1806 to June Week 3 2020
- AMED (Allied and Complementary Medicine) 1985 to June 2020

| Table A.1   | Search results: | : Ovid |
|-------------|-----------------|--------|
| 10010 / 112 | ocuren results  | 0110   |

| #  | Searches   | Medline | EMBASE   | Emcare  | PsycINFO | AMED  |
|----|--|---------|----------|---------|----------|-------|
| 1  | exp comparative study/ or comparative study.mp. or exp<br>clinical trial/ or clinical trial.mp. or randomized controlled<br>trial.mp. or randomi?ed controlled trial.mp. or exp randomized<br>controlled trial/ or exp randomization/ or randomization.mp.<br>or randomi?ation.mp. or exp single blind procedure/ or single<br>blind procedure.mp. or exp double blind procedure/ or double<br>blind procedure.mp. or exp triple blind procedure/ or triple<br>blind procedure.mp. or exp triple blind procedure/ or crossover<br>procedure.mp. or exp placebo/ or placebo*.mp. or<br>random*.mp. or rct.mp. or single blind.mp. or single<br>blinded.mp. or triple blind.mp. or triple blinded.mp. or<br>treble blind.mp. or triple blind.mp. or exp<br>prospective study/ or prospective study.mp. | 3773227 | 4504261  | 1053063 | 267299   | 30403 |
| 2  | exp clinical study/ or exp case control study/ or exp family<br>study/ or exp longitudinal study/ or exp retrospective study/ or<br>exp cohort analysis/ or (cohort adj1 stud*).mp. or (case control<br>adj1 stud*).mp. or (exp prospective study/ not randomi?ed<br>controlled trials.mp.) or (follow up adj1 stud*).mp. or<br>(observational adj1 stud*).mp. or (epidemiologic* adj1<br>stud*).mp. or (cross sectional adj1 stud*).mp.   | 3396392 | 10260402 | 2411044 | 110817   | 10576 |
| 3  | case report/   | 2104648 | 2487076  | 444770  | 22948    | 8215  |
| 4  | (editorial or letter or comment or historical article).pt.   | 2194295 | 1773725  | 600896  | 0        | 15140 |
| 5  | (animals/ or nonhuman/) not humans/  | 4675911 | 6160530  | 605395  | 7237     | 9483  |
| 6  | 3 or 4 or 5  | 8649695 | 10078422 | 1586482 | 30181    | 32623 |
| 7  | Exercise Movement Techniques/  | 718     | -        | -       | -        | -     |
| 8  | exp pilates/   | 0       | 663      | 535     | -        | -     |
| 9  | pilates.af.  | 515     | 916      | 596     | 294      | 196   |
| 10 | or/7-9   | 974     | 916      | 596     | -        | -     |
| 11 | (1 and 10) not 6   | 492     | 415      | 257     | 92       | 71    |
| 12 | (2 and 10) not 6   | 381     | 453      | 305     | 12       | 6     |

## A3.2 EBSCOHost

The search for RCTs and NRSIs via EBSCOHost was conducted on 21 June 2020.

Databases searched were as follows:

- CINAHL Complete (inception to 21 June 2020)
- SPORTDiscus with Full Text (inception to 21 June 2020)

#### Table A.2 Search results: EBSCOHost – CINAHL

| #          | Query  | Limiters/Expanders  | Results   |
|------------|--|---|-----------|
| 51         | ( MH "comparative study+" OR TX comparative study OR MH<br>"clinical trial+" OR TX clinical trial OR TX randomized controlled<br>trial OR TX randomised controlled trial OR MH "randomized<br>controlled trial+" OR MH "randomization+" OR TX<br>randomization OR TX randomisation OR MH "single blind<br>procedure+" OR TX single blind procedure OR MH "double blind<br>procedure+" OR TX double blind procedure OR MH "triple blind<br>procedure+" OR TX triple blind procedure OR MH "triple blind<br>procedure+" OR TX triple blind procedure OR MH "triple blind<br>procedure+" OR TX triple blind procedure OR MH "placebo+" OR<br>TX placebo* OR TX random* OR TX rct OR TX single blind OR TX<br>single blinded OR TX double blind OR TX triple blinded OR TX<br>treble blind OR TX triple blind OR TX triple blinded OR MH<br>"prospective study+" OR TX prospective study ) NOT ( MH "case<br>report+" OR PT editorial OR PT letter OR PT comment OR PT<br>historical article OR MH "(animals+ or nonhuman+)" NOT MH<br>"humans+" ) | Expanders - Apply equivalent subjects<br>Search modes - Boolean/Phrase                                      | 2,087,032 |
| 52         | ( MH "clinical study+" OR TX clinical study OR MH "case control<br>study+" OR TX family study OR MH "longitudinal study+" OR MH<br>"retrospective study+" OR MH "cohort analysis+" OR TX cohort<br>study OR TX cohort studies OR TX case control study OR TX cose<br>control studies OR (MH "prospective study+" NOT TX<br>randomized controlled trials) OR TX follow up study OR TX<br>follow up studies OR TX observational study OR TX observational<br>studies OR TX epidemiological study OR TX epidemiological<br>studies OR TX cross sectional study OR TX cross sectional studies<br>) NOT ( MH "case report+" OR PT editorial OR PT letter OR PT<br>comment OR PT historical article OR MH "(animals+ or<br>nonhuman+)" NOT MH "humans+" )  | Expanders - Apply equivalent subjects<br>Search modes - Boolean/Phrase                                      | 610,279   |
| <b>S</b> 3 | MH "Pilates+" OR TX Pilates  | Expanders - Apply equivalent subjects<br>Search modes - Boolean/Phrase                                      | 1,525     |
| <b>S</b> 4 | S1 AND S3  | Expanders - Apply equivalent subjects<br>Search modes - Boolean/Phrase                                      | 515       |
| <b>S</b> 5 | S2 AND S3  | Expanders - Apply equivalent subjects<br>Search modes - Boolean/Phrase                                      | 76        |
| <b>S6</b>  | S1 AND S3  | Expanders - Apply equivalent subjects<br>Narrow by SubjectMajor: - pilates<br>Search modes - Boolean/Phrase | 336       |
| S7         | S2 AND S3  | Expanders - Apply equivalent subjects<br>Narrow by SubjectMajor: - pilates<br>Search modes - Boolean/Phrase | 39        |

#### Table A.3 Search results: EBSCOHost – SPORTDiscus

| #         | Searches   | Limiters/Expanders  | Results |
|-----------|--|---|---------|
| <b>S1</b> | TI Pilates OR AB Pilates OR SU Pilates OR KW Pilates | Expanders - Apply equivalent subjects<br>Search modes - Boolean/Phrase  | 1,690   |
| 52        | TI Pilates OR AB Pilates OR SU Pilates OR KW Pilates | Expanders - Apply equivalent subjects<br>Narrow by Subject: - cross-sectional method<br>Narrow by Subject: - crossover trials<br>Narrow by Subject: - observation (scientific method)<br>Narrow by Subject: - observation (scientific method)<br>Narrow by Subject: - control groups<br>Narrow by Subject: - control groups<br>Narrow by Subject: - blind experiment<br>Narrow by Subject: - longitudinal method<br>Narrow by Subject: - comparative studies<br>Narrow by Subject: - clinical trials<br>Search modes - Boolean/Phrase | 72      |
| S3        | TI Pilates OR AB Pilates OR SU Pilates OR KW Pilates | Expanders - Apply equivalent subjects<br>Narrow by Subject: - randomized controlled trials<br>Search modes - Boolean/Phrase   | 68      |

## A3.3 Cochrane

The search for controlled clinical trials via the Cochrane Central Register of Controlled Trials (via Cochrane Library) was conducted on 21 June 2020.

| Table A.4 | Search results: Cochrane Central Re | egister of Co | ontrolled Trials | (Issue 6 of 12, June | 2020) |
|-----------|-------------------------------------|---------------|------------------|----------------------|-------|
|-----------|-------------------------------------|---------------|------------------|----------------------|-------|

| # | Query   | Limiters/Expanders   | Results |
|---|---------|--|---------|
| 1 | Pilates | Expanders - Apply equivalent subjects<br>Narrow by Content Type: - In Trials | 593     |

## A3.4 PEDro

The search for RCTs and NRSIs via the Physiotherapy Evidence Database (PEDro) was conducted on 21 June 2020.

#### Table A.5 Search results: PEDro

| # | Query  |  |  | LIMIT                  | Results |
|---|--------|--|--|------------------------|---------|
| 1 | Pilat* |  |  | Method: Clinical trial | 174     |

#### A3.5 PubMed

The PubMed search was restricted to records not indexed for MEDLINE and to records recently added to PubMed (i.e. in-process citations and citations from journals (or parts of journals) that are not currently MEDLINE-indexed). The search comprises free-text terms only and replicates the free-text sets in the Embase search (converted from the Ovid syntax).

The search for RCTs and NRSIs was conducted on 21 June 2020.

#### Table A.6 Search results: PubMed

| #  | Query   | Results   |
|----|---|-----------|
| #1 | "comparative study"[Title/Abstract] OR "comparative trial"[Title/Abstract] OR "clinical<br>trial"[Title/Abstract] OR "clinical study"[Title/Abstract] OR "controlled trial"[Title/Abstract] OR<br>"controlled study"[Title/Abstract] OR "random*"[Title/Abstract] OR "placebo*"[Title/Abstract] OR<br>"single blind"[Title/Abstract] OR "double blind"[Title/Abstract] OR "double blinded"[Title/Abstract] OR<br>"single blinded"[Title/Abstract] OR "triple blind"[Title/Abstract] OR "prospective study"[Title/Abstract]  | 1,560,884 |
| #2 | "clinical study"[Title/Abstract] OR "case control study"[Title/Abstract] OR "case control<br>stud*"[Title/Abstract] OR "family study"[Title/Abstract] OR "longitudinal studies"[Title/Abstract] OR<br>"retrospective studies"[Title/Abstract] OR "cohort studies"[Title/Abstract] OR "cohort<br>stud*"[Title/Abstract] OR "prospective stud*"[Title/Abstract] OR "prospective studies"[Title/Abstract]<br>NOT "randomized controlled trial"[Title/Abstract] OR "follow up stud*"[Title/Abstract] OR<br>"observational stud*"[Title/Abstract] OR "epidemiological study"[Title/Abstract] OR "epidemiological<br>stud*"[Title/Abstract] OR "cross sectional stud"[Title/Abstract] | 753,960   |
| #3 | "case report"[Title/Abstract] OR "editorial"[Title/Abstract] OR "letter"[Title/Abstract] OR<br>"Comment"[Title/Abstract] OR "historical article"[Title/Abstract] OR "animals"[Title/Abstract] OR<br>"nonhumans"[Title/Abstract]   | 1,195,661 |
| #4 | "Pilates"[Title/Abstract]   | 501       |
| #5 | (#1 AND #4) NOT 3   | 240       |
| #6 | (#2 AND #4) NOT 3   | 27        |
| #7 | (#5 AND pubmednotmedline[sb])   | 37        |
| #8 | (#6 AND pubmednotmedline[sb])   | 4         |

# A3.6 PAHO Virtual Health Library

The search for RCTs and NRSIs via the PAHO Virtual Health Library was conducted on 21 June 2020.

| Table A.7 Search results | РАНО | Virtual | heal | th Librai | ry |
|--------------------------|------|---------|------|-----------|----|
|--------------------------|------|---------|------|-----------|----|

| # | Search       | Limiters/Expanders  | Results |
|---|--------------|---|---------|
| 1 | tw:(pilate*) |   | 1573    |
| 2 | tw:(pilate*) | Expanders - Apply equivalent subjects<br>Narrow by Type of study: - Controlled clinical trial           | 460     |
| 3 | tw:(pilate*) | Expanders - Apply equivalent subjects<br>Narrow by Type of study: - Case-control study,<br>Cohort study | 29      |

# A4 Study selection criteria

This appendix documents the criteria used to identify studies eligible for inclusion in the systematic review on the effect of Pilates for preventing and treating any health condition, prior to the prioritisation process.

## A4.1 Types of studies

#### A4.1.1 Eligible studies

Eligible studies were RCTs or NRSIs that examined the effectiveness of Pilates compared to control or another intervention.

## Randomised controlled trials

The primary study design of interest was an RCT. 'Pseudo' or 'quasi' randomised studies<sup>1</sup> were also eligible for inclusion, as were cluster-randomised and crossover trials. These studies were to be evaluated alongside RCTs, with any concerns about the method of randomisation examined in the risk of bias assessment and addressed in the data synthesis. Studies were analysed using methods appropriate to the design (see Unit-of-analysis) (7).

## Non-randomised interventional studies

NRSIs were eligible for inclusion for all conditions. This was to ensure the evidence review adequately covered the breadth of health conditions and outcomes; particularly in the absence or paucity of RCT evidence for a health condition.

To be eligible, NRSIs must also have included design features as outlined in Figure A.1 and, at a minimum, include the following design features:

- allocation to, or practise of, the intervention occurred by choice (by the participant or other)
- the effect of the intervention in individuals (or clusters of individuals or groups) was compared with a contemporaneous control group

Eligible NRSIs that were assessed to be at critical risk of bias for one or more domains (see Section B4) were not included in the evidence synthesis because results from these studies were likely to lead to misinformed judgements about the effect estimate.

## A4.1.2 Ineligible studies

NRSIs in which the effect of the intervention was compared to a historical (or non-parallel or nonconcurrent) control group were not eligible for inclusion due to concerns regarding residual confounding or unmeasurable changes in clinical practice over time.

Case series with either post-test or pre-test/post-test outcomes, cross-sectional studies and case reports were also not eligible for inclusion, as these study designs are too problematic when assessing the effect of the intervention with any confidence (8, 9).

<sup>&</sup>lt;sup>1</sup> Studies were judged to be quasi-randomised if the method of randomisation was not strictly random (e.g., alternate allocation) or if not specifically stated (e.g., the authors mention 'random' allocation but there is no discussion on the method used)

#### Figure A.1 Eligible design features of non-randomised studies of interventions

An **experimental study** in which people are allocated to the intervention/treatment being studied or a control/placebo group and the outcomes compared. The method of **allocation is by choice**, **availability**, or chance.

A study in which outcomes from a **defined group of people** (the cohort) are followed over time, to examine associations between exposure and non-exposure to an intervention or factor under study. Outcome are recorded as they occur. A 'prospective' cohort study recruits participants before any intervention and **follows them into the future**.

A study in which outcomes from a **defined group of people** (the cohort) are identified to examine associations between exposure and non-exposure to an intervention or factor under study. A 'retrospective' cohort study identifies subjects from past records describing the interventions received and **follows them from the time of those records**.

A study that uses observations at multiple time points **before and after** an intervention (**the** 'interruption') is introduced to a group of people, and then **compared** to the outcomes at the same time points for a group of people that do not receive the intervention. The design attempts to detect whether the intervention has had an effect significantly greater than any underlying trend over time.

A study in which observations are made **before and after** the implementation of an intervention, both in a group that receives the intervention and in **a control group** that does not and **compared at the same timepoint**.

A study that compares people with a **specific outcome of interest** ('cases') with people from the same source population but without that outcome ('controls'), to examine the **association between the outcome and prior exposure** (e.g. having an intervention). This design is particularly useful when the outcome is rare.

Source: Adapted from NHMRC (8, 9); Chapter 24 Including nonrandomized studies on intervention effects (10); Cochrane Childhood Cancer (11)

## A4.2 Types of participants

People of any age with any injury, disease, medical condition or preclinical condition were eligible for inclusion. At-risk individuals were also eligible for inclusion (but not general at-risk populations). This meant that to be considered at-risk, individuals needed to be assessed at study entry to have met a minimal threshold for being at-risk: such as having early symptoms, being appraised for symptoms or having a history of a previous condition (or family history). Studies in which there was a broad general statement about the enrolment population were not included (e.g. a study that enrolled women in the community aged over 60 years was not included in fall preventions unless the enrolment criteria specified that they had balance impairment at enrolment).

Where there was uncertainty about whether a minimum threshold had been met, a process was developed to seek NTWC review of the 'aim' of the study in question and for NTWC to decide on eligibility – this was not required for the Pilates review.

At-risk was broadly defined as those who are at increased risk of becoming ill or injured based on social, biomedical or behavioural risk factors (12). For the purposes of this review, social determinants included factors such as income, education, employment and social support; biomedical factors included a person's age, genetic make-up or health status (such as obesity, high blood pressure, high cholesterol, vitamin

deficiency); and behavioural factors included a person's lifestyle choices (e.g. alcohol consumption, diet, exercise, tobacco and other drug use, etc.).

Healthy participants seeking health improvement, such as general wellbeing, fitness, aesthetic improvements, resilience and cognitive or emotional intelligence were not eligible for inclusion; however, a study with eligible and ineligible populations was to be included if separate data were available for the eligible population/s.

## A4.3 Types of interventions

## A4.3.1 Intervention

All styles and forms of Pilates were eligible for inclusion. This meant any exercise activity in the name of Pilates instruction that was delivered by an instructor to an individual or group of individuals, or Pilates that was self-practised was eligible for inclusion. That is, studies were included irrespective of whether the intervention was delivered by an instructor or through other media (e.g. instructional videos). To allow for potential subgroup analysis (and to inform decision-making), studies were to be stratified based on whether the participants receive instructor-led Pilates (see Section B3.4.3).

There were no limits on intensity, duration of practise, or mode of delivery. Studies that include mixed forms of Pilates (i.e. mat or apparatus) were included.

Studies that included Pilates delivered in combination with other forms of exercise were excluded unless the effect of Pilates alone could be discerned. That is, studies that examined Pilates delivered as an adjunct to another therapy (both groups received the other therapy) were included.

#### A4.3.2 Comparators

There were no restrictions on the type of eligible comparators, noting that the analysis stratified the evidence into two comparisons: (i) control (inclusive of no intervention, wait list or usual care, unless active); and (ii) other comparator (inclusive of usual care or control if considered active).

Where usual care was poorly described or where usual care was described as an adjunct (i.e. Pilates plus usual care versus usual care alone), it was considered an inactive intervention.

'Other' comparators could include pharmacologic treatments, manual therapies, exercise programs or other forms of physical activity designed to improve health.

Co-interventions (e.g. diet, education programs, lifestyle modification, or medication) could be administered simultaneously to the intervention and comparison group. Studies with co-interventions were included if all arms of a study receive the same co-interventions (i.e. the effectiveness of Pilates is not confounded).

Studies comparing different styles, forms or components of Pilates with one another were excluded.

## A4.4 Types of outcome measures

A4.4.1 Outcome role

All outcomes were eligible for inclusion.

#### A4.4.2 Outcome domains of interest

Eligible outcome domains were intended to be those that align with the reasons why patients use the therapy and/or practitioners prescribe the therapy. This included recovery, rehabilitation, and changes in disease outcomes and symptoms (e.g. pain, joint range of motion, strength, balance and accepted surrogate

outcomes such as HbA1C for diabetes, body mass index for weight gain or loss, lung function tests), health related psychological/behavioural outcomes, health related quality of life, self-reported benefits, symptoms and functional ability, medication use or compliance with conventional medicine treatment; and injury or disease specific prevention outcomes (e.g. falls prevention, smoking cessation).

It was out of scope to assess personal health care preferences, patient-reported experience measures (PREMS) (e.g. satisfaction with care), safety, quality and economic outcomes.

As there was a broad range of populations eligible for inclusion, it was not possible to prespecify outcome domains (or measures). Therefore, all prespecified outcome domains (and measures) reported in each eligible RCT or NRSI were listed in the '*Characteristics of included studies*' tables (See Appendix F1). Later, for each included population, outcomes were selected using a prespecified approach, with the data and results extracted for those outcome domains (or measures) identified as critical or important to the review (see Appendix A9). Prioritised outcome domains are highlighted in Appendix F1 in blue.

To avoid introducing bias, outcomes were prioritised by the NTWC, who remained blinded to the characteristics (e.g., study design) or results of eligible studies to prevent any influence on decision-making.

## A4.4.3 Outcome measures and timepoints of interest

There were no limits on timepoints (e.g., short- or long-term) or outcome measure when selecting studies. This meant that objective (such as clinical and laboratory assessments) and subjective measures (such as patient-reported outcome measures [PROMS]) were eligible, preferably (although not mandatory) measured using a validated tool.

Outcomes reported at different timepoints were to be grouped and considered in the evidence synthesis as follows: short term, intermediate term, long-term, or not specified. Determining whether something was considered short, intermediate or long term for a population was to be guided by the published evidence, the NTWC and COMET.

To avoid unit-of-analysis issues associated with repeated observations (see Section B3.2), data from a single timepoint were selected for each outcome, as determined by the NTWC during outcome prioritisation. If multiple timepoints were considered critical or important for decision-making (e.g. short- and long- term remission in symptoms) separate outcomes were to be specified for each timepoint.

# A5 Selection of studies (inclusion decisions)

This appendix documents how studies were identified, collected and managed so as to conduct the systematic review on the effect of Pilates for preventing and treating any health condition, prior to prioritisation.

## A5.1 Studies identified in the literature search

## A5.1.1 Title/abstract screening

A framework used for screening studies at title abstract/stage is provided below (Framework 1).

Citations (title/abstracts) retrieved by the literature searches were imported into EndNote and duplicates removed. Citations were then imported into Covidence (www.covidence.org), an online tool that streamlines the screening and data extraction stages of a systematic review.

Each citation (titles and abstract) was screened by a single evidence reviewer (either AS, AM, SB, or MJ) who discarded ineligible studies (marked as irrelevant and tagged with a reason for exclusion) and retained potentially eligible ones (marked as relevant or maybe). Where there was uncertainty regarding relevance, a decision was made through discussion with the lead reviewer (MJ), who decided to either mark the citation as irrelevant or take it through to full text. Citations that were in a language other than English were tagged and managed as described below (see *Studies published in languages other than English*).

## A5.1.2 Full text screening

A framework used for screening studies at full text (Framework 2) is provided below.

Full text articles identified for possible inclusion in the evidence synthesis were retrieved and assessed for inclusion by a single reviewer (either AS, AM, SB, or MJ). A prespecified, hierarchical approach was used to annotate reasons for exclusion, with the results of the study selection process illustrated in a PRISMA flow diagram. Where there was uncertainty regarding inclusion, a decision was made through discussion with the lead reviewer. The lead reviewer also reinspected approximately 40% of articles marked as excluded to ensure adherence to the *a priori* exclusion criteria, with any differences resolved by discussion. If additional expertise or advice regarding the application of the PICO criteria was required, excerpts from the publication relevant to the query (e.g., the description of the comparator group) were provided to the NTWC for advice. The NTWC remained blinded to other identifying details such as the study citation, study design and size, risk of bias and results.

Trial registration numbers, author names and study titles, locations and dates were used to identify multiple reports/citations arising from the same study. As per Cochrane guidelines the unit of analysis is considered to be the study, not the report, to avoid including the same data multiple times. Published errata or corrigenda identified in the search were checked and linked to the appropriate study. All studies identified for inclusion were cross-checked with the <u>Retraction Watch</u> database via <u>Zotero</u>. There were no retracted studies identified. Eligible studies that are not available in English were noted and managed as described in the section below (*Studies published in languages other than English*).

## A5.2 Evidence provided through the Department's public call for evidence

Potentially relevant primary studies identified by NTWC, NTREAP, and other key stakeholders were considered for inclusion if they satisfied the eligibility criteria described in Appendix A7. The submitted literature was collated, tabulated, and cross-referenced with the evidence identified in the literature search (see Appendix A6). In-scope studies not identified in the literature search were incorporated into the

evidence evaluation, with a rationale for exclusion provided for all studies considered out of scope (see Appendix C5).

## A5.3 Studies published in languages other than English

Studies published in languages other than English that were assessed as potentially eligible for inclusion in the review were recorded in a *'Studies Awaiting Classification'* table (see Appendix C7.5), with this information also reflected in the PRISMA flow diagram. No studies in a language other than English were included in the evidence synthesis.

To identify studies published in languages other than English, citations (title and/or abstract) identified in our searches that already had an English translation available were screened in Covidence as described above (see Appendix A8.4.1). In the absence of an English translation, we used Google translate to facilitate understanding of the title and/or abstract. If only the title was identified in the search, we retrieved the abstract directly from the journal or publishing house (if available). If online translation did not facilitate understanding of the title or abstract, then the study was listed in a table as *'Studies unable to be translated or interpreted at the title/abstract stage'* (see Appendix C7.7).

Translated titles and abstracts were reviewed and evaluated against the study selection criteria outlined in Appendix A7. Irrelevant citations were removed (marked as irrelevant and tagged with a reason for exclusion) and citations deemed as potentially eligible were retained (marked as 'awaiting classification' and 'publication not in English'). Full text translation did not occur to determine eligibility.

## A5.4 Collation of studies

A framework used for confirming and reviewing eligible studies is provided below (Framework 3).

All potential studies identified for inclusion were imported into an Excel 'progress' spreadsheet and sorted according to a Study ID (using separate tabs for eligible studies, studies awaiting classification, and ongoing studies). The Study ID incorporated all citations that related to the same trial (i.e., could be associated with more than one citation and, if available, included the clinical trial registry number). The Study ID (usually automatically assigned in Covidence) was the first author surname followed by the first publish date (conference abstract or full study report).

Preliminary data extraction for each Study ID then ensued, which included a summary of the PICO criteria entered into specific columns (illustrated in Table A.8). To facilitate assignment to a population (P), reviewers reviewed the trial enrolment criteria, and attributed a population based on the primary underlying condition. Reported outcomes were not used as the basis for assigning studies. Cells were highlighted if there were queries that required clarification either from the lead reviewer or the NTWC.

| STUDY<br>ID | ICD-11<br>CATEGORY | POPUL<br>ATION | INTERV<br>ENTION | CONTROL<br>(INACTIVE) | ACTIVE<br>CONTRO<br>L 1 | ACTIVE<br>CONTRO<br>L 2 | ACTIVE<br>CONTRO<br>L 3 | CO-<br>INTERVE<br>NTION | OUTCO<br>ME 1 | OUTCO<br>ME 2 | OUTCO<br>ME 3 |
|-------------|--------------------|----------------|------------------|-----------------------|-------------------------|-------------------------|-------------------------|-------------------------|---------------|---------------|---------------|
|             |                    |                |                  |                       |                         |                         |                         |                         |               |               |               |
|             |                    |                |                  |                       |                         |                         |                         |                         |               |               |               |

| Table A.8 | Sample Preliminary d | lata extraction | (for prioritisation a | nd progress checks) |
|-----------|----------------------|-----------------|-----------------------|---------------------|
|           |                      |                 |                       |                     |

Each Study ID was assessed or checked by the lead reviewer, who then assigned an ICD-11 category based on the population enrolled in the study (see Figure A.2). The focus was to ensure the study had been

assigned to the most appropriate population (P); being that which was considered the primary underlying clinical or preclinical condition, rather than the presenting symptoms or potential outcome and to ensure each study would only contribute to the synthesis for one population group.

For example, a study that assessed the effect of Pilates on sleep quality could be assigned to ICD-11 Category 07 (Sleep-Wake Disorders) if the participants had been diagnosed with insomnia; or the study could be assigned to ICD-11 Category 21 (Menopausal symptom or complaint) if the participants were women in perior post-menopause. ICD-11 category 24 (Factors influencing health status or contact with health services) was often found useful in categorising studies among populations that didn't specifically fit a 'disease' or 'condition' (e.g., prison populations, employment conditions). Studies focused on prevention (e.g. age-related physical or cognitive decline) were grouped into a separate category labelled *ICD-11 25 Prevention* (noting this is not a true ICD-11 category).

ICD-11 categories were used to help facilitate management of the project, to provide an understanding of the population/ underlying condition, and to help determine the most appropriate place a study would contribute for evidence synthesis (i.e. to ensure the same data was not used in the analysis across multiple conditions, and to minimise heterogeneity). ICD-11 population groupings were assigned prior to any critical appraisal, data synthesis or review of study size or results.

Other areas that were checked or confirmed related to the description of the comparator (being 'inactive' or 'active') or whether there was a co-intervention delivered to both treatment groups). Where Pilates was delivered as an adjunct to usual care (i.e., Pilates plus usual care versus usual care), the usual care was listed as a co-intervention and the comparator listed as Control (no intervention, waitlist, usual activities). Where Pilates was compared to an intervention described as usual care, a judgement was made as to whether it is active or inactive (described as Control (usual care)). Active 'usual care' interventions were then further described (e.g., Physiotherapy (TENS, massage, stretching)).

#### Framework 1 Framework for screening studies at abstract / title stage



#### Framework 2 Framework for screening studies at full text



#### Framework 3 Framework for confirming and reviewing eligible studies



#### Figure A.2 Overview of potential ICD-11 categories



Refer to https://icd.who.int/browse11/lm/en#/http://id.who.int/icd/entity/628615515) These categories were used to guide decisions on appropriate grouping of studies for metaanalysis. Subgrouping were to be applied where appropriate. The intent was to categorise studies according to the underlying condition For example: People with cancer seeking help for symptoms of insomnia or chronic pain to be categorised under cancer (not insomnia or chronic pain) People with symptoms of peri/menopause seeking help for symptoms of insomnia, depression etc. to be categorised under Diseases of the genitourinary system. Both groups assess symptoms of sleep disturbance but would be considered to be sufficiently different to consider separately in a meta-analysis (also different from clinical sleep

disorder). Exactly where/how they were included in the review was guided through discussion with NTWC

(see Framework for evidence review)

# A6 Refining the research questions

This appendix documents how populations and outcomes were prioritised to inform the data synthesis for the systematic review on the effect of Pilates for preventing and treating any health condition.

Throughout the population and outcome prioritisation exercise, NTWC remained blinded to the screening results (i.e., number of studies identified) or characteristics of included studies (e.g., study design, size, quality) to prevent any influence on decision-making.

Framework 4 outlines the process for refining the research questions and conducting the evidence review.

Framework 5 outlines the process for prioritising eligible populations for inclusion in the evidence review.

## A6.1 Population prioritisation process

A spreadsheet listing each identified condition (based on the ICD-11 category) was provided to NTWC to prioritise the list of populations and conditions to be included in the evidence synthesis. As part of the population prioritisation process, NTWC sought feedback from NTREAP, including seeking Australian survey data or equivalent on populations commonly seen by Pilates practitioners in Australia. NTREAP's advice informed NTWC of the populations considered most important for data analysis and synthesis in the review(sample in Table A.9). In deciding the final priority populations, NTWC considered the mechanism of action and applicability of Pilates for each identified condition. As a result, some common conditions (e.g. obesity, urinary incontinence etc.) were not prioritised for analysis or synthesis in the review.

| ICD-11  | Category                                     | Condition (population/s)                 | NTWC Working<br>Group<br>consensus | NTREAP<br>consensus |
|---------|--|--|------------------------------------|---------------------|
| Treatme | ent or management of dise                    | ase (and associated symptoms)            |                                    |                     |
| 1       | Infectious or parasitic diseases             | No studies identified                    |                                    |                     |
| 2       | Neoplasms                                    | Breast cancer - survivors post treatment | $\checkmark$                       | $\checkmark$        |
|         |  | Breast cancer - undergoing treatment     | $\checkmark$                       | ✓                   |
|         |  | Prostate cancer                          | $\checkmark$                       | ✓                   |
| 5       | Endocrine, nutritional or metabolic diseases | Type 2 diabetes                          | $\checkmark$                       | $\checkmark$        |
| 8       | Diseases of the nervous                      | Multiple sclerosis                       | ✓                                  | ✓                   |
|         | system                                       | Myelopathy (incl HTLV-1 associated)      | ✓                                  | Х                   |
|         |  | Parkinson's disease                      | $\checkmark$                       | $\checkmark$        |
| 11      | Diseases of the                              | Cardiac arrhythmia                       | Х                                  | Х                   |
|         | circulatory system                           | Heart failure                            | X                                  | X                   |
|         |  | Hypertension                             | $\checkmark$                       | $\checkmark$        |
|         |  | Stroke                                   | $\checkmark$                       | $\checkmark$        |

#### Table A.9 Sample list of conditions (populations) (for prioritisation)

**√ = yes;** X = no

Abbreviations: HTLV-1, Human T-lymphotropic virus; ICD-11, International Statistical Classification of Diseases and Related Health Problems 11th Revision; NTREAP, Natural Therapies Review Expert Advisory Panel

#### Framework 4 Framework for refining the research questions and conducting the evidence review: Pilates



Notes:

^ ICD-11, International Classification of Diseases for Mortality and Morbidity Statistics (ICD-11 MMS) 11th Revision (available at https://icd.who.int/browse11/l-m/en)

\* No identifying information about study ID, study design, study size, study quality or outcome results available (see Framework 2).

# Preliminary data extraction of included studies will begin at step 3 to inform outcome domains.

#### Framework 5 Framework for prioritising eligible populations for inclusion in the evidence review: Pilates



## A6.2 Outcome prioritisation process

A spreadsheet listing each population and condition, with associated outcome domains and outcome measures (including measurement tools) was developed and provided to NTWC to prioritise critical and important outcomes for inclusion in the evidence synthesis (see sample in Table A.10). To ensure the process for prioritising outcomes was blinded, a two staged prioritisation process was developed.

Stage 1 involved prioritising outcome domains for populations and conditions prioritised for analysis. NTWC sought NTREAP advice on priority outcome domains for each population and condition. To minimise potential reporting bias within the review, the list of outcome domains was supplemented with outcomes identified in core outcome sets for a particular condition (where available)

Core outcome sets were identified by searching COMET (http://www.comet-initiative.org/), ICHOM (https://www.ichom.org/), and PubMed (simple search "core outcome set" OR "core outcome measure" AND "XXX" [where XXX equals the population/condition of interest]). In the absence of a published core outcome sets, outcomes reported in relevant Cochrane reviews for that condition were also listed (if available).

In determining the critical and important outcomes, NTWC were guided by GRADE rating scale (see Figure A.3), with the focus being on the relevance of outcome domains for the intervention and research question.

The prioritised outcomes for each prioritised condition are provided in Tables in Appendix D.

| Condition<br>(population) | Outcome<br>domain     | Working Group<br>Consensus<br>Rating (1-9) | Outcome measure<br>(as reported in eligible studies)         | Eligible<br>measure<br>(Y/N) | NTWC<br>Priority<br>Rank | Comments  |
|---------------------------|-----------------------|--|--|------------------------------|--------------------------|---|
| Multiple                  | Functional            | 7  | Timed up and go*   | Y                            | 1                        |   |
| sclerosis                 | mobility *^           |  | 2 or 6-minute walk test                                      | Y                            | 2                        | -   |
|                           |                       |  | 10-metre walk test   | Y                            | 3                        | -   |
|                           |                       |  | Walking speed (m/s)  | Y                            | 4                        | -   |
|                           | Balance ^             | 7  | Limits of stability test                                     | Y                            | 5                        |   |
|                           |                       |  | Falls efficacy Scale International                           | Y                            | 3                        | -   |
|                           |                       |  | Berg balance scale   | Y                            | 1                        | -   |
|                           |                       |  | Six-spot step test   | Y                            | 7                        | -   |
|                           |                       |  | Functional reach   | Y                            | 4                        | -   |
|                           |                       |  | Activities specific balance confidence scale                 | Y                            | 2                        | -   |
|                           |                       |  | 10-point scale "Difficulty in Carrying a Drink when walking" | Y                            | 6                        | -   |
|                           |                       |  | Fullerton Advance balance scale                              | Y                            | 8                        | -   |
|                           |                       |  | Single leg stance  | Y                            | 7                        | -   |
|                           | Disability^           | 6  | No measures reported in eligible studies                     |                              |                          |   |
|                           | Fatigue *^            | 6  | Modified Fatigue Impact Scale (21-<br>item) *                | Y                            | 1                        |   |
|                           |                       |  | Fatigue impact scale (40-item)                               | Y                            | 1                        |   |
|                           | Physical performance  | 7  | MS walking scale (12-item)                                   | Y                            | 1                        | included in activity<br>domain, but moved as<br>more relevant to<br>performance |
|                           |                       |  | Flexibility (Sit and reach test)                             | Y                            | 2                        |   |
|                           |                       |  | Upper/lower extremity strength                               | n                            | 0                        | difficult to deal with  |
|                           |                       |  | Quadricep strength (maximum voluntary contraction)           | n                            | 0                        | data on these   |
|                           |                       |  | Sustained maximum voluntary contraction (torque drop)        | n                            | 0                        | -   |
|                           |                       |  | Time to roll   | n                            | 0                        | -   |
|                           |                       |  | Voluntary muscle activation                                  | n                            | 0                        | -   |
|                           | Quality of life<br>*^ | 7  | Multiple sclerosis QOL-54 *                                  | Y                            | 1                        |   |
|                           | Social<br>wellbeing   | 5  | No measures reported in eligible studies                     |                              |                          |   |

Table A.10 Sample outcome spreadsheet (for prioritisation)

KEY

\* Core outcome domain or measure (based on one or more of the core outcomes sets)

^ Identified as a primary outcome in a relevant/related Cochrane review

# Identified as a secondary outcome in a relevant/related Cochrane review

#### Figure A.3 GRADE rating scale



Source: (5)

Abbreviations: SoF summary of findings

Stage 2 of the outcome prioritisation process involved NTWC prioritising the most relevant and valid outcome measures for each prioritised outcome domain (see stage 1 process) (5).and the validity of outcome measures (5).

The outcome domains and measures were derived from the outcomes reported in studies identified for inclusion in the review. Only rating scales that had been described in peer-reviewed journals were included. We anticipated that existing studies in the literature would use different measures to assess outcomes relevant to this review; in particular, a variety of rating scales or patient-reported outcome measures. Therefore, each reported outcome measure was grouped into an appropriate outcome domain of interest (see Figure A.4).

Studies with no prioritised outcome domains and/or measures were not included in analysis.





# A7 Summary screening results

# A7.1 Search of published literature

Studies were excluded based on hierarchical, prespecified exclusion criteria, with all citations returned by the literature searches reviewed based on information in the publication title and abstract (where available). Potentially relevant publications were then retrieved and reviewed in full text before a final decision was made on their inclusion or exclusion for the review.

Results of the literature search and application of the study selection criteria are summarised in Table A.11.

Citation details of studies assessed at full text but not included in the evidence review (with reasons for exclusion) are listed in Appendix C1.

#### Table A.11 Screening results: studies identified in the literature search and additional evidence provided through the Department's public call for evidence

| Database (no. of hits)   | RCTs | NRSIs | Submitted<br>literature | Total<br>CITATIONs |
|--|------|-------|-------------------------|--------------------|
| Medline 1946 to June 19, 2020  | 492  | 381   |                         | 873                |
| Embase 1974 to June 19, 2020   | 415  | 453   |                         | 868                |
| Emcare to 2020 Week 25   | 257  | 305   |                         | 562                |
| PyschINFO to June Week 3 2020  | 92   | 12    |                         | 104                |
| AMED   | 71   | 6     |                         | 77                 |
| SPORTDiscus  | 68   | 72    |                         | 140                |
| CINAHL   | 336  | 39    |                         | 375                |
| Cochrane (CENTRAL)   | 593  | 0     |                         | 593                |
| PubMed (not Medline)   | 37   | 4     |                         | 41                 |
| PEDro  | 174  | 0     |                         | 174                |
| РАНО   | 460  | 29    |                         | 489                |
| Submitted literature   |      |       | 451                     | 451                |
| TOTAL  | 2995 | 1301  | 451                     | 4747               |
|  | 1    | 1     | 1                       | 1                  |
| Duplicates removed in Endnote  | 1037 | 1014  |                         | 2051               |
| Duplicates removed by Covidence  | 546  | 34    |                         | 580                |
| Duplicate citation (found at title/abstract)   | 11   | 3     |                         | 14                 |
| Duplicate citation (additional found at full text)   | 141  | 8     |                         | 149                |
| Duplicate citation submitted to the Department<br>(RCT / NRSI already identified in this SR) |      |       | 323                     | 323                |
| TOTAL DUPLICATES   | 1735 | 1059  | 323                     | 3117               |
|  |      | 1     | 1                       | 1                  |
| Number of citations screened in Covidence<br>TITLE/ABSTRACT                                  | 1260 | 242   | 128                     | 1630               |
| nonhuman study   | 1    | 0     | 0                       | 1                  |
| intervention out of scope  | 352  | 51    | 0                       | 403                |
| comparator out of scope  | 14   | 1     | 0                       | 15                 |
| population out of scope  | 42   | 12    | 0                       | 54                 |
| outcome out of scope   | 0    | 2     | 0                       | 2                  |
| publication type out of scope  |      |       |                         |                    |
| opinion piece, editorials, books, etc.   | 8    | 0     | 0                       | 8                  |
| Database (no. of hits)   | RCTs                       | NRSIs                  | Submitted<br>literature                | Total<br>CITATIONs |
|--|----------------------------|------------------------|--|--------------------|
| not an interventional study examining effectiveness                | 5                          | 1                      | 0                                      | 6                  |
| grey literature  | 0                          | 0                      | 0                                      | 0                  |
| study design out of scope  |                            |                        |  |                    |
| Nonsystematic reviews  | 20                         | 5                      | 0                                      | 25                 |
| Systematic review of RCTs and/or NRSIs                             | 173                        | 8                      | 0                                      | 181                |
| Case series, case reports, noncomparative studies etc.             | 43                         | 114                    | 0                                      | 157                |
| TOTAL irrelevant   | 658                        | 194                    | 0                                      | 852                |
|  |                            |                        |  |                    |
| Unable to be translated or interpreted at the title/abstract stage | 3                          | 0                      | 0                                      | 3                  |
|  |                            |                        |  |                    |
| Number of citations screened in Covidence<br>FULL TEXT             | 599                        | 48                     | 128                                    | 775                |
| nonhuman study   | 0                          | 0                      | 0                                      | 0                  |
| intervention out of scope  | 35                         | 13                     | 3                                      | 51                 |
| comparator out of scope  | 27                         | 2                      | 5                                      | 34                 |
| population out of scope  | 87                         | 10                     | 20                                     | 116                |
| outcome out of scope   | 0                          | 0                      | 0                                      | 0                  |
| publication type out of scope                                      |                            |                        |  |                    |
| opinion piece, editorials, books, etc.                             | 6                          | 0                      | 1                                      | 7                  |
| not an interventional study examining effectiveness                | 0                          | 0                      | 9                                      | 9                  |
| grey literature  | 5                          | 0                      | 7                                      | 12                 |
| study design out of scope  |                            |                        |  |                    |
| Nonsystematic reviews  | 1                          | 0                      | 1                                      | 2                  |
| Systematic review of RCTs and/or NRSIs                             | 0                          | 1                      | 36                                     | 37                 |
| Case series, case reports, noncomparative studies etc.             | 36                         | 10                     | 26                                     | 72                 |
| TOTAL EXCLUDED   | 197                        | 36                     | 108                                    | 339                |
|  |                            | 1                      | 1                                      | 1                  |
| RELEVANT CITATIONS   | 402                        | 12                     | 20                                     | 436                |
|  |                            |                        |  |                    |
| Relevant but additional follow-up needed                           | 400                        | 0                      |  | 422                |
| Ongoing study  | 123                        | 0                      | 0                                      | 123                |
| Publication not available in English                               | 43                         | 2                      | 10                                     | 56                 |
| Conference proceeding, poster or abstract                          | 27                         | 7                      | 0                                      | 35                 |
| Outcome of interest not reported/missing data                      | 0                          | 0                      | 0                                      | 0                  |
| Article not able to be retrieved                                   | 4                          | 0                      | 1                                      | 5                  |
| TOTAL ONGOING/AWAITING CLASSIFICATION                              | 197                        | 9                      | 11                                     | 219                |
|  |                            | 1                      | 1                                      |                    |
| INCLUDED CITATIONS   | 205                        | 3                      | 9                                      | 217                |
| CORRESPONDING NUMBER OF STUDIES                                    | 129 (69 RCT<br>RCTs & 14 N | s, 46 quasi-<br>IRSIs) | 9 (1 RCT,<br>7 quasi-RCTs<br>& 1 NRSI) | 138                |

NRSIs, non-randomised studies of interventions; RCTs, randomised controlled trials

# A7.2 Evidence provided through the Department's public call for evidence

A total of 451 citations were received through the Department's public call for evidence. Of these, 168 were already identified through our literature search and included. A further 155 were already identified and had been excluded from the review. The remaining 128 additional citations were screened for inclusion, with 22 additional citations identified as relevant, 9 of these were identified as eligible for inclusion in the review and the remaining 13 are awaiting classification.

A summary of the application of the study selection criteria to studies provided through the Department's public call for evidence is provided in Table A.12.

Citation details of studies provided through the Department's public call for evidence (with reasons for inclusion/exclusion) are listed in Appendix C5 (separate file).

|  | Submitted<br>literature | Duplicate citations | Totals |
|--|-------------------------|---------------------|--------|
| Total submitted  | 451                     |                     |        |
| Duplicate citation (already identified in the review)  |                         | 323                 |        |
| Number of new citations to screen                      | 128                     |                     |        |
| nonhuman study   | 0                       | 0                   | 0      |
| intervention out of scope                              | 3                       | 17                  | 20     |
| comparator out of scope                                | 5                       | 6                   | 11     |
| population out of scope                                | 20                      | 32                  | 52     |
| outcome out of scope                                   | 0                       | 0                   | 0      |
| publication type out of scope                          |                         |                     |        |
| opinion piece, editorials, books, etc.                 | 1                       | 0                   | 1      |
| not an interventional study examining effectiveness    | 9                       | 0                   | 9      |
| grey literature  | 7                       | 0                   | 7      |
| study design out of scope                              |                         |                     |        |
| Nonsystematic reviews                                  | 1                       | 4                   | 5      |
| Systematic review of RCTs and/or NRSIs                 | 36                      | 56                  | 92     |
| Case series, case reports, noncomparative studies etc. | 26                      | 40                  | 66     |
| TOTAL EXCLUDED   | 108                     | 155                 | 263    |
| RELEVANT CITATIONS                                     | 20                      | 0                   | 188    |
| Relevant but additional follow-up needed               |                         |                     |        |
| Ongoing study  | 0                       |                     | 0      |
| Publication not available in English                   | 10                      |                     | 10     |
| Conference proceeding, poster or abstract              | 0                       |                     | 0      |
| Article not able to be retrieved                       | 1                       |                     | 1      |
| TOTAL ONGOING/AWAITING CLASSIFICATION                  | 11                      |                     | 11     |
|  |                         |                     |        |
| INCLUDED CITATIONS                                     | 9                       | 168                 | 177    |

# Appendix B Methods of data appraisal, collection, analysis and reporting (included studies)

# **B1** Risk of bias

#### **B1.1** Tools used

The risk of bias of RCTs was assessed using the revised Cochrane Risk of Bias (RoB) tool v2.0 (13, 14) and the critical appraisal of NRSIs was guided by the methods described by Cochrane using the ROBINS-I tool (15).

For each included RCT or NRSI, potential sources of bias were assessed, and a judgement recorded against each domain specific to the risk of bias tool (i.e. 'high', 'low', or 'some concerns' for RCTs or 'low', 'moderate', 'serious', 'critical', or 'no information provided' for NRSIs). Concerns of bias were raised when it was considered plausible (i.e., likely, probable, possible or conceivable) that bias was present, with the algorithm provided for the RoB 2 and ROBINS-I tools (available online at <u>https://www.riskofbias.info</u>) used to guide decision making.

Supporting information and a rationale for each judgement is provided in Appendix E1 (RCTs) and Appendix E2 (NRSIs).

Consistent with the order of preference for analysis of intervention studies to inform health policy decisions (see Section B2.1) as recommended by the Australian Government (16, 17) (when claiming superiority), The Cochrane Collaboration (13, 18) and GRADE (5), the risk of bias for domain 2 was judged according to the effect of assignment to the intervention (the intention-to-treat effect). In this context, it is noted that although there is a potential for bias associated with non-blinding of trial participants or trial personnel (which was often not possible due to the nature of the intervention), the only deviations from the intended intervention that were assessed were (i) those considered to arise because of the trial context (i.e., unconscious or conscious processes associated with recruitment and engagement activities), (ii) those considered to be inconsistent with the trial protocol, *and* (iii) those judged likely to influence the outcome (as per guidance for RoB 2 (13)). This means that any deviations considered to accur *outside* the trial context (e.g., dropout due to a change in participants' ability to attend sessions), do not lead to a judgement of bias for the effect of assignment to the intervention.

No hard rule was set for an expected dropout rate to be considered reasonable for an exercise intervention (can range between 5% and 50%) (19-21) (domain 2); and, for continuous outcomes, if more than 5% data was missing a judgement was made on the likelihood the missingness of data would affect the outcome (domain 3).

An overall risk of bias judgement for each RCT or NRSI (based on the specified primary outcome for that study or the key reported outcome) was then described in the '*Characteristics of included studies*' table (Appendix F).

The overall risk for RCTs was based on the following criteria:

- overall low risk of bias low risk of bias for all key domains
- *some concerns* at least one domain has some concerns raised, but none are found to be at high risk of bias
- overall high risk of bias high risk of bias for one or more key domains

The overall risk of bias judgement for each NRSI was made using the following guide:

- *overall low risk of bias* the study is comparable to a well-performed RCT and is judged to be a low risk of bias for ALL domains.
- overall moderate risk of bias the study appears to provide sound evidence for a non-randomised study but cannot be considered comparable to a well-performed randomised trial. The study is judged to be a low or moderate risk of bias for ALL domains.
- *overall serious risk of bias* the study has some important problems and is judged to be at serious risk of bias in at least ONE domain, but not a critical risk of bias in any domain.
- overall critical risk of bias the study is too problematic with regards to this domain to provide any useful evidence on the effectiveness of the intervention. The study is judged to be at critical risk of bias in at least ONE domain.
- no information there is no information on which to base a judgement about overall risk of bias.
   There is no clear indication that the study is at serious or critical risk of bias AND there is a lack of information in one or more key domains of bias.

#### **B1.2 Assessment process**

The risk of bias for each included study was assessed by one reviewer (AS, SB, or JO). The lead reviewer for each population (AM, RM, MI, MJ) then checked and confirmed all assessments made. Disagreements were resolved by discussion, with advice sought from the project lead (MJ) where needed.

Initial assessments were done for all studies at two levels: (i) subjective outcome measures (e.g. patientreported measures such as pain visual analogue scale, that could be influenced by knowledge of the intervention received) and (ii) objective outcome measures (e.g. measures that cannot be influenced, such as blood glucose).

Checks made by the second reviewer against the initial risk of bias assessment were made at the same time as the evidence synthesis (i.e. when examining the outcome results for inclusion in a meta-analysis and when developing GRADE summary of findings tables), with the focus of the assessment being on the outcome of interest. That is, the reviewer checked that the 'study level' assessment was appropriate for the outcome, with any additional notes added to the RoB comment column in Appendix E.

At that time, <u>robvis</u> (22) was used to create risk-of-bias traffic light and summary plots. The assessment reported in the traffic light and summary plots (including the overall assessment) is based on the primary outcome measure for that study (if stated) or the key reported outcome/s (usually the subjective measure). Studies included in a priority population that do not report a critical or important outcome would have been through a brief check by the second reviewer, but the assessment is not outcome specific.

When considering treatment effects for an outcome in the GRADE summary of findings tables, the risk of bias of each study (for that outcome) that contributed data was considered as per the GRADE process (see Appendix B4.1).

# **B2** Data extraction process

The characteristics of all included studies were extracted by a single evidence reviewer (AS, SB or JO) using standardised data collection forms (see Appendix F1 and Appendix F2). Studies were grouped according to the ICD-11 category and population or condition to which they had been categorised

All data extraction forms were checked for completeness and accuracy by a second reviewer (AM, RM, MI, MJ), with checks made at the same time as the evidence synthesis. Where there was uncertainty or disagreement about included data, a decision was made through discussion with the lead reviewer (MJ).

## **B2.1 Data items**

A standardised data collection form was used to collect all data items relating to the study features (see Appendix F1). This included (but was not limited to) the following:

- Study identifier (author date)
- Study Reference (including all citations)
- Study design (RCT, cluster RCT, quasi-RCT, NRSI)
- Author affiliation
- Source of funds
- Declared interests of study authors
- Setting & provider (such as hospital, community, nursing home, research clinic)
- Country(s) & region (if reported)
- Enrolment period (if reported)
- Length of treatment & duration of followup
- Description of population (including the number of participants, inclusion and exclusion criteria and any notable demographics or comorbidities,)
- Description of intervention & comparators (including the number of sessions, session duration, and program duration, if the practitioner/instructor was certified, if the comparator was considered inactive)
- Description of co-interventions
- List of Outcomes, including the following:
  - outcome (as reported by the study authors)
  - timing of measurements (e.g. baseline, mid-treatment (6 wks), end of treatment (12 wks)
  - outcome measure used to measure the outcome and any measure details reported by the study authors required to interpret the measure (e.g. scale range, cut-offs used, direction of effect)

Outcome results reported by the study authors at the end of treatment were subsequently extracted into a different form (see Appendix F2) after agreement was reached with the NTWC regarding critical and important outcomes to be considered in the evidence synthesis (see Appendix A9).

The extracted outcome data included (but was not limited to) the following:

- Condition (e.g., Low back pain)
- Comparison (Pilates vs control or Pilates vs 'other')
- Outcome domain to which the outcome had been broadly categorised during the prioritisation process (e.g. functional disability, pain, quality of life, emotional wellbeing, physical wellbeing)

- Timing of measurement (preference was for end of treatment scores, but in the absence of this information we reported the mean change from baseline results)
- Outcome measure and scale range (e.g. Oswestry Disability Index (0-100))
- Measure interpretation (e.g., higher score means more disability in activities of daily living)
- Number of participants in the intervention group / comparator group
- Reported results in the intervention group / comparator group (e.g. means and standard deviations or medians and interquartile ranges)
- Estimates of effect (e.g. mean differences or adjusted mean differences), 95% confidence intervals, p-values)
- Risk of bias judgement for that outcome

If a study used (and reported) different approaches to assess the effect of the intervention, we reported the effect based on the following order of preference (13):

- 1. Full intention-to-treat analysis (i.e. an analysis of participants in the intervention groups to which they were randomised at baseline, regardless of the intervention they received).
  - a. When outcome data were missing, imputations for the missing data were made by the study authors using either:
    - i. a model-based approach (e.g. likelihood-based analysis, inverse-probability weighting) (preferred), or
    - ii. calculated as if they were observed (e.g. last observation carried forward, mean imputation, regression imputation, stochastic imputation).
- 2. Modified intention-to-treat analysis (i.e., an analysis that adheres to intention-to-treat principles except certain data are justifiably not included). This includes participants with missing outcome data, certain patients who never start treatment, and individuals deemed ineligible after randomisation.
- 3. An 'as-treated' or 'per-protocol' analysis (i.e., an analysis of the effect of adhering to the intervention as described in the trial protocol). This includes participants analysed according to the intervention they received, even if randomised to a different treatment group; or the exclusion of individuals who did not adhere to the assigned intervention.

#### **B2.2 Requests for data**

No attempts were made to obtain or clarify data from published peer-reviewed studies. There was also no attempt made to obtain additional data from eligible primary studies not published in English, ongoing trials or studies published as conference abstracts.

#### **B2.3 Transformations of data**

All reported data included in the evidence synthesis were collected from the published reports and entered in RevMan 5.4. No additional transformations of the data were made (e.g., adjustments for skewed baseline data, transformation of data reported in figures or graphs). If the reported information allowed for direct calculation of effect estimates or imputation of missing statistics (e.g., standard deviations), calculations were performed within the computer programme (usually transformed from published confidence intervals or standard errors of the mean) (23).

#### **B2.4 Missing outcome data**

All outcomes measured in the included studies were extracted into the study details sheet (see Appendix F1). Outcomes measured in the studies awaiting classification, and outcomes listed in the ongoing studies were recorded in the progress sheets.

No imputation for missing outcome data within a study was conducted. Studies with missing data were included alongside other studies for that condition; either in the narrative (non-quantitative) synthesis of results or on forest plots showing the sample size. Investigations into missing data within a study (through a review of the clinical trial protocol or registry entry if available) was considered and noted when assessing the risk of bias for that study.

Implications of the missing outcome data were considered when interpreting the evidence (see Section B3.3).

## **B3** Data analysis

This appendix documents the methods used to synthesise the evidence for priority populations and outcomes to inform the evaluation of the effect of Pilates for preventing and treating any health condition.

#### **B3.1 Measures of treatment effect**

#### **B3.1.1** Effect measures

Continuous data were reported as mean difference (MD) along with the standard deviation (SD) and number of participants (and *p*-values). Standardised mean differences (SMDs) were reported when different scales were used to measure the same conceptual outcome (e.g., depression). For consistency, and to ensure that all the scales pointed in the same direction of effect, data were adjusted by multiplying the mean value by -1 where needed (i.e., the MD was reported as a negative value for outcomes in which a higher score is better, with an effect favouring Pilates to sit on the left-hand side of the forest plot).

Dichotomous data were presented as risk ratios (RR)<sup>b</sup> or incidence rate ratio<sup>c</sup> with 95% confidence intervals and *p*-values. Time-to-event data were to be presented as hazard ratios, however no time-to event data were encountered .

To reduce effects of confounding, summary statistics from NRSIs were to be reported as adjusted effect estimates (e.g., adjusted odds ratios (OR) from logistic regression or adjusted rate ratios from Poisson regression analyses), if available.

Any variables that were used for adjustment were recorded.

#### B3.1.2 Clinical relevance

As there were a broad range of populations eligible for inclusion in the review, it was not possible to prespecify the minimal clinically important differences (MCID) for each outcome. Therefore, the MCID (or other scoring information) was sourced from published reports (where possible). This involved quick searches of relevant databases (e.g., <u>Physiopedia</u>), by directly searching for published reports relating to licensed outcome measurement tools (e.g., <u>Pittsburgh Sleep</u>), or by sourcing expert opinion via a relevant society (e.g., <u>Australasian Menopause Society</u>).

For each outcome, we have stated and referenced the relevant source in the technical report (see Appendix D), taking care to note if the reported value is a minimal detectable change (MDC: statistical) (i.e. the smallest change in score that likely reflects true change more than measurement error alone); or the minimal clinically important difference (MCID: clinical) (i.e. the smallest difference between the scores in a questionnaire that the patient perceives to be beneficial).

In the absence of an MCID, the magnitude of the effect estimates were considered on three levels: small (MD <10% of the scale), moderate (MD between 10% to 20% of the scale) or large (MD more than 20% of the scale). If the effect was quantified using an SMD (or was not it possible to use the scale<sup>d</sup>), we used Cohen's guidance for interpreting the magnitude of the SMD: 0.2 represents a small difference, 0.5 is moderate, and 0.8 is a large difference (24).

<sup>&</sup>lt;sup>b</sup> One outcome in people undergoing knee rehabilitation after injury (Global Rating of Change) was reported as a binary outcome (better/worse).

<sup>&</sup>lt;sup>c</sup> Two outcomes in people at risk of falls measured using incidence rates ratios (rate of falls and rate of fall injury per 1,000 person days).

<sup>&</sup>lt;sup>d</sup> i.e., measure that do not have an upper and lower range (e.g. BMI, BP, distance)

#### **B3.2 Unit-of-analysis issues**

No imputations for unit-of-analysis issues were performed. That is, no adjustments were made for intervention-related clustering using a statistical method. One RCT (Mirmohammadali 2012) with a cluster design was identified (see Postpartum recovery).

For crossover trials, only data from the first period was included in the analysis. One crossover study (Borges 2014) reporting paired analyses was found (see HTLV-1 associated myelopathy). Only data from a single timepoint ('end-of-treatment') was presented in the analysis (see Appendix G).

Only single pairwise comparisons of the intervention with a comparator (i.e. 'control') was considered. Where appropriate, we combined groups to create a single pairwise comparison (as described in Chapter 6 of the Cochrane Handbook (23)); otherwise a footnote was made in the forest plot to record which group was included in the evidence synthesis (and any impact this may have had on the result considered).

#### **B3.3** Risk of reporting bias across studies

The implications for missing data within studies was considered when interpreting the evidence. In the first instance, this was made through a sensitivity analysis, where trials judged to be at a high risk of bias were excluded from the meta-analysis (and the results noted alongside the original estimate of effect). Bias due to missing outcome data was considered within the overall bias judgement for an outcome (i.e. removing these studies materially changed the estimate of effect) (see Section B3.4.4).

Similarly, judgements regarding missing results across the identified studies were made based on available information (e.g., through inspection of outcomes reported in studies identified for a particular condition, including potentially eligible studies listed as 'Ongoing', 'Awaiting Classification' or 'Published in a language other than English) (see <u>Appendix C6</u>). Here, an assessment of 'known-unknowns' (i.e. non-reporting of results from identified studies or non-inclusion of results from studies published in a language other than English) was made through judgement on whether missingness of the results was likely related to the observed effect (e.g. in favour of the comparator, no observed effect) and if the missing result for the outcome would materially influence the meta-analysis results. Given most of the outcome results came from small studies, any missing results due to non-reporting was considered likely to impact the results.

A judgement about 'unknown-unknowns' was made based on the likelihood that missing data from studies not identified was likely to have included that outcome. Here, reporting bias was suspected when the evidence for an outcome was limited to a small number of small trials.

No additional statistical analysis for testing for small-study effects (e.g. contour enhanced funnel plots) was conducted.

#### **B3.4 Data synthesis**

Given the size and breadth of this review, a broad approach to data synthesis was implemented. This meant that summary estimates were focused on a specified outcome domain (e.g. pain) measured at a single time point (end-of treatment) using any reported (and appropriate) measurement tool (e.g. McGill Pain Questionnaire, Visual Analogue Scale, Numeric Rating Scale). This approach was intended to capture as many studies as possible for any given PICO.

#### **B3.4.1** Quantitative synthesis

Synthesis was only undertaken for studies that compared Pilates with 'control' (no intervention, wait list, or inactive comparators).

Data synthesis from RCTs and NRSIs was performed using RevMan 5.4 and forest plots presented (see Evaluation report). Data from RCT and NRSIs were meta-analysed separately. Effect estimates of NRSIs were only included if the NRSI was judged to be at low to moderate risk of bias and was considered sufficiently homogenous to be combined. This meant the PICO criteria and study design features of the NRSIs were sufficiently similar or comparable.

For each comparison and outcome, effect estimates were combined across studies using a random effects model (to account for expected differences between studies). Statistical heterogeneity was assessed by visually inspecting the overlap of confidence intervals on the forest plots, formally testing for heterogeneity using the Chi<sup>2</sup> test (using a significance level of  $\alpha$ =0.1), and quantifying heterogeneity using the I<sup>2</sup> statistic (25).

Results data from studies comparing Pilates with 'other' (active) interventions were extracted and presented in data tables but were not synthesised or considered further. These data are presented as an 'evidence inventory' and provide a snapshot of the available evidence comparing Pilates with 'other' interventions (see Appendix F2).

Effect estimates were not combined across outcomes if analysis of covariance has been used to adjust for baseline measures (e.g., skewed data). This is because means and SDs are not available for each intervention group separately. If available, the adjusted mean change from baseline scores were reported and included in the analysis (as per Cochrane guidance) (26), otherwise the end-of-treatment scores were extracted and a footnote included in the data extraction sheet (see Appendix F2) and in the forest plot (see main report).

No time-to-event data (hazard ratios) were encountered.

#### B3.4.2 Non-quantitative synthesis

The narrative summary included a brief description of the condition and studies identified (including study design, size and population demographics). Where possible, a visual representation of the results of included studies was presented in a forest plot (without a summary estimate) grouped by study design features.

Results from each study were reported, with the range and magnitude of observed effects noted. For studies where the results were incompletely reported (i.e. only the direction of effect of reported, the effect estimate is reported but with no confidence intervals or the direction of effect is reported along with a *p*-value, but there is of no effect estimate), we reported the available information.

To describe an overall effect across multiple studies for each outcome within the GRADE summary of findings tables (for studies comparing Pilates with control only and no available data), we described the magnitude, range and distribution of observed effects across the studies using a simple vote count based on direction of effect (e.g. X of Y studies reported an effect favouring the intervention for the outcome Z). Any important differences in study size or design features that may influence the interpretation of results was considered and discussed in the text for that outcome (Appendix D). Qualitative descriptors describing the size of the effect (small, large etc.) were used only in relation to the clinical importance (see Section B3.1.2) and were based on the smallest difference that patients perceive as beneficial (or detrimental) for that outcome.

#### **B3.4.3** Subgroup analyses and investigations of heterogeneity

We did not undertake any subgroup analyses of subsets of participants within or across studies. See Appendix G1 and G2 for details.

#### B3.4.4 Addressing risk of bias

All eligible RCTs were included in the review, regardless of judgements made regarding risk of bias.

To examine the impact of bias, a sensitivity analysis was conducted if there were more than two studies available for a PICO, with studies judged to be at high risk of bias removed from the analysis. The impact of this change was noted and discussed in the narrative summary for that outcome (see Appendix D).

Eligible NRSIs that were assessed to be at critical risk of bias for one or more domain (see Section B4) were not included in the evidence synthesis (i.e., the reporting of results, synthesis and conclusion) because results from these studies are likely to lead to misinformed judgements about the effect estimate. Study details were included under '*Characteristics of included studies*' (see Appendix F).

#### B3.4.5 Sensitivity analysis

Sensitivity analyses (through the removal of studies from the meta-analysis) was intended to be used to assess the robustness of outcome results specifically related to the inclusion of studies judged to be at high risk of bias. However, given the small number of studies found, no sensitivity analysis assessing the impact of study bias was possible.

Sensitivity analyses relating to study bias were conducted and reported (see Appendix D) for four conditions: multiple sclerosis (functional mobility), neck pain (pain, disability), low back pain (pain, disability) and age-related physical and mental decline (physical welling, mental wellbeing).

## **B4** Evidence statements

This appendix documents how the data were used to inform the certainty of evidence and to develop evidence statements about the effect of Pilates for preventing and treating any health condition.

#### **B4.1** Summary of findings and certainty of the evidence

Across each population, we assessed the certainty of the evidence for up to seven critical or important outcomes using the GRADE approach (5), in which the certainty of evidence is categorised as follows:

- High ( $\oplus \oplus \oplus \oplus$ ): meaning the authors have a lot of confidence that the true effect is similar to the estimated effect
- Moderate  $(\oplus \oplus \oplus \oplus \odot)$ : meaning that the true effect is probably close to the estimated effect
- Low  $(\oplus \oplus \ominus \ominus)$ : meaning the true effect might be markedly different from the estimated effect
- Very low  $(\bigoplus \ominus \ominus \ominus)$ : meaning the true effect is probably markedly different from the estimated effect

The GRADE process provides a framework for determining the certainty of the evidence and is based on consideration of the following five factors:

- Risk of bias. Based on a summary assessment (i.e. the overall risk of bias) across studies for each outcome reported (27). Serious concerns were raised if the outcome result was influenced by the inclusion of studies judged to be at high risk of bias (i.e. removing these studies changed the size of the effect) (see Section B3.4.5). Serious concerns were also raised if it was considered plausible (i.e. likely, probable or conceivable) that missing outcome data made a difference to the estimated effect (considering the weight of studies that had substantial missing data).
- Inconsistency. Based on heterogeneity in the observed intervention effects across studies that suggests important differences in the effect of the intervention and whether this can be explained (28). This included considering measures of statistical heterogeneity (e.g. I<sup>2</sup> statistic) and any non-overlap of confidence intervals (suggesting important difference in the observed effect). Inconsistency was not downgraded when there was only one study.
- Imprecision. Based on interpretation of the upper and lower confidence limits of the pooled result in relation to a minimal clinically important threshold (i.e. the confidence interval includes both appreciable benefit and harm); and whether the optimal information size has been reached (i.e. the total number of patients meets the required sample size for a sufficiently powered individual study) (29). In the absence of a published clinically important threshold a rough guide was used: for dichotomous outcomes a 25% relative risk reduction or increase; for continuous outcomes based on the threshold defined for a small effect (the mean difference being less than 10% of the scale) (see Section B3.1.2).
- Indirectness. Based on important differences between the review questions and the characteristics of included studies (population or intervention) that may lead to important differences in the intervention effects (30). For example, a judgement on whether evidence in older women is also generalisable to young men (sensible to apply) or if Pilates was delivered as typically practised in Australia.
- Publication bias. Based on the extent to which the evidence is available (see Section B3.3). This
  included: checking trial registries for missing outcome results in published studies, checking the
  ongoing studies and studies awaiting classification (including those published in a language other
  than English) and making a judgement on whether the studies were not complete, failed to report an
  outcome, were not published (or translated) due to the nature of their results (i.e. selective non-

reporting of results). Given most of the outcome results came from small studies, any missing results due to non-reporting in a meta-analysis was considered likely to impact the results. Publication bias was also suspected when the evidence was limited to a small number of small trials (31).

For each factor, a judgement was made about whether there were no concerns, or if the concerns were serious or very serious. Footnotes were used to record judgements made about downgrading the evidence (see Figure B.1). Scoring of the certainty of the evidence began as 'high' (score=4), which was downgraded by -1 for each factor with serious concerns or -2 for very serious concerns (5, 32). In certain circumstances, the certainty of evidence could also be upgraded (three factors relating to magnitude of effect, dose-response gradient, and confounding); however, we did not upgrade the evidence for any outcome recorded.

To ensure consistency, each GRADE summary of findings tables was drafted by the lead evidence reviewer for a population, in conjunction with the overall project lead (MJ) using the GRADEpro GDT software (<u>www.gradepro.org</u>). Only evidence comparing Pilates with 'control' was presented. All critical and important outcomes were reported, regardless of whether the findings demonstrate a clinically meaningful change.

#### **B4.2 Development of evidence statements**

As part of the summary of findings table, an evidence statement pertaining to each outcome was included. The evidence statement was guided by the prescribed format provided in GRADEPro (33), with the preferred statement selected listed in Table B.1.

| SIZE OF THE EFFECT ESTIMATE                    | SUGGESTED STATEMENTS *   |
|--|--|
| HIGH Certainty of the evidence                 |  |
| Large effect                                   | X results in a large reduction/increase in outcome                         |
| Moderate effect                                | X reduces/increases outcome  |
| Small important effect                         | X reduces/increases outcome slightly                                       |
| Trivial, small unimportant effect or no effect | X results in little to no difference in outcome                            |
| MODERATE Certainty of the evidence             |  |
| Large effect                                   | X probably results in a large reduction/increase in outcome                |
| Moderate effect                                | X probably reduces/increases outcome                                       |
| Small important effect                         | X probably results in a slight reduction/increase in outcome               |
| Trivial, small unimportant effect or no effect | X probably results in little to no difference in outcome                   |
| LOW Certainty of the evidence                  |  |
| Large effect                                   | The evidence suggests X results in a large reduction/increase in outcome   |
| Moderate effect                                | The evidence suggests X results in a reduction/increase in outcome         |
| Small important effect                         | The evidence suggests X results in a slight reduction/increase in outcome  |
| Trivial, small unimportant effect or no effect | The evidence suggests that X results in little to no difference in outcome |
| VERY LOW Certainty of the evidence             |  |
| Any effect                                     | The evidence is very uncertain about the effect of X on outcome            |

#### Table B.1 List of informative statements to communicate results of systematic reviews

Source: modified from Santesso et al. (2020) (33)

\* Replace X with intervention, replace 'reduce/increase' with direction of effect, replace 'outcome' with name of outcome, include 'when compared with Y' when needed)

#### Figure B.1 Sample footnotes for Summary of findings tables

| 1. Risk of bias<br>(evidence base)   | 2. Inconsistency?  | 3. Indirectness<br>(generalisability and<br>applicability)   | 4. Imprecision (clinical impact)  | 5. Other   |
|--|--|--|---|--|
| <ul> <li>One or more randomised<br/>studies with overall low<br/>risk of bias. Certainty of<br/>evidence not downgraded.</li> <li>The study is too<br/>problematic to prove any<br/>useful evidence on the<br/>outcome of interest.</li> <li>One or more randomised<br/>studies with plausible bias<br/>that raises serious doubts<br/>about the results.</li> </ul> | <ul> <li>Single study. Inconsistency<br/>not assessed. Certainty of<br/>evidence not downgraded.</li> <li>Substantial variability in<br/>effect estimates (l<sup>2</sup> statistic<br/>greater than 50%).<br/>Certainty of evidence<br/>downgraded.</li> <li>Evidence is inconsistent.<br/>Minimal overlap in<br/>confidence intervals.<br/>Confidence in the results<br/>to inform decision making<br/>is seriously reduced.</li> </ul> | <ul> <li>Evidence is directly generalisable and applicable to the target population with some caveats.</li> <li>Evidence is not directly generalisable to the target population and it is hard to judge whether it could be sensibly applied. The available evidence is in women (older than 70 years) with history of falls. This may not be applicable to all women aged over 60 years.</li> </ul> | <ul> <li>Low event rate. Study not<br/>sufficiently powered to<br/>detect a statistically<br/>significant difference.</li> <li>Single study with wide<br/>confidence intervals that<br/>cross the line of no effect.<br/>Confidence in the results is<br/>weak.</li> <li>Exclusion of participants<br/>who failed to attend all<br/>sessions raised serious<br/>doubts about the effect<br/>estimate.</li> <li>Study has high rates of<br/>attrition that raises serious<br/>doubts about the effect<br/>estimate.</li> </ul> | <ul> <li>Publication bias suspected<br/>but not formally assessed<br/>(less than 10 studies<br/>identified). Six studies<br/>awaiting classification.<br/>Certainty of evidence<br/>downgraded.</li> <li>Publication bias not<br/>detected. Body of<br/>literature is not well<br/>established. Certainty of<br/>evidence not downgraded.</li> </ul> |

# Appendix C Details of studies assessed at full text but not included

# C1 Citation details of studies from search results excluded (not eligible)

This appendix documents the studies that were screened in full text for a systematic review on the effect of Pilates for preventing and treating any health condition but were not included in the evidence synthesis as they did not meet the eligibility criteria.

As per Cochrane guidelines the table does not list every study that was excluded, only those that appear on the surface to meet eligibility criteria, but which turn out not to. The table is sorted by reason for exclusion. Each study notes the primary reason for exclusion, but there may have been multiple reasons.

#### Table C.1 Citation details of studies screened and excluded at full text (by reason for exclusion): Pilates

(See separate file)

# C2 Citation details of studies provided through the Department's public call for evidence

This appendix documents the studies that were provided through the Department's public call for evidence for a systematic review on the effect of Pilates for preventing and treating any health condition.

Studies that were already identified through the search of published literature were noted as duplicate citations, with the reason for exclusion (or inclusion) noted under the eligibility criteria. Studies that were not previously identified in the literature search were subsequently screened, with their reasons for inclusion/exclusion noted. The table is sorted first by whether the studies had already been found in the search (duplicate studies), then by whether they were excluded (with reasons) or included. As above, studies could be not eligible for multiple reasons, but only one reason is listed for each.

# Table C.2 Citation details of studies provided through the Department's public call for evidence with reasons: Pilates

(See separate file)

# C3 Citation details of studies from non-priority populations

This appendix documents the studies that met the prespecified inclusion criteria for a systematic review on the effect of Pilates for preventing and treating any health condition but were not included in the evidence synthesis. These studies (ordered by ICD-11 category and condition) are listed in Table C.3. A detailed description of each of the listed studies is provided in *Appendix C10 Description of studies from non-priority populations (not included in the synthesis)*.

| STUDY ID                                | Study<br>design | ICD-11 CATEGORY  | POPULATION  | INTERVENTION                              | CONTROL<br>(INACTIVE)            | ACTIVE<br>CONTROL 1                  | ACTIVE<br>CONTROL 2 | CO-<br>INTERVENTION  | Outcome domains   |
|---|-----------------|--|---|---|----------------------------------|--------------------------------------|---------------------|--|---|
| Wahba<br>2019 (34)                      | RCT             | 02 Neoplasms   | Thyroid cancer<br>(with shoulder<br>dysfunction<br>after surgery) | Pilates exercises<br>(mat &<br>equipment) |                                  | Convention<br>al physical<br>therapy |                     |  | Disability<br>Functional status,<br>upper extremity<br>Pain   |
| Tunar 2012<br>(35)                      | RCT,<br>cluster | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Diabetes (Type<br>1)  | Pilates exercises<br>(mat)                | Control<br>(usual<br>activities) |                                      |                     | Short-acting<br>insulin OR oral<br>carbohydrate (if<br>indicated) prior<br>to exercise | Glycaemic control<br>Metabolic control<br>Body composition<br>Physical performance                            |
| Aslan 2018<br>(36, 37)                  | Quasi-<br>RCT   | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises                         | Control (no<br>interventio<br>n) |                                      |                     | Diet<br>programme  | BMI<br>Blood glucose, fasting   |
| Burungale<br>2017 (38)                  | NRSI            | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises                         |                                  | Strength<br>training                 |                     | Diet<br>consultation   | BMI<br>Waist-hip ratio<br>Quality of life   |
| Cakmakci<br>2011 (39)                   | Quasi-<br>RCT   | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises<br>(mat & ball)         | Control (no<br>interventio<br>n) |                                      |                     |  | Body composition<br>(BMI, waist-hip ratio,<br>waist & hip<br>circumference, lean<br>body mass, % body<br>fat) |
| Hagner-<br>Derengows<br>ka 2015<br>(40) | NRSI            | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises                         | Control (no<br>interventio<br>n) | Nordic<br>Walking                    |                     | Low calorie diet   | Metabolic control<br>(lipid profiles)   |

| Table C.3 | Characteristics of excluded studies (ordered by ICD-11 category): Pilates – nonpriority populations |
|-----------|---|
|-----------|---|

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| STUDY ID                           | Study<br>design | ICD-11 CATEGORY  | POPULATION  | INTERVENTION                              | CONTROL<br>(INACTIVE)            | ACTIVE<br>CONTROL 1                                      | ACTIVE<br>CONTROL 2 | CO-<br>INTERVENTION | Outcome domains   |
|------------------------------------|-----------------|--|---|---|----------------------------------|--|---------------------|---------------------|---|
| Ramezankh<br>any 2011<br>(41)      | Quasi-<br>RCT   | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises                         | Control (no<br>interventio<br>n) | Aerobic<br>exercise                                      | Low calorie<br>diet |                     | Metabolic control<br>(lipid profiles)<br>Body composition<br>(weight, waist-hip<br>ratio) |
| Rayes 2019<br>(42)                 | Quasi-<br>RCT   | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises                         | Control (no<br>interventio<br>n) | Aerobic<br>exercise                                      |                     |                     | Heart rate<br>Borg scale<br>Muscle strength /<br>flexibility<br>Body composition          |
| Savkin<br>2017 (43)                | RCT             | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises                         | Control (no<br>interventio<br>n) |  |                     |                     | Body composition  |
| Vancini<br>2017 (44)               | Quasi-<br>RCT   | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises<br>(mat &<br>equipment) | Control (no<br>interventio<br>n) | Walking  |                     |                     | Anxiety<br>Depression<br>Heart rate<br>Quality of life                                    |
| Wong 2020<br>(45)                  | RCT             | 05 Endocrine,<br>nutritional and<br>metabolic diseases | Obesity   | Pilates exercises<br>(mat)                | Control (no<br>interventio<br>n) |  |                     |                     | Blood pressure<br>Nitric oxide levels<br>Body composition                                 |
| GrebloJura<br>kic 2017<br>(46)     | Quasi-<br>RCT   | 06 Mental and<br>behavioural<br>disorders              | Neurocognitive,<br>Mild cognitive<br>impairment                   | Pilates exercises                         |                                  | Huber<br>training<br>(balance<br>and core<br>resistance) |                     |                     | Cognitive function  |
| Mehrabi-<br>Taleghani<br>2018 (47) | Quasi-<br>RCT   | 06 Mental and<br>behavioural<br>disorders              | Neurodevelopm<br>ental, ADHD (6-<br>18 years)                     | Pilates exercises                         | Control (no<br>interventio<br>n) | Dynamic<br>exercise<br>(Football)                        |                     |                     | Diagnosis<br>Function   |
| Seghatolesl<br>amy 2019<br>(48)    | Quasi-<br>RCT   | 06 Mental and<br>behavioural<br>disorders              | Neurodevelopm<br>ental, Learning<br>disorders<br>(female 8 years) | Pilates exercises<br>(mat)                | Control (no<br>interventio<br>n) | Aerobic<br>exercise                                      |                     |                     | Intelligence  |

| STUDY ID                     | Study<br>design | ICD-11 CATEGORY   | POPULATION   | INTERVENTION                       | CONTROL<br>(INACTIVE)            | ACTIVE<br>CONTROL 1                            | ACTIVE<br>CONTROL 2  | CO-<br>INTERVENTION             | Outcome domains  |
|------------------------------|-----------------|---|--|------------------------------------|----------------------------------|--|----------------------|---------------------------------|--|
| Priebe<br>2013 (49-<br>53)   | RCT             | 06 Mental and<br>behavioural<br>disorders                               | Schizophrenia  | Pilates exercises                  |                                  | Psychother<br>apy classes                      |                      |                                 | Extrapyramidal<br>symptoms<br>Positive symptoms<br>Negative symptoms<br>General<br>psychopathology<br>Depression<br>Negative symptoms -<br>experiential<br>Negative symptoms -<br>expressive |
| Walowska<br>2018 (54,<br>55) | Quasi-<br>RCT   | 10 Diseases of the<br>ear or mastoid<br>process                         | Hearing<br>impaired,<br>congenital (13 to<br>24 years) | Modified Pilates<br>(no equipment) |                                  | Physical education                             |                      |                                 | Balance control  |
| Zarei 2020<br>(56)           | RCT             | 10 Diseases of the<br>ear or mastoid<br>process                         | Hearing<br>impaired,<br>congenital (11 to<br>19 years) | Pilates exercises<br>(equipment)   | Control<br>(usual<br>activities) |  |                      |                                 | Balance, static<br>Balance, dynamic  |
| Hoseini<br>Niya 2019<br>(57) | NRSI            | 11 Diseases of the circulatory system                                   | Cardiac<br>arrhythmia<br>(women)                       | Pilates exercises                  |                                  | Walking<br>(treadmill)                         | Pilates +<br>Walking |                                 | Heart rate, resting<br>Blood pressure  |
| Guimaraes<br>2010 (58)       | Quasi-<br>RCT   | 11 Diseases of the circulatory system                                   | Heart failure<br>(LVEF < 40%,<br>NYHA class I-II)      | Pilates exercises<br>(mat)         |                                  | Convention<br>al cardiac<br>rehabilitati<br>on |                      | Aerobic exercise<br>(treadmill) | Heart rate<br>Blood pressure<br>Carbon dioxide<br>output<br>Oxygen uptake<br>Minute ventilation  |
| Mendonca<br>2013 (59)        | RCT             | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Arthropathies,<br>Juvenile<br>Idiopathic<br>Arthritis  | Pilates exercises<br>(equipment)   |                                  | Convention<br>al<br>therapeutic<br>exercises   |                      |                                 | Emotional impact<br>Physical impact<br>Fatigue<br>Joint limitation<br>Joint pain<br>Physical functioning<br>QoL, disease specific  |

| STUDY ID                        | Study<br>design | ICD-11 CATEGORY   | POPULATION  | INTERVENTION                    | CONTROL<br>(INACTIVE)                        | ACTIVE<br>CONTROL 1   | ACTIVE<br>CONTROL 2 | CO-<br>INTERVENTION                                  | Outcome domains   |
|---------------------------------|-----------------|---|---|---------------------------------|--|---|---------------------|--|---|
| Dale 2016<br>(60)               | Quasi-<br>RCT   | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Lateral<br>epicondylitis or<br>epicondylosis                            | Pilates exercises<br>(mat)      | Control (no<br>interventio<br>n)             |   |                     | Conventional physical therapy                        | Functional capacity<br>Pain<br>Physical performance   |
| Chiavegato<br>2014 (61-<br>63)  | RCT             | 16 Diseases of the genitourinary system                                 | CKD<br>(hospitalised<br>with kidney<br>failure or after<br>transplant)  | Modified Pilates<br>(equipment) |  | Convention<br>al physical<br>therapy                          |                     | Respiratory<br>therapy (if<br>requested)             | Functional<br>independence<br>Respiratory muscle<br>strength<br>Exercise capacity<br>Length of stay<br>Satisfaction with care |
| Lendraitien<br>e 2018 (64)      | Quasi-<br>RCT   | 16 Diseases of the genitourinary system                                 | CKD (with renal transplant)   | Pilates exercises<br>(mat)      | Physical<br>therapy<br>(aerobic<br>exercise) |   |                     |  | Physical activity<br>Grip strength<br>Psychoemotional<br>status   |
| Rahimimog<br>hadam<br>2017 (65) | RCT             | 16 Diseases of the genitourinary system                                 | CKD (on<br>haemodialysis)   | Modified Pilates<br>(mat)       | Control (no<br>interventio<br>n)             |   |                     | Usual care   | Physiological<br>wellbeing (general<br>health)  |
| Rahimimog<br>hadam<br>2019 (66) | RCT             | 16 Diseases of the genitourinary system                                 | CKD (on<br>haemodialysis)   | Modified Pilates<br>(mat)       | Control (no<br>interventio<br>n)             |   |                     | Usual care   | QoL, disease specific   |
| Chmielews<br>ka 2019<br>(67)    | NRSI            | 16 Diseases of the genitourinary system                                 | Urinary<br>incontinence<br>(stress, women<br>> 45 years)                | Pilates exercises               |  | Surface<br>electromyo<br>graphic<br>(sEMG)<br>biofeedbac<br>k |                     | Pelvic floor<br>muscle<br>contraction<br>(voluntary) | Symptom severity<br>QoL-global<br>Pelvic floor muscle<br>activity   |
| Lausen<br>2018 (68-<br>70)      | RCT             | 16 Diseases of the genitourinary system                                 | Urinary<br>incontinence<br>(stress, urge,<br>mixed, women<br>> 18years) | Modified Pilates                | Control (no<br>interventio<br>n)             |   |                     | Conventional physical therapy                        | Symptom severity<br>QoL, disease specific<br>Self esteem  |

| STUDY ID                         | Study<br>design | ICD-11 CATEGORY                                  | POPULATION   | INTERVENTION                                       | CONTROL<br>(INACTIVE)               | ACTIVE<br>CONTROL 1                      | ACTIVE<br>CONTROL 2 | CO-<br>INTERVENTION        | Outcome domains  |
|----------------------------------|-----------------|--|--|--|-------------------------------------|--|---------------------|----------------------------|--|
| Pavithraloc<br>hani 2019<br>(71) | NRSI            | 16 Diseases of the genitourinary system          | Urinary<br>incontinence<br>(stress,<br>perinatal)  | Pilates exercises                                  | Kegel's<br>exercise                 |  |                     |                            | Urinary incontinence<br>distress<br>Impact of<br>incontinence  |
| Yuvarani<br>2018 (72)            | Quasi-<br>RCT   | 16 Diseases of the genitourinary system          | Urinary<br>incontinence<br>(stress,<br>postpartum) | Pilates exercises                                  | Transverse<br>Abdominus<br>training |  |                     |                            | Urinary incontinence<br>distress<br>Impact of<br>incontinence  |
| Dias 2018<br>(73)                | RCT             | 18 Pregnancy,<br>childbirth or the<br>puerperium | Pregnant<br>women (14 to 16<br>GW)                 | Pilates exercises<br>(mat and<br>equipment)        |                                     | Walking<br>and<br>resistance<br>training |                     |                            | PFM strength<br>PFM endurance  |
| Oktaviani<br>2018 (74)           | NRSI            | 18 Pregnancy,<br>childbirth or the<br>puerperium | Pregnant<br>women (> 28<br>GW)                     | Pilates exercises                                  |                                     | Convention<br>al exercise<br>program     |                     |                            | Pregnancy-related<br>musculoskeletal pain  |
| Rodriguez-<br>Diaz 2017<br>(75)  | RCT             | 18 Pregnancy,<br>childbirth or the<br>puerperium | Pregnant<br>women (24 to 30<br>GW)                 | Pilates exercises<br>(equipment)                   | Control<br>(usual<br>activities)    |  |                     | Standard<br>antenatal care | BMI<br>Blood pressure<br>Strength<br>Flexibility<br>Dorsal spine<br>curvature<br>Birthing experience<br>Newborn outcomes |
| Sarpkaya<br>Guder 2018<br>(76)   | NRSI            | 18 Pregnancy,<br>childbirth or the<br>puerperium | Perinatal women<br>(28 to 32 GW)                   | Pilates-assisted<br>childbirth<br>training program | Control (no<br>interventio<br>n)    |  |                     | Standard<br>antenatal care | Birthing experience<br>Newborn outcomes  |

Abbreviations: %, percentage; ADHD, Attention deficit/ hyperactivity disorder; BMI, body mass index; CKD, Chronic kidney disease; GW, gestational weeks; NRSI, non-randomised study of intervention; PFM, pelvic floor muscle; QoL, quality of life; RCT, randomised controlled trial

# C4 Citation details of studies awaiting classification

This appendix documents the studies that potentially met the prespecified inclusion criteria for a systematic review on the effect of Pilates for preventing and treating any health condition, but certainty of inclusion is precluded by missing information (i.e., they were published in another language, incomplete reporting), or they were identified after the literature search date.

An overview of studies awaiting classification (by ICD-11 disease category) is provided in Table C.4.

| Disease Category  | # studies with<br>incomplete information | # studies published in<br>languages other than<br>English | # studies not able to<br>be retrieved | TOTALS |
|---|--|---|---------------------------------------|--------|
| 02 Neoplasms  |  | 2   |                                       | 2      |
| 05 Endocrine, nutritional, or metabolic diseases                  |  | 14  |                                       | 14     |
| 06 Mental and behavioural disorders                               | 1  | 2   |                                       | 3      |
| 08 Diseases of the nervous system                                 | 7  | 6   |                                       | 13     |
| 10 Diseases of the ear or mastoid process                         |  | 1   |                                       | 1      |
| 11 Diseases of the circulatory system                             |  | 1   |                                       | 1      |
| 12 Diseases of the respiratory system                             | 1  |   |                                       | 1      |
| 13 Diseases of the digestive system                               | 1  |   |                                       | 1      |
| 15 Diseases of the musculoskeletal system or connective tissue    | 4  | 8   |                                       | 12     |
| 16 Diseases of the genitourinary system                           | 4  | 2   | 1                                     | 7      |
| 21 Symptoms, signs or clinical findings, not elsewhere classified | 8  | 4   | 3                                     | 15     |
| 25 Prevention   | 1  | 11  | 1                                     | 14     |
| Grand Total   | 27                                       | 51  | 5                                     | 83     |

Table C.4 Overview of studies awaiting classification (by ICD-11 disease category): Pilates

# C4.1 Studies with incomplete information or missing data

| STUDY ID                         | Study<br>design | ICD 11 Category                           | CONDITION<br>(population)              | N   | Intervention         | Intervention<br>details                   | INACTIVE<br>Comparator        | Active<br>Comparator/s                   | Co-<br>intervention | Note                              |
|----------------------------------|-----------------|---|--|-----|----------------------|---|-------------------------------|--|---------------------|-----------------------------------|
| Akbas 2016<br>(77)               | RCT             | 06 Mental and<br>behavioural<br>disorders | Schizophrenia                          | 20  | Pilates<br>exercises | 6 wks, 2 x<br>50min sessions<br>per wk    | Control (no<br>intervention)  |  | Usual care          | Conference<br>abstract/post<br>er |
| Jachacz-<br>Lopata<br>2016 (78)  | Quasi-RCT?      | 08 Diseases of the nervous system         | Cervicogenic<br>headache<br>(postural) | 103 | Pilates<br>exercises | total 10x ?min<br>sessions                |                               | Manual<br>therapy                        |                     | Conference<br>abstract/post<br>er |
| Abasiyanik<br>2018c (79)         | RCT?            | 08 Diseases of the nervous system         | Multiple sclerosis                     | 29  | Pilates<br>exercises | 8 wks, 1x ?min<br>sessions per wk         |                               | Yoga                                     |                     | Conference<br>abstract/post<br>er |
| Beratto<br>2017<br>(80)          | RCT?            | 08 Diseases of the nervous system         | Multiple sclerosis                     | 18  | Pilates<br>exercises | 5 mos, 2x ?min<br>sessions per wk         |                               | Multiple<br>Neuromuscular<br>Stimulation |                     | Conference<br>abstract/post<br>er |
| Catena<br>2014<br>(81)           | RCT?            | 08 Diseases of the nervous system         | Multiple sclerosis                     | 20  | Pilates<br>exercises | 8 wks, 2x<br>60min sessions<br>per wk     |                               | Muscle<br>Relaxation<br>Technique        |                     | Conference<br>abstract/post<br>er |
| Guclu-<br>Gunduz<br>2017<br>(82) | RCT?            | 08 Diseases of the nervous system         | Multiple sclerosis                     | 19  | Pilates<br>exercises | 8 wks, 3x ?min<br>sessions per wk         | Control (no<br>intervention)  |  |                     | Conference<br>abstract/post<br>er |
| Mehrvar<br>2017<br>(83)          | Quasi-RCT?      | 08 Diseases of the nervous system         | Multiple sclerosis                     | 36  | Pilates<br>exercises | 8 wks, 3x 40-<br>60min sessions<br>per wk | Control (no<br>intervention)  | Massage OR<br>Pilates +<br>Massage       |                     | Conference<br>abstract/post<br>er |
| Novotna<br>2018<br>(84, 85)      | NRSI            | 08 Diseases of the nervous system         | Multiple sclerosis                     | 33  | Pilates<br>exercises | 10 wks, ?x<br>?min sessions<br>per wk     | Control (usual activities)    |  |                     | Conference<br>abstract/post<br>er |
| Most 2014<br>(86)                | RCT             | 12 Diseases of the respiratory system     | Asthma                                 | 20  | Pilates<br>exercises | 10 wks, 3x<br>30min sessions<br>per week  | Control<br>(standard<br>care) |  |                     | Conference<br>abstract/post<br>er |

 Table C.5
 Characteristics of studies awaiting classification (by ICD-11 disease category): Pilates - conference abstracts, posters etc.

| STUDY ID   | Study<br>design | ICD 11 Category   | CONDITION<br>(population)                                       | N  | Intervention                  | Intervention<br>details                   | INACTIVE<br>Comparator       | Active<br>Comparator/s   | Co-<br>intervention | Note                              |
|--|-----------------|---|---|----|-------------------------------|---|------------------------------|--|---------------------|-----------------------------------|
| Pestana<br>2018<br>(87)                              | RCT             | 13 Diseases of the digestive system                                     | Non-alcoholic fatty<br>liver disease                            | ?  | Pilates<br>exercises<br>(mat) | ?   |                              | Aerobic<br>walking<br>(treadmill)  |                     | Conference<br>abstract/post<br>er |
| Baltaci<br>2005 (88)                                 | Quasi-RCT?      | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Arthropathies,<br>Osteoarthritis<br>(knee, bilateral)           | 34 | Pilates<br>exercises          | 4 wks, 3x<br>45min sessions<br>per wk     |                              | Conventional<br>physical<br>therapy<br>(isometric<br>exercise and<br>neuromuscular<br>electrical<br>stimulation) |                     | Conference<br>abstract/post<br>er |
| Patru 2017<br>(89)                                   | Quasi-RCT?      | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Osteoporosis (post<br>menopause)                                | 50 | Pilates<br>exercises          | 12 wks, 3x<br>60min sessions<br>per wk    |                              | Home exercise<br>program   |                     | Conference<br>abstract/post<br>er |
| Oksuz<br>2018,<br>NCT032115<br>59 (90)               | Quasi-RCT?      | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Spondyloarthritis,<br>ankylosing                                | 36 | Pilates<br>exercises          | 8 wks, 3x 30-40<br>min sessions<br>per wk | Control (no<br>intervention) |  | Aerobic<br>exercise | Conference<br>abstract/post<br>er |
| Uzun 2018<br>(91)                                    | Quasi-RCT?      | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Structural spine,<br>Postural (anterior<br>tilt, shoulder)      | 51 | Pilates<br>exercises          | 6 wks, ?x ?min<br>sessions per wk         |                              | Traditional<br>posture<br>exercise group   |                     | Conference<br>abstract/post<br>er |
| Omidali<br>2015 (92),<br>IRCT20150<br>50120465N<br>3 | Quasi-RCT?      | 16 Diseases of the genitourinary system                                 | Premenstrual<br>syndrome  | 40 | Pilates<br>exercises          | 4 wks, 3x ?min<br>sessions per wk         | Control (no<br>intervention) | Vitamin E OR<br>Pilates +<br>Vitamin E   |                     | Conference<br>abstract/post<br>er |
| Seckin<br>2011 (93)                                  | RCT             | 16 Diseases of the genitourinary system                                 | Urinary<br>incontinence<br>(stress or<br>overactive<br>bladder) | 80 | Modified<br>Pilates           | 6 wks, 2x<br>60min sessions<br>per wk     |                              | Aerobic<br>exercise (pelvic<br>floor muscle<br>programme)  |                     | Conference<br>abstract/post<br>er |

| STUDY ID                                | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)                               | N  | Intervention                                | Intervention<br>details                     | INACTIVE<br>Comparator       | Active<br>Comparator/s  | Co-<br>intervention  | Note                              |
|---|-----------------|--|---|----|---|---|------------------------------|---|----------------------|-----------------------------------|
| Huang<br>2011, Yang<br>2011 (94,<br>95) | Quasi-RCT?      | 16 Diseases of the genitourinary system            | Urinary<br>incontinence<br>(stress)                     | 37 | Pilates                                     | 12 wks, 1 or 2x<br>65min sessions<br>per wk |                              | Low impact<br>aerobic<br>exercise and<br>resistance<br>training |                      | Conference<br>abstract/post<br>er |
| Santos<br>2017 (96)                     | NRSI            | 16 Diseases of the genitourinary system            | Urinary<br>incontinence<br>(stress, women<br>> 50years) | 60 | Pilates<br>exercises                        | 10 wks, 2x<br>60min sessions<br>per wk      | Control (no<br>intervention) |   |                      | Conference<br>abstract/post<br>er |
| Anderson<br>2006 (97)                   | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific)              | 21 | Pilates<br>exercises                        | 6 wks, 2x ?min<br>sessions per wk           |                              | Massage   |                      | Conference<br>abstract/post<br>er |
| Borges<br>2019 (98)                     | NRSI            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific)              | 26 | Pilates<br>exercises<br>(mat)               | 8wks, 2x 50min<br>sessions per wk           |                              | Jacobson<br>Relaxation<br>Technique                             |                      | Conference<br>abstract/post<br>er |
| Kerr 2011<br>(99)                       | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific)              | 64 | Pilates<br>exercises                        | 6 wks, ?x ?min<br>sessions per wk           | Control<br>(waitlist)        | Physiotherapy   |                      | Conference<br>abstract/post<br>er |
| Montero<br>Camara<br>2011 (100)         | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific)              | 24 | Pilates<br>hamstring<br>stretch<br>(active) | ?   |                              | Traditional<br>hamstring<br>stretch<br>(passive)                |                      | Conference<br>abstract/post<br>er |
| Yang 2016<br>(101)                      | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific)              | 39 | Pilates<br>exercises                        | 8 wks, ?x ?min<br>sessions per wk           | Control (no<br>intervention) |   | Usual care           | Conference<br>abstract/post<br>er |
| Sousa 2019<br>(102)                     | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic, overuse)                     | 18 | Pilates<br>exercises                        | 6 wks, ?x ?min<br>sessions per wk           | Control (no intervention)    |   | Handball<br>training | Conference<br>abstract/post<br>er |
| O'Brien<br>2006 (103)                   | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(subacute)                             | 45 | Pilates<br>exercises                        | 4 wks, 2x<br>60min sessions<br>per wk       | Control (no intervention)    | Usual care<br>(Physiotherapy)                                   |                      | Conference<br>abstract/post<br>er |

Technical report – Appendices A to C

| STUDY ID            | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)   | N  | Intervention                              | Intervention<br>details            | INACTIVE<br>Comparator       | Active<br>Comparator/s | Co-<br>intervention                       | Note                              |
|---------------------|-----------------|--|---|----|---|------------------------------------|------------------------------|------------------------|---|-----------------------------------|
| Cheng 2011<br>(94)  | RCT             | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Neck pain (chronic,<br>mechanical)  | 57 | Pilates-<br>based<br>thoracic<br>exercise | 6 wks, 2 x ?min<br>sessions per wk | Control (no<br>intervention) |                        | Usual care<br>(cervical ROM<br>exercises) | Conference<br>abstract/post<br>er |
| Haiou 2015<br>(104) | Quasi-RCT?      | 25 Prevention                                      | Postural disorders,<br>employment<br>conditions, office<br>workers at risk of | 80 | Pilates<br>(chair)                        | 6 wks, 2 x ?min<br>sessions per wk |                              | Posture<br>education   |   | Conference<br>abstract/post<br>er |

Abbreviations: ?, not reported; min, minutes; N, total number of participants; NEC, not elsewhere classified; NRSI, non-randomised study of intervention; RCT, randomised controlled trial; wks, weeks

# C4.2 Studies published in languages other than English

| STUDY ID                 | Study<br>design | ICD 11 Category  | CONDITION<br>(population)                           | N  | Intervention         | Intervention<br>details            | Inactive<br>Comparator       | Active<br>Comparator/s                                       | Co-<br>intervention | Notes  |
|--------------------------|-----------------|--|---|----|----------------------|------------------------------------|------------------------------|--|---------------------|--|
| Azamian<br>2015 (105)    | Quasi-<br>RCT?  | 02 Neoplasms   | Breast Cancer<br>(survivors)                        | 27 | Pilates<br>exercises | 12 wks, 3x ?min sessions per wk    | Control (no<br>intervention) |  |                     | Not in English   |
| Guan 2019<br>(106)       | RCT             | 02 Neoplasms   | Prostate cancer<br>(after radical<br>prostatectomy) | 86 | Pilates<br>exercises | ?                                  |                              | Conventional<br>pelvic floor<br>muscle<br>training           |                     | Not in English,<br>Full text not able<br>to be retrieved |
| Hassani<br>2018 (107)    | RCT             | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Diabetes (type 2)                                   | ?  | Pilates<br>exercises | ?                                  | Control (usual care)         |  |                     | Not in English   |
| Karimi<br>2018a<br>(108) | RCT             | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Metabolic<br>syndrome                               | 30 | Pilates<br>exercises | 6 wks, 3x 30min<br>sessions per wk | Control (no<br>intervention) | Pilates +<br>Vitamin E                                       |                     | Not in English   |
| Amirsasan<br>2017 (109)  | RCT             | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                              | 20 | Pilates<br>exercises | 8 wks, 3x ?min<br>sessions per wk  | Control (no<br>intervention) |  | Isocaloric diet     | Not in English,<br>Submitted<br>literature               |
| Asl 2019<br>(110)        | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                              | 32 | Pilates<br>exercises | 8 wks, 3x 60min<br>sessions per wk | Control (no<br>intervention) | Barley bread<br>consumption<br>OR Pilates +<br>Barley bread  |                     | Not in English   |
| Bagheri<br>2018 (111)    | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity (children)                   | 20 | Pilates<br>exercises | 8 wks, ?x ?min<br>sessions per wk  | Control (no<br>intervention) |  |                     | Not in English,<br>Submitted<br>literature               |
| Gorji 2015<br>(112)      | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                              | 60 | Pilates<br>exercises | 8 wks, ?x ?min<br>sessions per wk  | Control (no<br>intervention) | Celery<br>supplement<br>OR Pilates +<br>Celery<br>Supplement |                     | Not in English,<br>Full text not able<br>to be retrieved |
| Karimi<br>2018b (108)    | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity<br>(adolescents)             | 20 | Pilates<br>exercises | 8 wks, 3x 60min<br>sessions per wk | Control (usual activities)   |  |                     | Not in English   |

Table C.6 Characteristics of studies awaiting classification (by ICD-11 disease category): Pilates – studies published in languages other than English

| STUDY ID  | Study<br>design | ICD 11 Category  | CONDITION<br>(population)                         | N  | Intervention                  | Intervention details                   | Inactive<br>Comparator       | Active<br>Comparator/s                 | Co-<br>intervention | Notes  |
|---|-----------------|--|---|----|-------------------------------|--|------------------------------|--|---------------------|--|
| Khajehlandi<br>2020 (113)                                 | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                            | 28 | Pilates<br>exercises          | 12 wks, 3x<br>60min sessions<br>per wk | Control (no<br>intervention) |  |                     | Not in English   |
| Kheirandish<br>2018,<br>IRCT201801<br>25038503N1<br>(114) | RCT             | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity   | 30 | Pilates<br>exercises          | 8 wks, 3x 60min<br>sessions per wk     | Control (no<br>intervention) |  |                     | Not in English   |
| Khodadadi<br>2014 (115)                                   | NRSI            | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                            | ?  | Pilates<br>exercises          | ?                                      |                              | High Intensity<br>interval<br>training |                     | Not in English   |
| Khosravi<br>2019 (116)                                    | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                            | 20 | Pilates<br>exercises          | 8 wks, 3x ?min<br>sessions per wk      | Control (no<br>intervention) |  |                     | Not in English   |
| Nazari 2019<br>(117)                                      | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity   | 30 | Pilates<br>exercises          | 12 wks, 3x<br>90min sessions<br>per wk | Control (no<br>intervention) |  |                     | Not in English   |
| Habibi 2017<br>(118)                                      | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Overweight-<br>Obesity                            | ?  | Pilates<br>exercises          | ?                                      | Control (no<br>intervention) |  |                     | Not in English,<br>Full text not able<br>to be retrieved |
| Saremi 2014<br>(119)                                      | Quasi-<br>RCT?  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Polycystic ovary syndrome                         | 20 | Pilates<br>exercises          | 8 wks, 3x ?min<br>sessions per wk      | Control (usual activities)   |  |                     | Not in English   |
| Pessin 2018<br>(120)                                      | NRSI            | 06 Mental and<br>behavioural<br>disorders              | Symptoms of<br>anxiety or stress<br>(adolescents) | 33 | Pilates<br>exercises<br>(mat) | ?                                      |                              | Physical education                     |                     | Not in English   |
| Rashidi 2013<br>(121)                                     | Quasi-<br>RCT?  | 06 Mental and<br>behavioural<br>disorders              | Depression<br>(postmenopausal)                    | 40 | Pilates<br>exercises          | 8 wks, 3x 60min<br>sessions per wk     | Control (no<br>intervention) |  |                     | Not in English,<br>Full text not able<br>to be retrieved |
| Farsi 2017<br>(122)                                       | Quasi-<br>RCT?  | 08 Diseases of the nervous system                      | Multiple sclerosis                                | 15 | Pilates<br>exercises          | 6 wks, ?x ?min<br>sessions per wk      | Control (no<br>intervention) |  |                     | Not in English,<br>Submitted<br>literature               |

| STUDY ID   | Study<br>design | ICD 11 Category   | CONDITION<br>(population)                  | N   | Intervention         | Intervention details   | Inactive<br>Comparator        | Active<br>Comparator/s   | Co-<br>intervention | Notes  |
|--|-----------------|---|--|-----|----------------------|--|-------------------------------|--|---------------------|--|
| Nezakatolho<br>sseini 2015<br>(123)                    | NRSI            | 08 Diseases of the nervous system                                       | Multiple sclerosis                         | ?   | Pilates<br>exercises | ?  |                               | Routine<br>exercise  |                     | Not in English                                   |
| Rezvankhah<br>Golsefidi<br>2017 (124)                  | Quasi-<br>RCT?  | 08 Diseases of the nervous system                                       | Multiple sclerosis                         | 40  | Pilates<br>exercises | 5 wks, 3x 60min<br>sessions per wk                                   | Control (no<br>intervention)  |  |                     | Not in English,<br>Submitted<br>literature       |
| Pahlevanzad<br>e 2016 (125)                            | Quasi-<br>RCT?  | 08 Diseases of the nervous system                                       | Multiple sclerosis                         | ?   | Pilates<br>exercises | ?  | Control (no<br>intervention)  | Resistance<br>exercises OR<br>Pilates +<br>Resistance<br>exercises |                     | Not in English                                   |
| Alavi 2018<br>(126)                                    | NRSI            | 08 Diseases of the nervous system                                       | Parkinson's<br>disease                     | 106 | Pilates<br>exercises | 12 wks, 3x ?min<br>sessions per wk                                   | Control (no<br>intervention)  | Tai chi  |                     | Not in English,<br>Submitted<br>literature       |
| Abedini<br>2015 (127)                                  | Quasi-<br>RCT?  | 08 Diseases of the nervous system                                       | Stroke recovery                            | 6   | Pilates<br>exercises | 3 wks, 1x 60min<br>session every<br>other day (total<br>16 sessions) | Control (no<br>intervention)  | Neurofeedbac<br>k  |                     | Not in English,<br>Submitted<br>literature       |
| Baluchi 2018<br>(128)                                  | Quasi-<br>RCT?  | 10 Diseases of the<br>ear or mastoid<br>process                         | Hearing impaired                           | 32  | Pilates<br>exercises | 8 wks, 3x ?min<br>sessions per wk                                    | Control (no<br>intervention)  |  |                     | Not in English                                   |
| Eghbali 2017<br>(129)                                  | Quasi-<br>RCT?  | 11 Diseases of the<br>circulatory system                                | Hypertension<br>(males)                    | 30  | Pilates<br>exercises | 8 wks, 3x 60min<br>sessions per wk                                   | Control (no intervention)     |  |                     | Not in English                                   |
| Kisacik 2015<br>(130)                                  | Quasi-<br>RCT?  | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Arthropathies,<br>Osteoarthritis<br>(knee) | ?   | Pilates<br>exercises | ?  | Control (no<br>intervention)  |  |                     | Not in English,<br>conference<br>abstract/poster |
| Brayjani<br>2019,<br>IRCT201812<br>18042034N1<br>(131) | Quasi-<br>RCT?  | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Spondyloarthritis,<br>ankylosing           | 20  | Pilates<br>exercises | 8 wks, 3x 60min<br>sessions per wk                                   | Control (usual<br>activities) |  |                     | Not in English                                   |

| STUDY ID                                       | Study<br>design | ICD 11 Category   | CONDITION<br>(population)  | N  | Intervention                  | Intervention details                          | Inactive<br>Comparator       | Active<br>Comparator/s     | Co-<br>intervention | Notes  |
|--|-----------------|---|--|----|-------------------------------|---|------------------------------|----------------------------|---------------------|--|
| Martínez-<br>Pubil 2017 a<br>& b (132,<br>133) | RCT             | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Spondyloarthritis,<br>ankylosing   | 49 | Pilates<br>exercises          | 17 wks, 7x<br>90min sessions<br>per fortnight |                              | Conventional home exercise |                     | Not in English   |
| Afroundeh<br>2017 (134)                        | NRSI            | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Structural spine,<br>hyperlordosis<br>(lumbar spine)                             | 30 | Pilates<br>exercises          | 3 wks, 3x 60min<br>sessions per wk            |                              | Traditional corrective     |                     | Not in English,<br>Submitted<br>literature               |
| Rezaei 2015<br>(135)                           | Quasi-<br>RCT?  | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Structural spine,<br>hyperlordosis<br>(lumbar spine,<br>immediate<br>postpartum) | 30 | Pilates<br>exercises<br>(mat) | 8 wks, 3x 60min<br>sessions per wk            | Control (no<br>intervention) |                            |                     | Not in English   |
| Shahrjerdi<br>2014 (136)                       | NRSI            | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Structural spine,<br>hyperlordosis and<br>nonspecific low<br>back pain           | ?  | Pilates<br>exercises          | ?   | Control (no<br>intervention) |                            |                     | Not in English   |
| Hurer 2019,<br>NCT0335292<br>1 (137)           | RCT             | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Structural spine,<br>postural (sagittal<br>cervical<br>disorientation)           | 46 | Pilates<br>exercises          | 8 wks, 3x 40-<br>50min sessions<br>per wk     |                              | Home<br>exercise           |                     | Not in English,<br>conference<br>abstract/poster         |
| Yang 2012<br>(138)                             | RCT             | 15 Diseases of the<br>musculoskeletal<br>system or<br>connective tissue | Acute lumbar<br>intervertebral<br>disc herniation                                | 60 | Pilates<br>exercise           | 8 wks, ?x ?min<br>session per wk              | Control (no<br>intervention) |                            | Traction            | Not in English,<br>Full text not able<br>to be retrieved |
| Ramezanpo<br>ur 2018<br>(139)                  | Quasi-<br>RCT?  | 16 Diseases of the genitourinary system                                 | Dysmenorrhoea  | 30 | Pilates<br>exercises          | 8 wks, 3x ?min<br>sessions per wk             | Control (no<br>intervention) |                            |                     | Not in English   |
| Samadi 2013<br>(140)                           | NRSI            | 16 Diseases of the genitourinary system                                 | Premenstrual syndrome  | ?  | Pilates<br>exercises          | ?   | Control (no<br>intervention) | Aerobic<br>exercise        |                     | Not in English   |
| Mendes<br>Tozim 2014,<br>RBR-9mndx8<br>(141)   | Quasi-RCT       | 21 Symptoms, signs<br>or clinical findings,<br>NEC                      | Chronic<br>musculoskeletal<br>pain (elderly)                                     | 31 | Pilates<br>exercises          | 8 wks, 1x ?min<br>session per wk              |                              | Education                  |                     | Not in English   |

| STUDY ID   | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)                                   | N   | Intervention                  | Intervention<br>details                      | Inactive<br>Comparator       | Active<br>Comparator/s                                       | Co-<br>intervention | Notes                                      |
|--|-----------------|--|---|-----|-------------------------------|--|------------------------------|--|---------------------|--|
| Ekici 2008<br>(142)                                | Quasi-<br>RCT?  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Chronic<br>widespread pain<br>(Fibromyalgia)                | 51  | Pilates<br>exercises          | 4 wks, 3x ?min<br>sessions per wk            |                              | Connective<br>tissue<br>manipulation                         |                     | Not in English                             |
| Jurcova<br>2017 (143)                              | NRSI            | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific)                  | 20  | Pilates<br>exercises          | 10 wks, 2x<br>60min sessions<br>per wk       |                              | Dynamic<br>neuromuscula<br>r stabilization                   |                     | Not in English                             |
| Sokhanguei<br>2017 (144)                           | Quasi-<br>RCT?  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific)                  | 34  | Pilates<br>exercises          | total 10x 60min<br>sessions                  | Control (no<br>intervention) |  |                     | Not in English                             |
| Filho 2016 a<br>& b (145,<br>146)                  | RCT             | 25 Prevention                                      | Age-related<br>decline, women<br>(>? years) at risk<br>of   | 114 | Pilates<br>exercises          | 24 wks, 3x<br>60min sessions<br>per wk       |                              | Gymnastics<br>OR Aqua<br>aerobics OR<br>Strength<br>training |                     | Not in English                             |
| Lopes<br>Macedo<br>2016 (147)                      | Quasi-<br>RCT?  | 25 Prevention                                      | Age-related<br>decline, women<br>(> 55 years) at<br>risk of | 22  | Pilates<br>exercises<br>(mat) | 12 wks, ?x ?min<br>sessions per wk           | Control (no<br>intervention) |  |                     | Not in English                             |
| Mokhtari<br>2013 (148),<br>IRCT201211<br>2810493N2 | RCT             | 25 Prevention                                      | Age-related<br>decline, women<br>(> 60 years) at<br>risk of | 30  | Pilates<br>exercises          | 12 wks, 3x 30-<br>45min sessions<br>per week | Control<br>(waitlist)        |  |                     | Not in English                             |
| Dashti 2015<br>(149)                               | Quasi-<br>RCT?  | 25 Prevention                                      | Falls, women (60<br>to 75 years) at<br>risk of              | 45  | Pilates<br>exercises          | 6 wks, ?x ?min<br>sessions per wk            | Control (usual activities)   | Theraband  |                     | Not in English                             |
| Abedini<br>2013 (150)                              | Quasi-<br>RCT?  | 25 Prevention                                      | Falls, men (> 60<br>years, history of<br>falls) at risk of  | 30  | Pilates<br>exercises          | 8 wks, ?x ?min<br>sessions per wk            | Control (usual activities)   |  |                     | Not in English,<br>Submitted<br>literature |
| Aradmehr<br>2015 (151)                             | Quasi-<br>RCT?  | 25 Prevention                                      | Falls, men (> ?<br>years) at risk of                        | 30  | Pilates<br>exercises          | 6 wks, ?x ?min<br>sessions per wk            | Control (no<br>intervention) | Balance<br>training  |                     | Not in English                             |

| STUDY ID                              | Study<br>design | ICD 11 Category | CONDITION<br>(population)   | N  | Intervention                          | Intervention<br>details                  | Inactive<br>Comparator                 | Active<br>Comparator/s | Co-<br>intervention | Notes                                      |
|---------------------------------------|-----------------|-----------------|---|----|---------------------------------------|--|--|------------------------|---------------------|--|
| Lara 2014<br>(152)                    | NRSI            | 25 Prevention   | Menopausal<br>symptom or<br>complaint,<br>women (mean 50<br>years) at risk of     | 50 | Pilates<br>exercises                  | ?  |  | Bodybuilding           |                     | Not in English                             |
| lanc 2019<br>(153)                    | Quasi-<br>RCT?  | 25 Prevention   | Menopausal<br>symptom or<br>complaint,<br>women (mean 57<br>years) at risk of     | 33 | Pilates<br>exercises                  | 52 weeks, 2x<br>60min sessions<br>per wk | Control (no<br>intervention)           |                        |                     | Not in English                             |
| Cascales-<br>Ruiz 2015<br>(154)       | NRSI            | 25 Prevention   | Problems linked<br>to sedentary<br>behaviour,<br>women (> 30<br>years) at risk of | 21 | Pilates<br>exercises                  | 9 mos, ?x ?min<br>sessions per wk        | Control (no<br>intervention)           |                        |                     | Not in English,<br>Submitted<br>literature |
| Rodrigues<br>deOliveira<br>2016 (155) | NRSI            | 25 Prevention   | Postural<br>disorders, healthy<br>adolescents at<br>risk of                       | 30 | Pilates<br>exercises<br>(experienced) | ?  | Inactive (no<br>Pilates<br>experience) |                        |                     | Not in English                             |
| Ferreira<br>2019 (156)                | RCT             | 25 Prevention   | Repetitive strain<br>injury, workers<br>(construction) at<br>risk of              | 57 | Pilates<br>exercises                  | total 12x ?min<br>sessions               | Control (no<br>intervention)           |                        |                     | Not in English                             |

Abbreviations: ? not reported; NEC, not elsewhere classified; NRSI, non-randomised study of intervention; RCT, randomised controlled trial

# C4.3 Studies not able to be retrieved

| STUDY ID  | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)   | N  | Intervention         | Intervention<br>details               | Inactive<br>Comparator       | ACtive<br>Comparator/s                                   | Co-<br>intervention    | Note   |
|---|-----------------|--|---|----|----------------------|---------------------------------------|------------------------------|--|------------------------|--|
| Savage<br>2005,<br>ISRCTN276<br>33617<br>(157, 158) | RCT?            | 16 Diseases of the genitourinary system            | Urinary<br>incontinence<br>(stress, women)  | ?  | Modified<br>Pilates  | 12 wks, total 6<br>?min sessions      |                              | Standard static<br>pelvic floor<br>training<br>exercises |                        | Full text not<br>able to be<br>retrieved;<br>abstract only                             |
| Palekar<br>2014 (159)                               | NRSI            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Chronic<br>widespread pain<br>(Fibromyalgia)  | 20 | Pilates<br>exercises | 4 wks, 7x ?min<br>sessions per<br>wk  |                              | Yogasanas  |                        | Full text not<br>able to be<br>retrieved;<br>abstract only                             |
| Sharma<br>2017 (160)                                | Quasi-<br>RCT?  | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific)  | 45 | Pilates<br>exercises | ?                                     |                              | EMG<br>Biofeedback<br>and TENS                           | Hydro collator<br>pack | Full text not<br>able to be<br>retrieved;<br>abstract only                             |
| Rajalaxmi<br>2018 (161)                             | RCT             | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Neck pain<br>(chronic,<br>mechanical)   | 40 | Pilates<br>exercises | 3 wks, ?x ?min<br>sessions per<br>wk  | Control (no<br>intervention) | Tai chi OR Yoga  |                        | Full text not<br>able to be<br>retrieved;<br>abstract only                             |
| Arslanp lu<br>2013 (162)                            | Quasi-<br>RCT?  | 25 Prevention                                      | Problems linked<br>to sedentary<br>behaviour,<br>women (middle-<br>aged) at risk of | 20 | Pilates<br>exercises | 8 wks, 3x<br>45min sessions<br>per wk | Control (no<br>intervention) |  |                        | Full text not<br>able to be<br>retrieved;<br>abstract only;<br>Submitted<br>literature |

#### Table C.7 Characteristics of studies awaiting classification (by ICD-11 disease category): Pilates – studies not able to be retrieved

Abbreviations: ? not reported; NEC, not elsewhere classified; NRSI, non-randomised study of intervention; RCT, randomised controlled trial

### C4.4 Studies unable to be translated or interpreted at the title/abstract stage

| STUDY ID           | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)                                     | N  | Intervention         | Intervention details | Comparator     | Co-intervention | OUTCOME           |
|--------------------|-----------------|--|---|----|----------------------|----------------------|----------------|-----------------|-------------------|
| lvanova<br>2002    | ?               | 01 Certain<br>infectious and<br>parasitic diseases | Pulmonary<br>tuberculosis                                     | ?  | Exercise<br>therapy  | No<br>information    | No information | No information  | No<br>information |
| Wronski<br>2008    | ?               | 12 Disease of the respiratory system               | Asthma  | ?  | Pilates<br>breathing | No<br>information    | No information | No information  | No<br>information |
| Gildenhuys<br>2013 | ?               | 25 Prevention                                      | Age-related decline,<br>healthy women (?<br>years) at risk of | 22 | Pilates<br>exercises | 12 weeks, ?          | No information | No information  | No<br>information |

Table C.8 List of studies unable to be translated or interpreted at the title/abstract stage (ordered by ICD-11 disease category): Pilates

Abbreviations: ?, no information; N, total number of participants

References:

Ivanova 2002. [Exercise therapy in rehabilitation of patients with pulmonary tuberculosis before and after surgical treatment]. Voprosy Kurortologii, Fizioterapii i Lechebnoi Fizicheskoi Kultury Nov-Dec 2002;(6):14-7 Gildenhuys 2013. Evaluation of Pilates training on agility, functional mobility and cardiorespiratory fitness in elderly women. African Journal for Physical, Health Education, Recreation and Dance 2013;19(2):505-512 2013;

Wronski 2008. Pilates breathing exercise method as a form of pneumological rehabilitation in children and youths with bronchiale asthma. [Polish] Przeglad Lekarski 2008;65 Suppl 2():9-11

# C4.5 Studies submitted or published after the literature search date

 Table C.9
 List of studies submitted or published after the literature search date

None identified

# **C5** Citation details of ongoing studies

This appendix documents the studies that met the prespecified inclusion criteria for a systematic review on the effect of Pilates for preventing and treating any health condition but outcome data from the study is not yet available. An overview of ongoing studies (by ICD-11 disease category) is provided in Table C.10.

| Disease Category  | # studies Not<br>yet recruiting | # studies<br>Recruiting | # studies<br>Active, not<br>recruiting | # studies<br>Recruitment<br>complete | # studies<br>Complete, results<br>not available | # studies Brief<br>results on<br>registry | # status<br>Unknown | TOTAL |
|---|---------------------------------|-------------------------|--|--------------------------------------|---|---|---------------------|-------|
| 02 Neoplasms  |                                 | 3                       |  | 5                                    |   |   | 1                   | 9     |
| 05 Endocrine, nutritional, or metabolic diseases                      |                                 | 2                       |  | 5                                    | 2   |   |                     | 9     |
| 06 Mental, behavioural or<br>neurodevelopmental                       | 1                               |                         |  | 2                                    |   |   |                     | 3     |
| 08 Diseases of the Nervous system                                     | 2                               | 3                       |  | 4                                    | 4   |   |                     | 13    |
| 09 Diseases of the visual system                                      |                                 | 1                       |  | 1                                    |   |   |                     | 2     |
| 11 Disease of the circulatory system                                  |                                 |                         |  |                                      | 2   |   | 2                   | 4     |
| 12 Diseases of the respiratory system                                 |                                 | 1                       |  |                                      |   |   | 1                   | 2     |
| 13 Diseases of the digestive system                                   |                                 |                         |  |                                      | 1   |   |                     | 1     |
| 15 Diseases of the musculoskeletal system or connective tissue        |                                 | 4                       |  | 3                                    | 2   |   | 2                   | 11    |
| 16 Diseases of the genitourinary system                               | 3                               |                         |  | 2                                    | 1   | 1   |                     | 7     |
| 18 Pregnancy, childbirth and the puerperium                           |                                 |                         |  | 2                                    | 2   |   |                     | 4     |
| 21 Symptoms, signs or clinical findings, not elsewhere classified     | 2                               | 8                       | 1                                      | 5                                    | 8   | 1   |                     | 25    |
| 22 Injury, poisoning or certain other consequences of external causes |                                 |                         |  | 2                                    | 1   |   |                     | 3     |
| 24 Factors influencing health status or contact with health services  |                                 | 1                       |  | 1                                    |   |   |                     | 2     |
| 25 Prevention   | 2                               | 5                       |  | 6                                    | 7   | 1   |                     | 21    |
| GRAND TOTAL   | 10                              | 28                      | 1                                      | 38                                   | 30  | 3   | 6                   | 116   |

#### Table C.10 Overview of ongoing studies (by ICD-11 disease category): Pilates

## Table C.11 Characteristics of ongoing studies (by ICD-11 Category): Pilates

| STUDY ID                 | Status                                | ICD 11 Category  | CONDITION<br>(population)                       | N   | Intervention                             | Intervention<br>details             | Inactive<br>Comparator                   | Active<br>comparator/s | Co-<br>intervention              |
|--------------------------|---------------------------------------|--|---|-----|--|-------------------------------------|--|------------------------|----------------------------------|
| IRCT2018051<br>1039615N1 | Recruitment<br>complete               | 02 Neoplasms   | Breast cancer<br>(survivors with<br>lymphedema) | 40  | Pilates<br>exercises                     | 4 wks, 3x 60min<br>sessions per wk  | Control (usual<br>care)                  |                        |                                  |
| IRCT2013010<br>912078N1  | Unknown                               | 02 Neoplasms   | Breast cancer<br>(survivors)                    | 40  | Pilates<br>exercises                     | ? (total 15 sessions)               | Control (usual care)                     |                        |                                  |
| IRCT2013020<br>712078N2  | Recruitment complete                  | 02 Neoplasms   | Breast cancer<br>(survivors)                    | 60  | Pilates<br>exercises                     | ? (total 15 sessions)               | Control (usual care)                     | Yoga                   |                                  |
| IRCT2016110<br>113107N3  | Recruitment complete                  | 02 Neoplasms   | Breast cancer<br>(survivors)                    | 30  | Pilates<br>exercises                     | 8 wks, 3x 60min<br>sessions per wk  | Control (no<br>intervention)             |                        |                                  |
| RBR-27p6qf               | Recruiting                            | 02 Neoplasms   | Breast cancer<br>(survivors)                    | 50  | Pilates<br>exercises                     | 10 wks, 2x ?min<br>sessions per wk  | Control (no<br>intervention)             |                        | Home exercise                    |
| Boing 2020               | Recruiting                            | 02 Neoplasms   | Breast cancer<br>(undergoing<br>treatment)      | 57  | Pilates<br>exercises                     | 16 wks, 3x 60min<br>sessions per wk | Control (usual<br>care and<br>education) | Belly Dance            |                                  |
| NCT03333993              | Recruitment complete                  | 02 Neoplasms   | Breast cancer<br>(undergoing<br>treatment)      | 154 | Pilates<br>exercises (mat)               | 5 wks, 2x 60min<br>sessions per wk  | Control (no<br>intervention)             |                        | Home exercise<br>for upper limbs |
| RBR-3253dz               | Recruiting                            | 02 Neoplasms   | Breast cancer<br>(undergoing<br>treatment)      | 34  | Pilates<br>exercises (mat)               | 24 wks, 3x 60min<br>sessions per wk | Control (no<br>intervention)             |                        |                                  |
| RBR-3wsdhs               | Recruitment<br>complete               | 02 Neoplasms   | Breast cancer<br>(undergoing<br>treatment)      | 60  | Pilates<br>exercises                     | 8 wks, 2x 75min<br>sessions per wk  | Control (usual activities)               | Aerobics exercise      |                                  |
| RBR-95xdzh               | Recruiting                            | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Diabetes<br>(gestational)                       | 34  | Pilates<br>exercises                     | 10 wks, 2x ?min<br>sessions per wk  | Control (no<br>intervention)             |                        | Usual care                       |
| IRCT2017040<br>833311N1  | Recruitment complete                  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Diabetes (Type 2)                               | 36  | Pilates<br>exercises                     | 8 wks, 3x 60min<br>sessions per wk  | Control (usual care)                     |                        |                                  |
| NCT03307031              | Complete,<br>results not<br>available | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Dyslipidaemia<br>(women, 60 to 75<br>years)     | 26  | Pilates<br>exercises (2 OR<br>4x per wk) | 10 wks, 45-55min<br>sessions        | Control (usual care)                     |                        |                                  |
| STUDY ID                   | Status                                | ICD 11 Category  | CONDITION<br>(population)  | N   | Intervention                     | Intervention<br>details   | Inactive                      | Active  | Co-   |
|----------------------------|---------------------------------------|--|--|-----|----------------------------------|---|-------------------------------|---|---|
| IRCT2012080<br>6010512N8   | Recruitment<br>complete               | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity  | 20  | Pilates<br>exercises             | 8 wks, 3x 60min<br>sessions per wk                                  | Control (usual activities)    |   |   |
| IRCT2016080<br>124717N2    | Recruitment complete                  | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity  | 20  | Pilates<br>exercises             | 8 wks, 3x 30min<br>sessions per wk                                  | Control (usual activities)    |   |   |
| IRCT2017030<br>432873N1    | Recruitment<br>complete               | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity  | 20  | Pilates<br>exercises             | 8 wks, 3x ?min<br>sessions per wk                                   | Control (no<br>intervention)  |   |   |
| IRCT2018021<br>8038785N1   | Recruitment<br>complete               | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity  | 48  | Pilates<br>exercises             | 12 wks, 3x ?min<br>sessions per wk                                  |                               | Pilates + Turmeric<br>OR Turmeric OR<br>Placebo |   |
| RBR-2jcc8d                 | Recruiting                            | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity  | 156 | Pilates<br>exercises             | 24 wks, 2x 15-<br>60mins sessions<br>per wk (increase<br>over time) |                               | Aerobic exercise<br>(walking)                   |   |
| RBR-7qnsh6                 | Complete,<br>results not<br>available | 05 Endocrine,<br>nutritional, or<br>metabolic diseases | Obesity  | 60  | Pilates<br>exercises             | 8 wks, 3x 60min<br>sessions per wk                                  | Control (no<br>intervention)  |   |   |
| JPRN-<br>UMIN000028<br>835 | Recruitment<br>complete               | 06 Mental,<br>behavioural or<br>neurodevelopmental     | Psychiatric disorders  | 30  | Pilates<br>exercises             | 8 wks, 20-30min<br>per day  |                               | Yoga OR Life<br>guidance<br>(education)         |   |
| NCT04058119                | Not yet<br>recruiting                 | 06 Mental,<br>behavioural or<br>neurodevelopmental     | Symptoms of anxiety<br>or stress (adults<br>referred for distress) | 200 | Pilates<br>exercises             | 26 wks, 2x 60min<br>sessions per wk                                 | Control (waitlist)            | Qigong  | Yoga  |
| IRCT2014031<br>52324N13    | Recruitment<br>complete               | 06 Mental,<br>behavioural or<br>neurodevelopmental     | Symptoms of<br>depression and<br>anxiety (adolescent,<br>women)    | 60  | Pilates<br>exercises             | 12 wks, 3x 45min<br>sessions per wk                                 | Control (usual<br>activities) |   |   |
| NCT04035954                | Recruiting                            | 08 Diseases of the<br>Nervous system                   | Cerebral palsy   | 16  | Modified<br>Pilates<br>exercises | 8 wks, 2x 60min<br>sessions per wk                                  | Control (no<br>intervention)  |   | Routine<br>neurodevelopm<br>ent physical<br>therapy |
| RBR-7fhgkk                 | Recruitment complete                  | 08 Diseases of the<br>Nervous system                   | Cerebral palsy   | 12  | Pilates<br>exercises             | 6 wks, 2x 60min<br>sessions per wk                                  |                               | Dance lessons                                   |   |

HTANALYSTS | NHMRC | EVIDENCE EVALUATION ON THE CLINICAL EFFECTIVENESS OF PILATES

| STUDY ID                   | Status                                | ICD 11 Category                      | CONDITION<br>(population) | N   | Intervention                          | Intervention details                | Inactive<br>Comparator       | Active<br>comparator/s                     | Co-<br>intervention                 |
|----------------------------|---------------------------------------|--------------------------------------|---------------------------|-----|---------------------------------------|-------------------------------------|------------------------------|--|-------------------------------------|
| IRCT2016093<br>019995N7    | Recruitment<br>complete               | 08 Diseases of the<br>Nervous system | Multiple sclerosis        | 92  | Pilates<br>exercises                  | 12 wks, 3x 45min sessions per wk    |                              | Rehabilitation<br>training<br>(individual) |                                     |
| JPRN-<br>UMIN000038<br>431 | Complete,<br>results not<br>available | 08 Diseases of the Nervous system    | Multiple sclerosis        | 30  | Pilates<br>exercises                  | 12 wks, ?                           | Control (usual<br>care)      |  |                                     |
| NCT03006900                | Complete,<br>results not<br>available | 08 Diseases of the Nervous system    | Multiple sclerosis        | 30  | Pilates<br>exercises                  | 12 wks, 2x 50min sessions per wk    | Control (no<br>intervention) |  | Massage                             |
| NCT03502772                | Complete,<br>results not<br>available | 08 Diseases of the Nervous system    | Multiple sclerosis        | 42  | Pilates<br>exercises                  | 8 wks, 3x ?min<br>sessions per wk   |                              | Home exercise                              |                                     |
| NCT04011579                | Not yet<br>recruiting                 | 08 Diseases of the Nervous system    | Multiple sclerosis        | 126 | Pilates<br>exercises (via<br>MS-FIT)  | 12 wks, 3x 30min sessions per wk    | Control (no<br>intervention) |  |                                     |
| NCT04252053                | Recruiting                            | 08 Diseases of the<br>Nervous system | Multiple sclerosis        | 42  | Pilates<br>exercises                  | 8 wks, 2x ?min<br>sessions per wk   |                              | Home exercise                              |                                     |
| NCT03294031                | Complete,<br>results not<br>available | 08 Diseases of the Nervous system    | Parkinson's disease       | 15  | Pilates<br>exercises                  | 12 wks, 2x ?min<br>sessions per wk  |                              | Conventional exercise                      |                                     |
| NCT03983785                | Recruitment complete                  | 08 Diseases of the<br>Nervous system | Parkinson's disease       | 31  | Pilates<br>exercises                  | 6 wks, 2x ?min<br>sessions per wk   | Control (waitlist)           | Pilates exercises +<br>Elastic taping      |                                     |
| NCT04063605                | Recruitment complete                  | 08 Diseases of the<br>Nervous system | Parkinson's disease       | 38  | Pilates<br>exercises                  | 8 wks, 2x 45min<br>sessions per wk  |                              | Conventional physiotherapy                 |                                     |
| RBR-6ckggn                 | Not yet<br>recruiting                 | 08 Diseases of the Nervous system    | Parkinson's Disease       | 60  | Pilates<br>exercises (solo<br>method) | 12 wks, 2x 60min<br>sessions per wk | Control (usual activities)   | Adapted<br>functional<br>training          |                                     |
| NCT04157582                | Recruiting                            | 08 Diseases of the Nervous system    | Stroke (chronic)          | 40  | Pilates<br>exercises                  | 6 wks, 3x 40min<br>sessions per wk  | Control (no<br>intervention) |  | Conventional<br>physical<br>therapy |
| RBR-73c7bz                 | Recruiting                            | 09 Diseases of the visual system     | Visually impaired         | 20  | Pilates<br>exercises                  | ? (total 15x 30min sessions)        |                              | Verbal commands<br>and Education           |                                     |

| STUDY ID                | Status                                      | ICD 11 Category   | CONDITION<br>(population)                                | Ν   | Intervention  | Intervention<br>details                                  | Inactive<br>Comparator       | Active<br>comparator/s                         | Co-<br>intervention                       |
|-------------------------|---|---|--|-----|---|--|------------------------------|--|---|
| IRCT2016111<br>530904N1 | Recruitment<br>complete                     | 09 Diseases of the visual system  | Visually impaired<br>(binocular, adults 35-<br>55 years) | 90  | Pilates<br>exercises  | 8 wks, 3x ?min<br>sessions per wk                        | Control (no<br>intervention) | Postural exercises                             | Physical<br>therapy                       |
| NCT02109055             | Unknown                                     | 11 Disease of the circulatory system                                    | Coronary artery<br>bypass<br>(postoperative)             | 30  | Modified<br>Pilates   | 6 days (inpatient),<br>2-3 ?min sessions<br>per day      |                              | Conventional physical therapy                  |   |
| NCT03214016             | Complete,<br>results not<br>available       | 11 Disease of the circulatory system                                    | Hypertension   | 30  | Pilates<br>exercises  | 8 wks, 1x 60min<br>session per wk                        |                              | Aerobic exercise<br>(treadmill)                |   |
| NCT03791307             | Complete,<br>results not<br>available       | 11 Disease of the circulatory system                                    | Hypertension   | 60  | Pilates<br>exercises  | 16 wks, 2x 50min<br>sessions per wk                      | Control (no<br>intervention) | Modified Pilates                               |   |
| NCT02437240             | Unknown<br>(? active,<br>not<br>recruiting) | 11 Disease of the circulatory system                                    | Open heart surgery<br>(postoperative)                    | 140 | Modified<br>Pilates (self-<br>perception of<br>breathing and<br>body core<br>control) | during in-patient<br>cardiopulmonary<br>physical therapy | Control (no<br>intervention) |  | Conventional<br>physical<br>therapy       |
| NCT03670654             | Unknown<br>(? active,<br>not<br>recruiting) | 12 Diseases of the respiratory system                                   | Asthma   | 30  | Pilates<br>exercises  | 12 wks, 3x 40min<br>sessions per wk                      |                              | Muscle stretching exercise                     | Educational<br>advice                     |
| RBR-5hq3xh              | Recruiting                                  | 12 Diseases of the respiratory system                                   | Asthma (children, 7-<br>15 years)                        | 60  | Pilates<br>exercises  | 10 wks, 2x 60min<br>sessions per wk                      | Control (no<br>intervention) | Pilates exercises<br>with Buteyko<br>breathing | None specified                            |
| da Costa 2016           | Complete,<br>results not<br>available       | 13 Diseases of the digestive system                                     | Temporomandibular<br>disorders                           | 40  | Pilates<br>exercises  | 15 wks, 2x 50min<br>sessions per wk                      | Control (no<br>intervention) |  | Conventional<br>care (occlusal<br>splint) |
| NCT03904953             | Recruiting                                  | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Ankylosing<br>spondylitis                                | 40  | Pilates<br>exercises  | 8 wks, 3x 60min<br>sessions per wk                       |                              | Conventional exercise                          |   |

| STUDY ID                 | Status                                | ICD 11 Category   | CONDITION<br>(population)                           | Ν  | Intervention         | Intervention<br>details                  | Inactive<br>Comparator        | Active<br>comparator/s                                    | Co-<br>intervention                     |
|--------------------------|---------------------------------------|---|---|----|----------------------|--|-------------------------------|---|---|
| NCT04292028              | Complete,<br>results not<br>available | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Ankylosing<br>spondylitis                           | 60 | Pilates<br>exercises | 8 wks, 3x ?min<br>sessions per wk        |                               | Home exercise   |   |
| IRCT2018050<br>6039562N1 | Recruitment<br>complete               | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Lordosis and<br>kyphosis<br>(adolescents,<br>women) | 45 | Pilates<br>exercises | 8 wks, 1x 60min<br>session per wk        | Control (usual<br>activities) |   |   |
| CTRI/2013/10<br>/004110  | Unknown                               | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Low back instability                                | ?  | Pilates<br>exercises | 5 days, 1x 15mins<br>session per day     |                               | Lumbar<br>stabilization<br>exercises                      | TENS (20 mins),<br>hotpack (10<br>mins) |
| CTRI/2019/06<br>/019559  | Unknown                               | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Lumbar Disc<br>Herniation                           | ?  | Pilates<br>exercises | 4 wks, 5x ?min<br>sessions per wk        | ?                             |   |   |
| NCT03198273              | Recruiting<br>(? complete<br>)        | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Lumbar Disc<br>Herniation                           | 88 | Pilates<br>exercises | 6 wks, 3x 45-<br>60min session per<br>wk |                               | Physiotherapy<br>(hotpack and<br>TENS)                    |   |
| IRCT2016040<br>41552N6   | Recruitment<br>complete               | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Osteoarthritis (knee)                               | 20 | Pilates<br>exercises | 4 wks, 3x ?min<br>sessions per wk        |                               | Usual care (TENS,<br>hotpack,<br>Ultrasound,<br>Exercise) |   |
| NCT04183933              | Recruiting                            | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Osteoarthritis (knee)                               | 50 | Pilates<br>exercises | 6 wks, 3x ?min<br>sessions per wk        |                               | Combined<br>exercise training                             |   |
| IRCT2015092<br>624201N1  | Recruitment<br>complete               | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Rheumatoid arthritis                                | 70 | Pilates<br>exercises | 14 wks, 1x 60min<br>session per wk       | Control (no<br>intervention)  |   |   |

| STUDY ID                 | Status  | ICD 11 Category   | CONDITION<br>(population)                                     | N   | Intervention                                 | Intervention<br>details                  | Inactive<br>Comparator       | Active<br>comparator/s                                | Co-<br>intervention   |
|--------------------------|---|---|---|-----|--|--|------------------------------|---|---|
| NCT03836820              | Recruiting  | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Rheumatoid arthritis  | 30  | Pilates<br>exercises                         | 8 wks, 3x 60min<br>sessions per wk       |                              | Aerobic exercise<br>(walking) OR<br>Pilates + Walking |   |
| NCT01711203              | Complete,<br>results not<br>available                   | 15 Diseases of the<br>musculoskeletal<br>system or connective<br>tissue | Spondylolisthesis &<br>Spondylolysis                          | 25  | Modified<br>Pilates with<br>verbal cues      | 6 wks, ?                                 | Control (no<br>intervention) |   | Bracing and a<br>general<br>strengthening<br>program            |
| IRCT2015011<br>520465N1  | Recruitment<br>complete                                 | 16 Diseases of the genitourinary system                                 | Premenstrual syndrome   | 260 | Pilates<br>exercises                         | 4 wks, 3x 45min<br>sessions per wk       | Control (no<br>intervention) | Pilates exercises<br>plus fennel<br>extract           | Fennel extract  |
| IRCT2015012<br>520465N2  | Recruitment<br>complete                                 | 16 Diseases of the genitourinary system                                 | Premenstrual syndrome   | 260 | Pilates<br>exercises                         | 4 wks, 3x 45min<br>sessions per wk       | Control (no<br>intervention) | Pilates exercises<br>plus Vitamin B<br>complex        | Vitamin B<br>Complex  |
| Buen 2014                | Not yet recruiting                                      | 16 Diseases of the genitourinary system                                 | Urinary incontinence<br>(stress, perinatal)                   | 40  | Pilates<br>exercises                         | 10 wks, 2x 60min sessions per wk         |                              | Pelvic floor<br>exercises and<br>guided walks         |   |
| ISRCTN27633<br>617       | Complete,<br>results not<br>available                   | 16 Diseases of the genitourinary system                                 | Urinary incontinence<br>(stress, women<br>> 16 years)         | ?   | Modified<br>Pilates                          | 12 wks, ?                                |                              | Standard Pelvic<br>floor training                     |   |
| RBR-4zvpwb               | Complete,<br>brief results<br>(p-values)<br>on registry | 16 Diseases of the genitourinary system                                 | Urinary incontinence<br>(stress, women > 45<br>to < 60 years) | 50  | Pilates<br>exercises                         | 12 wks, 1x ?min<br>session per wk        |                              | Perineal exercises                                    |   |
| RBR-9gf79b               | Not yet<br>recruiting                                   | 16 Diseases of the genitourinary system                                 | Urinary incontinence<br>(stress, women<br>> 45 years)         | 35  | Pilates<br>exercises                         | ? (total 20<br>sessions)                 | Control (no<br>intervention) |   | Conventional<br>pelvic floor<br>training with<br>Kegel exercise |
| ACTRN12619<br>000784112  | Not yet recruiting                                      | 16 Diseases of the genitourinary system                                 | Urinary incontinence<br>(stress, women<br>> 60years)          | 30  | Pilates<br>exercises                         | 4 wks, 1x 45-<br>60min session per<br>wk | Control<br>(standard care)   | Yoga  |   |
| IRCT2017012<br>4032161N2 | Recruitment<br>complete                                 | 18 Pregnancy,<br>childbirth and the<br>puerperium                       | Perinatal (primi and<br>multiparous)                          | 60  | Pilates<br>exercises<br>(@8wks<br>gestation) | 12 wks, 2x 30min<br>sessions per wk      | Control (usual<br>care)      | Pilates exercises<br>(@18wks<br>gestation)            |   |

| STUDY ID                   | Status                                | ICD 11 Category                                    |  | N   | Intervention         | Intervention                        | Inactive                     | Active  | Co-                          |
|----------------------------|---------------------------------------|--|--|-----|----------------------|-------------------------------------|------------------------------|---|------------------------------|
| RBR-249t3r                 | Complete,<br>results not<br>available | 18 Pregnancy,<br>childbirth and the<br>puerperium  | Perinatal (primi and<br>multiparous)       | 60  | Pilates<br>exercises | 20 wks, 2x 60min<br>sessions per wk |                              | Conventional<br>physiotherapy,<br>aerobic,<br>strengthening<br>and stretching |                              |
| IRCT2019082<br>2044583N1   | Recruitment<br>complete               | 18 Pregnancy,<br>childbirth and the<br>puerperium  | Perinatal<br>(primiparous)                 | 100 | Pilates<br>exercises | 8 wks, 3x 45min<br>sessions per wk  | Control (usual<br>care)      |   |                              |
| PACTR201801<br>002825282   | Complete,<br>results not<br>available | 18 Pregnancy,<br>childbirth and the<br>puerperium  | Perinatal<br>(primiparous)                 | 60  | Pilates<br>exercises | 8 wks, 2x 60min<br>sessions per wk  | Control (usual<br>care)      | Aerobic exercise  |                              |
| ACTRN12619<br>000780156    | Not yet<br>recruiting                 | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Fibromyalgia                               | 30  | Pilates<br>exercises | 16 wks, 2x 30min sessions per wk    |                              | Stretching<br>exercise  |                              |
| Franco 2019                | Active, not recruiting                | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Fibromyalgia                               | 98  | Modified<br>Pilates  | 8 wks, 2x 60min<br>sessions per wk  |                              | Aerobic exercise<br>(treadmill or<br>stationary bike)                         |                              |
| NCT00636623                | Complete,<br>results not<br>available | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Fibromyalgia                               | 36  | Pilates<br>exercises | 4 wks, 3x ?min<br>sessions per wk   |                              | Connective tissue massage   |                              |
| NCT03318458                | Complete,<br>results not<br>available | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Fibromyalgia                               | 50  | Pilates<br>exercises | 12 wks, 2x 60min sessions per wk    | Control (no<br>intervention) |   |                              |
| Bastos de<br>Oliveira 2019 | Recruitment<br>complete               | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 74  | Pilates<br>exercises | 8 wks, 2x 60min<br>sessions per wk  |                              | Aerobic exercises,<br>stretching and<br>relaxation                            |                              |
| IRCT2014061<br>69440N4     | Recruitment<br>complete               | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 40  | Pilates<br>exercises | 2 wks, 5x ?min<br>sessions per wk   |                              | Williams exercise   | TENS, hotpack,<br>Ultrasound |
| IRCT2018090<br>9040975N1   | Recruitment complete                  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 30  | Modified<br>Pilates  | ? (total 18<br>sessions)            |                              | General exercise  | TENS, Hot pack               |
| IRCT2018101<br>1041309N1   | Recruitment<br>complete               | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 30  | Pilates<br>exercises | 6 wks, ?                            |                              | Conventional physiotherapy  |                              |

| STUDY ID                 | Status  | ICD 11 Category                                    | CONDITION<br>(population)                  | Ν  | Intervention                                | Intervention<br>details                                     | Inactive<br>Comparator       | Active<br>comparator/s   | Co-<br>intervention |
|--------------------------|---|--|--|----|---|---|------------------------------|--|---------------------|
| NCT02922322              | Complete,<br>results not<br>available                   | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 30 | Pilates<br>exercises                        | 8 wks, 2x 60min<br>sessions per wk                          | Control (no<br>intervention) |  |                     |
| NCT04135131              | Complete,<br>results not<br>available                   | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 60 | Pilates<br>exercises (mat)                  | 8 wks, 3x 60min<br>sessions per wk                          |                              | Home exercise  |                     |
| NCT04191317              | Recruiting  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 26 | Pilates<br>exercises                        | 8 wks, 1x 60min<br>session per wk                           |                              | Pain<br>neuroscience<br>education  |                     |
| PACTR201608<br>001655272 | Recruiting  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 60 | Pilates<br>exercises (mat)                  | 4 wks, 3x ?min<br>sessions per wk                           |                              | Stabilization<br>exercises   |                     |
| RBR-25zx8q               | Complete,<br>brief results<br>(p-values)<br>on registry | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 26 | Pilates<br>exercises                        | 5 wks, 1x 60min<br>sessions per wk                          |                              | Stretching<br>training OR<br>Education   |                     |
| RBR-2ytjzw               | Recruiting  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 30 | Pilates<br>exercises                        | 4 wks, 2-3x 30min<br>sessions per wk<br>(total 10 sessions) | Control (no<br>intervention) |  |                     |
| RBR-4jyr4r               | Recruiting  | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 90 | Pilates<br>exercises                        | 6 wks, 3x 6min<br>sessions per wk                           |                              | Conventional<br>therapeutic<br>exercise OR TENS  |                     |
| RBR-5vr3vt               | Complete,<br>results not<br>available                   | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 30 | Pilates<br>exercises (mat)                  | 5 wks, 2x 60min<br>sessions per wk                          |                              | Conventional<br>therapeutic<br>exercise  |                     |
| RBR-7yhzym               | Recruiting<br>(? complete<br>)                          | 21 Symptoms, signs<br>or clinical findings,<br>NEC | Low back pain<br>(chronic,<br>nonspecific) | 40 | Pilates<br>exercises (mat<br>and apparatus) | ? wks, ?x 45min<br>sessions per wk                          |                              | Conventional<br>physiotherapy<br>(electrotherapy,<br>heat, strength<br>training,<br>stretching,<br>mobilisation and<br>patient<br>education) |                     |

| STUDY ID                  | Status                                | ICD 11 Category  | CONDITION<br>(population)                                  | Ν   | Intervention               | Intervention<br>details             | Inactive<br>Comparator       | Active<br>comparator/s  | Co-<br>intervention |
|---------------------------|---------------------------------------|--|--|-----|----------------------------|-------------------------------------|------------------------------|---|---------------------|
| RBR-8yfq4g                | Recruiting                            | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Low back pain<br>(chronic,<br>nonspecific)                 | 45  | Pilates<br>exercises (mat) | 12 wks, 2x 60min<br>sessions per wk |                              | Low intensity<br>exercises OR<br>Ballet Bar<br>Exercises                                    |                     |
| Tottoli 2019              | Recruiting                            | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Low back pain<br>(chronic,<br>nonspecific)                 | 144 | Pilates<br>exercises       | 6 wks, 2x 45min<br>sessions per wk  |                              | Home exercise   |                     |
| RBR-43wzk4                | Not yet<br>recruiting                 | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Low back pain<br>(chronic,<br>nonspecific)<br>(adolescent) | 90  | Pilates<br>exercises       | 6 wks, 2x 50min<br>sessions per wk  |                              | Low intensity<br>laser applications<br>of Arsenic<br>Gallium infrared<br>OR Pilates + Laser |                     |
| RBR-5nk2tr                | Complete,<br>results not<br>available | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Low back pain<br>(chronic,<br>nonspecific)<br>(adolescent) | 54  | Pilates<br>exercises       | 12 wks, 2x 60min<br>sessions per wk |                              | Back school<br>exercises  |                     |
| RBR-3k9vxy                | Complete,<br>results not<br>available | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Low back pain<br>(chronic, nonspecific,<br>elderly)        | 41  | Pilates<br>exercises       | 8 wks, 2x 60min<br>sessions per wk  |                              | Kinesiotherapy<br>OR Education  |                     |
| IRCT2015053<br>1022498N27 | Recruitment<br>complete               | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Low back pain<br>(mechanical)                              | 30  | Pilates<br>exercises       | 8 wks, 3x 45min<br>sessions per wk  | Control (no<br>intervention) | Yoga  |                     |
| NCT03782584               | Complete,<br>results not<br>available | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Neck pain (chronic)  | 49  | Modified<br>Pilates        | 6 wks, 2x ?min<br>sessions per wk   |                              | Education   |                     |
| PACTR201807<br>573146508  | Recruiting                            | 21 Symptoms, signs<br>or clinical findings,<br>NEC                             | Neck pain (chronic,<br>nonspecific)                        | 60  | Pilates<br>exercises       | 8 wks, 2x 30min<br>sessions per wk  |                              | Dynamic<br>Isometric<br>exercises OR<br>Neck stabilization<br>exercises                     |                     |
| IRCT2017072<br>335236N1   | Recruitment<br>complete               | 22 Injury, poisoning<br>or certain other<br>consequences of<br>external causes | Burns (second<br>degree)                                   | 64  | Pilates<br>exercises       | 2 wks, 6x 50min<br>sessions per wk  | Control (usual<br>care)      |   |                     |

| STUDY ID                 | Status                                | ICD 11 Category  | CONDITION<br>(population)  | N   | Intervention                       | Intervention<br>details                     | Inactive<br>Comparator       | Active<br>comparator/s                                   | Co-<br>intervention         |
|--------------------------|---------------------------------------|--|--|-----|------------------------------------|---|------------------------------|--|-----------------------------|
| IRCT2017050<br>933772N2  | Recruitment<br>complete               | 22 Injury, poisoning<br>or certain other<br>consequences of<br>external causes | Rehabilitation (after<br>hip arthroplasty)   | 38  | Pilates<br>exercises               | ? (not described)                           | Control (usual<br>care)      |  |                             |
| NCT04360447              | Complete,<br>results not<br>available | 22 Injury, poisoning<br>or certain other<br>consequences of<br>external causes | Rehabilitation (after<br>spinal cord injury, T2<br>and below)                        | 18  | Pilates<br>exercises<br>(Reformer) | 8 wks,<br>individualised                    |                              | Home exercise  |                             |
| NCT03729466              | Recruiting                            | 24 Factors<br>influencing health<br>status or contact<br>with health services  | Caregivers, primary<br>(of special needs<br>children)                                | 70  | Pilates<br>exercises               | 8 wks, 2x 45-<br>60min sessions<br>per week | Control (no<br>intervention) |  |                             |
| IRCT2019030<br>3042904N1 | Recruitment<br>complete               | 24 Factors<br>influencing health<br>status or contact<br>with health services  | Employment<br>conditions (female<br>nurses with stress,<br>anxiety, back pain)       | 70  | Pilates<br>exercises               | 8 wks, 3x 60min<br>sessions per wk          | Control (usual activities)   |  |                             |
| IRCT2016033<br>026251N3  | Recruitment<br>complete               | 25 Prevention  | 08 Nervous system,<br>older males (64-75<br>years)                                   | 20  | Pilates<br>exercises               | 12 wks, 5x 60min<br>sessions per wk         | Control (usual activities)   |  |                             |
| NCT03962842              | Recruiting                            | 25 Prevention  | 21 Musculoskeletal<br>symptoms and signs,<br>healthy adolescents<br>(11 to 17 years) | 163 | Pilates<br>exercises               | 32 wks, 2x<br>10mins sessions<br>per wk     | Control (no<br>intervention) |  | Physical<br>education class |
| NCT02816541              | Complete,<br>results not<br>available | 25 Prevention  | 21 Musculoskeletal<br>symptoms and signs,<br>healthy adults<br>(> 60 years)          | 20  | Modified<br>Pilates                | single 40min<br>session                     |                              | Aerobic exercise<br>(treadmill) OR<br>Modified Pilates 2 |                             |
| NCT02845544              | Complete,<br>results not<br>available | 25 Prevention  | 21 Musculoskeletal<br>symptoms and signs,<br>healthy adults<br>(sedentary)           | 18  | Pilates<br>exercises               | 6 wks, 2x 60min<br>sessions per wk          | Control (no<br>intervention) |  |                             |
| RBR-8q3p8n               | Recruiting                            | 25 Prevention  | 21 Musculoskeletal<br>symptoms and signs,<br>healthy children (4<br>to 8 years)      | 81  | Pilates<br>exercises (mat)         | 10 wks, 1x 50min<br>session per wk          | Control (no<br>intervention) | Global postural reeducation                              |                             |

| STUDY ID                | Status                                | ICD 11 Category | CONDITION  | N   | Intervention   | Intervention                            | Inactive                                    | Active   | Co-          |
|-------------------------|---------------------------------------|-----------------|--|-----|--|---|---|--|--------------|
|                         |                                       |                 | (population)   |     |  | details                                 | Comparator                                  | comparator/s                                       | intervention |
| RBR-8t5p7d              | Complete,<br>results not<br>available | 25 Prevention   | 21 Musculoskeletal<br>symptoms and signs,<br>healthy children (8<br>to 12 years) | 60  | Pilates<br>exercises (in<br>soil)                            | 14 wks, 2x 50min<br>sessions per wk     | Control (waitlist)                          |  |              |
| IRCT2017010<br>431767N1 | Recruitment<br>complete               | 25 Prevention   | Age-related decline,<br>frail older women at<br>risk of                          | 44  | Pilates<br>exercises (mat)                                   | 8 wks, 3x 1hr<br>sessions per wk        | Control (usual<br>care - basic<br>training) |  |              |
| IRCT2017091<br>422320N7 | Recruitment<br>complete               | 25 Prevention   | Age-related decline,<br>older women<br>referred for<br>unhappiness               | 54  | Pilates exercise   | 8 wks, 3x 60min<br>sessions per wk      | Control (no<br>intervention)                |  |              |
| RBR-4ym2j4              | Recruitment<br>complete               | 25 Prevention   | Age-related decline,<br>older adults (> ?<br>years)                              | 50  | Pilates<br>exercises (mat<br>& equipment)                    | 24 wks, 2x<br>60mins sessions<br>per wk | Control (no<br>intervention)                |  |              |
| NCT03299374             | Recruiting<br>(? complete<br>)        | 25 Prevention   | Age-related decline,<br>older adults (> 60<br>years)                             | 30  | Pilates<br>exercises   | 16 wks, ?                               |   | Falls prevention exercises                         |              |
| NCT03791502             | Complete,<br>results not<br>available | 25 Prevention   | Age-related decline,<br>older adults (> 60<br>years)                             | 48  | Pilates<br>exercises (high<br>volume, 18<br>exercises)       | 12 wks, 2x 60min<br>sessions per wk     | Control (usual<br>activites)                | Pilates exercises<br>(low volume, 12<br>exercises) |              |
| RBR-8c33jx              | Recruitment<br>complete               | 25 Prevention   | Age-related decline,<br>older adults (> 60<br>years)                             | 30  | Pilates<br>exercises   | 8 wks, 2x 50min<br>sessions per wk      | Control (no<br>intervention)                |  |              |
| NCT04343300             | Complete,<br>results not<br>available | 25 Prevention   | Age-related decline,<br>older adults (> 65<br>years)                             | 60  | Pilates<br>exercises   | 12 wks, 2x 60min<br>sessions per wk     | Control (no<br>intervention)                |  |              |
| NCT02371837             | Complete,<br>results not<br>available | 25 Prevention   | Age-related decline,<br>older women (> 60<br>years)                              | 103 | Pilates<br>exercises   | 6 wks, 2x ?hrs<br>sessions per wk       | Control (no<br>intervention)                |  |              |
| RBR-4y4q7z              | Not yet<br>recruiting                 | 25 Prevention   | Age-related decline,<br>older women (> 60<br>years)                              | 33  | Pilates<br>exercises (mat)<br>with pelvic<br>floor exercises | 8 wks, 2x 50min<br>sessions per wk      | Control (no<br>intervention)                |  |              |

| STUDY ID                 | Status  | ICD 11 Category | CONDITION<br>(population)   | N  | Intervention                              | Intervention<br>details                 | Inactive<br>Comparator        | Active<br>comparator/s | Co-<br>intervention                      |
|--------------------------|---|-----------------|---|----|---|---|-------------------------------|------------------------|--|
| RBR-3x64sp               | Recruiting<br>(? complete<br>)                          | 25 Prevention   | Age-related decline,<br>older women (> 65<br>years)                           | 60 | Pilates<br>exercises                      | 12 wks, 2x ?min<br>sessions per wk      | Control (no<br>intervention)  |                        | Education                                |
| RBR-969prp               | Recruiting<br>(? complete<br>)                          | 25 Prevention   | Age-related decline,<br>older women (> 65<br>years)                           | 60 | Pilates<br>exercises                      | 12 wks, 2x ?min<br>sessions per wk      | Control (no<br>intervention)  |                        | Education                                |
| RBR-22bpsb               | Complete,<br>results not<br>available                   | 25 Prevention   | Age-related decline,<br>older women (60 to<br>69 years)                       | 24 | Pilates<br>exercises (mat<br>& equipment) | 26 wks, 2x<br>30mins sessions<br>per wk | Control (no<br>intervention)  |                        |  |
| RBR-84gg5w               | Not yet recruiting                                      | 25 Prevention   | Falls, older adults<br>(> 65 years) with<br>history of falls                  | 46 | Pilates<br>exercises                      | 8 wks, 2x 50min<br>sessions per wk      | Control (no<br>intervention)  |                        | Lower limb<br>strengthening<br>exercises |
| RBR-2cfy62               | Complete,<br>brief results<br>(p-values)<br>on registry | 25 Prevention   | Menopausal<br>symptoms or<br>complaints, healthy<br>women (? years)           | 21 | Pilates<br>exercises (in<br>soil)         | 12 wks, 3x 60min<br>sessions per wk     | Control (no<br>intervention)  |                        |  |
| IRCT2016082<br>1029446N4 | Recruitment<br>complete                                 | 25 Prevention   | Menopausal<br>symptoms or<br>complaints, healthy<br>women (40 to 60<br>years) | 98 | Pilates<br>exercises                      | 12 wks, 2x 60min<br>sessions per wk     | Control (usual<br>activities) |                        |  |

Abbreviations: ?, unclear or not reported; min, minute; NEC, not elsewhere classified; NR, not reported; NRSI, non-randomised study of interventions; QoL, quality of life; RCT, randomised controlled trial; TENS, transcutaneous electrical nerve stimulation; wk, week

## C6 Implications of missing data

| Table C.12 Studies in priority populations that are eligible for the main comparison (Pilates vs control): studies awaiting classification and ongoing studies (with res | sults |
|--|-------|
| not available or published)  |       |

| STUDY ID                   | Notes   | Study<br>design | ICD 11 Category   | CONDITION<br>(population)    | N  | Intervention        | Comparator 1<br>(inactive)   | Comparator 2<br>(other)                  | Co-<br>interventions | Outcome measures  |
|----------------------------|---|-----------------|---|------------------------------|----|---------------------|------------------------------|--|----------------------|---|
| Azamian 2015               | Not in<br>English                             | Quasi-<br>RCT?  | 02 Neoplasms  | Breast Cancer<br>(survivors) | 27 | Pilates<br>exercise | Control (no<br>intervention) |  |                      | Serum adiponectin level<br>Vo2max<br>Insulin level/resistance<br>Body composition (BMI, fat %, waist-<br>hip ratio)   |
| Hassani 2018               | Not in<br>English                             | RCT             | 05 Endocrine,<br>nutritional and<br>metabolic<br>diseases | Diabetes (type 2)            | ?  | Pilates<br>exercise | Control (usual<br>care)      |  |                      | No information  |
| Farsi 2017                 | Not in<br>English,<br>Submitted<br>literature | Quasi-<br>RCT?  | 08 Diseases of<br>the nervous<br>system                   | Multiple sclerosis           | 15 | Pilates<br>exercise | Control (no<br>intervention) |  |                      | Balance<br>Electrical muscle activity (soleus tibias<br>anterior, gluteus maximus)  |
| Guclu-Gunduz<br>2017       | Conf<br>abstract                              | RCT?            | 08 Diseases of<br>the nervous<br>system                   | Multiple sclerosis           | 19 | Pilates<br>exercise | Control (no intervention)    |  |                      | 6-min walk test<br>Perceived exertion (Borg rating scale)   |
| JPRN-<br>UMIN0000384<br>31 | Complete,<br>result not<br>available          | RCT             | 08 Diseases of<br>the nervous<br>system                   | Multiple sclerosis           | 30 | Pilates<br>exercise | Control (usual care)         |  |                      | Not reported  |
| Mehrvar 2017               | Conf<br>abstract                              | Quasi-<br>RCT?  | 08 Diseases of<br>the nervous<br>system                   | Multiple sclerosis           | 36 | Pilates<br>exercise | Control (no intervention)    | Pilates +<br>Massage OR<br>Massage alone |                      | Serum IL-17<br>Serum IFN-β  |
| NCT03006900                | Complete,<br>result not<br>available          | RCT             | 08 Diseases of<br>the nervous<br>system                   | Multiple sclerosis           | 30 | Pilates<br>exercise | Control (no<br>intervention) |  | Massage              | 6-min walk test<br>Fullerton Advanced Balance Scale<br>Flexibility (sit and reach)<br>Timed up & go<br>Physical activity level<br>Muscle strength (isometric knee<br>extension)<br>Muscle endurance (trunk) |

| STUDY ID                     | Notes   | Study<br>design | ICD 11 Category                             | CONDITION<br>(population) | N   | Intervention        | Comparator 1<br>(inactive)   | Comparator 2<br>(other)  | Co-<br>interventions | Outcome measures  |
|------------------------------|---|-----------------|---|---------------------------|-----|---------------------|------------------------------|--|----------------------|---|
|                              |   |                 |   |                           |     |                     |                              |  |                      | Body composition (lean mass, fat<br>mass)<br>Multiple Sclerosis Quality of Life -54   |
| Novotna 2018                 | Conf<br>abstract                              | NRSI            | 08 Diseases of<br>the nervous<br>system     | Multiple sclerosis        | 33  | Pilates<br>exercise | Control (usual<br>activites) |  |                      | Balance (Berg balance test)<br>Balance (Mini-Best test)<br>Timed up and Go<br>Single leg stance<br>Step test<br>Gait performance (Timed 25 Foot<br>Walk Test)<br>Gait performance (2-min walk test)<br>GAIT Rite instrument |
| Pahlevanzade<br>2016         | Not in<br>English                             | Quasi-<br>RCT?  | 08 Diseases of<br>the nervous<br>system     | Multiple sclerosis        | ?   | Pilates<br>exercise | Control (no<br>intervention) | Pilates +<br>Resistance<br>exercise OR<br>Resistance<br>exercise alone |                      | Quality of life<br>Muscular strength<br>Fatigue   |
| Rezvankhah<br>Golsefidi 2017 | Not in<br>English,<br>Submitted<br>literature | Quasi-<br>RCT?  | 08 Diseases of<br>the nervous<br>system     | Multiple sclerosis        | 40  | Pilates<br>exercise | Control (no<br>intervention) |  |                      | Number of falls<br>Fear of falling<br>Reaction time   |
| Alavi 2018                   | Not in<br>English,<br>Submitted<br>literature | NRSI?           | 08 Diseases of<br>the nervous<br>system     | Parkinson's<br>disease    | 106 | Pilates<br>exercise | Control (no<br>intervention) | Tai chi  |                      | Balance, static<br>Balance, dynamic<br>Berg Balance scale questionnaire<br>Kurtzke expanded disability status<br>scale<br>Physical activity readiness<br>questionnaire  |
| Abedini 2015                 | Not in<br>English,<br>Submitted<br>literature | Quasi-<br>RCT?  | 08 Diseases of<br>the nervous<br>system     | Stroke recovery           | 6   | Pilates<br>exercise | Control (no<br>intervention) | Neurofeedbac<br>k  |                      | Balance (Berg Balance test)<br>MMSE   |
| NCT03791307                  | Complete,<br>result not<br>available          | RCT             | 11 Diseases of<br>the circulatory<br>system | Hypertension              | 60  | Pilates<br>exercise | Control (no<br>intervention) |  |                      | Systolic/diastolic blood pressure<br>Heart rate<br>Heart rate variability<br>Cardiopulmonary exercise test (ergo-<br>spirometric treadmill)   |

| STUDY ID                                   | Notes                                  | Study<br>design | ICD 11 Category  | CONDITION<br>(population)            | N  | Intervention                            | Comparator 1<br>(inactive)    | Comparator 2<br>(other) | Co-<br>interventions                                 | Outcome measures   |
|--|--|-----------------|--|--------------------------------------|----|---|-------------------------------|-------------------------|--|--|
|  |  |                 |  |                                      |    |   |                               |                         |  | Quality of life (WHO-QOL)<br>Flexibility (Bank of Wells test)<br>Muscle strength (hand grip<br>dynamometer)<br>Functional capacity (lift from sitting,<br>lift from layered, shoe tie)<br>Body mass index<br>Waist circumference               |
| Eghbali 2017                               | Not in<br>English                      | Quasi-<br>RCT?  | 11 Diseases of<br>the circulatory<br>system                                | Hypertension<br>(males)              | 30 | Pilates<br>exercise                     | Control (no<br>intervention)  |                         |  | Blood pressure<br>Nitric oxide<br>Resting heart rate   |
| Kisacik 2015                               | Not in<br>English,<br>conf<br>abstract | Quasi-<br>RCT?  | 15 Diseases of<br>the<br>musculoskeletal<br>system or<br>connective tissue | Osteoarthritis<br>(knee)             | ?  | Pilates<br>exercise                     | Control (no<br>intervention)  |                         |  | Proprioception<br>Mobility   |
| NCT01711203                                | Complete,<br>result not<br>available   | RCT             | 15 Diseases of<br>the<br>musculoskeletal<br>system or<br>connective tissue | Spondylolisthesis<br>& Spondylolysis | 25 | Modified<br>Pilates with<br>verbal cues | Control (no<br>intervention)  |                         | bracing and a<br>general<br>strengthening<br>program | Global rating of change scale<br>Modified Oswestry Disability Index<br>McGill Physical Endurance Test<br>Cluster   |
| Brayjani 2019,<br>IRCT201812180<br>42034N1 | Not in<br>English                      | Quasi-<br>RCT   | 15 Diseases of<br>the<br>musculoskeletal<br>system or<br>connective tissue | Ankylosing<br>spondylitis            | 20 | Pilates<br>exercise                     | Control (usual<br>activities) |                         |  | Dynamic balance<br>Static balance<br>Muscular endurance of the central<br>part of body<br>Range of motion of lumbar spine<br>Pain<br>Quality of life   |
| Oksuz 2018,<br>NCT03211559                 | Conf<br>abstract                       | Quasi-<br>RCT?  | 15 Diseases of<br>the<br>musculoskeletal<br>system or<br>connective tissue | Ankylosing<br>spondylitis            | 36 | Pilates<br>exercise                     | Control (no<br>intervention)  |                         | Aerobic<br>exercise                                  | Aerobic capacity (6-min walk test)<br>Flexion, Lateral spinal& Lumbar<br>Flexibility (tragus to wall,<br>intermalleolar)<br>Cervical rotation<br>Spinal mobility (rib cage expansion)<br>Balance (single leg stance, functional<br>reach test) |

| STUDY ID    | Notes                                | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)   | N  | Intervention        | Comparator 1<br>(inactive)   | Comparator 2<br>(other) | Co-<br>interventions | Outcome measures  |
|-------------|--------------------------------------|-----------------|--|-----------------------------|----|---------------------|------------------------------|-------------------------|----------------------|---|
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Strength and endurance (Chair sit and stand test, Back Muscle dynamometer)          |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Bath Ankylosing Spondylitis<br>Functionality Index                                  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Bath Ankylosing Spondylitis Disease<br>Activity Index                               |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Spirometry  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Multidimensional Fatigue Inventory  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Fatigue Severity Scale  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Pittsburgh Sleep Quality Index  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Ankylosing Spondylitis Quality of Life<br>Scale                                     |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Hospital Anxiety and Depression Scale   |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Tampa Kinesiophobia Scale   |
| Rezaei 2015 | Not in                               | Quasi-          | 15 Diseases of                                     | Hyperlordosis               | 30 | Pilates             | Control (no                  |                         |                      | Lumbar lordosis (flexible ruler)  |
|             | English                              | RCT?            | the<br>musculoskeletal                             | (lumbar spine, in immediate |    | exercise (mat)      | intervention)                |                         |                      | Muscle strength, abdominal (Sit-up test)  |
|             |                                      |                 | system or connective tissue                        | postpartum)                 |    |                     |                              |                         |                      | Flexibility, low back (sit and reach test)  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Range of Motion, lumbo-pelvic<br>(modified Schober's test)                          |
| Shahrjerdi  | Not in                               | NRSI            | 15 Diseases of                                     | Hyperlordosis,              | ?  | Pilates             | Control (no                  |                         |                      | Pain  |
| 2014        | English                              |                 | the  | low back pain               |    | exercise            | intervention)                |                         |                      | Functioning   |
|             |                                      |                 | musculoskeletal<br>system or<br>connective tissue  | (nonspecific),              |    |                     |                              |                         |                      | Lumbar lordosis   |
| NCT03318458 | Complete,<br>result not<br>available | Quasi<br>RCT?   | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Fibromyalgia                | 50 | Pilates<br>exercise | Control (no<br>intervention) |                         |                      | Hand grip strength (dynamometer)<br>Activities Specific Balance Confidence<br>Scale |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Falls Efficacy Scale-International  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Fatigue Severity Scale & VAS  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Fibromyalgia Impact Questionnaire   |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Menopause Rating Scale  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Pain (VAS)  |
|             |                                      |                 |  |                             |    |                     |                              |                         |                      | Pittsburgh Sleep Quality Index  |

HTANALYSTS | NHMRC | EVIDENCE EVALUATION ON THE CLINICAL EFFECTIVENESS OF PILATES

| STUDY ID           | Notes                                | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)                  | N  | Intervention        | Comparator 1<br>(inactive)   | Comparator 2<br>(other)           | Co-<br>interventions | Outcome measures   |
|--------------------|--------------------------------------|-----------------|--|--|----|---------------------|------------------------------|-----------------------------------|----------------------|--|
|                    |                                      |                 |  |  |    |                     |                              |                                   |                      | Anxiety & Depression (HADS)<br>Quality of life (SF-36)<br>Bone Mineral Content   |
|                    |                                      |                 |  |  |    |                     |                              |                                   |                      | Body composition (BMI, muscle mass,<br>lean mass, fat mass, fat %, waist-hip<br>ratio)   |
|                    |                                      |                 |  |  |    |                     |                              |                                   |                      | Physical function (timed up and go, CT10P)   |
|                    |                                      |                 |  |  |    |                     |                              |                                   |                      | Flexibility (sit and reach), Shoulder<br>ROM (back scratch), Endurance (30s<br>chair stand test)                                   |
| Kerr 2011          | Conf<br>abstract                     | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific) | 64 | Pilates<br>exercise | Control<br>(waitlist)        | Physiotherapy                     |                      | Roland Morris Disability<br>Questionnaire<br>Pain (VAS)<br>QoL (SF-36)   |
| Sokhanguei<br>2017 | Not in<br>English                    | Quasi-<br>RCT?  | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific) | 34 | Pilates<br>exercise | Control (no<br>intervention) |                                   |                      | Flexion (Modified-Modified Schober<br>test)<br>Pain (VAS)  |
| Yang 2016          | Conf<br>abstract                     | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific) | 39 | Pilates<br>exercise | Control (no<br>intervention) |                                   | Usual care           | Pain (VAS)<br>Roland Morris Disability<br>Questionnaire<br>Oswestry Low Back Pain Disability<br>Questionnaire<br>QoL (EQ-5D-3L)    |
| Sousa 2019         | Conf<br>abstract                     | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>overuse)     | 18 | Pilates<br>exercise | Control (no<br>intervention) |                                   | Handball<br>training | Functional disability<br>Pain (VAS)<br>Muscle endurance (trunk, right& left<br>lateral)  |
| O'Brien 2006       | Conf<br>abstract                     | RCT?            | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(subacute)                | 45 | Pilates<br>exercise | Control (no<br>intervention) | Usual care<br>(Physiotherap<br>y) |                      | Muscle strength, transverse<br>abdominus (pressure biofeedback<br>unit)<br>Roland Morris Disability<br>Questionnaire<br>Pain (VAS) |
| NCT02922322        | Complete,<br>result not<br>available | RCT             | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Low back pain<br>(chronic,<br>nonspecific) | 30 | Pilates<br>exercise | Control (no<br>intervention) |                                   |                      | Numerical Pain Rating Scale<br>Quality of life (SF-36)   |

HTANALYSTS | NHMRC | EVIDENCE EVALUATION ON THE CLINICAL EFFECTIVENESS OF PILATES

| STUDY ID                                  | Notes   | Study<br>design | ICD 11 Category                                    | CONDITION<br>(population)  | N  | Intervention                          | Comparator 1<br>(inactive)   | Comparator 2<br>(other) | Co-<br>interventions                      | Outcome measures  |
|---|---|-----------------|--|--|----|---------------------------------------|------------------------------|-------------------------|---|---|
|   |   |                 |  |  |    |                                       |                              |                         |   | Disability (Oswestry Disability Index)<br>McGill Pain Questionnaire   |
| Cheng 2011                                | Conf<br>abstract                              | RCT             | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Neck pain<br>(chronic,<br>mechanical)  | 57 | Pilates-based<br>thoracic<br>exercise | Control (no<br>intervention) |                         | Usual care<br>(cervical ROM<br>exercises) | Cervical ROM<br>Upper thoracic and thoracic ROM<br>Static posture (forward head angle)<br>Static posture (thoracic kyphotic<br>angle))<br>Pain<br>Perceived improvement<br>Function<br>Disability |
| Rajalaxmi 2018                            | Full text<br>not able to<br>be<br>retrieved   | RCT             | 21 Symptoms,<br>signs or clinical<br>findings, NEC | Neck pain<br>(chronic,<br>mechanical)  | 40 | Pilates<br>exercise                   | Control (no<br>intervention) | Tai Chi OR<br>Yoga      |   | Northwick Pain Park Questionnaire<br>Tampa scale for Kinesiophobia  |
| Aradmehr<br>2015                          | Not in<br>English                             | Quasi-<br>RCT?  | 25 Prevention                                      | Age-related<br>decline, healthy<br>men (>? yrs) at<br>risk of                  | 30 | Pilates<br>exercise                   | Control (no<br>intervention) | Balance<br>training     |   | Body composition (BMI, fat %, waist-<br>hip ratio)<br>Balance, static (stork test)<br>Functional mobility (timed up and go)   |
| LopesMacedo<br>2016                       | Not in<br>English                             | Quasi-<br>RCT   | 25 Prevention                                      | Age-related<br>decline, healthy<br>women (>? yrs)<br>at risk of                | 22 | Pilates<br>exercise (mat)             | Control (no<br>intervention) |                         |   | Flexibility (sit and reach)<br>Flexibility (hip goniometry)<br>Flexibility (shoulder goniometry)  |
| Cascales-Ruiz<br>2015                     | Not in<br>English,<br>Submitted<br>literature | NRSI            | 25 Prevention                                      | Age-related<br>decline, healthy<br>women (>30 yrs)                             | 21 | Pilates<br>exercise                   | Control (no<br>intervention) |                         |   | Resting HR<br>Systolic/diastolic blood pressure<br>Body composition (BMI, fat %, waist-<br>hip ratio)<br>QoL (SF-36)<br>Senior Fitness Test   |
| Mokhtari 2013,<br>IRCT201211281<br>0493N2 | Not in<br>English                             | RCT?            | 25 Prevention                                      | Age-related<br>decline, healthy<br>women (>60 yrs,<br>care home) at<br>risk of | 30 | Pilates<br>exercise                   | Control<br>(waitlist)        |                         |   | WHO-Quality of Life<br>Depression (Geriatric depression<br>scale  |

| STUDY ID     | Notes   | Study<br>design | ICD 11 Category | CONDITION<br>(population)  | N  | Intervention                                   | Comparator 1<br>(inactive)    | Comparator 2<br>(other) | Co-<br>interventions | Outcome measures   |
|--------------|---|-----------------|-----------------|--|----|--|-------------------------------|-------------------------|----------------------|--|
| Dashti 2015  | Not in<br>English                             | Quasi-<br>RCT?  | 25 Prevention   | Age-related<br>decline, healthy<br>women (60-75<br>yrs) at risk of                           | 45 | Pilates<br>exercise                            | Control (usual activities)    | TheraBand               |                      | Balance Stability (Berg Balance test)<br>Lower limb strength (30s Chair-Stand<br>test)   |
| RBR-22bpsb   | Complete,<br>result not<br>available          | RCT             | 25 Prevention   | Age-related<br>decline, healthy<br>women (60-69<br>yrs)                                      | 24 | Pilates<br>exercise (mat<br>& equipment)       | Control (no<br>intervention)  |                         |                      | Bone mineral density<br>Lean muscle mass   |
| RBR-2cfy62   | Complete,<br>result on<br>registry            | RCT             | 25 Prevention   | Age-related<br>decline, women<br>with diastasis of<br>the rectus<br>abdominus (40-<br>60yrs) | 21 | Pilates<br>exercise (in<br>soil)               | Control (no<br>intervention)  |                         |                      | Abdominal rectus muscle diastasis  |
| Abedini 2013 | Not in<br>English,<br>Submitted<br>literature | Quasi-<br>RCT?  | 25 Prevention   | Falls, healthy<br>men (>60 yrs,<br>history of falls)   | 30 | Pilates<br>exercise                            | Control (usual activities)    |                         |                      | Balance, dynamic (Berg Balance test)<br>Gait performance   |
| NCT03791502  | Complete,<br>result not<br>available          | RCT             | 25 Prevention   | Falls, healthy<br>adults (>60 yrs)   | 48 | Pilates<br>exercise (low<br>or high<br>volume) | Control (usual<br>activities) |                         |                      | Muscle strength, lower limbs<br>(biofeedback)<br>Muscle strength, lower limbs (30s<br>Chair-stand test)<br>Palmar Grip strength<br>Postural balance, static<br>Postural balance, dynamic (timed up<br>& go)<br>Postural balance, dynamic (step test)<br>Flexibility, hamstring (sit and reach)<br>Functional Autonomy (ability to<br>dress)<br>Geriatric depression scale<br>Maximal inspiratory/expiratory<br>pressure<br>Forced vital capacity |
| NCT04343300  | Complete,<br>result not<br>available          | RCT             | 25 Prevention   | Falls, healthy<br>adults (>65 yrs)   | 60 | Pilates<br>exercise                            | Control (no<br>intervention)  |                         |                      | Falls Efficacy Scale - International<br>Platform Footwork pro Pressure plate<br>Functional reach   |

| STUDY ID    | Notes                                | Study<br>design | ICD 11 Category | CONDITION<br>(population)         | N   | Intervention        | Comparator 1<br>(inactive)   | Comparator 2<br>(other) | Co-<br>interventions | Outcome measures  |
|-------------|--------------------------------------|-----------------|-----------------|-----------------------------------|-----|---------------------|------------------------------|-------------------------|----------------------|---|
|             |                                      |                 |                 |                                   |     |                     |                              |                         |                      | Timed up & go<br>GAIT Rite® system<br>Physical Activity Questionnaire - short<br>form |
| NCT02371837 | Complete,<br>result not<br>available | RCT             | 25 Prevention   | Falls, healthy<br>women (>60 yrs) | 103 | Pilates<br>exercise | Control (no<br>intervention) |                         |                      | Falls Efficacy Scale - International<br>Star Excursion Balance Test                   |

# C7 Description of studies from non-priority populations (not included in the synthesis)

#### **C7.1** Certain infectious and parasitic diseases

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

One potentially relevant study (163) was identified that examined exercise therapy in the rehabilitation of patients with pulmonary tuberculosis. The study was unable to be interpreted or translated at title/abstract stage and is not yet incorporated into the review (see Appendix C4.4).

#### **C7.2 Neoplasms**

#### C7.2.1 Thyroid cancer

One citation (34) corresponding to one RCT (Wahba 2019) was identified in the literature. No additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

Wahba 2019 was carried out in a single centre setting in Egypt with a sample size of 50 participants. The study included participants who developed shoulder dysfunction (range of motion limitation and shoulder pain) six months to one year, post unilateral neck dissection. Participants in the included trials were middle-aged (mean age 39 years) and both males and females were included.

Wahba 2019 compared a modified form of Pilates with conventional therapy. The Pilates sessions were 40-45 minutes in duration and were delivered three-times per week for 12 weeks.

#### C7.3 Disease of the blood and blood forming organs

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

#### C7.4 Disease of the immune system

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

#### C7.5 Endocrine, nutritional, or metabolic diseases

#### C7.5.1 Diabetes, type 1

One citation (35) corresponding to one RCT (Tunar 2012) was identified in the literature search. No additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

Tunar 2012 was conducted in sedentary paediatric patients with Type 1 diabetes. The Pilates group consisted of 11 females and six males with a mean age of 14.2 years. The control group consisted of 5 female and 9 male patients with a mean age of 14.3 years. Duration of diabetes was 5.3 years in the Pilates group

and 6.0 years in the control group. None of the participants engaged in vigorous or moderate physical activity at baseline.

The study investigated Pilates against an inactive comparator; participants allocated to the control group engaged in their usual activities that included prescribed medical and dietary treatments. The study investigated the effectiveness of a 12-weeks mat-based Pilates training program led by a certified Pilates instructor. Pilates exercise classes were 45 minutes in duration and were delivered three times a week.

#### C7.5.2 Overweight, obesity or specific nutrient excesses

Ten citations (36-45) corresponding to two RCTs (Savkin 2017, Wong 2020), five quasi-RCTs (Aslan 2018, Cakmakci 2011, Ramezankhany 2011, Rayes 2019, Vancini 2017) and two NRSIs (Burungale 2017, Hagner-Derengowska 2015) were identified in the literature search. There were six ongoing studies (see Appendix C5) and 11 studies awaiting classification (108-118), all of which were published in a language other than English (see Appendix C4.3). No additional studies were identified in the Department's public call for evidence (see Appendix C2).

All studies were conducted in obese participants at single centres in a variety of countries including Turkey (Aslan 2019, Cakmakci 2011, Savkin 2017), India (Burungale 2017), Poland (Hagner-Derengowska 2015), Iran (Ramezankhany 2010), Brazil (Rayes 2018, Vancini 2013) and the United States (Wong 2020). Sample sizes ranged from 28 to 69 participants in the RCTs (total 368) and from 36 to 196 participants in the NRSIs (total 232).

On average, participants across all studies were obese (BMI ≥ 30 kg/m<sup>2</sup>) (40, 42-44) although some studies included participants who were overweight (BMI greater than 25 kg/m<sup>2</sup> but less than 30 kg/m<sup>2</sup>) (Hagner-Derengowska 2015, Rayes 2019, Savkin 2017, Vancini 2017). Additionally, some studies explicitly required patients to be sedentary at baseline (Burungale 2017, Cakmakci 2011, Ramezankhany 2010, Rayes 2019, Savkin 2017, Vancini 2017, Cakmakci 2011, Ramezankhany 2010, Rayes 2019, Savkin 2017, Vancini 2017) and/or have an absence of comorbidities such as diabetes mellitus, smoking, menopause, cancer, neurological diseases and hypertension (Burungale 2017, Hagner-Derengowska 2015, Ramezankhany 2010, Rayes 2019, Savkin 2017, Vancini 2017).

The average age of participants in the studies were comparable except one study (Hagner-Derengowska 2015) that was conducted in older participants (aged between 50 and 75 years) and one study (Wong 2020) that was in younger patients (mean age 22 to 23 years). Five studies (Cakmakci 2011, Hagner-Derengowska 2015, Ramezankhany 2010, Savkin 2017 and Wong 2020) were conducted only in women.

In all studies, the Pilates intervention ranged from 45-60 minutes per session from 2 to 4 days a week lasting between 4 and 16 weeks. In addition to performing Pilates with a trainer, participants in Hagner-Derengowska 2015 were also required do the same training at home unsupervised. Conventional mat Pilates was performed in all but one study (Cakmakci 2011) that included the use of small apparatus (ball) and one study (Vancini 2017) that included a variety of apparatus (reformer, Cadillacs, chairs, magic circles, and dumbbells).

All studies except one (Burungale 2017) included an inactive control arm (i.e. participants in the control group maintained usual activities). Five studies included an active comparator which included strength training (Burungale 2017), Nordic walking (Hagner-Derengowska 2015), aerobics exercise (Ramezankhany 2011, Rayes 2019), low calorie diet (Ramezankhany 2011) or walking (Vancini 2017). Pilates was co-administered with changes to the diet in three studies (Aslan 2018, Burungale 2017 and Hagner-Derengowska 2015).

#### C7.5.3 Other conditions

Two potentially relevant studies awaiting classification (108, 119) (see Appendix C4) and one ongoing study (NCT03307031) were identified that cover three conditions (metabolic syndrome, polycystic ovary syndrome, dyslipidaemia) not yet considered in this review (no identified studies) (see Appendix C5).

#### C7.6 Mental, behavioural or neurodevelopmental disorders

#### C7.6.1 Neurocognitive disorders

One citation (46) corresponding to one quasi-RCT (Greblo Jurakic 2017) was identified in the literature search. No additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

One study (Greblo Jurakic 2017) was carried out in the local community in Croatia and enrolled 50 women aged 66-79 years. Participants were included if they met the trialists' diagnostic criteria for MND, defined as a total score ranging between 19 to 25 on the Montreal Cognitive Assessment (MoCA).

Greblo-Jurakic 2017 compared the effect of Pilates training to sessions involving training with a feedbackbased balance and core resistance training device (HUBER<sup>®</sup>, LPG Systems, Valence, France). Pilates sessions, delivered over 60 minutes, were focussed on core exercises and involved the use of elastic bands. Core resistance training sessions were approximately 30 minutes in duration and involved push and pull exercises with handles in different postures and hand positions. Both Pilates and core resistance training interventions occurred 3 times per week for 8 weeks.

#### C7.6.2 Neurodevelopmental disorders

One citation (47) corresponding to one quasi-RCT (Mehrabi-Taleghani 2018) was identified in the literature search. One additional quasi-RCT (48) was identified in the Department's public call for evidence (see Appendix C2) (Seghatoleslamy 2019). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

Both studies (Mehrabi-Taleghani 2018, Saghatoleslamy 2019) were carried out in single centres in Iran and included children or adolescents aged between 6 and 18 years. One study (Mehrabi-Taleghani 2018) enrolled 75 students who had achieved high scores on the SNAP IV questionnaire and were classified by the study authors as having ADHD. The mean age of students was not reported.

One study (Saghatoleslamy 2019) enrolled 45 female students aged eight years old diagnosed with a learning disorder based on parent and student interviews and Wechsler testing. Based on these assessments, students were reported to have below average scores on reading and mathematics, however no further details were provided.

Both studies (Mehrabi-Taleghani 2018, Saghatoleslamy 2019) compared Pilates to no intervention or an aerobic form of exercise. Mehrabi-Taleghani 2018 was conducted over a 52-week period, but details regarding the Pilates program, including use of equipment, the number of treatment sessions, or session duration were not specified. In Saghatoleslamy 2019, the exercise interventions sessions lasted 45 minutes and were performed three times per week for eight weeks. Each Pilates session consisted of a 10-minute warm-up period, 30 minutes of basic Pilates stretch-based exercises and a 5-minute cool-down period. The use of equipment during the Pilates sessions was not specified.

#### C7.6.3 Schizophrenia and other primary psychotic disorders

Five citations (49-53) corresponding to one RCT (Priebe 2013) were identified in the literature. There was and one study (Akbas 2016) (77) awaiting classification (see Appendix C4) and one ongoing trial (JPRN-UMIN000028835) (see Appendix C5). No additional studies were identified in the Department's public call for evidence (see Appendix C2).

The study by Priebe 2013 was carried out through National Health Service Mental Health Community teams in London and Manchester, England and enrolled 275 adults aged 18-65 years with schizophrenia (based on DSM-IV criteria). Participants were required to have mild-to-moderate negative symptoms (PANSS negative subscale score greater than or equal to 18) and no change of anti-psychotic medication in the previous 6 weeks.

Priebe 2013 compared the effect of Pilates to body psychotherapy classes, both of which were delivered over 90 minutes, and were performed twice per week for 10 weeks (20 treatment sessions in total). Pilates sessions consisted of a 'beginners' regimen (from the Pilates Union Matwork Manual (164)) but no further details of the Pilates sessions were provided. Body psychotherapy sessions involved 1) overcoming communication barriers through non-verbal techniques; 2) re-focussing cognitive and emotional awareness towards the body; 3) stimulating activity and emotional responsiveness; 4) exploring physical potentials; 5) focussing on strength and experiencing the body as a source of creativity, reliability, pleasure and self-expression; 6) modifying dysfunctional self-perception and addressing body-related psychopathological features such as boundary loss, somatic depersonalisation, and body schema disturbances.

#### C7.6.4 Other conditions

Two potentially relevant studies awaiting classification (120, 121) (see Appendix C4) and two ongoing studies (NCT04058119, IRCT201403152324N13) (see Appendix C5) were identified that cover three conditions (Symptoms of depression, anxiety, or stress) not yet incorporated into this review (no studies identified).

#### **C7.7 Sleep-wake disorders**

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

#### **C7.8** Disease of the nervous system

#### C7.8.1 Other conditions

One potentially relevant study awaiting classification (78) (see Appendix C4) and two ongoing studies (NCT04035954, RBR-7fhgkk) (see Appendix C5) were identified that cover two conditions (cervicogenic headache, cerebral palsy) not yet considered in this review (no identified studies).

#### **C7.9** Disease of the visual system

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) but two ongoing studies were identified (RBR-73c7bz, IRCT2016111530904N1) (see Appendix C5) that cover one condition (visual impairment) not yet considered in this review (no identified studies).

#### C7.10 Diseases of the ear or mastoid process

#### C7.10.1 Disorders with hearing impairment

Three citations (54-56) corresponding to two RCTs (Walowska 2018, Zarei 2020) were identified in the literature search. There was one study awaiting classification (Baluchi 2018) (128) that was published in a language other than English (see Appendix C4) and no ongoing studies (see Appendix C5). No additional studies were identified in the Department's public call for evidence (see Appendix C2).

Both studies were carried out in education centre settings in either Poland (Walowska 2018) or Iran (Zarei 2020). Walowska 2018 included 80 high school and secondary school students with diagnosed congenital hearing impairment, all of whom had mixed hearing loss in the left and right ear classified as severe and profound but without other additional dysfunctions. Participating students did not use their hearing aids during the study. Zarei 2020 included 24 deaf female students aged between 15 and 18 years who were willing to participate in the study, were not using drugs and did not have cochlear implants. Written consent from parents and/or guardians for the participation of their child was obtained in both studies.

Walowska 2018 compared 6 weeks of modified Pilates exercises to physical education classes. Pilates classes were held three times a week for 45 minutes, with the Pilates exercises designed to improve balance and strengthen motor skills. Zarei 2020 compared 8 weeks of Pilates to no intervention. Pilates classes were held three times a week for 60 minutes and included the use of a variety of small apparatus stick, dumbbells, and balls. Both studies began the Pilates exercises with warm up and cool down exercises.

#### **C7.11 Disease of the circulatory system**

#### C7.11.1 Cardiac arrhythmia

One citation (57) corresponding to one NRSI (Hoseini Niya 2019) was identified in the literature search. There were no studies awaiting classification (see Appendix C4), no ongoing studies (see Appendix C5) and no additional studies identified in the Department's public call for evidence (see Appendix C2).

Hoseini Niya 2019 was conducted in Iran in a research setting (details not provided). The study enrolled 30 women with cardiac arrhythmia (tachycardia) aged between 24-59 years. Baseline characteristics per group were not reported.

Hoseini Niya 2019 compared the effectiveness of Pilates to an active comparator (walking on a treadmill). Pilates sessions lasted 60 minutes, including warm up and cooling down periods, and were delivered three times a week for 8 weeks. The intensity of exercise was from 60% to 70% of maximum heart rate controlled using a pulse oximeter. Walking sessions included gradual increases in slope and speed, up to a maximum 14% slope and 3.4 miles/hour speed. The duration of exercise was as much as the participants were able to tolerate.

#### C7.11.2 Heart failure

One citation (58) corresponding to one RCT (Guimaraes 2012) was identified in the literature search. There were no studies awaiting classification (see Appendix C4), no ongoing studies (see Appendix C5) and no additional studies identified in the Department's public call for evidence (see Appendix C2).

Guimaraes 2010 was carried out in a cardiology hospital in Brazil and included 16 heart failure patients receiving clinical and optimised pharmacological treatment for at least 3 months. Participants were enrolled if they had LVEF  $\leq$  40% as determined by echocardiography and NYHA functional classification of I or II (no or

slight limitation of physical activity). Participants were middle aged (mean age range 44-46 years) and predominantly male.

Guimaraes 2010 compared Pilates to a conventional exercise program, both of which were supervised and performed for 20 minutes twice a week for 16 weeks. Pilates exercises were performed on mats using accessories including TheraBands, fitballs and foam rollers and conventional exercises included small free weights and elastic bands. In addition, all participants performed 40 minutes of aerobic exercise training (walking on a treadmill) prior to performing either mat Pilates exercises or conventional exercises.

#### C7.11.3 Other cardiac conditions

Two ongoing studies (NCT02109055, NCT02437240) (see Appendix C5) were identified that cover one condition (recovery after acute event) not yet incorporated into this review (no identified studies). There were no studies awaiting classification (see Appendix C4) and no additional studies identified in the Department's public call for evidence (see Appendix C2).

#### **C7.12** Diseases of the respiratory system

One potentially relevant study awaiting classification (86) (see Appendix C4) and two ongoing studies (NCT03670654, RBR-5hq3xh) (see Appendix C5) were identified that cover one condition (Asthma) not yet incorporated into this review (no identified studies). No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2).

#### C7.13 Disease of the digestive system

One potentially relevant study awaiting classification (87) (see Appendix C4) and one ongoing study (da Costa 2016) (see Appendix C5) were identified that cover two conditions (non-alcoholic liver disease, temporomandibular disorders) not yet incorporated into this review (no identified studies). No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2).

#### **C7.14 Disease of the skin**

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

#### C7.15 Diseases of the musculoskeletal system or connective tissue

**C7.15.1** Inflammatory arthropathies (juvenile idiopathic arthritis, rheumatoid) One citation (59) corresponding to one RCT (Mendonca 2013) was identified in the literature search. No additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and two ongoing studies (IRCT2015092624201N1, NCT03836820) (see Appendix C5).

Mendonca 2013 was carried out in a single centre setting in Brazil and enrolled 50 children aged 8 to 18 years diagnosed with oligoarticular, polyarticular, and systemic subtypes of JIA. The mean age of the mostly female (64%) participants was 11 to 12 years.

Mendonca 2013 compared the effectiveness of Pilates exercises with conventional exercise, with 50-minute sessions delivered twice per week for 24 weeks. The exercises, adapted to the physical and cognitive

specification for the age group and disease-specific limitations, included floor exercises as well as exercises with the Reformer, Stability Chair, Cadillac, and Ladder Barrel.

#### C7.15.2 Lateral epicondylitis or lateral epicondylosis

One citation (60) corresponding to one quasi-RCT (Dale 2016) was identified in the literature search. There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5). No additional studies were identified in the Department's public call for evidence (see Appendix C2).

Dale 2016 was a pilot study carried out in a single centre setting in the USA. Participants were diagnosed with lateral epicondylitis or lateral epicondylosis (tennis elbow) and had been referred to an occupational therapist. Thirteen of the 17 participants (76%) were female.

Dale 2016 compared the effect of mat Pilates with no intervention offered as an adjunct to standard care that included therapeutic exercise, modification of daily task performance, use of physical agent modalities, augmented soft tissue mobilisation and orthosis wear (elbow brace). The Pilates sessions were delivered two times per week for five weeks, but the session duration was not specified.

#### C7.15.3 Degenerative condition of spine

There were four ongoing studies (CTRI/2019/06/019559, NCT03198273, CTRI/2013/10/004110, NCT01711203) identified that cover three conditions not yet incorporated into this review (no identified studies) (see Appendix C5). Spondylolysis is related to the degeneration of a portion of the vertebra, with or without the forward displacement of a vertebral body (spondylolisthesis). Herniated discs occur when the pads between the vertebrae bulge into the space containing the spinal cord, causing pain. Lumbar instability refers to the loss of a normal pattern of spinal motion associated with functional (e.g., loss of neuromotor capability) or structural changes.

#### **C7.16** Diseases of the genitourinary system

#### C7.16.1 Chronic kidney disease

Six citations (61, 63-66) corresponding to four RCTs (Chiavegato 2014, Lendraitiene 2018, Rahimimoghadam 2017, Rahimimoghadam 2019) were identified in the literature search. There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5). No additional studies were identified in the Department's public call for evidence (see Appendix C2).

All four studies were carried out in single centre settings in either Brazil (Chiavegato 2014), Iran (Rahimimoghadam 2017, Rahimimoghadam 2019) or Lithuania (Lendraitiene 2018) with the sample size ranging from 32 to 56 participants (total 188). Chiavegato 2014 included patients who were in the late postoperative phase following kidney transplant or with kidney failure. Lendraitiene 2018 also included participants who had undergone kidney transplant; 84.4% of whom had glomerulonephritis, pyelonephritis, or polycystic kidney disease. Patients in Rahimimoghadam 2017 and Rahimimoghadam 2019 were healthier and included participants who had a history of haemodialysis treatment 2 to 3 times per week for at least 6 months (Rahimimoghadam 2017), or participants with Stage II (GFR: 60–89 mL/min/1.73 m2) or Stage III (GFR: 30–59 mL/ min/1.73 m2 ) CKD (Rahimimoghadam 2019). Most participants in the included trials were middle-aged (mean age ranged between 38-52 years), but participants in Rahimimoghadam 2017 and Rahimimoghadam 2019 were predominantly male (> 80%), whereas participants in Lendraitiene 2018 were mostly female (72%).

Two studies (Rahimimoghadam 2017, Rahimimoghadam 2019) compared a modified form of Pilates with no intervention. One study (Chiavegato 2014) compared modified Pilates with conventional physical therapy and one study (Lendraitiene 2018) compared Pilates with aerobic exercise. In all studies the Pilates sessions were typically one hour in duration, but the treatment programmes ranged in intensity from daily for 10 days (until discharge) (Chiavegato 2014), through to three-times per week for 12 weeks (Rahimimoghadam 2019). Post-intervention follow-up occurred in one study (Chiavegato 2014).

#### C7.16.2 Urinary incontinence

Five citations (67-70, 72) corresponding to one RCT (Lausen 2018), one quasi-RCT (Yuvarani 2018) and one NRSI (Chmielewska 2019) were identified in the literature search. There were six citations (93, 95, 96, 157, 158, 165) corresponding to four studies awaiting classification (Huang 2011, Santos 2017, Savage 2005, Seckin 2011) (see Appendix C4) and five ongoing studies (see Appendix C5). One additional study (Pavithralochani 2019) (71) was identified in the Department's public call for evidence (see Appendix C2).

Three studies were carried out in single centre settings in either the UK (Lausen 2018), Poland (Chmielewska 2019) or Brazil (Yuvarani 2018). One study (Pavithralochani 2019) did not report the study setting and was based in India. The number of participants included in the studies ranged from 30 to 73 people (total 174). Participants in all studies were women. Chmielewska 2019 enrolled older women aged 45 years or older with mild or moderately severe stress urinary incontinence. Lausen 2018 included participants with stress, urge or mixed urinary incontinence who had been referred for physiotherapy (mean age between 49 and 51 years). Yuvarani 2018 enrolled primiparous<sup>e</sup> women (up to one-year postpartum) aged between 21 and 25 years with stress urinary incontinence that had persisted for more than two months. Participants in Pavithralochani 2019 were aged between 21 and 25 years and in their third trimester of pregnancy.

One study (Lausen 2018) compared modified Pilates with no intervention as adjunct to standard physiotherapy. The other three studies compared Pilates exercises with another intervention: either surface electromyographic biofeedback (Chmielewska 2019), Kegels exercise (Pavithralochani 2019) or transverse abdominal training (Yuvarani 2018). All participants in Chmielewska 2019 were also asked to do at home pelvic floor muscle contraction exercise. The treatment programs ranged in duration and intensity from three 60-minute sessions a week for eight weeks (Chmielewska 2019), six 60-minute sessions per week for six weeks (Lausen 2018), ten repetitions of a set program five times per week for 12 weeks (Yuvarani 2018), through to ten 20-minute sessions per week for four weeks (Pavithralochani 2019).

#### C7.16.3 Other genitourinary system conditions

Three potentially relevant studies awaiting classification (92, 139, 140) (Omidali 2015, Ramezanpour 2018, Samadi 2013) (see Appendix C4) and two ongoing studies (IRCT2015011520465N1, IRCT2015012520465N2) were identified that cover two conditions (dysmenorrhoea, premenstrual syndrome) not yet incorporated into this review (no identified studies) (see Appendix C5).

#### **C7.17 Conditions related to sexual health**

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

<sup>&</sup>lt;sup>e</sup> A woman who has been pregnant and given birth once.

#### C7.18 Pregnancy, childbirth, or the puerperium

#### C7.18.1 Antenatal

Four citations (73-76) corresponding to two RCTs (Dias 2018, Rodriguez-Diaz 2017) and two NRSIs (Sarpkaya Guder 2018, Oktaviani 2018) were identified in the literature search. There were five ongoing studies (see Appendix C5) and no studies awaiting classification (see Appendix C4). No additional studies were identified in the Department's public call for evidence (see Appendix C2).

Two studies were carried out in hospital settings in Cyprus (Sarpkaya Guder 2018) and Spain (Rodriguez-Diaz 2018), and two studies were carried out in research settings in Brazil (Dias 2018) and Indonesia (Oktaviani 2018). Sample sizes ranged from 40 to 108 participants (total 303). Two studies (Dias 2018, Sarpkaya Guder 2018) included women who were primiparous<sup>f</sup>, carrying one foetus and had no pregnancy related complications. Dias 2018 included women who were between 14 to 16 gestational weeks and Sarpkaya Guder 2018 enrolled women who were between 28 to 32 gestational weeks. Two studies included participants who were primiparous or multiparous, with Rodriguez-Diaz 2017 including women who were between 24 to 30 gestational weeks, carrying one foetus and had no pregnancy related complications, and Oktaviani 2018 enrolling women who were more than 27<sup>+6</sup> gestational weeks presenting with musculoskeletal pain affecting pregnancy. Oktaviani 2018 did not indicate whether the pregnancy involved more than one fetus. In all studies, the age of participants was comparable, with the mean ages ranging between 27 and 32 years.

Two studies compared Pilates with control (no intervention or usual activities) offered as an adjunct to standard care. Rodriguez-Diaz 2018 evaluated an equipment-based Pilates program and Sarpkaya Guder 2018 evaluated a Pilates-assisted childbirth preparation training program. The other two studies compared Pilates with another intervention, being pregnancy exercises guided by a certified instructor (Oktaviani 2018) or walking and strengthening exercises (Dias 2018). In three studies the duration of the Pilates program was 8 weeks, however the intensity of the program ranged from one 70- to 80-minute session per week (Oktaviani 2018) to two 40- to 45-minute sessions per week (Rodriguez-Diaz 2018, Sarpkaya Guder 2018). In one study (Sarpkaya Guder 2018), participants also participated in a 60-minute theoretical education training program in the first 4 weeks, accompanied by an additional 15-minutes breathing exercise for 8 weeks. In one study (Dias 2018) the duration of the Pilates program was 18 weeks offered between gestational weeks 14 to 16 and gestational weeks 32 to 34, with participant attending two 60-minute sessions per week.

#### C7.19 Certain conditions originating in the perinatal period

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

#### C7.19.1 Developmental anomalies

No studies were identified in the literature search and no additional studies were identified in the Department's public call for evidence (see Appendix C2). There were no studies awaiting classification (see Appendix C4) and no ongoing studies (see Appendix C5).

<sup>&</sup>lt;sup>f</sup> A woman who has been pregnant and given birth once.

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Stephanie Allerdice, Santwona Baidya, Aaron Shikhule, and Juan Olaya contributed to the evidence review but are not listed as authors of the review. Contributions were made in the following areas: conduct of the literature search, screening for eligible studies, preliminary study appraisal and data collection.

# **Contributions of authors**

The Evidence Evaluation Report was written and developed by **HT**Analysts, with evidence synthesis (statistical analysis and GRADE) conducted by the following lead reviewers: Margaret Jorgensen, Roxanne Maurin, Alison Miles, or Mary Iconomou. Expert advice was provided by NTREAP and NTWC, especially in relation to intervention, study design and eligibility criteria.

A methodological review of the draft evaluation report was conducted by Cochrane Australia.

# **Declarations of interest**

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

In line with the process to establish any NHMRC committee, each committee member was asked to disclose their interests. Potential conflicts of interest among NHMRC NTWC members are lodged with the NHMRC and are available <u>online</u>.

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