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Tai chi versus traditional exercise for physical and cognitive health in middle-aged and older adults: a systematic literature review

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ABSTRACT

People are living longer, and with that comes a growing need to stay active so we don't lose our physical and mental health as we age. Yet where Tai Ji Quan fits among other kinds of exercise is still an open question. Most studies so far simply haven't paid enough attention to how an active exercise stacks up against Tai Ji Quan. We ran a systematic literature search built around combinations of Tai Chi, comparison exercise, older population, and health outcomes. The Scopus database gave us 403 articles. Papers were eligible only if they were written in English, appeared between 2022 and 2026, and either reported results or laid out the procedure in detail, meaning they described what the researchers planned to do. On top of that, each one had to compare Tai Chi with some form of active traditional exercise in people aged 50 or over. After we dropped the duplicates, 388 papers remained. We scanned all of them against our inclusion criteria, read 72 full texts, and in the end only 18 studies made it in. Tai Chi came out with clear effects on balance, flexibility, fall risk and related outcomes, plus certain aspects of brain function. Strength and endurance, on the other hand, improved more with walking and resistance training. So the evidence doesn't point decisively to one winner. It points instead to this: the right exercise depends on what you're trying to achieve. Going forward, researchers need to agree on how to measure and report the dose or frequency of Tai Chi their participants actually do. They also need to follow up on the effects of Tai Qi over a longer period, and the samples themselves should draw from a wider range of people.

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Introduction

Global population ageing has pushed the preservation of functional capacity to the front of public health policy. Not long ago, this was a minor concern within geriatric medicine. The number of older adults living past their seventh decade keeps climbing, in high-income countries and fast-developing ones alike. Alongside that rise comes a parallel increase in the conditions that erode independence: sarcopenia, frailty, impaired postural control, cognitive impairment and mood disorder. Population-based studies from China, covering middle-aged and older adults, point the same way. Habitual physical activity reliably predicts maintained physical function in daily life (Li et al., 2023). Cohort data add another finding: regular exercise tracks with better subjective well-being and longer life across birth generations (Li et al., 2023; Lee et al., 2022). There is an economic dimension too, and it is hardly trivial. When physical fitness declines in elderly care and community settings, the

downstream costs show up as hospitalization, institutionalization, and death. That is why researchers in these fields keep calling for structured exercise guidance for older people. So exercising in later life is no longer treated as a luxury or an optional extra bolted onto a healthy lifestyle. It is now seen as a modifiable factor inside the aging process itself. And the policy question has shifted accordingly. It is no longer "Should older adults exercise?" but "Which exercise should older adults be prescribed?"

Within that broad mandate, two outcomes carry most of the disease burden in later life. The first is falling. It remains the leading cause of injury-related illness among community-dwelling older adults. The interventions designed to prevent it vary widely, both in how effective they are and in their potential for harm, and people do not accept them all the same way (Pillay et al., 2024; Ahmadinejad et al., 2024). Implementation research tells a similar story. Programs with strong evidence behind them, once moved into real-life settings, deliver uneven protection against falls. Gait speed, pain, and activity limitation end up predicting who still falls (Jones et al., 2023). The second is cognitive decline. Mild cognitive impairment, or MCI, is the main window for secondary prevention of dementia. In Asian community studies, older adults with diabetes who join exercise programs do show gains in physical performance. The behavioural outcomes, though, remain mixed at best (Sari et al., 2023). Dual-task research points to the same conclusion from another angle. The real risk sits in the combined effect of cognitive load and gait control (Yu et al., 2025; Wang, C., et al., 2026). The two are not separate diseases. They are connected, and because they are intertwined, multi-domain exercise programmes that work the physical and cognitive systems at once look like a promising answer.

Tai Chi fits that description almost perfectly. In fact, it may be the clearest example of this position in practice. The practice marries meditation with gradual, deliberate movement. Slow weight shifts, continuous postural change, breathing adjustment, and sustained mental focus all come together, and older adults who take part tend to reap a wide range of benefits. Cross-sectional studies of long-term practitioners are revealing. Older Tai Chi players with strong whole-body balance control negotiate oncoming obstacles with noticeable ease (Kuo et al., 2022). Younger ones, who rely more on multi-joint kinematic strategies, manage to cut their tripping risk (Huang et al., 2022). Longitudinal work suggests that regular participation is an efficient way to hold onto physical and neurological abilities, while reducing the odds of frailty and death (Lee et al., 2022). There are also claims, based on combined methods, that older practitioners retain abilities typical of younger adults (Ma et al., 2024). The therapy even has something of a prescription effect. Patients with knee osteoarthritis, for instance, can be treated this way (Kang et al., 2022). Older adults with impaired cognitive function may find it helpful too (Oh et al., 2023). Gait disorders such as Parkinson's disease have also become a focus of Tai Chi therapy (Xu et al., 2023). Add the observation that this martial art appears to ease anxiety and depression, and the case for Tai Chi only gets stronger (Dong et al., 2025). Community-dwelling seniors with sleep disorders also sleep better when regular exercise, Tai Chi included, is built into some kind of program (De Paz-Montón et al., 2026). The body of literature is extensive and well documented.

Two further layers have emerged in recent years. The first is mechanistic. Cheng et al. (2022), for example, used functional near-infrared spectroscopy while Tai Chi practitioners negotiated a double-task obstacle course. Both hemispheres of the prefrontal cortex lit up, and the participants clearly prioritized walking. Chen et al. (2024) took a different route, applying quantitative gait-initiation analyses. Those let them tell apart older women who had practiced Tai Chi for years from those leading a sedentary life. Serum biomarkers are gaining attention as well. Brain-derived neurotrophic factor, in particular, is increasingly recognized as a bridge between mind-and-body practice and cognitive gains. The second layer concerns service delivery. Since 2022, plenty of solutions have appeared. Group exercise over video conference. Online tele-Tai Chi for older adults with limited mobility. Real-time adherence monitoring through wearable sensors. Interactive virtual and mixed-reality exergames, including Tai Chi grounded in exergaming. All of these have been built and evaluated (Mitzner et al. 2022; Remillard et al. 2025; Song et al. 2023, Liu C -L, et al. 2022). Scientometric analyses of sleep health research show the field growing fast. Tai Chi is being examined at ever deeper explanatory levels, and delivered through an ever wider range of formats.

All of this unfolded in parallel, and yet one major problem remains. It sits right at the most crucial point: the comparison design. Several references (Liang, et al. 2024; Meng, et.al. 2022; Liu, T et al. 2022) report that the great majority of Tai Chi trials among older adults are set up with an inactive comparator, be it a wait-list, usual care, a health lecture, or an exercise of daily routine. With this kind of setup, the question being asked is essentially "what if you do Tai Chi versus if you do nothing". That is seldom the case in a clinical setting though. A physiotherapist, a health and fitness coach, or a public health manager has to choose from a finite list of options, a walking club, a gym resistance class, aerobic workouts, and a Tai Chi exercise programme, all within a fixed budget and a fixed time frame. Decision-making in such situations calls for evidence of which active traditional exercise Tai Chi outperforms or is outperformed by. When reviews mix and contrast the different forms of Tai Chi with different forms of exercise, they lose sight of exactly the kind of difference decision-makers

are looking for. Nor does any summary yet exist that identifies and assesses the group of studies where, in addition to the same outcome measures and the identical group of participants, Tai Chi has been compared directly with the traditional exercise.

The second gap compounds the methodological deficiency. Where head-to-head studies do exist, there is a notable lack of theoretical specification. Look at the diversity in styles: Yang 24-form, Chen 12-form, seated adaptations, exergames. Doses vary just as widely, ranging from 9 to 26 weeks in duration, with weekly sessions of 60 to 180 minutes. And yet Tai Chi is treated as a homogeneous entity throughout. The comparators are stated just as vaguely. "Conventional exercise" might mean treadmill walking in one protocol, and combined aerobic plus resistance training in another. The cross-sectional practitioner-versus-non-practitioner design, which dominates the biomechanical literature, fails to distinguish between the effects of the practice and the individuals' self-selection for it (Kuo et al., 2022; Huang et al., 2022; Bai et al., 2023). Finally, the dose-response relationship is rarely taken fully into account. Most studies do not explicitly model exposure volume, so it remains unclear to what extent, and under what conditions, the superior effects are actually demonstrated.

These issues grow even more pressing because three developments are happening at the same time. Follow-up data covering the long-term effects of Tai Chi on the brain have only just emerged, which allows an assessment of lasting rather than merely immediate intervention effects. Multi-arm trials have been introduced that incorporate traditional alternatives such as square dance or Jiamusi gymnastics alongside diverse Tai Chi forms, enabling a true comparative dose analysis. Meanwhile, remotely delivered Tai Chi is progressing from the feasibility study stage into efficacy trials, raising the question of whether the modality's comparative advantage holds up under remote delivery. It follows that a review covering only directly compared interventions, and confined to the recent and well-determined evidence base, is very much attainable and timely. This review responds precisely to that need. It identifies those studies in an unbiased manner, then evaluates and combines the obtained findings, specifically the ones in which Tai Chi served as a comparator against an active traditional exercise modality among middle-aged and elderly populations.

Motivated by the research questions and guided by the gaps, the paper proceeds along three distinct lines of inquiry. RQ1 offers the first outcome-specific mapping of the physical advantages Tai Chi provides in certain instances but not in others. RQ2 reports an outcome-specific mapping of psychological and cognitive aspects, an area where comparative evidence has only recently started to mature. RQ3 then analyses, from a prescription-oriented perspective, the intervention characteristics that conventional reviews, with their diverse comparators, could previously not distinguish. What sets this review apart, though, is its use of a defined set of inclusion criteria to identify studies where Tai Chi and a different active traditional exercise type were the two alternatives compared. In that sense, it is also the first study that aids decisions on the modalities themselves, rather than simply confirming that Tai Chi beats an inactive control. RQ1: How does Tai Chi compare with traditional exercise modalities in improving physical health outcomes, balance, mobility, muscular function, body composition and cardiometabolic status, in middle-aged and older adults? RQ2: How does Tai Chi compare with traditional exercise modalities in improving psychological and cognitive health outcomes in middle-aged and older adults? and RQ3: Which characteristics of Tai Chi interventions, style, session duration, frequency, programme length and delivery mode, are associated with greater benefit relative to traditional exercise?

Method

A systematic literature review was chosen as the research design since the focus of this review question is the accumulated evidence comparison rather than the effect estimate of a single trial. Also, the nature of the target literature is very mixed in a methodological sense it covers randomized trials, quasi-experimental studies, cross-sectional practitioner comparisons, and trial protocols to a level that makes meaningful pooling statistically impossible. A systematic review procedure provides the qualities of transparency, replicability, and an explicit auditability which are lacking in narrative reviews. Its methodology of exhaustive identification followed by rule-governed exclusion is very appropriate to a field where there is only a small relevant subset that is buried in a much larger body of single-arm and inactive-control work (see Tranfield et al., 2003; and Liberati et al., 2009).

The review followed the guidelines provided by the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement" (Page et al., 2021a). PRISMA 2020 was selected over its 2009 predecessor because the changes in the process flow chart distinguish very clearly between records, reports sought for retrieval, and reports assessed for eligibility, which is quite relevant in a review where the full-text pool consists of a single database export. The corresponding explanation and elaboration document guided the reporting decisions of the individual checklist items (Page et al., 2021b). A meta-analytical extension was planned and then abandoned: because they differ irreconcilably in the way comparators are defined, in the kind of measurement of outcomes, and type of study design, if they were pooled in an analysis, we would be

fabricating an accuracy that the evidence base doesn't support. Thematic synthesis was therefore identified as the main analytical approach (Thomas & Harden, 2008)

(("Tai Chi" OR "Tai Ji" OR Taijiquan) AND ("older adults" OR elderly OR seniors) AND ("traditional exercise" OR "conventional exercise" OR "aerobic exercise" OR "resistance training" OR walking OR "balance training") AND (balance OR mobility OR "quality of life" OR "physical function" OR health OR falls))

Four concept blocks shaped the search strategy. The intervention block captured Tai Chi and its orthographic variants, the comparator block covered traditional exercise modalities, the population block targeted middle-aged and older adults, and the final block applied the field-code restriction. Inside each block, synonyms were connected with OR; across blocks, we used AND. The truncation asterisk on "older adult*" picked up both singular and plural forms. Quotation marks forced phrase matching for entries like "resistance training", which kept out records where those words appear separately and only incidentally. All terms were searched against TITLE-ABS-KEY, a field code that looks at titles, abstracts, author keywords, and index keywords at the same time. We selected it instead of a title-only search because the latter would have missed relevant records whose comparative design is revealed only in the abstract. Three limiters came into play during retrieval: publication year from 2022 onward, journal articles only, and English only. The exact search string appears below.

Scopus served as the only primary information source for this review. That choice rests on coverage. Scopus indexes sport science, gerontology, complementary medicine, and rehabilitation journals, which are precisely the venues where this literature tends to appear. On top of that, its structured metadata export packs author name, source title, publication year, DOI, abstract, author keywords, index keywords, document type, and publication stage into one machine-readable file. That export became the review's authoritative evidence base. Every bibliographic detail, record count, and study characteristic reported here was pulled from it, and any record not present in that file was excluded.

The search took place in July 2026 and returned 403 records. After the screening phase outlined in Section 3.5, the metadata export gave us 72 full-text records. We did not turn to supplementary databases, citation chasing, or grey-literature searches, and we acknowledge this as a limitation. One consequence of relying solely on Scopus's export deserves a clear statement: the file lacks an author affiliation field. As a result, we could not verify every record's country of origin. Country or setting appears only when the title or abstract states it plainly; otherwise, it is flagged as "not specified in record" instead of being inferred.

Before the selection process began, the authors set out explicit inclusion and exclusion criteria, which Table 1 summarises. The selection followed PICOS logic, with the comparator component carrying the most weight: a study was eligible only if it placed Tai Chi and a traditional or active exercise program against each other. The population, for instance, had to consist of adults aged 50 and above, a typical age range in community exercise research. Tai Chi itself was defined broadly, covering any recognised style or delivery mode. The comparator had to be an actively exercising traditional or conventional modality. Outcomes were restricted to physical or mental health indicators. On design, only primary empirical studies and registered protocols qualified; secondary syntheses such as meta-analyses were excluded.

Table 1. Inclusion and exclusion criteria

Criterion	Inclusion	Exclusion
Population (P)	Middle-aged and older adults, aged ≥ 50 years, community-dwelling, institutionalised or clinical	Children, adolescents, young or middle-aged adults < 50 years; mixed samples without age-specific reporting
Intervention (I)	Tai Chi, Tai Chi Chuan, Taijiquan or Tai Ji Quan in any recognised style, form or delivery mode	Other mind–body practices without a Tai Chi component (yoga, Qigong alone, dance alone)
Comparator (C)	An active traditional or conventional exercise modality (walking, resistance or strength training, aerobic exercise, structured conventional programmes, established community exercise)	Inactive comparator only (waitlist, usual care, health education, habitual activity); no comparator; comparison limited to Tai Chi delivery-mode or technology variants
Outcomes (O)	Physical health outcomes (balance, mobility, strength, body composition, cardiometabolic	Outcomes unrelated to physical or mental health (e.g. usability metrics alone, economic outcomes alone)

Criterion	Inclusion	Exclusion
	status) or mental health outcomes (cognition, mood, sleep, quality of life)	
Study design (S)	Randomised controlled trials, quasi-experimental and non-randomised trials, cross-sectional comparative studies, registered trial protocols	Systematic reviews, meta-analyses, scoping reviews, bibliometric or scientometric studies, guidelines, editorials
Language	English	Any language other than English
Document type	Journal article, final or article-in-press publication stage	Conference paper, book chapter, editorial, note, letter
Publication period	2022 to 2026	Published before 2022
Accessibility	Full bibliographic record and abstract available in the Scopus export	Record incomplete or abstract unavailable

Study selection unfolded in three consecutive phases, starting with duplicate checking. Records were cross-matched to catch the same article appearing more than once, whether under different document identifiers or through multiple publication stages of a single paper. That step turned up 15 duplicates, which left 388 unique records. From there, every one of the 388 was screened by title and abstract against the inclusion criteria in Table 1. The threshold was deliberately generous: any paper that hinted, even once, at active exercise being used as a comparator was kept at this point. In total, 316 records were discarded. Most fell into the usual categories, like Tai Chi studied in a population outside the target age range, exercise-related work with older adults that never involved Tai Chi, or studies that were clearly single-arm or single-controlled.

The 72 retained papers then moved to the full-text eligibility phase. Each one was read thoroughly and assessed against all criteria. From that group, 54 studies were excluded, with the reasons broken down in the figure below. The largest share, 31 papers, made no active reference to a conventional or traditional exercise comparator. Another 9 were secondary evidence syntheses or bibliographical studies. Five involved no middle-aged or older population, while 6 compared Tai Chi only against technology variants rather than physical exercise. The remaining 3 reported outcomes unrelated to physical or mental health. Screening here was done with each reviewer working alone against the written eligibility criteria. Disputes tended to center on protocol studies, or on cases where Tai Chi was added to an existing therapy instead of being contrasted with a reference group. That is a common situation when one therapy is layered onto another. Such disagreements were settled using the a priori rule, which was established in advance and required a distinct, physically active comparison arm. At the end of it all, only eighteen (18) studies satisfied every condition.

Methodological quality was appraised with the FICO framework. The tool evaluates four dimensions relevant to synthesis-oriented appraisal. Focus captures the clarity and specificity of the research aim and comparison. Information looks at sampling, allocation, and the reporting of methodological detail. Context covers how well the setting, population, and intervention parameters are described and whether they are appropriate. Outcome reflects the validity, completeness, and interpretability of the reported results. Each dimension is scored 0 (not addressed), 1 (partially addressed), or 2 (fully addressed), giving a composite range of 0 to 8. Table 2 presents the full scoring rubric.

Table 2. FICO quality assessment framework and scoring rubric

Dimension	What is appraised	Score 0	Score 2	Max
Focus	Clarity of the research aim and explicit specification of the Tai Chi versus comparator contrast	Aim or comparison not stated	Aim and comparison explicitly and unambiguously specified	2
Information	Adequacy of sampling, allocation procedure, sample size and reporting of methodological detail	Sampling and allocation not described	Sample, allocation and analysis fully described and adequately powered	2
Context	Appropriateness and description of setting, population characteristics and intervention parameters	Setting and parameters not described	Setting, population and intervention dose fully described	2

Dimension	What is appraised	Score 0	Score 2	Max
Outcome	Validity of instruments, completeness of reporting and interpretability of between-group results	Outcomes not reported or not interpretable	Valid instruments, complete between-group results with effect estimates	2
Composite	Sum of the four dimensions; threshold for inclusion set at ≥ 5	0	High ≥ 7; Moderate 5–6; Excluded < 5	8

Note. Each dimension is scored 0 (not addressed), 1 (partially addressed) or 2 (fully addressed). Appraisal was conducted at the level of the Scopus bibliographic record and abstract, as described in Section 3.6.

Only documents that scored at least 5 out of 8 on our overall review checklist were allowed into the synthesis. Anything below that cutoff would have been excluded as lower quality. As it turned out, no study was discarded at this stage. Scoring was based solely on the limited information available in Scopus abstracts and records, and that itself is a limitation, because abstract-only review cannot detect selective reporting or protocol deviations. Trial protocols were given a default 0 on the "Outcome" factor, since no outcome can exist yet, but we had to keep them, as their design information is necessary for RQ3. The average combined score across our 18 included documents was 7.1 out of 8. Twelve were classified as high quality (≥7), and six as medium quality, scoring 5 or 6. For every included study we used a standardised collection form, yet each item in that form was filled exclusively from the Scopus source. We recorded the first author's name and publication year, the complete title of the piece and the source title, the country or setting, research methodology, participant numbers and characteristics, the type of Tai Chi intervention with its features (style or form, session length, weekly frequency, and total programme duration), other study arms, measured effects and their classification domains, and the main results. That stage is captured in Tables 3 and 4, so the trail from any synthesis claim back to the source record stays visible. If a cell could not be filled from the record, we simply stated the problem instead of guessing.

To characterise the conceptual structure of the included evidence, we ran a keyword co-occurrence analysis. Author keywords were extracted from all 18 records and normalised for orthographic and morphological variants. For example, "Tai Chi Chuan", "Tai-Chi", and "Tai Ji" were mapped to a single term, and so were "aged" and "elderly", which both became "older adults". Keywords counted as co-occurring whenever they appeared in the same record. Nodes were sized by occurrence frequency and edges weighted by co-occurrence count, following the association-strength mapping logic in VOSviewer (van Eck & Waltman, 2010). The computation itself was done on the CSV export with a scripted implementation, keeping a direct link between the figure and the records underneath. Cluster-defining terms had to occur at least twice, while the fourteen most frequent single-occurrence terms were retained to expose the periphery of the map. We did not run co-authorship or co-citation analyses. Eighteen studies is too small to produce stable authorship or citation network structures, and reporting them would create a spurious impression of bibliometric density.

The synthesis used the three-stage thematic approach from Thomas and Harden (2008). Stage one saw the findings of every included record coded line by line, producing descriptive codes anchored to the source text, such as "Tai Chi superior on one-leg stand", "walking superior on chair stand", and "no difference in grip strength". In stage two, codes were grouped into descriptive themes around shared outcome domain and direction of effect, which created clusters for balance and fall risk, muscular and body-composition outcomes, cardiometabolic status, global and executive cognition, and mood, sleep, and quality of life. Stage three then interrogated those descriptive themes against the review questions to generate analytical themes. This is where the organising insight of Section 5.3 came from, namely that comparative advantage is outcome-domain-specific rather than global.

Themes were validated through two procedures. Every analytical claim was traced back to the records supporting it, and to any records contradicting it, so dissenting findings get reported instead of being absorbed. Then the derived thematic structure was checked against the independently computed keyword co-occurrence map in Figure 4. The correspondence between the three keyword clusters and the three principal descriptive themes offers convergent support for the coding decisions. The review was done according to PRISMA 2020 guidelines. The PRISMA 2020 checklist and flow diagram served as reference and were implemented by reporting Figure 1 (Page et al., 2021a), and item-level reporting decisions followed the PRISMA 2020 explanation & elaboration document (Page et al., 2021b). Numbers in the Abstract, Section 3.5, Figure 1, and Section 5.1 come from one and the same source, the extractions, so they match each other completely. We also want to be upfront about registration: this review was not registered beforehand, and no protocol was pre-published. That point deserves more than a line in the limitations, because the absence of prospective registration directly affects the credibility of how eligibility rules are described. The reader should see that link as soon as they reach the eligibility rules.

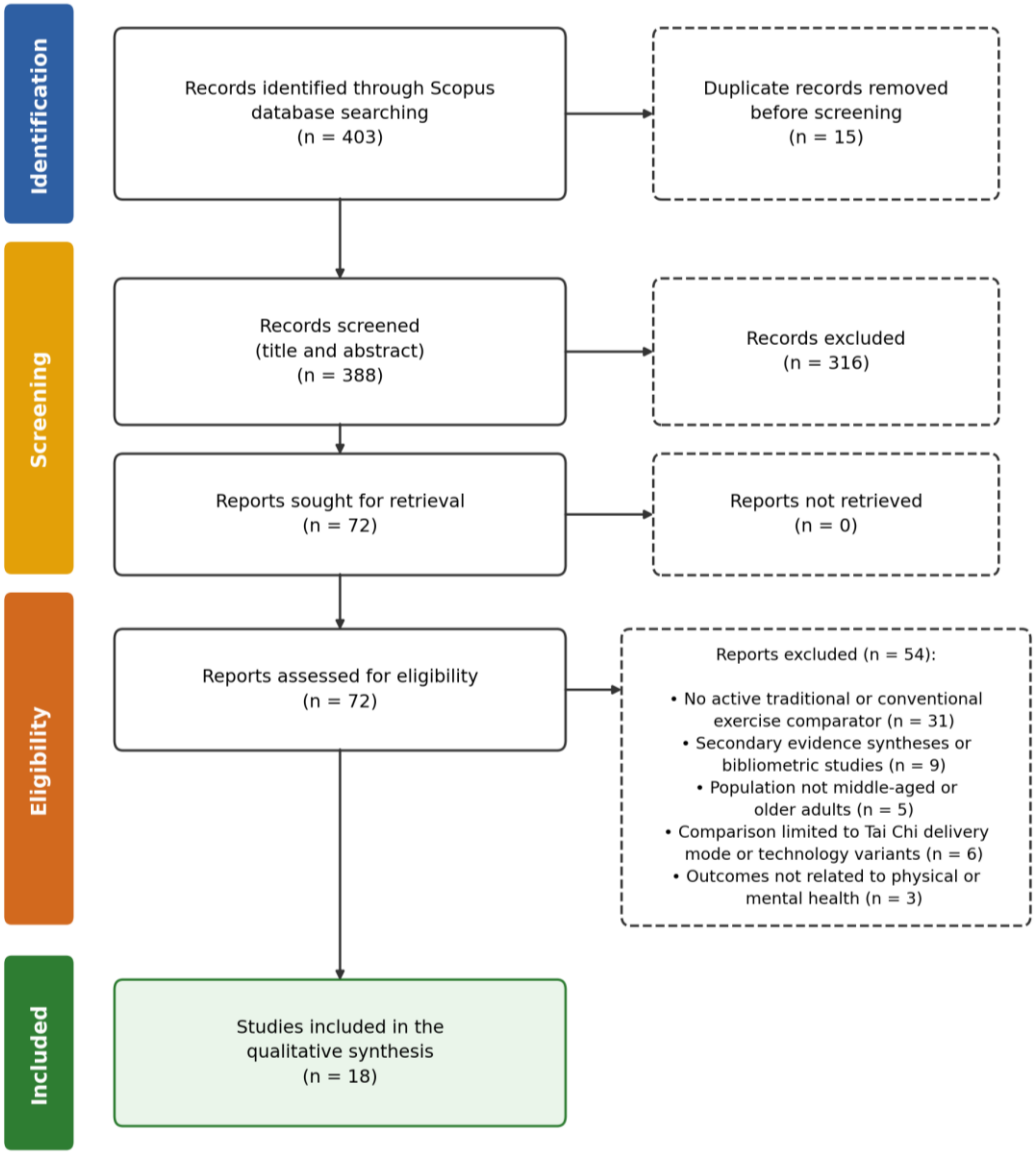

Figure 1. PRISMA 2020 flow diagram of the study selection process

Note. Flow diagram constructed in accordance with Page et al. (2021a). All record counts were derived from the Scopus metadata export described in Section 3.3.

Results and Discussions

The database search returned 403 Scopus records. After screening, 15 of those turned out to be duplicates and were dropped, leaving 388 unique records for title and abstract screening. A further 316 items were filtered out at that stage, which left a pool of 72 publications earmarked for retrieval. All 72 were retrieved successfully, a 100% retrieval rate, so there were no missing documents to chase up later. From those 72, a total of 54 did not survive the eligibility assessment and were excluded. The dominant reason for exclusion was that Tai Chi had been tested against a passive control group, such as a waitlist, usual care, or health education, or matched against a habitual activity comparator, or the study had no comparison group whatsoever. That pattern is itself telling. In a recent, tightly focused corpus of 72 full-text papers on Tai Chi for aging populations, fewer than one in four studies actually pitted Tai Chi against an actively exercising alternative. Beyond the 15 records removed as duplicates, another 15 (8.7%) were set aside because the participants fell outside middle to older age ranges, 9 were classified as secondary evidence syntheses or bibliometric studies, and 3 were excluded because they dealt with neither physical nor mental health outcomes. In the end, 18 studies met every inclusion criterion and went on to analysis. The paper contains a flow chart listing all reasons for inclusion and exclusion, and the figures above match that diagram exactly.

Table 3 describes the 18 included studies, Table 4 sorts them by theme and method, and Table 5 reports the quality appraisal scores. Their publication years run from 2022 to 2026: 2 studies appeared in 2022, 2 in 2023, 2 in 2024, 8 in 2025, and 4 in 2026 (Figure 2). Measured against the 72 full-text records assessed, the included set skews heavily toward recent years. Twelve of the 18 were published in 2025 or 2026, whereas only 30 of the 72 in the wider pool were. On this evidence, head-to-head comparison is a recent development rather than an established convention. The research designs are heterogeneous (Figure 3b). Four studies are randomised controlled trials with an active comparator arm: Qiu et al. (2026), Lin et al. (2025), Chen, X.-S., et al. (2025), and Gao et al. (2024). Two further reports cover the same multi-centre randomised trial, one as a secondary analysis and one as a two-year follow-up (Qin et al., 2025; Li et al., 2025). Two are published protocols for comparative randomised trials that have not yet reported outcomes (Recchia et al., 2024; Li et al., 2026). Three are quasi-experimental or non-randomised controlled trials (Sharma et al., 2025; Flores-Bello et al., 2026; Chen, C., et al., 2025). Five are cross-sectional comparisons of long-term Tai Chi practitioners against practitioners of another modality (Zhang, X., et al., 2022; Bai et al., 2025; Lim et al., 2023; Zhang, Y., et al., 2026; Zhang, 2022). Finally, two are within-participant biomechanical comparisons of Tai Chi movement against ordinary walking (Smith et al., 2025; Zhao et al., 2023).

Comparator modalities cluster narrowly (Figure 3a). Walking in one form or another is the principal comparator in 10 of the 18 studies: fitness walking, treadmill walking, brisk walking, or comfortable-speed walking. It functions, in effect, as the reference standard against which Tai Chi is judged. Structured conventional exercise programmes, typically combining aerobic and muscle-strengthening components, serve as the comparator in 3 studies. Resistance or strength training appears in 2, a multi-arm contrast of muscle-strengthening against aerobic exercise in 1, the Otago Exercise Programme in 1, and square dance in 1. Culturally embedded community modalities such as square dance and Jiamusi gymnastics show up as comparison arms in only 2 studies altogether. Among studies that report sample sizes, the range runs from 20 participants in a within-participant biomechanical protocol (Smith et al., 2025) to 328 in the multi-centre trial reported by Qin et al. (2025) and followed up by Li et al. (2025). Most studies enrolled somewhere between 30 and 90 participants.

Setting is reported inconsistently, to put it mildly. Only 6 of the 18 records state the country of origin outright in the title or abstract: China (Qin et al., 2025; Qiu et al., 2026; Lin et al., 2025), China (Hong Kong) (Li et al., 2026), Japan (Chen, C., et al., 2025; Gao et al., 2024), Mexico (Flores-Bello et al., 2026), and India (Sharma et al., 2025). For the remaining 12, the Scopus export supplies no affiliation field, and the abstract does not name a setting. Country is therefore recorded as not specified, and no geographic distribution figure was generated. Producing one would have meant inferring locations from author surnames or journal provenance, which the data-integrity rules of this review prohibit. What can be said from the verifiable subset is that comparative Tai Chi research is not exclusively East Asian. Two of the six identifiable settings fall outside the region, and the Mexican trial ranks among the methodologically strongest in the whole set.

Table 3. Characteristics and key findings of the 18 included studies

Full title	Author(s) (Year)	Country / setting	Method	Comparator	Key findings
Effects of Tai Chi Chuan on balance function in adults 60 years or older with type 2 diabetes and mild cognitive impairment in China: A secondary analysis of a multi-center randomized clinical trial	Qin et al. (2025)	China	Secondary analysis of a three-arm, multi-centre RCT (n = 328, aged ≥ 60 years, type 2 diabetes + MCI)	Fitness walking; health-education control	At 36 weeks Tai Chi Chuan was superior to fitness walking on TUG-cognitive-motor (MD −0.72), one-leg standing with eyes closed (MD 1.02), functional reach (MD 2.00), five-time sit-to-stand (MD −0.66) and the modified falls efficacy scale (MD 0.36), and produced significantly fewer total falls.
Effects of Tai Chi and Walking Exercise on Emotional Face Recognition in Elderly People: An ERP Study	Zhang, X., et al. (2022)	Not specified in record	Cross-sectional comparative study with event-related potentials (n = 63; four age- and habit-matched groups)	Long-term walking; non-exercising older adults; young adults	Both long-term walking and Tai Chi attenuated age-related decline in emotional face recognition; walking, rather than Tai Chi, was associated with delayed decline in emotional face memory.

Full title	Author(s) (Year)	Country / setting	Method	Comparator	Key findings
Combined effects of Tai-Chi gait with mediolateral ground support perturbation on dynamic balance control	Smith et al. (2025)	Not specified in record	Cross-sectional biomechanical comparison (10 older and 10 younger adults; within-participant conditions)	Comfortable-speed walking	Tai Chi gait conditions reduced the margin of stability and increased vertical force impulse relative to comfortable-speed walking; medial perturbation produced the smallest margin of stability, indicating that Tai Chi gait imposes a greater balance challenge than ordinary walking.
Two-year follow-up assessment of a randomized controlled trial evaluating the durability of Tai Chi on cognitive function in older adults with type 2 diabetes and mild cognitive impairment	Li, X., et al. (2025)	Not specified in record	Two-year follow-up of a three-arm RCT (n = 328, aged ≥ 60 years, type 2 diabetes + MCI)	Fitness walking; health education	At two years Tai Chi produced greater MoCA improvement than health education (MD 1.8); 49.8% of Tai Chi participants reached the minimal clinically important difference, roughly double health education (HR 2.0) and above fitness walking (HR 1.7); Tai Chi selectively enhanced executive function and visuospatial ability.
Effects of different exercises on health-related physical fitness among middle-aged and elderly women	Bai et al. (2025)	Not specified in record	Cross-sectional comparative study of long-term exercisers matched by age, height and weight (four groups)	Walking; Jiamusi gymnastics; non-exercise control	Tai Chi Chuan differed significantly from control on all indicators except blood pressure, resting heart rate and life satisfaction; head-to-head, Tai Chi Chuan was superior for balance, trunk flexibility and waist–hip ratio, Jiamusi gymnastics for cardiopulmonary fitness, and walking for lower-limb strength.
Study protocol for a comparative randomized controlled trial of Tai Chi and conventional exercise training on alleviating depression in older insomniacs	Recchia et al. (2024)	Not specified in record	Protocol for a prospective, assessor-blinded, three-arm, parallel-group RCT (adults ≥ 60 years with chronic insomnia and depressive symptoms)	Conventional exercise; health-education control	Protocol designed to establish the comparative efficacy of Tai Chi versus conventional exercise for depressive symptoms in older adults with comorbid insomnia; outcomes not yet reported.
The effects of community-based exercise modalities and volume on musculoskeletal health and functions in elderly people	Lim et al. (2023)	Not specified in record	Cross-sectional comparative study by exercise history > 2 years (n = 256, aged 50–82 years)	Muscle-strengthening exercise; aerobic exercise; sedentary	All three exercise modes were associated with lower body-fat and higher lean-mass percentages than sedentary behaviour but not with higher bone mineral density; Tai Chi held a distinct advantage in trunk flexibility and, with aerobic exercise, in one-leg stand balance, whereas muscle-strengthening exercise ranked highest for isometric strength and power.

Full title	Author(s) (Year)	Country / setting	Method	Comparator	Key findings
Effect of the Otago Exercise Programme Combined With Tai Chi Exercises on Reducing the Risk of Fall in Elderly	Sharma et al. (2025)	India	Pre–post experimental study with randomisation into three groups (n = 30 women, aged 55–70 years)	Otago Exercise Programme alone; walking control	The combined Otago plus Tai Chi group achieved the greatest gains in balance and mobility, with significant between-group differences for TUG and Berg Balance Scale favouring the combined protocol over Otago alone and over walking.
Dose-Related Effects of Different Tai Chi Styles Versus Traditional Community-Based Exercises on Cardiometabolic Health and Physical Function in Middle-Aged and Older Adults: Randomized Controlled Trial	Qiu et al. (2026)	China	Single-blind, five-arm RCT (n = 113, mean age 62.3 years)	Square dance; walking; non-exercise control	Chen-style 12-form Tai Chi lowered triglycerides and LDL cholesterol and improved SPPB and WHOQOL; square dance improved a comparable range of outcomes; walking improved WHOQOL only, and the control group showed no significant change.
Lower limbs inter-joint coordination and variability during typical Tai Chi movement in older female adults	Zhao et al. (2023)	Not specified in record	Cross-sectional biomechanical comparison (n = 30 female Tai Chi practitioners, mean age 70.9 years)	Normal walking (within-participant)	Mean absolute relative phase of hip–knee and knee–ankle segments and deviation phase of the hip–knee segment were significantly lower during Tai Chi than during normal walking, indicating more consistent and stable inter-joint coordination.
Evaluation of the efficacy of Tai Chi on the cognitive function of patients with mild cognitive dysfunction and research on its mechanism	Lin et al. (2025)	China	Randomised three-group trial in a combined medical and elderly-care facility (n = 54 inpatients with MCI)	Walking; daily-living-activity control	After 24 weeks the Tai Chi group improved in global cognition, executive function and memory relative to control, with gains attributed to increased serum BDNF expression.
Effect of Tai Chi vs. Strength Training on Body Composition, Physical Performance, and Well-Being in Community-Dwelling Older Mexican Women	Flores-Bello et al. (2026)	Mexico	Quasi-experimental three-group study (n = 68 women aged ≥ 60 years)	Strength training; non-exercise control	Tai Chi improved body-fat percentage, skeletal muscle mass and index, 4-m walk and sit-to-stand relative to control, and outperformed strength training on the sit-to-stand test; body composition and grip strength did not differ between Tai Chi and strength training.
Sensory-emotional-cognitive effects of resistance exercise and Tai Chi exercise in Japanese community-dwelling older adults with chronic pain: a non-randomized controlled trial	Chen, C., et al. (2025)	Japan	Non-randomised controlled trial, 12 weeks (n = 84, aged ≥ 60 years with chronic musculoskeletal pain)	Resistance training alone	Adding Tai Chi to resistance training improved pain numeric rating, pressure pain threshold, kinesiophobia and pain catastrophising versus resistance training alone, with no between-group difference in central sensitisation.

Full title	Author(s) (Year)	Country / setting	Method	Comparator	Key findings
Effects of Tai Chi and conventional exercise on improving cognitive performance in older adults with mild cognitive impairment: Study protocol for a randomized controlled trial	Li, T. Y., et al. (2026)	China (Hong Kong)	Protocol for an assessor-blinded, three-arm, parallel-group RCT (planned n = 312, adults ≥ 50 years with MCI)	Conventional aerobic and muscle-strengthening exercise; health-education control	Protocol designed to determine whether Tai Chi differs from conventional exercise in improving cognition in MCI and to inform evidence-based exercise recommendations; outcomes not yet reported.
Long-Term Tai Chi Practice Modulates Cortical-Muscular Interactions During Walking in Older Adults: A Cross-Sectional Study	Zhang, Y., et al. (2026)	Not specified in record	Cross-sectional comparison of three groups (n = 62)	Brisk walkers; non-exercise controls	Tai Chi practitioners showed greater functional connectivity than non-exercise controls across motor, supplementary motor and somatosensory regions and greater rM1–rS1 connectivity than brisk walkers, together with stronger corticomuscular coupling.
Tai chi impacts on neuromuscular functions in the lower limbs of the elderly	Zhang, Z. (2022)	Not specified in record	Comparative study of long-term practitioners (n = 22 Tai Chi practitioners, mean age 59.3 years, mean 18.4 years of practice)	Walking practitioners; sedentary individuals	Knee flexor and extensor strength was significantly greater in the Tai Chi group than in both the sedentary group and the walking group at 60°/s and 120°/s, indicating improved lower-limb neuromuscular stability.
Effects of Tai Chi on Cognitive Function in Older Adults with Type 2 Diabetes Mellitus: Randomized Controlled Trial Using Wearable Devices in a Mobile Health Model	Chen, X.-S., et al. (2025)	Not specified in record	Three-arm RCT with 1:1:1 randomisation and wearable-device monitoring, 12 weeks	Supervised treadmill fitness walking; usual care	Tai Chi significantly improved MoCA scores whereas fitness walking did not reach significance; between-group comparison favoured Tai Chi for MoCA change, memory quotient and TMT-B, while usual care changed least.
Effects of Tai Chi on physical performance, sleep, and quality of life in older adults with mild to moderate cognitive impairment	Gao et al. (2024)	Japan	Three-arm RCT in a nursing home (n = 81, mean age 81.0 years, mild-to-moderate cognitive impairment)	Conventional exercise; waitlist control	Both exercise arms improved SPPB, sleep efficiency and quality of life versus control at week 12, and physical performance improved significantly more in the Tai Chi group than in the conventional exercise group.

Note. All entries were extracted directly from the Scopus metadata export. Where country or setting is not explicitly stated in the title or abstract, the entry reads "Not specified in record"; no inference was made from author names or journal provenance.

Table 4. Classification of the included studies by theme, intervention and outcome

Author(s)	Year	Country / setting	Research design	Theme / focus	Tai Chi intervention and comparator	Outcome domain
Qin et al.	2025	China	Secondary analysis of a three-arm, multi-centre RCT (n = 328, aged ≥ 60 years, type 2 diabetes + MCI)	Balance and fall risk	24-form simplified Tai Chi Chuan, 60 min/session, 3×/week, 24 weeks vs. Fitness walking; health-education control	Physical (balance, mobility, falls)
Zhang, X., et al.	2022	Not specified in record	Cross-sectional comparative study with event-related potentials (n = 63; four age- and habit-matched groups)	Emotional and cognitive function	Long-term habitual Tai Chi practice vs. Long-term walking; non-exercising older adults; young adults	Mental/cognitive (emotional face recognition and memory)
Smith et al.	2025	Not specified in record	Cross-sectional biomechanical comparison (10 older and 10 younger adults; within-participant conditions)	Balance and postural control	Tai Chi gait, with and without medial/lateral ground-support perturbation vs. Comfortable-speed walking	Physical (dynamic stability, limb support force)
Li, X., et al.	2025	Not specified in record	Two-year follow-up of a three-arm RCT (n = 328, aged ≥ 60 years, type 2 diabetes + MCI)	Cognitive preservation	Tai Chi, 24-week supervised programme with long-term follow-up vs. Fitness walking; health education	Mental/cognitive (global cognition, executive function, visuospatial ability)
Bai et al.	2025	Not specified in record	Cross-sectional comparative study of long-term exercisers matched by age, height and weight (four groups)	Health-related physical fitness	Long-term Tai Chi Chuan practice vs. Walking; Jiamusi gymnastics; non-exercise control	Physical (fitness, balance) and mental (life satisfaction)
Recchia et al.	2024	Not specified in record	Protocol for a prospective, assessor-blinded, three-arm, parallel-group RCT (adults ≥ 60 years with chronic insomnia and depressive symptoms)	Depression and sleep	Tai Chi, 3-month intervention with 6-month follow-up vs. Conventional exercise; health-education control	Mental (depressive symptoms, sleep quality, anxiety, quality of life)
Lim et al.	2023	Not specified in record	Cross-sectional comparative study by exercise history > 2 years (n = 256, aged 50–82 years)	Musculoskeletal health and dose–response	Community-based Tai Chi exercise across four weekly volume strata vs. Muscle-strengthening exercise; aerobic	Physical (body composition, bone mineral density, strength, flexibility, balance)

Author(s)	Year	Country / setting	Research design	Theme / focus	Tai Chi intervention and comparator	Outcome domain
					exercise; sedentary	
Sharma et al.	2025	India	Pre–post experimental study with randomisation into three groups (n = 30 women, aged 55–70 years)	Fall prevention	Otago Exercise Programme (50 min) plus Tai Chi (30 min), 3×/week vs. Otago Exercise Programme alone; walking control	Physical (mobility, balance) and mental (fear of falling)
Qiu et al.	2026	China	Single-blind, five-arm RCT (n = 113, mean age 62.3 years)	Cardiometabolic health and dose–response	12-form Chen-style Tai Chi and 24-form Tai Chi, 2 supervised 90-min sessions/week, 12 weeks vs. Square dance; walking; non-exercise control	Physical (SPPB, ADL), cardiometabolic (lipids, glucose, IL-6) and mental (WHOQOL)
Zhao et al.	2023	Not specified in record	Cross-sectional biomechanical comparison (n = 30 female Tai Chi practitioners, mean age 70.9 years)	Neuromuscular coordination	Typical Tai Chi movement vs. Normal walking (within-participant)	Physical (inter-joint coordination and variability)
Lin et al.	2025	China	Randomised three-group trial in a combined medical and elderly-care facility (n = 54 inpatients with MCI)	Cognitive function and biological mechanism	Tai Chi added to routine activities, 12 weeks with 12-week follow-up vs. Walking; daily-living-activity control	Mental/cognitive (MoCA, TMT-A, AVLT) and biochemical (BDNF, PF4)
Flores-Bello et al.	2026	Mexico	Quasi-experimental three-group study (n = 68 women aged ≥ 60 years)	Body composition and well-being	Tai Chi, 60 min/day, 4 days/week, 6 months vs. Strength training; non-exercise control	Physical (body composition, performance, grip strength) and mental (psychological well-being)
Chen, C., et al.	2025	Japan	Non-randomised controlled trial, 12 weeks (n = 84, aged ≥ 60 years with chronic musculoskeletal pain)	Chronic pain and pain-related cognition	Resistance training plus Tai Chi vs. Resistance training alone	Physical (pain intensity, pressure pain threshold) and mental (kinesiophobia, pain catastrophising)
Li, T. Y., et al.	2026	China (Hong Kong)	Protocol for an assessor-blinded, three-arm, parallel-group RCT (planned n = 312, adults ≥ 50 years with MCI)	Cognitive performance	24-form Yang-style Tai Chi, two 90-min sessions/week, 26 weeks vs. Conventional aerobic and muscle-	Mental/cognitive (HK-MoCA, neurocognition, mood, sleep, quality of life)

Author(s)	Year	Country / setting	Research design	Theme / focus	Tai Chi intervention and comparator	Outcome domain
					strengthening exercise; health-education control	
Zhang, Y., et al.	2026	Not specified in record	Cross-sectional comparison of three groups (n = 62)	Neural control of gait	Long-term Tai Chi practice vs. Brisk walkers; non-exercise controls	Physical/neurophysiological (cortical functional connectivity, corticomuscular coupling)
Zhang, Z.	2022	Not specified in record	Comparative study of long-term practitioners (n = 22 Tai Chi practitioners, mean age 59.3 years, mean 18.4 years of practice)	Neuromuscular function	Regular long-term Tai Chi practice vs. Walking practitioners; sedentary individuals	Physical (isokinetic knee flexor and extensor strength, balance)
Chen, X.-S., et al.	2025	Not specified in record	Three-arm RCT with 1:1:1 randomisation and wearable-device monitoring, 12 weeks	Cognitive function and digital delivery	24-style simplified Tai Chi delivered by live video streaming, 3×/week, 12 weeks vs. Supervised treadmill fitness walking; usual care	Mental/cognitive (MoCA, memory quotient, TMT-B) and metabolic indices
Gao et al.	2024	Japan	Three-arm RCT in a nursing home (n = 81, mean age 81.0 years, mild-to-moderate cognitive impairment)	Physical performance, sleep and quality of life	Tai Chi, 12 weeks vs. Conventional exercise; waitlist control	Physical (SPPB) and mental (sleep efficiency, quality of life)

Note. Theme and outcome domain were derived through the thematic coding procedure described in Section 3.9.

Table 5. FICO quality appraisal scores for the 18 included studies

Author(s) (Year)	Focus	Information	Context	Outcome	Total	Grade
Qin et al. (2025)	2	2	2	2	8	High
Zhang, X., et al. (2022)	2	2	1	2	7	High
Smith et al. (2025)	2	2	1	1	6	Moderate
Li, X., et al. (2025)	2	2	2	2	8	High
Bai et al. (2025)	2	2	1	2	7	High
Recchia et al. (2024)	2	2	2	0	6	Moderate
Lim et al. (2023)	2	2	2	2	8	High
Sharma et al. (2025)	2	1	2	1	6	Moderate
Qiu et al. (2026)	2	2	2	2	8	High
Zhao et al. (2023)	2	2	1	1	6	Moderate
Lin et al. (2025)	2	2	2	2	8	High
Flores-Bello et al. (2026)	2	2	2	2	8	High

Author(s) (Year)	Focus	Information	Context	Outcome	Total	Grade
Chen, C., et al. (2025)	2	2	2	1	7	High
Li, T. Y., et al. (2026)	2	2	2	0	6	Moderate
Zhang, Y., et al. (2026)	2	2	1	2	7	High
Zhang, Z. (2022)	2	1	1	1	5	Moderate
Chen, X.-S., et al. (2025)	2	2	2	2	8	High
Gao et al. (2024)	2	2	2	2	8	High

Note. Maximum composite score = 8. Threshold for inclusion = 5. Mean composite score = 7.1. Protocols score 0 on the Outcome dimension because results are not yet reported.

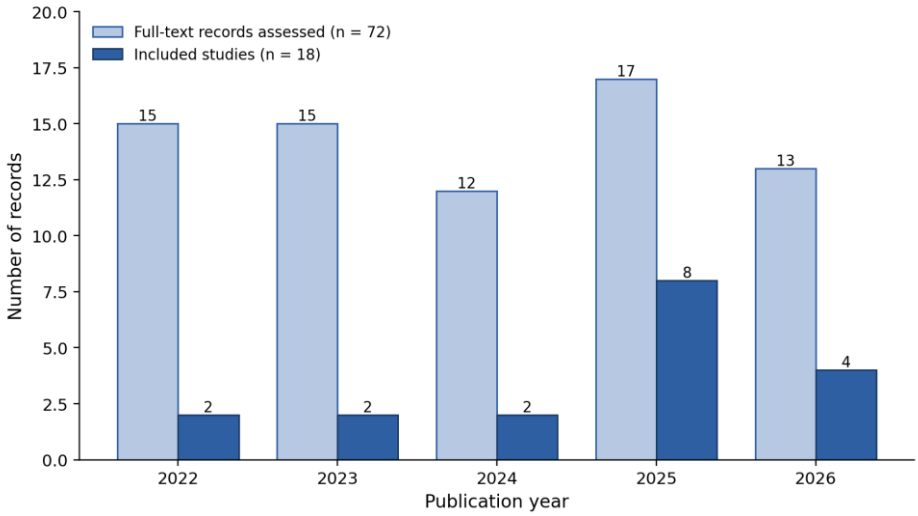

Figure 2. Distribution of publication years for the full-text records assessed (n = 72) and the included studies (n = 18)

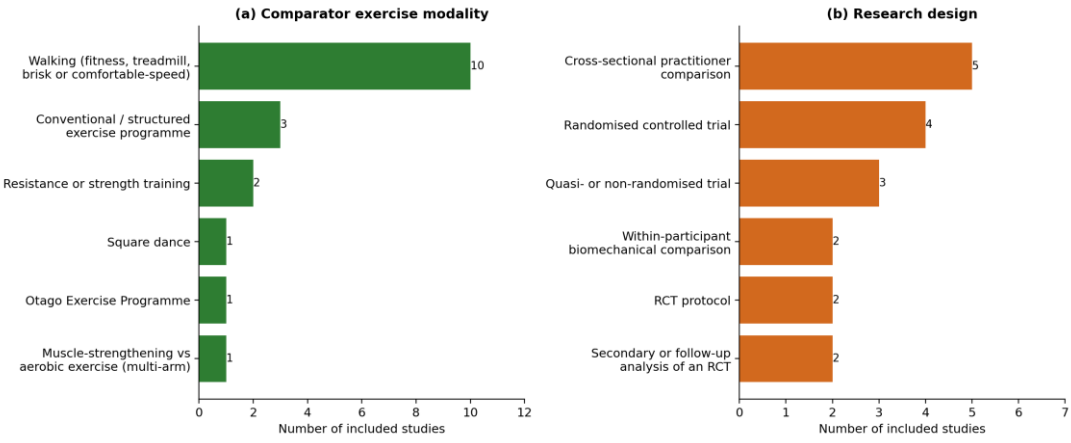

Figure 3. Comparator exercise modality (a) and research design (b) across the 18 included studies

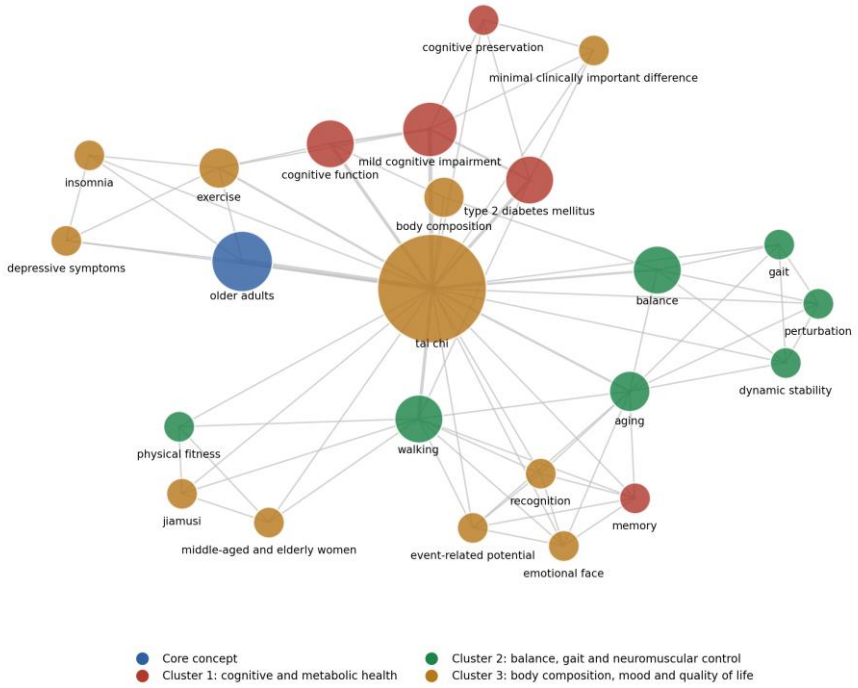

Figure 4. Keyword co-occurrence map of author keywords across the 18 included studies

Note. Node size is proportional to occurrence frequency and edge thickness to co-occurrence count. Terms were normalised for orthographic variants as described in Section 3.8.

The keyword co-occurrence map in Figure 4 splits into three clusters, and all of them connect back to the core concept. Memory, cognitive preservation, mild cognitive impairment, and type 2 diabetes sit with Tai Chi in the first cluster. This one captures the dominant line of recent research, where clinical concerns and cognitive concerns are studied together, whether the focus is cognitive impairment or its improvement. Balance, gait, perturbation, and walking make up the second cluster, pointing toward biomechanics and fall prevention. Then comes the third, which links Tai Chi to exercise, wellbeing, physical performance, and body composition, in other words the fitness and quality-of-life themes. Because this map came from an independent method, one that differs from the manual coding, and still produced the same three groups, it offers solid support for the thematic analysis that follows.

Look across the physical domain and the evidence pulls in different directions. The pattern that emerges is not one consistent superiority, and it is not full equivalence either. What you actually see is a steady division of advantages based on the outcome being measured. The best documented benefit is improved postural control and fewer fall-related outcomes. In one large randomized trial within this set, Tai Chi Chuan beat fitness walking on timed up-and-go, motor-cognitive performance, one-leg standing with eyes closed, functional reach, five-time sitstand, and the falls efficacy scale at the 36-week follow-up. Total falls were also far fewer in the Tai Chi group (Qin et al., 2025). A cross-sectional comparison reached the same conclusion through a different route. Among long-term exercisers, Tai Chi Chuan outperformed walking and Jiamusi gymnastics specifically for balance, trunk flexibility, and waist, hip ratio (Bai et al., 2025). Community-based comparisons told a similar story. Tai Chi Chuan came out ahead of muscle-strengthening and aerobic exercise on trunk flexibility, and alongside aerobic exercise it did better on one-leg stand balance (Lim et al., 2023). Adding Tai Chi to a fall prevention programme also beat walking alone or the programme by itself, with the combined protocol superior on the timed up-and-go and the Berg Balance Scale (Sharma et al., 2025).

Mechanistic studies clarify what kind of advantage this is. It seems to be specific rather than general. Compared with normal walking, Tai Chi movement produces significantly lower mean absolute relative phase in the hip-knee and knee-ankle segments, along with lower deviation phase in the hip-knee segment, which points to more consistent and more stable inter-joint coordination (Zhao et al., 2023). Tai Chi gait also decreases the margin of stability and increases vertical force impulse relative to comfortable-speed walking (Smith et al., 2025). In effect, it operates close to the limits of the balance system, offering a form of balance training that ordinary walking simply does not provide. Long-term practitioners show greater cortical functional connectivity

than controls, and compared with brisk walkers they show greater right primary motor to right somatosensory connectivity, together with stronger corticomuscular coupling (Zhang, Y., et al., 2026). The balance advantage over other activities therefore stems from a unique neuromechanical demand rather than a general exercise effect.

There is a methodological trap worth noting. When a comparison activity has been trained with the very stimulus that serves as the benchmark, the comparison gets an unfair advantage, and any finding from that setup cannot support a general claim. One study found walking better than Tai Chi Chuan on the chair-stand test, even though Tai Chi won the balance task. The same study gave Jiamusi gymnastics the edge for resting heart rate (Bai et al., 2025). Muscle-strengthening exercises were preferred over aerobic exercise and Tai Chi for isometric strength and ball-throwing strength. And no single activity, Tai Chi included, raised bone mineral density beyond what a sedentary lifestyle showed (Lim et al., 2023). After six months of direct comparison with strength training, Tai Chi performed better on the sit-to-stand test, yet no differences appeared in body composition or handgrip strength (Flores-Bello et al., 2026). One apparent counter-example is actually informative. The Tai Chi practitioners outperformed both the walkers and the sedentary individuals on knee flexor and extensor strength measured by isokinetic testing (Zhang, 2022). The problem lies with the study itself. It was a single time-point design with a small sample, it received the lowest quality rating in the appraisal (Table 5), and the comparison group did not even include resistance training. On cardiometabolic factors, practitioners of the Chen-style 12-form Tai Chi saw their triglycerides and LDL cholesterol drop, stayed physically active, and reported a greater quality of life. Walking, by contrast, only improved quality of life. The researchers also noted that square dance, a grassroots exercise modality rooted in traditional community activities, reached a similar overall level of outcomes and in some respects a more comprehensive one. So the answer to RQ1 is conditional. Tai Chi is better for balance, flexibility, coordination, and fall-related outcomes. It stands on par with other exercises for body composition and handgrip strength. It falls short of resistance training on maximal strength and power, and short of walking on lower-limb endurance tasks.

The psychological and cognitive evidence has only appeared fairly recently. Most of these studies were set up properly and fairly, and they stayed within the areas they claimed to investigate. Taken together, within the boundaries considered, Tai Chi has come out more helpful than the physical aspects of health. Three studies dealt with global cognition in elderly type 2 diabetic patients with MCI. Compared with health education, Tai Chi produced a better MoCA improvement at the 2-year follow-up. At that point 49.8% of the Tai Chi participants reached a difference considered clinically important. That is roughly double the share seen with healthcare education and significantly higher than with fitness walking. Tai Chi's advantage was not just global; executive function and visuospatial ability were selectively affected (Li et al., 2025). Another study in the same population found that Tai Chi alone significantly improved MoCA scores, while walking alone barely changed them. Looking at between-group changes, Tai Chi showed improvement on the MoCA, the memory quotient, and the Trail Making Test Part B (Chen, X.-S., et al., 2025). Among inpatients with MCI, Tai Chi beat a daily-activities-only control group on global cognition, executive function, and memory, an effect attributed mainly to increased BDNF in the blood (Lin et al., 2025). All of these studies support the idea that Tai Chi improves cognitive function through neurotrophin regulation rather than cardiorespiratory load. Only one of them, however, tested that hypothesis directly.

Tai Chi may be doing more than just sharpening cognition. The benefits seem to reach sleep, pain-related cognition, and quality of life, although the evidence in those areas is less settled. Take a nursing home study of patients with mild to moderate cognitive impairment. Both Tai Chi and conventional exercise produced better physical fitness, sleep quality, efficiency, and quality of life than a waitlist control. Even so, Tai Chi came out clearly ahead of conventional exercise on physical performance (Gao et al., 2024). In Japanese older adults with chronic pain, adding Tai Chi to their training brought meaningful gains: greater reduction in pain intensity, a higher pressure pain threshold, less kinesiophobia, and less pain catastrophising, which is a measure of negative thoughts and emotions tied to pain. Central sensitization, though, did not budge (Chen, C., et al., 2025). Among older community-dwelling Mexican women, the physical advantage belonged to Tai Chi over strength training, while psychological wellness did not separate the two arms (Flores-Bello et al., 2026). Two qualifications stand in the way of any strong interpretation. First, coverage across the research domain has been uneven. Global cognition and executive function have received adequate attention, but depression and anxiety, both highly meaningful clinically, have not been directly compared in a design that has yet to deliver results (Recchia et al., 2024). The second protocol in that series is meant to provide data on cognitive performance too, but it has not reported so far (Li et al., 2026). This makes the two most policy-relevant mental health comparisons in the review more of a promise than a finding. Second, a clear counter example exists. Aerobic exercise and Tai Chi can both slow the age-related decline in emotional face recognition, yet it is walking, not Tai Chi, that predicts later decline in memory for emotional faces (Zhang X., et al., 2022). So Tai Chi's superiority over exercise and health education in global cognition, executive function, and visuospatial ability held up over a one-year follow-

up. It also seems to help sleep and pain-related cognitive function. On psychological well-being, however, it lands in the same place as general physical exercise, and the question of how it compares in affective disorders remains officially open.

Thirteen studies described their programmes clearly enough for intervention features to be listed. Style is the first parameter that seems to matter for comparative benefit. Only one study actually broke down style variations separately, and it found that 12-form Chen-style Tai Chi produced significant gains in lipid profiles, physical activity, and quality of life, while the 24-form came across as lacking in depth. Walking, in that same study, could only improve quality of life (Qiu et al., 2026). Across the series as a whole, the most prevalent form is nonetheless the 24-form simplified or Yang-style sequence (Qin et al., 2025; Chen, X.-S., et al., 2025; Li et al., 2026). That creates an awkward situation: the modality tested most often is not the one with the strongest disaggregated evidence. Style is therefore a source of influence that most studies have simply failed to control.

Delivery, the fourth feature of intervention design, is where the comparative evidence gets most striking. Tai Chi delivered through live video streaming, with professional guidance, wearable-device monitoring, and a mobile health model, beat fitness walking on global cognition, memory quotient, and executive function (Chen X.-S. et al., 2026). The fact that remote delivery did not erase the comparative advantage matters for large-scale implementation, since access barriers are a recurring theme in the wider literature (Mitzner et al., 2022; Remillard et al., 2026). What seems to matter more than co-location is supervision. Every study in this review that reported a Tai Chi superiority effect used supervised or professionally directed delivery, and none compared unsupervised, self-directed practice against an active comparator. So the answer to RQ3 is that relative advantage comes from supervised delivery, a programme lasting at least 12 weeks, 120 to 180 minutes per week, and, on the one study that tested it, Chen-style rather than 24-form practice. Remote delivery does not appear to weaken the effect. That said, the evidence behind the style and dose recommendations is thin, resting on one within-trial comparison and none for dose respectively, which makes it hypothesis-generating rather than definitive.

Methodologically, the same set of papers splits into two literatures that barely talk to each other. The clinical-cognitive literature is characterised by randomisation, sufficient power, long follow-up, and samples concentrated respectively on patients with diabetes and MCI (Qin et al., 2025; Li et al., 2025; Chen, X.-S., et al., 2025; Lin et al., 2025; Gao et al., 2024). The biomechanical literature, by contrast, is almost entirely cross-sectional, involves very few subjects, and leans on practitioner versus non-practitioner or within-subject contrasts (Zhao et al., 2023; Smith et al., 2025; Zhang, Y., et al., 2026; Zhang, 2022). This split is not accidental. It means the domain where we have the most confident evidence for Tai Chi, namely balance and neuromuscular control, rests on designs least able to remove self-selection. Meanwhile, the domain with the strongest evidence for an underlying mechanism, cognition, is exactly where causality has rarely been tested in a direct way.

The structure of the studies reinforces the same picture. Out of 18 papers, 6 are randomised trials with active comparators, although one of these is a secondary analysis and another is a follow-up of a single randomised trial. Three are quasi-randomised studies, 5 are practitioner cross-sectional comparisons, 2 are within-participant biomechanical comparisons, and 2 are protocols. Randomised evidence therefore covers a good third of the entire set. Cross-sectional comparisons are a different matter, because no statistical technique can fully strip away their confounding. Someone who has practised Tai Chi for 18 years (Zhang, 2022), or even accumulated more than two years in a particular exercise mode (Lim et al., 2023), is simply not comparable to the rest of the population on features that predict the outcomes being studied. When randomised and cross-sectional evidence converge, as they do for balance, the conclusion deserves confidence. But when an evidence-based claim rests on cross-sectional work alone, the kind of claim made about muscle strength or isokinetic strength, it should never be read as proof of an intervention effect.

The methodological orientation of the window period has clearly shifted. Back in 2022, research leaned mainly on observation and biokinetics (Zhang, et al., 2022; Zhang, 2022). What followed, the body of work published between 2024 and 2026, looks very different: multi-arm randomised trials with blinded assessments, intention-to-treat analyses, and registered protocols now dominate (Recchia et al., 2024; Li et al., 2026). In two cases there may even be pre-registered comparative designs explicitly framed to move away from the conventional exercise template. Two innovations stand out. Qiu et al. (2026) is the only study that treats Tai Chi in a plural way, as an array of distinct components, and pairs it with a culturally embedded traditional comparator, square dance, alongside walking. Chen, X.-S., et al. (2025), meanwhile, is the first to integrate wearable physiological monitoring into a comparative design, measuring adherence and exposure directly rather than taking them for granted. The underused designs remain obvious. No factorial or dismantling study tells us which part of Tai Chi, the postural challenge, the attentional load, or the breath regulation, if any, drives the comparative effect. No non-inferiority test has been published either, even though for several outcomes that

would have been a far more practically relevant conclusion than the difference the conventional analysis produced.

Take the 18 studies as a whole, and Tai Chi does not emerge as the most advantageous physical activity for older adults. What the evidence supports is more modest and, at the same time, practically relevant: Tai Chi is a particular form of training, and its benefit reaches only as far as the outcomes its mechanics physically bring about. Biomechanical evidence explains why. The Tai Chi way of walking purposefully reduces stability margins compared with regular walking (Smith et al., 2025). It also calls for more inter-joint coordination (Zhao et al., 2023). So it trains postural control under a condition where stability is constantly challenged over long stretches, something walking, whose margin of stability is designed to be safe, never does. But Tai Chi lacks progressive external load, the feature that keeps resistance training more powerful when it comes to maximal strength and power (Lim et al., 2023). That is precisely why body composition and grip strength do not separate Tai Chi from strength training (Flores-Bello et al., 2026).

Advantage follows stimulus, not tradition. On the theory side, the cognitive findings align with exercise-induced neuroplasticity through the cardiorespiratory pathway, yet they do not actually confirm the cardiorespiratory theory as it stands. Consider this: if brain function depended solely on aerobic intensity, the aerobic dose on offer should have been enough to show a cognitive benefit, and walking could supply that dose. Aerobic activity alone, then, should have matched Tai Chi, or at least equalled it, on the short and long outcomes among patients with MCI. Walking did not match it. It did not beat it either, not even on the one- or two-year outcomes (Li et al., 2025, 2002; Chen et al., 2006). Theoretically, the dual-task model, where simultaneous motor and attentional demands drive the effect, is the best supported. Evidence points to prefrontal activation and decision-making processes on gait (Chen et al., 2022, 2002; Wang et al., 2026, 013), plus the empirical finding that Tai Chi's cognitive benefit is a selective gain in working memory and visuospatial skills, distinct from overall cognition (Li et al., 2025). Lin et al. (2025) proposed the neurotrophin (BDNF) signalling pathway as another potential player, but that remains an educated guess. Few studies have tested it, one on a single small group of hospitalized patients, and none has clearly told whether neurotrophic factors sit behind the dual-task or cardiopulmonary models. The review makes two points here. This kind of analysis is badly needed in the field. And the trial comparison required to answer the question is already available, comparing Tai Chi with an active exercise matched on an aerobic basis; it simply needs to be used for investigating the underlying physiological mechanisms.

Practically, these findings translate into different prescription forms being more effective for different modalities. If a senior person's main risk is falling, the literature says Tai Chi should be recommended over walking. When a fall-prevention programme already exists, adding Tai Chi to it beats replacing the programme (Q. et.al 2025; S., et.al 2025). A similar logic holds for a senior with MCI who also has type 2 diabetes: Tai Chi comes recommended over fitness walking for cognitive preservation, and the durable advantage still holds after two years (L., et.al 2025). But if muscle weakness or low bone density is the prime deficit, Tai Chi cannot replace resistance training (L. et.al 2023; F. et.al 2026). From a commissioner's perspective, two points stand out. Remote supervised delivery, tested through the only trial available, maintained its effectiveness (Chen et. al. 2025). And a traditional local exercise, square dance, shows the same profile as Tai Chi on a couple of outcomes (Q. et.al 2026). All of which suggests a programme's acceptability and cultural fit may matter more than modality differences when that difference is the only consideration in play.

Compared with previous reviews, this paper is more narrowly focused and more precise. A review evaluating Tai Chi for mood and anxiety disorders (D. et.al 2025) and a paper looking at Tai Chi for balance in people with gait disorders (X. et.al 2023) both combined Tai Chi with other kinds of activities, and their results could only be split into two categories: "better than nothing" and "better than the alternative". The paper comparing structured aerobic exercise with mind/body exercise in MCI (W. et.al 2026) is probably the closest to our question, but there mind/body exercise was a broad class that included yoga and dance along with Tai Chi. Our strategy is to make the inclusion rule more specific to the control group. The trade-off is fewer studies, yet more reliable ones, because each represents the effectiveness of two active options at the same time. The bottom line: our finding that Tai Chi is no better than other exercise types in specific aspects, meaning no domain-specific superiority, is much more conservative than what the general literature would suggest. That difference is explained by our inclusion rule, not by other primary evidence.

Three contradictions need explicit stating rather than resolving. First, lower limb strength. The tai chi group scored much higher on isokinetic knee flexor and quadriceps strength than the walking and sedentary groups (Zhang, 2022). On the other hand, Lim et al., 2023 showed muscle-strengthening exercises outperforming tai chi at isometric strength. One could frame Tai Chi as a superior walking exercise but not a resistance training exercise for strength; the differing comparators in the two studies explain the conflicting results. Neither study was experimental, so both are susceptible to selection bias. Secondly, emotional cognition. Walking was better

than Tai Chi at delaying the decline of emotional face memory (Zhang, X., et al., 2022), which runs opposite to the usual direction of cognitive findings. This might illustrate domain specificity, since emotional memory functions differently from executive function, or it might be a limitation of the cross-sectional design. One cannot tell the difference.

Third, modal distinctiveness: if Tai Chi's edge is due to its mind, body union, square dance shouldn't even come close to matching it in cardemetic and life-quality indicators (Qiu et al., 2026). Thus, the essence of Tai Chi is either broader and less mind, body specific than the mind, body view allows, or square dance has more in common with Tai Chi than the way of classifying dance suggests. Either one of these points denies the idea of Tai Chi as a unique phenomenon. Besides all these three points also indicate shortcomings of the review. The first shortcoming is the gap of affective outcomes: not one of the included studies provided direct evidence that tai chi could have been superior in reducing symptoms of depression or anxiety, although there were two protocols registered that exactly targeted this question (Recchia et al., 2024; Li et al., 2026). The second clinically important one at this mental-health domain comparison is at the moment unanswered: the third is the dose, response gap: none of the included studies compared Tai Chi dosing within a single trial, so every dosage recommendation in this body of literature, including, for example, those that appeared in Section 5.3.3 -is a comparison across different studies in which population, comparator, and the outcome change all at once. The third is the mechanism-isolation gap: no study with either a dismantling or factorial design was able to clearly separate postural challenge, attentional load, or breath regulation, so the field is able to confirm only that Tai Chi is different from the simple walking without explaining how.

Four main limitations of these conclusions will be presented. First, the review only used one database for the paper search namely Scopus; thus, no supplementary search database was used and no paper trace-back was also done to search grey-literature. Therefore, trials that are only published only in other language databases as for example PubMed, Embase, the Cochrane Library and Chinese databases, they haven't been captured, which is not a small matter, since there are many trials in this field carried out in China. Second, language barrier problem adds to these only English articles have been considered, so it is very likely that some important trials have been missed as they may only have been written in other languages. Third, the appraisal and data extraction activities were only based on abstracts and citations in Scopus and, therefore, without seeing the full text of the papers independently. Because of this limitation, the FICO appraisal is not sufficiently sensitive to report a selective publication or the change of the study protocol. Besides, as a result, for 20 only (6 out of 18) studies the country of the setting could have been ascertained. Fourth, the review was not prospectively registered and, therefore, the decision criteria particularly the one about preserving the protocols while deleting comparative variants of delivery were set by the authors themselves and the reviewers only can check them by looking at the original work. On one hand, the very particular nature of the comparator allowed the study to be a very high standard one, but also on the other side made it so narrow that it could have been very easily challenged and the findings could have been very different with even a slightly different rule.

Four main points have been raised. First, in order to clarify the benefits and drawbacks, a 3-arm, randomized controlled study comparing Tai Chi against (A) an aerobic-based active control as well as (B) a heavy-muscle training control would be needed for outcome variables covering physical strength, balance and cognitive performance. Design element that will be used for separating the effects of cardiorespiratory versus dual-task is that the two conditions being matched will be physiological load not time. Second, the trial within the dose and style factors, such as the difference between Chen-style and Yang-style of Tai Chi or even the total minutes of exercising in a week (say 90 minutes versus 180 minutes) should be examined since Qiu et al. (2026) found a change in conclusions when style of Tai Chi was separated but no other study has reported dose of exercise being a variable. Third, comparative trials should be powered and analyzed for non-inferiority, which is the practically relevant conclusion for example it seems to be the case for body composition and grip strength; Superiority framing always presents these outcomes as null. Fourth, since supervised, remote delivery was shown to maintain the therapeutic benefits in the single trial where the effect was studied (Chen, X.-S. et al., 2025), comparative remote vs. in-person delivery trials that will also include populations from different parts of the world besides East-Asia should be considered as the most urgent research areas since it is the issue of scale up and cultural appropriateness rather than the effectiveness per se that nowadays limits the widespread introduction of the therapy.

In responding directly to the research questions: RQ1 Tai Chi is more effective than walking and conventional physical activities regarding balance, flexibility, inter-joint coordination, and fall-related outcomes, as effective as strength training in terms of body composition and grip strength, and, however, less effective than resistance training in regards to maximal strength and power. RQ2 Tai Chi is more beneficial than fitness walking and health education in terms of global cognition, executive function, and visuospatial ability, with benefit lasting till two years; possibly better in terms of sleep efficiency and pain-related cognition; comparable

to strength training for psychological well-being; and comparative value to depression and anxiety where only unreported protocols exist are unknown. RQ3 The main factors contributing to a more competitive result are the supervised delivery mode, a program of at least 12 weeks with a weekly time commitment of 120, 180 minutes, and the practice of Chen-style rather than 24-form.

Conclusions

This paper synthesized results of 18 studies on the effects of Tai Chi versus active traditional exercise among middle aged an elder individuals. With respect to traditional exercise, Tai Chi enhanced balance, flexibility, coordination, and fall related results, plus global cognition, executive function, and visuospatial ability (advantages lasting up to two years). It did not differ from strength training in terms of the changes in bodily composition and psychological well-being but was less effective in terms of maximum muscle strength. Its major insight is the change from the general superiority to a domain-specific benefit which is the one following the physical stimulus that the exercise generates, not the nature of the exercise itself. Therefore, the fitness professionals should make their choice of intervention according to the specific deficiency and should not default to either. If there is any limitation then it might be the reliance on one source, the exclusion of non--English materials, and the abstract level of evaluation plus a failure to a priori registration. Future research which compares the two types of sports on equal physiological work rate, breaks down style and dose within the study design, and test for non-inferiority should become the next major research step.

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