Fysioterapeutisk anbefaling til

styrketræning

som behandling af udvalgte geriatriske tilstande

Dansk Selskab
for Fysioterapi
i Gerontologi
og Geriatri

Indholdsfortegnelse

Læseguide

Denne fysioterapeutiske anbefaling har til formål at samle og formidle den nyeste viden om styrketræning som intervention til forebyggelse og behandling af funktionstab hos ældre med udvalgte geriatriske tilstande.

Anbefalingen er udarbejdet med fokus på klinisk anvendelighed for fysioterapeuter og bygger primært på eksisterende forskning fra systematiske reviews og metaanalyser. Anbefalingen er ikke en klinisk retningslinje, men en evidensbaseret sammenfatning, hvor der, når litteraturen ikke muliggør præcise dosisanbefalinger, gives et forsigtigt bud på bedste praksis understøttet af relevante faglige anbefalinger [8, 28].

Rapporten indledes med en **baggrund**, der beskriver den demografiske udvikling og de aldersrelaterede ændringer i muskelmasse, muskelstyrke og funktion, som øger risiko for funktionstab og tab af selvhjulpenhed. Her introduceres samtidig rationalet for, at styrketræning bør betragtes som en central indsats i fysioterapeutisk praksis hos ældre, samt behovet for mere retningsgivende anbefalinger i dansk kontekst [8, 17].

Herefter præsenteres **anbefalingens formål**, hvor målgruppe, fokus og afgrænsning tydeliggøres. Anbefalingen omfatter 14 grupper af ældre - raske ældre og ældre med forskellige geriatriske tilstande:

Raske, sarkopeni, overvægt og sarkopen fedme, hjertesygdomme og sygdomme i kredsløbet, demens og mild kognitiv svækkelse (MCI), diabetes, kroniske nyresygdomme, osteoporose, artrose, kronisk obstruktiv lungesygdom (KOL), risiko for fald, skrøbelighed, mobilitetsbegrænsning og **multisygdom: osteosarkopenisk overvægt**.

Anbefalingen har fokus på effekter af styrketræning relateret til funktionsevne, muskelstyrke og livskvalitet, mens biomarkører og øvrige ikke-funktionelle mål ikke prioriteres i fremstillingen, selv når de indgår i de inkluderede studier.

Læseguide (fortsættes)

I **metodeafsnittet** beskrives, hvordan litteraturen er identificeret, udvalgt og vurderet. Litteraturen omfatter perioden 2015–2025 med søgning i PubMed, Cochrane Library og PEDro. Metodeafsnittet forklarer screeningsprocessen samt anvendelse af kædesøgninger i grupper med sparsom litteratur. Kvalitetsvurdering og vurderingen af evidens (A–D) er baseret på pragmatiske kriterier og anvendes til at vægte styrken af anbefalingerne.

Resultatsyntesen udgør rapportens kerne og er organiseret i de 14 geriatriske tilstande. Hvert område indeholder en kort, klinisk rettet opsummering og afsluttes med en tydelig boks: "Anbefalet dosering i klinikken", hvor frekvens, intensitet, volumen, progression og centrale muskelgrupper opsummeres, samt der angives en evidensvurdering (A–D). Her kan læseren hurtigt orientere sig mod de mest anvendelige kliniske parametre og samtidig se, hvor anbefalinger er baseret på direkte evidens, og hvor de primært er understøttet af generelle principper for styrketræning hos ældre [8].

Rapporten afsluttes med en **diskussion**, der samler fundene på tværs af de 14 geriatriske tilstande og sætter dem ind i et klinisk perspektiv, herunder hvor evidensen er stærkest (fx muskelstyrke og funktion), og hvor den er mere usikker (fx fald og mobilitet). Diskussionen inkluderer desuden et hypotetisk perspektiv på en anbefaling for den multisyge ældre med alle diagnoser, som består af et konservativt udgangspunkt for dosering, hvor styrketræning tilpasses den enkeltes funktionsniveau og tolerance, men stadig struktureres omkring store muskelgrupper og flerledsøvelser [8].

Til sidst præsenteres en **konklusion**, der sammenfatter de vigtigste kliniske pointer: at styrketræning samlet set fremstår som en sikker og effektiv intervention til ældre på tværs af helbredstilstande, men at præcise dosis–respons-anbefalinger i flere af grupperne med geriatriske tilstande fortsat begrænses af heterogenitet og utilstrækkelig rapportering i den eksisterende litteratur.

Resumé med centrale budskaber

Definition af styrketræning

I denne anbefaling skal styrketræning forstås ud fra følgende definition: "*Styrketræning er træning med vægte eller anden ydre modstand i belastningsområdet 1-15RM og som medfører fysiologiske ændringer i det neuro-muskulære system*" [3].

Baggrund: Den voksende andel af ældre øger behovet for effektive fysioterapeutiske strategier til forebyggelse og behandling af funktionstab. Aldring er forbundet med tab af skeletmuskelmasse, styrke og funktion, hvilket kan reducere robusthed og øge sårbarhed med konsekvenser for mobilitet, selvhjulpenhed og livskvalitet [8]. Styrketræning er derfor en central indsats, men nyere retningsgivende anbefalinger til klinisk praksis efterspørges - herunder om dosering og systematisk brug af objektiv intensitetsvurdering [7-8, 16-17, 22, 26].

Formål: Formålet er at udarbejde en evidensbaseret fysioterapeutisk anbefaling med konkrete retningslinjer for styrketræning til forebyggelse og behandling af funktionstab hos ældre på tværs af 14 geriatriske tilstande (raske, sarkopeni, overvægt og sarkopen fedme, hjertesygdomme og sygdomme i kredsløbet, demens og mild kognitiv svækkelse (MCI), diabetes, kroniske nyresygdomme, osteoporose, artrose, kronisk obstruktiv lungesygdom (KOL), risiko for fald, skrøbelighed, mobilitetsbegrænsning og multisygdom: osteosarkopenisk overvægt) – og hvor muligt identificere intensiteter og doseringer for bedst effekt.

Metode: En systematisk litteratursøgning blev gennemført for perioden 2015–2025, i PubMed, Cochrane Library og PEDro efter systematiske reviews og metaanalyser. Ud af 1753 identificerede referencer blev 90 studier inkluderet (inkl. 5 via kædesøgning). Evidensen blev vurderet pragmatisk ved en A–D-klassifikation (A: meget høj, B: høj, C: moderat, D: modsigende/lav), hvor konsistens, præcision og deltagergrundlag indgik.

Resultater: På tværs af 14 geriatriske tilstande fremstår effekt af styrketræning på muskelstyrke som det mest konsistente og robuste resultat. Evidensen for muskelstyrke vurderes overvejende som moderat til høj med entydig positiv effektretning. Funktionelle effekter varierer mere og afhænger ofte af population, træningsindhold og målemetoder. Særligt ses overordnet positiv effekt på styrke i underekstremiteterne (rejse-sætte-sig-test) i flere af de undersøgte grupper, mens effekten på ganghastighed, mobilitet (Timed Up and Go) og faldrisiko varierer mere. Styrketræning alene reducerer ikke faktiske fald, men kan forbedre funktionelle effekter. Målrettet faldforebyggelse peger på behov for supplerende reaktiv balance- og gangtræning. I flere grupper begrænses præcisionen af dosis–respons-konklusioner af ufuldstændig eller uensartet rapportering. Den samlede evidens peger på, at styrketræning bør være systematisk og progressiv, at fokus bør være på store muskelgrupper og flerledsøvelser, samt at dosering bør individualiseres ud fra mål og evne.

Konklusion: Styrketræning er en central, sikker og bredt anvendelig intervention til forebyggelse og behandling af funktionstab hos ældre, på tværs af helbredstilstande. I klinisk praksis bør styrketræning struktureres som systematisk og progressiv træning af store muskelgrupper med individualiseret dosering og fokus på flerledsøvelser. Ved høj faldrisiko suppleres med reaktiv balance- og gangtræning.

Samlet understøttes styrketræning som fælles fundament i fysioterapeutisk praksis for ældre.

Baggrund

At arbejde med ældre i fysioterapeutisk praksis kræver viden og forståelse for at opnå den bedste effekt [8]. Samtidig viser den demografiske udvikling, at andelen af personer over 80 år forventes at stige fra et antal, der i dag ligger på 4,4 % af befolkningen til over 10 % efter 2053 [6]. Denne udvikling omtales ofte som "ældrebyrden", da den kan medføre øgede udgifter til sundheds- og plejesektoren samt udfordringer for arbejdsmarkedet [2, 13, 15]. At udviklingen omtales som en byrde, begrundes af at selv i fraværet af kroniske sygdomme, er aldring forbundet med en række biologiske ændringer, der kan bidrage til reduktion i skeletmuskelmasse, styrke og funktion [8]. Disse aldersrelaterede tab mindsker den fysiologiske modstandsdygtighed og øger den enkeltes sårbarhed over for tab af mobilitet, selvhjulpenhed og livskvalitet [8]. Dette understreger behovet for effektive strategier til både forebyggelse og behandling af funktionsevnetab, som kan fremme ældre menneskers sundhed og velbefindende [8].

Flere studier har vist, at styrketræning kan forbedre muskelstyrke, balance og gangfunktion samt reducere risikoen for fald og funktionstab hos ældre [7-8, 16, 22]. På denne baggrund bør styrketræning ses som en central indsats i ældre menneskers sundhedsfremme [8]. Dette stiller krav til sundhedsprofessionelles viden om og kompetencer i at understøtte styrketræning for både raske ældre og personer med kroniske og geriatriske tilstande med det formål at fastholde et funktionsniveau, der muliggør selvhjulpenhed og deltagelse i daglige gøremål [8]. Ifølge en amerikansk faglig anbefaling fra 2019 bør et veltilrettelagt styrketræningsprogram for ældre mennesker tage afsæt i en individualiseret, periodiseret tilgang, der tager højde for geriatriske tilstande og varierende funktionsniveauer. Programmet bør understøtte fastholdelse af fysisk aktivitet, funktion og livskvalitet [8]. Fysioterapeuter spiller derfor en central rolle, men der mangler nyere, retningsgivende anbefalinger for fysioterapeuter om forebyggelse og genoptræning til ældre [26]. Samtidig er objektive vurderinger af intensitet hos ældre anvendt i et begrænset omfang af danske fysioterapeuter [17]. Dette betyder, at potentialet ved tung styrketræning til ældre ofte ikke udnyttes fuldt ud [17]. Samlet betyder dette, at det voksende antal af ældre stiller komplekse krav og accentuerer behovet for en styrket fysioterapeutisk praksis.

Anbefalingens formål

Målet med denne fysioterapeutiske anbefaling fra Dansk Selskab for Fysioterapi i Gerontologi og Geriatri er at samle evidensbaseret viden, der munder ud i retningslinjer for, hvordan funktionstab hos ældre mennesker både forebygges og behandles, samt – hvor det er muligt – ved hvilke intensiteter den bedste effekt findes. Retningslinjerne består af konkret viden, der kan anvendes som værktøjer og behandlingsstrategier. Anbefalingen belyser således evidens og konkrete redskaber, der kan støtte fysioterapeutens muligheder for bedst muligt at kunne rådgive ældre mennesker omkring styrketræning og tilpasning efter deres individuelle behov og begrænsninger. Herunder findes eksempler på fysioterapeutiske trænings- og behandlingstiltag.

Den fysioterapeutiske anbefaling gælder (men er ikke begrænset til) følgende 14 grupper af ældre:

- **Raske**
- **Sarkopeni**
- **Overvægt og sarkopen fedme**
- **Hjertesygdomme og sygdomme i kredsløbet**
- **Demens og mild kognitiv svækkelse (MCI)**
- **Diabetes**
- **Kroniske nyresygdomme**
- **Osteoporose**
- **Artrose**
- **Kronisk obstruktiv lungesygdom (KOL)**
- **Risiko for fald**
- **Skrøbelighed**
- **Mobilitetsbegrænsning**
- **Multisygdom: Osteosarkopenisk overvægt**

Anbefalingen er udarbejdet på baggrund af en omfattende litteraturgennemgang, og anbefalinger, der er integreret i de enkelte grupper, er udarbejdet ud fra graduering af evidensen.

Metode

Dette afsnit beskriver metoden for 1) Litteratursøgning og -gennemgang, 2) Valg og vurdering af litteratur. Studierne blev udvalgt på baggrund af relevans og kvalitet. I tilfælde hvor systematiske reviews og metaanalyser var mangelfulde, anvendtes kædesøgninger til at afdække områder. I tilfælde hvor evidensen er mangelfuld, er anbefalingen underbygget med tidligere anbefalinger [8, 28].

Litteratursøgning og -gennemgang

Denne fysioterapeutiske anbefaling fokuserer på effekt af styrketræning på forskellige grupper af ældre. Dermed var søgningen åben for flere geriatriske problemstillinger, men blev foretaget med udgangspunkt i at afdække litteratur på 14 forudbestemte grupper (se valgte geriatriske tilstande jf. Anbefalingens formål).

Litteratursøgning: Litteratursøgningen blev gennemført i oktober 2025 og omfatter studier fra perioden 2015-2025. Søgningen blev gennemført på tre databaser: PubMed, Cochrane Library og PEDro. Herunder frasorterede filtre studier, der ikke var enten systematiske reviews eller metaanalyser. Systematiske reviews og metaanalyser blev prioriteret, da de i højere grad giver robuste og overskuelige evidensgrundlag, der sikrer et bedre grundlag for at vurdere både effekt og usikkerhed. Andre studietyper blev ikke inkluderet, for at reducere risikoen for, at enkeltstudier med kontekstafhængige eller tilfældige fund ville få uforholdsmæssig vægt.

Søgetermer: De bolske operatorer "AND", ”OR”, [tiab] og [MeSH] blev anvendt for at begrænse søgningen til studier af høj relevans. Studierne blev fremsøgt gennem én søgestreng og derefter opdelt i nævnte 14 grupper (se fuld søgning jf. bilag 1: Søgestrenge).

Søgningen gav n = 1753 resultater (PubMed n = 1014; Cochrane Library n = 53; PEDro n = 686), hvoraf der blev fjernet 117 duplikater.

To reviewere: Efter søgning i de forskellige databaser blev den fundne litteratur gennemgået af to reviewere. Reviewer 1 gennemgik litteraturen for relevans på baggrund af titel og abstract med løbende sparring med reviewer 2. Herefter gennemgik begge reviewere de udvalgte studier på baggrund af fuldtekst, og havde løbende konsensusmøder om in- og eksklusion af studierne. Ved uenighed om in- eller eksklusion af et studie, blev en tredje reviewer involveret for opnåelse af konsensus om relevans af det givne studie.

Titel og abstract: 1636 studier blev screenet ved titel og abstract. Inklusionskriterierne i denne proces var: 1) populationen består af ældre og 2) intervention skal bestå af eller indeholde styrketræning.

Fuldtekstgennemgang: 277 studier blev vurderet som relevante og gik videre til fuldtekstgennemgang. Søgningen er foretaget med en SDU-adgang og herunder er adgang til 74 af de relevante studier ikke opnået (jf. bilag 1: Fuldtekstgennemgang). Uden adgang til et større omfang studier, er disse forsøgt indhentet ved kontakt til forfattere. Fuldtekstgennemgangen bestod derved at n = 203 studier. Dette skal anses som en potentiel begrænsning, idet det blot er 73,3% den tilgængelige evidens, der er inddraget i denne anbefaling.

Ved fuldtekstgennemgangen blev studier inkluderet hvis: 1) populationen består af ældre over 60 år* (totalt set eller opdelt i aldersbestemte subgrupper), 2) effekten af styrketræning kunne isoleres eller ses i kombinationsinterventioner og 3) effekter blev målt på forebyggelse og/eller behandling af funktionstab.

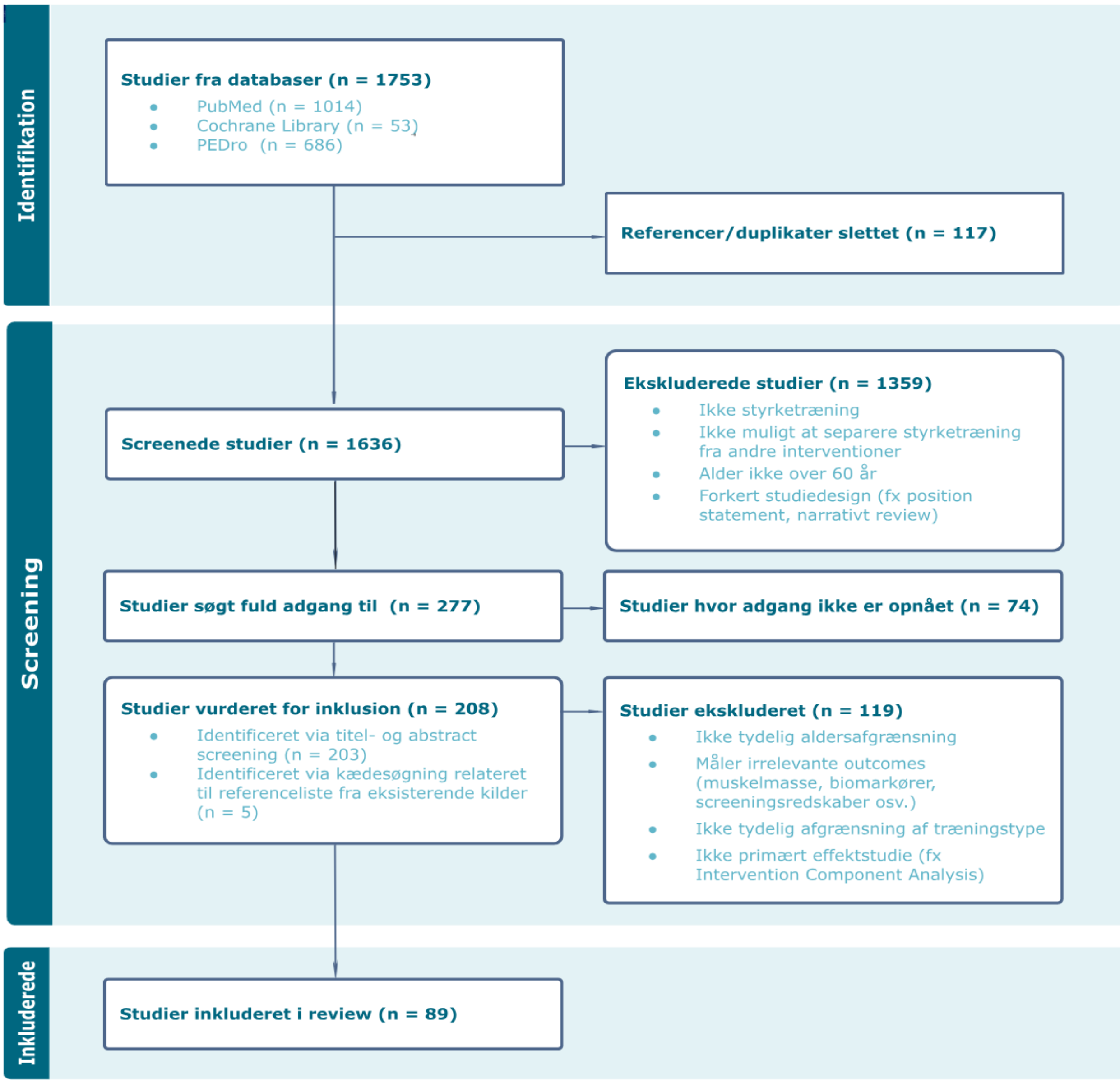
**Note: Diagnosen sarkopeni er blevet brugt som inklusionskriterie, frem for inklusion baseret på alder, for denne gruppe.*

Inkluderede studier: På baggrund af fuldtekstgennemlæsningen blev 84 studier inkluderet i denne anbefaling.

Efter gennemgangen og udvælgelsen af litteratur, var der ingen studier, der omhandlede styrketræning som intervention, for ældre med kroniske nyresygdomme, osteoporose, atrose eller kronisk obstruktiv lungesygdom (KOL). Via kædesøgninger, relateret til referencelister fra eksisterende kilder, blev yderligere 5 studier inkluderet, for at tilføje viden om effekten af styrketræning på ældre inden for disse fire grupper.

Anbefalingen er således baseret på 89 studier fordelt over de 14 grupper (se PRISMA Flowchart jf. model 1).

Fysioterapeutisk anbefaling til styrketræning som behandling af udvalgte geriatriske sygdomme



Model 1: *PRISMA Flowchart*

Valg og vurdering af litteratur

Kvalitetsvurdering

Kvaliteten og troværdigheden af de inkluderede studier blev vurderet ud fra en pragmatisk screening (se yderligere jf. Bilag 2: Kvalitetsvurdering). Herunder om studiet:

- **Havde en publiceret protokol**
- **Havde en vurdering af risk of bias / ROB2**
- **GRADE**
- ≥10 studier

Udfra scoren blev kvaliteten vurderet som:

- **4 point:** GOOD
- **3 point:** ADEQUATE
- **<2 point:** POOR

Vurdering af evidens

Resultatsyntesen er baseret på systematiske reviews med meta-analyser, hvor dette er metodisk muligt. Metaanalyser anvendes for at muliggøre kvantitativ syntese og estimering af samlede effekter. Dette muliggør sammenlignelige anbefalinger på tværs af de 14 grupper, baseret på den bedst tilgængelige evidens fra flere primærstudier.

Vurderingen af evidens blev foretaget på baggrund af de 1-3 nyeste metaanalyser af højest mulig metodisk kvalitet inden for hver gruppe. Først blev alle identificerede systematiske reviews og metaanalyser kvalitetsvurderet som beskrevet ovenfor (jf. Kvalitetsvurdering). Herefter blev metaanalyser, der var vurderet som god eller tilstrækkelig metodisk kvalitet, prioriteret. Blandt disse blev de nyeste inkluderet, idet aktualitet blev tillagt betydning under forudsætning af acceptabel metodisk kvalitet. Denne fremgangsmåde bygger på en antagelse om, at nyere og metodisk veludførte metaanalyser typisk inkluderer tidligere relevante primærstudier og dermed repræsenterer den mest opdaterede samlede evidens.

Det blev efterstræbt at vurdere evidens på tre studier for hver af de 14 grupper, men antallet er bestemt af, hvor mange studier, der var i de 14 grupper. I grupper hvor der var færre end tre studier, blev alle inkluderet i resultatsyntesen, uafhængigt af kvalitet. Metaanalyser vurderet som værende af dårlig kvalitet blev således kun inkluderet i de tilfælde, hvor der ikke fandtes metaanalyser af højere kvalitet i den pågældende gruppe. Dermed er evidens i disse grupper vurderet på studier af tilstrækkelig kvalitet og/eller dårlig metodisk kvalitet.

Vurderingen af evidens er, ligesom kvalitetsvurderingen, baseret på nogle pragmatiske principper (jf. Bilag 2: Vurdering af evidens):

- **A – Meget høj kvalitet:** Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man ikke forventer at ny forskning vil finde anden effekt.
- **B – Høj kvalitet:** Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man forventer at ny forskning kan have en lille, men ikke betydelig effekt.
- **C – Moderat kvalitet:** Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man forventer at ny forskning kan have en moderat betydning for den præcise effekt, hvor heterogenitet i studier eller om der findes signifikant effekt kan variere.
- **D – Modsigende/lav kvalitet:** Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man forventer at ny forskning kan have en væsentlig betydning for den præcise effekt, hvor heterogenitet i studier eller om der findes signifikant effekt kan ændres.

I resultatsyntesen vil denne vurdering af evidens visualiseres ud fra farvekoder i tekstbokse med *Anbefalet dosering i klinikken* (jf. Resultatsyntese), hvor evidensstyrke opdeles ud fra følgende koder:

A	B	C	D

Da der er tale om metaanalyser, er alle inkluderede studier på det øverste evidensniveau – men sikkerheden i estimatet varierer [14].

Den anvendte evidensklassifikation (A–D) kan betragtes som en pragmatisk finsortering, hvor både antal studier, konsistens samt præcision af effektestimater indgår. Vurderes effekten for lille til at have kliniske relevans for funktionelle resultater vil vurdering af evidens nedgraderes. Det kan derfor forventes at resultater er klinisk relevante, hvis andet ikke fremgår.

I vurderingen af evidensklassifikation kan et højt samlet deltagerantal i de relevante analyser opveje et lavere antal studier. Studier vurderet til A og B indikerer høj sikkerhed i evidensen, mens studier vurderet til C og D er forbundet med stigende usikkerhed omkring den præcise effekt. Selvom enkelte metaanalyser vurderet til D viser statistisk signifikante effekter, er disse forbundet med betydelig usikkerhed som følge af få inkluderede studier, høj heterogenitet eller modstridende fund. Signifikante resultater i disse analyser tolkes derfor med forsigtighed og anvendes primært som understøttende evidens snarere end som grundlag for selvstændige anbefalinger.

Udvælgelse af studier

Da udvælgelse af studier til resultatsyntesen ikke i alle grupper er lykkedes med at inkludere 3 studier af høj metodisk kvalitet skal dette tages i betragtning, når man vurderer effekt og overførbarhed til klinisk praksis (jf. Vurdering af evidens).

Hvor inkluderet litteratur ikke er tilstrækkelig til at sikre anbefalinger af høj kvalitet, vil der refereres til et ældre Position Statement fra *the National Strength and Conditioning Association* [8], der omhandler styrketræning for ældre, for derved at understøtte kvaliteten. For osteoporose henvises desuden til en faglig anbefaling fra *Dansk Selskab for Fysioterapi i Gerontologi og Geriatri* [28].

Definitioner af tests

Short Physical Performance Battery er en standardiseret test af fysisk funktionsevne i underekstremiteterne baseret på tre deltests omhandlende balance, ganghastighed og rejse-sætte-sig-evne, med formål at vurdere mobilitet og risiko for fald [27].

Timed Up and Go er en test af dynamisk mobilitet og balance [11].

Rejse-sætte-sig-test måler styrkeudholdenhed i benene [25].

Forklaring af 1RM

1RM (one repetition maximum) er den maksimale belastning en person kan løfte én gang med korrekt teknik i en given øvelse. Træningsintensitet angives ofte som en procentdel af 1RM, hvor højere procenter svarer til tungere belastning og færre mulige gentagelser. En 1RM-tabel kan bruges til at estimere træningsbelastning ud fra ud fra det antal gentagelser, en person kan udføre ved en given belastning eller udfra en kendt 1RM [1, 10].

Max antal gentagelser	1RM	2	3	4	5	6	7	8	9	10
% af max	100%	97%	94%	92%	89%	86%	83%	81%	78%	75%
Træningsbelastning i kilo	150	145,8	141,7	137,5	133,3	129,2	125,0	120,8	116,7	112,5
	140	136,1	132,2	128,3	124,4	120,6	116,7	112,8	108,9	105,0
	130	126,4	122,8	119,2	115,6	111,9	198,3	104,7	101,1	97,5
	120	116,7	113,3	110,0	106,7	103,3	100,0	96,7	90,3	90,0
	110	106,9	103,9	100,8	97,8	94,7	91,7	88,6	85,6	82,5
	100	97,2	94,4	91,7	88,9	86,1	83,3	80,6	77,8	75,0
	90	87,5	85,0	82,5	80,0	77,5	75,0	72,5	70,0	67,5
	80	77,8	75,6	73,3	71,1	68,9	66,7	64,4	62,2	60,0
	70	68,1	66,1	64,2	62,2	60,3	58,3	56,4	54,4	52,5
	60	58,3	56,7	55,0	53,3	51,7	50,0	48,3	46,7	45,0
	50	48,6	47,2	45,8	44,4	43,1	41,7	40,3	38,9	37,5
	40	38,9	37,8	36,7	35,6	34,4	33,3	32,2	31,1	30,0
	30	29,2	28,3	27,5	26,7	25,8	25,0	24,2	23,3	22,5

1RM-tabel *[19].*

Resultatsyntese

Alle præsenterede reviews er metaanalyser. Resultater vil i følgende afsnit afgrænses til relevante effektmål af styrketræning, indenfor funktionsevne, muskelstyrke, mobilitet, fald og livskvalitet. Deri vil resultater om biomarkører mv. ikke blive præsenteret, når de indgår i studierne. For hver af de 14 geriatriske tilstande præsenteres følgende afsnit: 1) Centralt budskab, 2) Anbefalet dosering i klinikken, 3) Præsentation af inkluderede studier og 4) Udvidet konklusion og klinisk anvendelse.

Raske

Centralt budskab

Hos raske, selvhjulpne ældre medfører styrketræning konsistente forbedringer i muskelstyrke, særligt i underekstremiteterne [61, 91], samt små til moderate forbedringer i funktionelle tests som Short Physical Performance Battery, Timed Up and Go og en rejse-sætte-sig-test [81]. Styrketræning bør derfor anvendes systematisk hos raske ældre med fokus på både styrke og funktion. Powerstyrketræning er generelt mere effektiv end lavhastigheds- eller traditionel styrketræning for styrke og enkelte funktionelle mål [81, 91], hvorfor hastighed bør prioriteres og tilpasses ud fra individuelle mål og evne.

Anbefalet dosering i klinikken

- **Frekvens:** : 2–3×/uge [61, 81, 91].
- **Intensitet:** Op mod 70–85 % 1RM [8, 61, 81, 91].
- **Volume:** 2–3 sæt × 8–12 gentagelser pr. større muskelgruppe [8].
- **Powerstyrketræning:** 40–60 % 1RM udført eksplosivt i koncentrisk fase [8, 81, 91].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne [8, 108].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

Studier

Tre metaanalyser undersøgte effekten af styrketræning hos raske eller relativt raske ældre uden specifik sygdomsdiagnose eller andre geriatriske tilstande [61, 81, 91]. Interventionerne omfattede traditionel styrketræning samt høj- og lavhastighedsstyrketræning, med mål relateret til muskelstyrke og funktionel kapacitet, som er det funktionsniveau, en person er i stand til at præstere og fysisk performance, der omfatter at blive bedre til at udføre dagligdags aktivitet.

Udvidet konklusion og klinisk anvendelse

Der er moderat-høj evidens for forbedring af muskelstyrke [61, 91] og moderat, men heterogen, evidens for forbedringer i funktionelle tests [81]. Effekten er mest robust for muskelstyrke, mens effekten på gangfunktion og balance er mere varierende [81]. Styrketræning bør derfor prioriteres som grundelement i træning af raske ældre, evt. suppleret med powerøvelser for yderligere funktionel gevinst.

Yderligere kan effekt forventes på muskelpower og neuromuskulær funktion, særligt når styrketræning udføres med moderat belastning og eksplosiv koncentrisk fase. Dette kan understøtte hurtige funktionelle bevægelser som retningsskift, opbremsning og reaktionsevne, også hos ellers raske ældre. Disse effekter er veldokumenterede ved systematisk styrketræning af større muskelgrupper med planlagt progression [8].

Sarkopeni

Centralt budskab

Hos ældre med sarkopeni medfører styrketræning, med høj evidens, konsistente forbedringer i muskelstyrke, særligt håndgrebsstyrke og knæekstensionsstyrke [87, 96, 101]. Funktionelle forbedringer i rejse-sætte-sig-test, ganghastighed og Timed Up and Go ses mest tydeligt, når styrketræning kombineres med balance- eller aerob træning, mens ren styrketræning har moderat evidens og har mere variabel funktionel effekt, der ikke altid er klinisk relevant. Styrketræning kombineret med aerob træning eller balancetræning har øget effekt på funktionsniveau og mobilitet [87, 96]. Styrketræning kan derfor med fordel anvendes til at opnå styrke og funktionelle forbedringer ved sarkopeni, men funktionsniveau og mobilitet forbedres mere ved kombinationstræning [87, 96].

Anbefalet dosering i klinikken

- Frekvens: 1–3×/uge [101]; oftest 2–3×/uge [87].
- Intensitet: 40–85 % 1RM; bedst respons ≥60–70 % 1RM [101].
- Volume: ≥3 sæt × 8–12 gentagelser pr. øvelse, hvor muligt [8, 101].
- Muskelgrupper: Hele kroppen med fokus på underekstremiteterne [8, 101].
- Supplerende elementer: Balancetræning ved funktionelle mål [87, 96].
- Anbefalet: Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

B

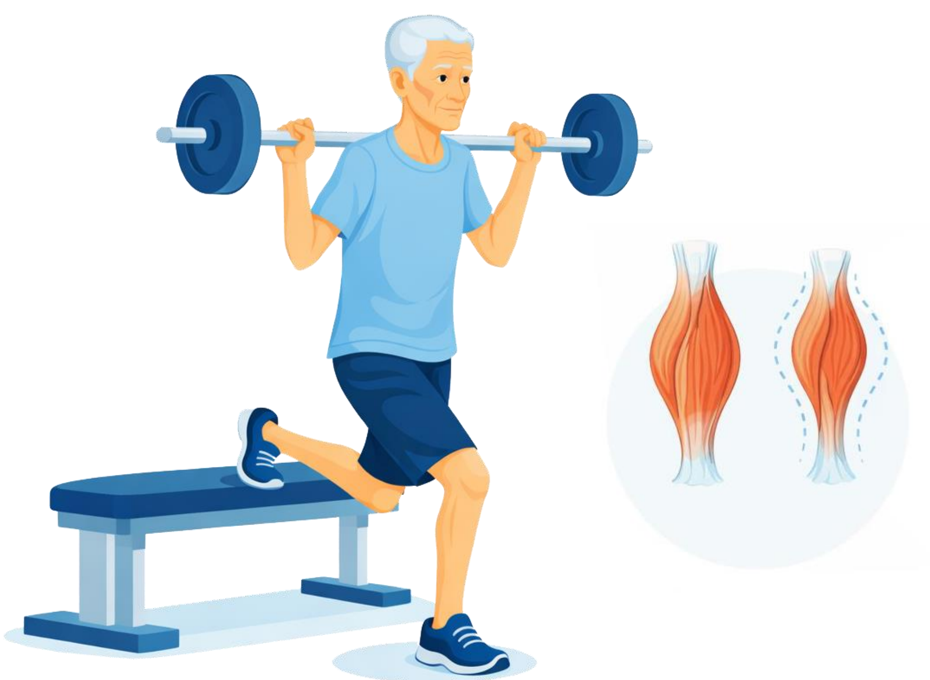
Studier

Tre metaanalyser undersøger styrketræning alene eller i kombination med balance- eller aerob træning og/eller ernæring, med mål relateret til muskelstyrke (håndgrebsstyrke, knæekstensionsstyrke) og funktion (rejse-sætte-sig-test, ganghastighed, Timed Up and Go) [87, 96, 101].

Udvidet konklusion og klinisk anvendelse

Der foreligger høj evidens for forbedring af muskelstyrke ved styrketræning hos ældre med sarkopeni [87, 96, 101]. Funktionelle forbedringer er understøttet af moderat evidens og er mest konsistente i kombinationsforløb, især styrketræning kombineret med balancetræning [87, 96]. Klinisk bør styrketræning individualiseres og suppleres med balanceelementer, når målet er forbedring i gang og mobilitet.

Yderligere kan effekt forventes på muskelpower, funktionel bevægelseshastighed og evnen til hurtig kraftudvikling, som er centrale for selvstændig mobilitet og faldforebyggelse hos ældre med sarkopeni. Det understreges, at styrketræning med moderat–høj intensitet og eksplosiv udførelse kan forbedre neuromuskulær funktion og funktionel kapacitet, hvilket er særligt relevant ved reduceret muskelmasse og -funktion [8].



Overvægt og sarkopen fedme

Centralt budskab

Hos ældre med sarkopen fedme medfører træningsinterventioner med en tydelig styrkekomponent forbedringer i tests, særligt håndgrebsstyrke, rejse-sætte-sig-test og ganghastighed [90, 108]. Evidensen for funktionelle resultater (Short Physical Performance Battery og Timed Up and Go) og balance er mere begrænset og varierer [89, 108]. Styrketræning bør derfor anvendes som centralt element, og kan evt. kombineres med aerob eller multikomponent træning, der bidrager positivt til både muskelstyrke og funktionelle resultater [90, 108].

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge [89-90, 108].
- **Varighed:** ≥12 uger (ofte 8–32 uger) [108].
- **Intensitet:** 40–85 % 1RM eller HRR* [108].
- **Volume:** 2–3 sæt × 8–12 gentagelser [8, 108].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne [8, 108].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

****HRR (heart rate reserve):** forskellen mellem maksimale puls og hvilepuls angiver en persons pulsreserve i forhold til kardiovaskulær kondition, hvor effektivt et hjerte, lunger og blodkar kan transportere ilt til musklerne under fysisk aktivitet [18].*

C

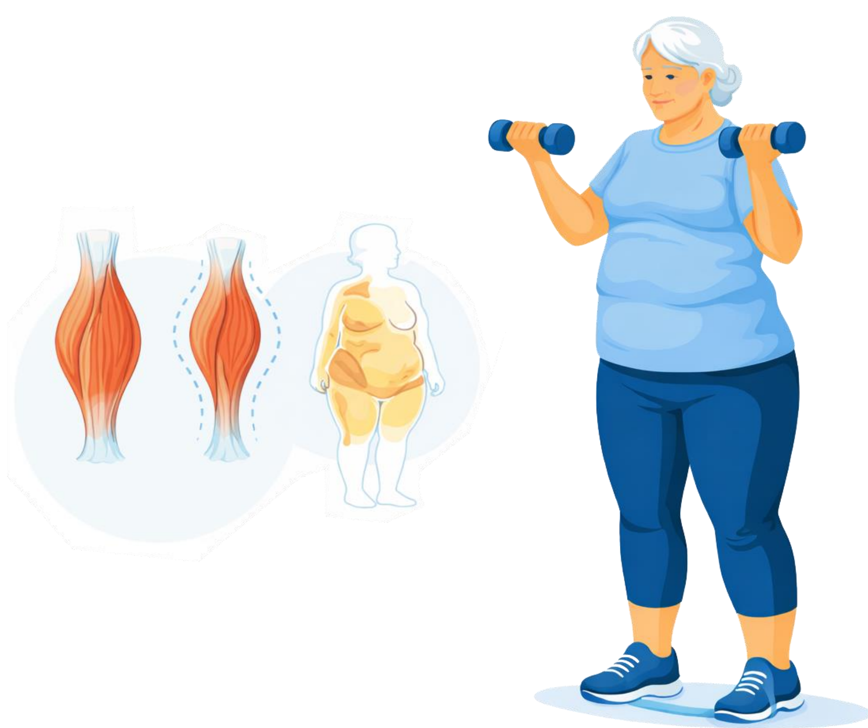
Studier

Tre metaanalyser fra 2025 undersøger styrketræning, aerob træning, kombineret styrke med aerob træning, multikomponent træning, cirkelløbstræning, hypertrofitræning og højhastigheds-kredsløbstræning og virkningerne af samtidig træning og rapporterer effekter på muskelstyrke, funktion og mobilitet hos ældre med sarkopen fedme [89-90, 108].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat-høj evidens for forbedring af håndgrebsstyrke, rejse-sætte-sig-test og ganghastighed [90, 108], mens evidensen for funktionelle resultater (Short Physical Performance Battery og Timed Up and Go) og balance primært understøttes af enkeltstudier [89, 108]. På trods heraf fremstår styrketræning som et relevant og klinisk anvendeligt valg ved sarkopen fedme.

Yderligere kan effekt forventes på overordnet muskelstyrke og muskelpower, når styrketræning målrettes større muskelgrupper og gennemføres med systematisk dosering. Samtidig viser evidens at styrketræning kan bidrage til forbedret neuromuskulær funktion og funktionel kapacitet, hvilket kan understøtte fysisk performance og daglig funktion hos ældre med sarkopenisk overvægt [8].



Hjertesygdomme og sygdomme i kredsløbet

Centralt budskab

Hos ældre med kronisk hjertesvigt er fysisk træning forbundet med små–moderate forbedringer i gangrelaterede mål, aerob kapacitet og livskvalitet. Evidensen for effekt på aerob kapacitet måles på forskellige parametre på tværs af studierne og effekt af isoleret styrketræning afhænger derfor af fokus. Det ene studie måler på en 6-minutters gangtest og det andet laver en test af VO_2max* [97, 115]. Styrketræning alene har ikke statistisk signifikant effekt på VO_2max og bør ikke anvendes som en selvstændig strategi for forbedring på dette, men ved aerob træning alene samt ved kombineret aerob- og styrketræning ses effekt på kardiovaskulær funktion. Derfor bør styrketræning kun anvendes som et supplerende element, hvis fokus er forbedring af kardiovaskulær funktion. Studiet vurderer ikke effekt på gangfunktion [115]. I det andet studie, der tester aerob kapacitet på en gangtest, ses effekt af styrketræning. Styrketræning bør derfor primært anvendes til at understøtte funktionel kapacitet og muskulær funktion i kliniske forløb [97].

**Anbefalet dosering i klinikken*

VO_2max omhandler iltoptag i blodet og er bl.a. forbundet med et velfungerende kredsløb og kardiovaskulære funktioner [96, 114]. VO_2max anvendes i det ene studie til at måle aerob kapacitet [114].

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge [97, 115].
- **Intensitet**: Moderat intensitet med gradvis progression; typisk 60–80 % 1RM ved styrkefokus, tilpasset klinisk tolerance [8].
- **Volume:** Ikke er tydeligt rapporteret [97, 115]; generelt anbefales 1–3 sæt × 8–12 gentagelser pr. større muskelgruppe som klinisk ramme [8].
- **Aerob supplement (når relevant):** 40–80 % VO_2-reserve rapporteret i de inkluderede studier [115].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne, med særligt fokus på underekstremiteter for gang- og rejsefunktion [8].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

Studier

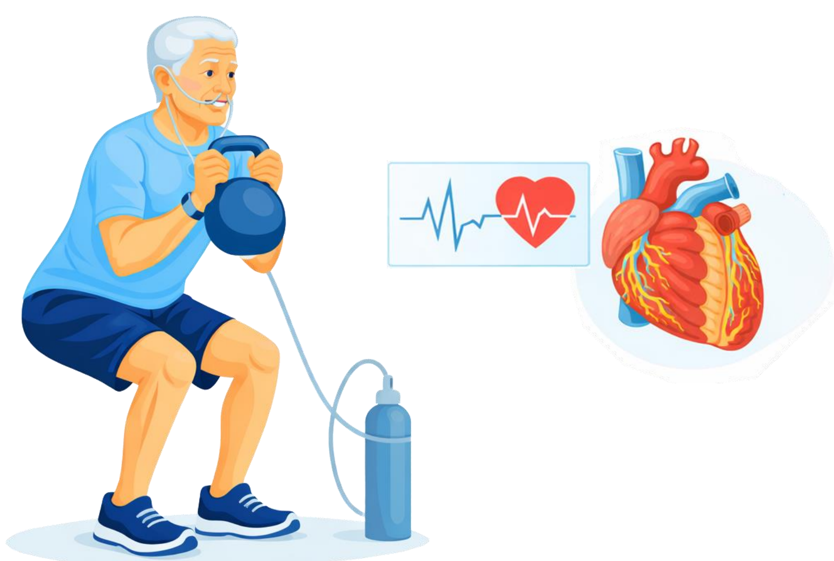
To metaanalyser undersøger træning ved kronisk hjertesvigt og inkluderer aerob træning, styrketræning og kombinationsprogrammer, med tests relateret til aerob kapacitet, gangfunktion og livskvalitet [97, 115].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat–høj evidens for, at fysisk træning ved hjertesvigt forbedrer aerob kapacitet, gangrelaterede mål og livskvalitet, men der ses inkonsistente resultater vedrørende effekten af styrketræning, aerob- og kombineret træning på tværs af studierne [97, 115]. I ét studie måles aerob kapacitet ud fra VO_2max, hvor aerob træning og kombineret aerob- og styrketræning giver de mest robuste forbedringer i VO_2max, mens styrketræning alene ikke viser signifikant effekt [115]. I det andet studie måles aerob kapacitet ud fra en gangtest, hvor der ses størst effekt på aerob kapacitet og kardiovaskulære funktioner ved styrketræning, lille effekt ved aerob træning og triviel effekt ved en kombination af de to [97].

Studiernes data om dosering for styrketræningsdelen er utilstrækkelige til at lave præcise og evidensbaserede anbefalinger [97, 115]. Styrketræning bør primært bruges til at støtte op om øvrige interventioner. Træning bør være progressiv og have fokus på store muskelgrupper [8, 97, 115].

Yderligere kan effekt forventes på muskelstyrke, muskeludholdenhed, funktionel kapacitet og evnen til at udføre daglige aktiviteter, når styrketræning gennemføres systematisk og progressivt hos ældre med kronisk sygdom og geriatriske tilstande. Særligt kan forbedret neuromuskulær funktion og øget muskulær reserve bidrage til bedre tolerance for hverdagsbelastninger og til at understøtte den samlede træningsrespons i kombinerede forløb [8].



Demens og mild kognitiv svækkelse (MCI)

Centralt budskab

Hos ældre med kognitiv skrøbelighed og mild kognitiv svækkelse (MCI) er træningsinterventioner med styrkekomponent forbundet med forbedringer på flere funktionelle parametre, særligt mobilitetsmål (Timed Up and Go, ganghastighed) og muskelstyrke (håndgreb) [71, 112]. Resultaterne er dog præget af høj heterogenitet i flere centrale tests og Short Physical Performance Battery viser ikke sikker samlet effekt i materialet for kognitiv skrøbelighed [112]. Styrketræning bør derfor anvendes som et struktureret element i træningsforløb ved kognitiv skrøbelighed og MCI med fokus på funktion, at tilpasse dosering efter tolerance og tydelig progression, ofte i kombination med andre træningsformer.

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge [112]; typisk omkring 3×/uge [71].
- **Varighed:** 6–48 uger [71, 112].
- **Intensitet:** Moderat–høj efter tolerance; eksempelvis styrketræning omkring ~75% RM / 7RM eller RPE 14–15 [71]; som klinisk ramme ofte 60–80 % 1RM ved styrkefokus med gradvis progression [8].
- **Volume:** 2–3 sæt × 6–15 gentagelser [71]; som klinisk ramme ofte 2–3 sæt × 8–12 gentagelser pr. større muskelgruppe [8].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne samt funktionelle bevægelser (rejse-sætte-sig-test/squat, benpres/knæ-hofteekstension, træk/skub, greb) [8, 71, 112].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

Studier

To metaanalyser med fokus på kognitiv skrøbelighed [112] og på MCI [71] inkluderer træningsinterventioner, hvor styrketræning indgår som centralt eller delvis komponent, med tests relateret til mobilitet (Timed Up and Go, ganghastighed), muskelstyrke (håndgrebsstyrke, rejse-sætte-sig-test) og enkelte samlede funktionsmål (Short Physical Performance Battery) [71, 112].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat evidens for, at træningsinterventioner med styrkekomponent kan forbedre styrke og funktionelle resultater hos ældre med kognitiv skrøbelighed og MCI, men med tydelige begrænsninger i form af høj heterogenitet [71, 112]. For kognitiv skrøbelighed ses signifikante forbedringer i Timed Up and Go (ingen heterogenitet), samt forbedringer i ganghastighed håndgrebsstyrke og rejse-sætte-sig-test, men heterogeniteten er høj for flere tests, og ændring i Short Physical Performance Battery er ikke statistisk signifikant [112]. For MCI er håndgrebsstyrke det mest tydeligt rapporterede, relevante resultat, hvor der ses signifikant forbedring, som dog begrænses af få studier med et relativt lille deltagerantal for dette nøglemål (total 73 personer). Øvrige funktionelle eller styrkeorieterede mål fremgår ikke i metaanalysen om MCI [71]. Klinisk taler dette for at prioritere styrketræning, der målrettes funktionelt relevante bevægelser (rejse-sætte-sig, gangrelateret benstyrke, grebsstyrke) og gennemføres med systematisk dosering og progression, samt at supplere med træning, der adresserer gang og balance, når dette er et centralt mål [71, 112].

Yderligere kan effekt forventes på muskelpower, reaktionshastighed og neuromuskulær funktion, når styrketræning udføres systematisk og progressivt hos ældre med kognitiv svækkelse. Dette kan understøtte hurtige og sikre funktionelle handlinger i hverdagen (fx korrigerende skridt, opbremsning, retningsskift), hvor både fysisk robusthed og bevægelseshastighed er centrale. Disse effekter er veldokumenterede ved styrketræning af større muskelgrupper med planlagt progression og kan derfor være relevante som klinisk supplement til de funktionelle mål ved kognitiv skrøbelighed og MCI [8].

Diabetes

Centralt budskab

Hos ældre med metabolisk dysregulation såsom type 2-diabetes kan styrketræning medføre signifikante forbedringer i muskelstyrke i både over- og underekstremiteter, men effekten er meget lav i overekstremiteterne og er ikke klinisk relevant. Det inkluderede studie forbinder type 2-diabetes hos ældre med med funktionstab og ændret kropssammensætning og fokuserer derfor på metabolisk sundhed, kropssammensætning og muskelstyrke. Effekterne på styrke er præget af meget stor variation, og den samlede evidens for funktionelle resultater vurderes derfor som svag [55]. Styrketræning kan anvendes som supplerende indsats med primært fokus på styrkeopbygning - særligt i underekstremiteter - snarere end sikre funktionelle gevinster.

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge (ud fra samlet variation i studier (1-7) [55].
- **Intensitet:** Overvejende moderat–høj, typisk 60–80 % 1RM (interval 40–90 % 1RM) [8, 55].
- **Volume:** 2–4 sæt × 8–20 gentagelser pr. øvelse; 6–10 øvelser pr. session, afhængigt af tolerance [8, 55].
- **Progression:** Gradvis belastningsstigning baseret på RM, RPE eller gentagelser, hvor muligt [8, 55].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne [8, 55].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

D

Studier

Én metaanalyse undersøger effekten af ren styrketræning hos ældre ≥60 år med type 2-diabetes. Fokus er metabolisk sundhed, kropssammensætning og muskelstyrke, hvor studiet tager udgangspunkt i, at type 2-diabetes hos ældre er tæt forbundet med funktionstab og ændret kropssammensætning, som øger insulinresistens og medfører tab af muskelmasse. På den baggrund har studiet fokus på muskelstyrke i over- og underekstremiteter som en central faktor i forebyggelse og behandling [55].

Udvidet konklusion og klinisk anvendelse

Der foreligger svag evidens for, at styrketræning kan forbedre muskelstyrke hos ældre med type 2-diabetes, idet både styrke i både over- og underekstremiteter øges signifikant, men med ekstrem heterogenitet (I^2 ~95–96 %) og derfor reduceres robustheden af konklusionerne markant. Yderligere er effektstørrelsen for overekstremiteterne meget lille [55]. Der rapporteres ingen ensartede funktionelle tests (fx gang, Timed Up and Go eller rejse-sætte-sig-test), og evidensen kan derfor ikke understøtte klare konklusioner om overførsel til funktionel kapacitet.

Klinisk kan styrketræning anvendes med henblik på at modvirke alders- og sygdomsrelateret tab af muskelstyrke, men forventningen om sikre og konsistente funktionelle effekter bør være forsigtig.

Yderligere kan effekt forventes på muskelmasse, neuromuskulær funktion og basal kraftudvikling, når styrketræning udføres systematisk med moderat–høj intensitet og planlagt progression. Generelle anbefalinger for ældre viser, at styrketræning af større muskelgrupper kan understøtte vedligeholdelse af fysisk kapacitet og funktionel reserve, også hos personer med kroniske tilstande, selv når den direkte evidens for funktionelle resultater er begrænset. Glukoseniveauet bør desuden overvåges før og efter træningssessionen, for at reducere frygten for træningsinduceret hypoglykæmi [8].

Kroniske nyresygdomme

Centralt budskab

Hos personer med kronisk nyresygdom kan styrketræning medføre signifikante forbedringer i gangkapacitet og håndgrebsstyrke [42]. Forbedringen i gangkapacitet er klinisk relevant, men er præget af substantiel heterogenitet, hvorfor effektstørrelsen kan variere. Styrketræning kan derfor overvejes som supplement med fokus på funktion, men effektstørrelsen er usikker.

Anbefalet dosering i klinikken

- **Frekvens:** Ikke entydigt rapporteret; generel anbefaling 2–3×/uge [8].
- **Intensitet:** Ikke rapporteret [42]; generelt anbefales moderat intensitet svarende til ca. 60–80 % 1RM, tilpasset tolerance og sygdomsstadie [8].
- **Volume:** Ikke rapporteret; generel anbefaling 2–3 sæt × 8–12 gentagelser pr. større muskelgruppe [8].
- **Progression:** Ikke rapporteret; generelt anbefales at det bør planlægges gradvist og individualiseres ud fra træthed, restitution og klinisk status [8].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne; håndgreb og underekstremitetsstyrke er særligt relevante for funktion [8, 42].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

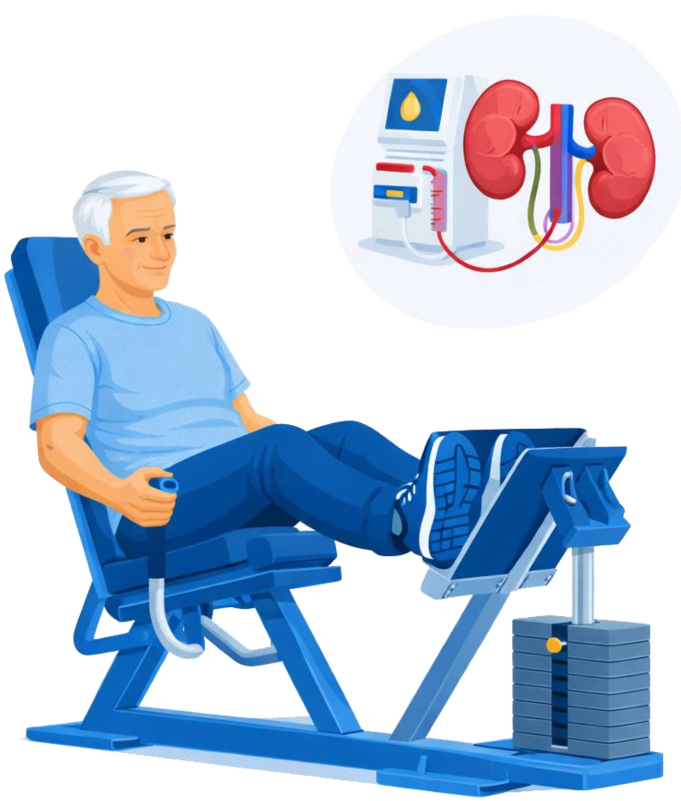
Studier

Én metaanalyse, som omfatter voksne med kronisk nyresygdom, undersøger effekten af styrketræning på funktionelle parametre (gangtest og håndgrebsstyrke) samt metaboliske og inflammatoriske markører [42].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat evidens for, at styrketræning kan forbedre gangkapacitet og håndgrebsstyrke hos personer med kronisk nyresygdom [42]. Effekten på gangkapacitet er potentielt klinisk relevant, men er præget af heterogenitet [42]. Klinisk kan styrketræning anvendes som et muligt supplement med fokus på vedligeholdelse eller mindre forbedringer i fysisk funktion, men grundet den substantielle heterogenitet bør dette anvendes uden forventning om sikre eller konsistente effekter.

Yderligere kan effekt forventes på muskelstyrke, muskelmasse og neuromuskulær funktion, når styrketræning udføres systematisk og med passende progression. Generelle anbefalinger for ældre og personer med kroniske tilstande understøtter, at træning af større muskelgrupper kan bidrage til bedre funktionel reserve, gangudholdenhed og evne til daglige aktiviteter, selv når evidens for specifikke geriatriske tilstande er begrænset [8].



Osteoporose

Centralt budskab

Hos postmenopausale kvinder er styrketræning forbundet med signifikante forbedringer i knogletæthed (BMD), mest konsistent for hele hoften, hvor heterogeniteten er lav [116]. Effekter ses også i lænderyggen og lårbenshalsen, men med meget høj heterogenitet, hvilket reducerer sikkerheden.

Funktionelle resultater er ikke rapporteret, og den kliniske betydning i forhold til funktion kan derfor ikke vurderes direkte, men da osteoporose primært påvirker muskel-skelet-systemet og funktionskapaciteten indirekte, vurderes knogletæthed som et relevant fysisk mål i denne specifikke geriatriske tilstand. Da effekten ikke kan kobles direkte til forbedringer i funktion, mobilitet eller faldrisiko, kan styrketræning derfor klinisk anbefales med henblik på knoglesundhed, men ikke som dokumenteret middel til funktionel forbedring på baggrund af denne metaanalyse alene [116]. Der henvises derfor til at læse andre relevante afsnit (jf. Raske; Risiko for fald; Sarkopeni; Mobilitetsbegrænsning; Skrøbelighed).

Anbefalet dosering i klinikken

- **Frekvens:** ≥3×/uge er forbundet med bedre BMD-respons [116].
- **Intensitet:** Moderat–høj; bedst effekt ved ≥70 % 1RM eller lavere repetitionsområder (<6 reps) [116].
- **Varighed:** Længere interventioner giver bedre effekt; ≥48 uger særligt for lårbenshalsen og hele hoften [116].
- **Volume:** Ikke systematisk rapporteret; generel anbefaling 2–3 sæt × 8–12 gentagelser pr. større muskelgruppe [8].
- **Progression:** Progressiv belastningsstigning anvendt i de fleste studier, men uden fælles model; bør planlægges og individualiseres [8, 116].
- **Muskelgrupper:** Ikke specificeret; generelt anbefales træning af store, vægtbærende muskelgrupper omkring hofte og columna [8].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

Studier

Én metaanalyse, der omfatter postmenopausale kvinder, undersøger effekten af styrketræning på DXA-målt knogletæthed (lænderyggen, lårbenshalsen, hele hoften og trochanter) [116].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat evidens for, at styrketræning kan forbedre knogletæthed hos postmenopausale kvinder. Effekten fremstår mest konsistent for hele hoften [116]. For lænderyggen og lårbenshalsen er effekterne statistisk signifikante, men præget af meget høj heterogenitet, hvilket begrænser sikkerheden omkring hvor stor effekt, der opnås [116]. Da metaanalysen ikke rapporterer funktionelle resultater, anbefales det at se andre relevante afsnit (jf. Raske; Risiko for fald; Sarkopeni; Mobilitetsbegrænsning; Skrøbelighed).

Yderligere kan effekt forventes på muskelstyrke, muskelmasse og neuromuskulær funktion, når styrketræning udføres med tilstrækkelig intensitet og systematisk progression. Disse tilpasninger kan indirekte understøtte funktion, stabilitet og belastningstolerance i muskel-skelet-systemet, også hos personer med osteoporose, selvom dette ikke er direkte undersøgt i den inkluderede metaanalyse [8, 28].

Artrose

Centralt budskab

Træningsinterventioner er forbundet med signifikante smertereduktion ved skuldersmerter og rotator cuff-relaterede gener samt ved knæartrose, men effekten varierer for de to områder [63, 99]. Ved skuldersmerter ses små til moderate forbedringer på tværs af analyser [99]. Ved knæartrose ses både smertereduktion og forbedring i funktionsnedsættelse, men med betydelig heterogenitet og lav effekt, vurderes det ikke klinisk relevant [63]. For knæartrose er målrettet, quadriceps-specifik styrketræning mere effektiv end generel underekstremitetstræning, og simple, single-type træningsprogrammer, der kun består af én type træning (styrketræning eller aerob træning eller performancetræning) er mere effektive end multikomponente forløb. Effekterne er oversat til ca. 8,5 mm smertereduktion og 8,3 mm forbedring i funktionsnedsættelse på en 0–100 mm VAS [63].

Anbefalet dosering i klinikken

- **Frekvens:** ≥3×/uge og mindst 12 superviserede sessioner for optimal effekt ved knæartrose [63].
- **Intensitet:** Ingen klar dosis-respons; generelt anbefales moderat–høj belastning, hvor teknisk korrekt udførelse kan opretholdes [8].
- **Volume:** 2–3 sæt × 8–12 gentagelser pr. relevant muskelgruppe, som generel klinisk ramme [8].
- **Træningstype:**
  - **Skulder:** Træningsterapi med styrkeelementer; specifikke parametre er ikke systematisk rapporteret [99].
  - **Knæartrose:** Quadriceps-specifik styrketræning frem for generel underekstremitetstræning [63].
- **Progression:** Ikke systematisk rapporteret; generelt anbefales at det bør planlægges gradvist og individuelt [8].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

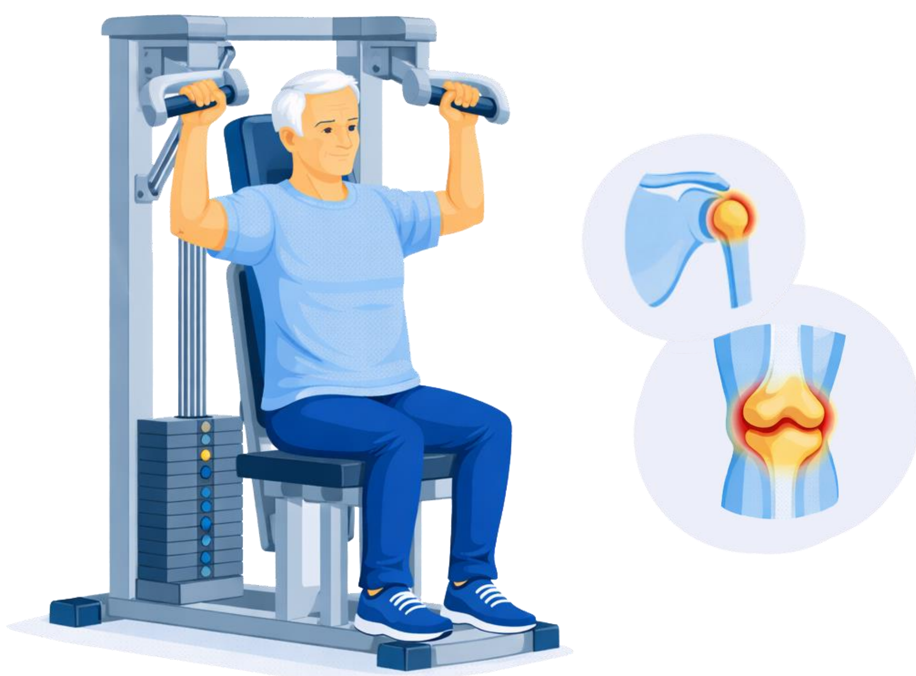
Studier

To metaanalyser med fokus på skuldersmerter/rotator cuff-relaterede tilstande [99] og knæartrose [63] undersøger træningens effekt på smerte og funktionelt funktionsniveau (funktionsnedsættelse), mens direkte styrkerelaterede effekter ikke er primære mål [63, 99].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat evidens for at opnå en mindre smertereduktion ved træning ved skuldersmerter [99]. For knæartrose foreligger svag–moderat evidens for både smertereduktion og forbedring i funktionsnedsættelse, men effekterne er præget af høj heterogenitet og effektstørrelsen vurderes ikke klinisk relevant. Forudsigelsesinterval indikerer desuden, at effekten kan variere mellem kontekster [63]. Den inkluderede evidensen peger på, at styrketræning kan anvendes som en del af behandlingen ved artrose, særligt med fokus på målrettet muskeltræning frem for brede multikomponentprogrammer. Effekten forventes at variere på tværs af artroseområder. Ved knæartrose bør quadriceps-specifik træning prioriteres [63].

Yderligere kan effekt forventes på muskelstyrke, muskeludholdenhed og neuromuskulær funktion omkring det afficerede led, når styrketræning udføres systematisk og med tilstrækkelig belastning. Disse tilpasninger kan bidrage til bedre ledstabilitet og belastningstolerance og dermed indirekte understøtte smertereduktion og funktionel kapacitet, også ved artrose [8].



Kronisk obstruktiv lungesygdom (KOL)

Centralt budskab

Hos personer med KOL medfører målrettet styrketræning af overekstremiteterne konsistente og signifikante forbedringer i muskelstyrke. Effekterne ses ved træning 2–3×/uge i mindst 6 uger, ved moderat–høj intensitet (typisk 50–85 % 1RM eller 6–25 RM), og uafhængigt af om træningen udføres med elastisk modstand eller maskinbaseret udstyr [64]. Evidensen er afgrænset til muskelstyrke i overekstremiteterne, og funktionelle effekter er ikke undersøgt.

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge i mindst 6 uger [64].
- **Intensitet:** 50–85 % 1RM eller tilsvarende 6–25 RM [8, 64].
- **Volume:**
    - **Maskinbaseret styrketræning:** 1–4 sæt × 8–12 gentagelser.
    - **Elastisk modstand:** 2–7 sæt × 6–25 gentagelser [64].
- **Muskelgrupper:** Overekstremiteter (fx bryst, skuldre, albuefleksorer/-ekstensorer, ryg) [8, 64].
- **Progression:** Gradvis øgning af modstand over tid; ingen standardiseret model rapporteret [64].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

B

Studier

Én metaanalyse undersøger effekten af styrketræning af overekstremiteterne, primært styrkebaseret træning med maskiner eller elastiske bånd, hos personer med KOL i lungerehabilitering [64].

Udvidet konklusion og klinisk anvendelse

Der foreligger høj evidens for, at overekstremitetsstyrketræning kan forbedre muskelstyrke hos personer med KOL [64]. Effekterne er konsistente på tværs af flere muskelgrupper (fx pectoralis major og albuefleksorer) og ses både på kort og længere sigt [64]. Der er ingen dokumenteret forskel i styrkeeffekt mellem elastisk modstand og maskinbaseret styrketræning, hvilket giver fleksibilitet i klinisk praksis.

Da metaanalysen ikke rapporterer funktionelle effekter (fx selvhjulpenhed, armfunktion i hverdagen eller livskvalitet), kan effekten ikke direkte kobles til funktionel kapacitet. Klinisk bør styrketræning af overekstremiteterne derfor anvendes som et supplement til rehabilitering ved KOL med fokus på forbedring af muskelstyrke i overekstremiteterne, særligt hos patienter med udtalt træthed eller begrænset tolerance for helkropstræning.

Yderligere kan effekt forventes på neuromuskulær funktion, muskeludholdenhed og muskelpower i overekstremiteterne, når styrketræning udføres systematisk og med tilstrækkelig belastning. Disse tilpasninger kan understøtte mere effektiv brug af arme ved daglige aktiviteter og reducere relativ belastning ved armarbejde, hvilket er relevant hos personer med KOL, hvor overekstremitetsaktivitet ofte er forbundet med dyspnø [8].

Risiko for fald

Centralt budskab

Hos ældre med øget risiko for fald kan styrketræning forbedre underekstremitetsstyrke og enkelte funktionelle parametre såsom Timed Up and Go og ganghastighed, men styrketræning alene reducerer ikke antallet af faktiske fald [46]. Lavintensiv styrketræning med okklusionstræning kan anvendes, når høj belastning ikke tolereres, og medfører forbedringer i muskelstyrke, muskelmasse og funktionel mobilitet [72]. For selve faldmekanismen peger evidensen på, at opgave-specifik perturbationsbaseret reaktiv balance- og gangtræning (gangtræning med en eller flere mekaniske posturale forstyrrelser under øvelsen) er mest effektiv, efterfulgt af powerstyrketræning [65]. I klinisk praksis bør faldforebyggelse derfor baseres på kombinerede indsatser, hvor styrketræning suppleres med reaktiv balance- og gangtræning, for at øge evnen til at genvinde balancen ved perturbation [46, 65, 72].

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge [46, 65, 72].
- **Styrketræning:**
    - **Hvis muligt:** Moderat–høj intensitet, op mod 70–85 % 1RM [8].
    - **Alternativ (ved lav tolerance):** 20–30 % 1RM med BFR [72].
- **Volume:** 2–3 sæt × 6–12 gentagelser [8, 46].
- **Supplerende elementer:** Opgave-specifik reaktiv balancetræning og perturbationsbaseret gangtræning [65].
- **Muskelgrupper:** Primært underekstremiteter (quadriceps, hofte- og ankelmuskulatur) [8, 72].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

Studier

Tre metaanalyser undersøger træningsinterventioner relateret til faldforebyggelse. Kun én metaanalyse analyserer faktiske fald, mens de øvrige fokuserer på funktionelle mål tæt relateret til faldrisiko, herunder styrke, balance og mobilitet [46, 65, 72].

Udvidet konklusion og klinisk anvendelse

Der foreligger svag–moderat til moderat evidens for, at styrketræning kan forbedre styrke og visse funktionelle mål relateret til faldrisiko, men ingen evidens for reduktion i faktiske fald ved styrketræning alene [46]. Lavintensiv styrketræning med okklusionstræning kan være et relevant alternativ hos ældre med lav belastningstolerance og giver forbedringer i styrke, muskelmasse og mobilitet, men højintensiv styrketræning giver større styrkegevinst, hvor den kan tolereres [72]. For målrettet faldforebyggelse peger evidensen på, at reaktiv balancetræning og perturbationsbaseret gangtræning bør indgå som centrale elementer, eventuelt suppleret med power-træning. Reaktiv balancetræning viser mere konsistente, opgave-specifikke forbedringer i reaktiv balance end gangtræning uden mekaniske posturale forstyrrelser [65].

Yderligere kan effekt forventes på fysisk funktion, neuromuskulært respons og evnen til hurtig kraftudvikling gennem systematisk styrketræning og power-orienterede øvelser, hvilket kan understøtte ældres robusthed over for pludselige belastninger i hverdagen [8].

Skrøbelighed

Centralt budskab

Hos skrøbelige og præ-skrøbelige ældre medfører styrketræning forbedringer i funktionelle tests, især styrke i underekstremiteter (rejse-sætte-sig-test), mens effekterne på mobilitet (ganghastighed og Timed Up and Go) er mere variable og har ofte ikke statistisk signifikante effekter i samlede analyser [74, 82]. Både powerstyrketræning og traditionel styrketræning kan forbedre funktion, men der ses ikke klare forskelle mellem powerstyrketræning og traditionel styrketræning på fysisk funktion [74]. Multikomponent træning, der kombinerer to eller flere træningstyper, kan reducere skrøbelighed og i enkelte analyser forbedre selvhjulpenhed og livskvalitet, men evidensen er overvejende lav [102]. Styrketræning bør derfor anvendes som central intervention ved skrøbelighed med fokus på funktionel benstyrke og målrettet progression.

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge [74, 82].
- **Intensitet:** 40–80 % 1RM, afhængigt af tolerance [74, 82]; typisk 60–80 % 1RM ved mål om styrke [8].
- **Volume:** 1–4 sæt × 8–15 gentagelser pr. øvelse [82]; ofte 2–3 sæt × 8–12 gentagelser pr. større muskelgruppe som klinisk ramme [8].
- **Powerstyrketræning:** Kan indgå som eksplosiv koncentrisk fase ved moderat belastning, når det er sikkert og relevant for funktion [8, 74].
- **Muskelgrupper:** Store muskelgrupper med fokus på underekstremiteter. (hofte/knæ/ankel) samt relevante posturale muskler [8, 82].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

C

Studier

Tre metaanalyser undersøger traditionel styrketræning og powerstyrketræning samt bredere ikke-farmakologiske, multikomponente forløb, med mål relateret til funktion (rejse-sætte-sig-test, ganghastighed, Timed Up and Go, Short Physical Performance Battery), skrøbelighed, selvhjulpenhed og livskvalitet [74, 82, 102].

Udvidet konklusion og klinisk anvendelse

Der foreligger moderat evidens for, at styrketræning forbedrer funktion hos skrøbelige og præ-skrøbelige ældre, med mest konsistente effekter på rejse-sætte-sig-test [74, 82]. Effekter på ganghastighed og Timed Up and Go er samlet set mere heterogene og ofte ikke statistisk signifikante i samlede analyser, og multikomponent træning kan reducere skrøbelighed og understøtte selvhjulpenhed og livskvalitet, men med lav evidensstyrke og effekt ses ikke i alle test for gruppen af skrøbelige [82, 102]. Klinisk bør styrketræning prioriteres som grundelement og tilrettelægges med funktionel overførsel (fx rejse-sætte-sig, trappefunktion) og gradvis progression, mens gangrelaterede mål ofte kræver supplerende træning (fx gang- og balanceelementer) for mere sikker effekt [74, 82].

Yderligere kan effekt forventes på muskelpower, hurtig kraftudvikling, neuromuskulær funktion og bevægelseshastighed, hvilket kan understøtte tidskritiske funktioner som reaktion, opbremsning og korrigerende skridt ved balanceudfordringer. Disse effekter er veldokumenterede ved systematisk styrketræning af større muskelgrupper med planlagt progression og kan være særligt relevante ved lavt funktionsniveau, hvor små forbedringer i kraftudvikling kan få stor funktionel betydning [8].

Mobilitetsbegrænsning

Centralt budskab

Hos mobilitetsbegrænsede ældre i plejesektoren kan siddende elastikbaseret styrketræning medføre små til moderate, men klinisk relevante forbedringer på funktionelle parametre, herunder selvhjulpenhed, håndgrebsstyrke, rejse-sætte-sig-test og mobilitet målt ved Timed Up and Go [54]. Interventionen med siddende elastikbaseret styrketræning er gennemførlig hos ældre med meget lavt funktionsniveau og behov for støtte, og fremstår som et anvendeligt alternativ, når stående eller vægtbærende træning ikke er mulig.

Anbefalet dosering i klinikken

- **Frekvens:** 2–3×/uge [54].
- **Varighed:** 12–60 uger; typisk omkring 24 uger [54].
- **Intensitet:** Moderat til moderat–høj anstrengelse svarende til RPE 4–8/10; ofte RPE 6–8 ved submaksimale gentagelser [54].
- **Volume:** Ikke entydigt rapporteret; t; generelt anbefales at der klinisk kan tilstræbes 2–3 sæt med 8–12 (op mod 15) gentagelser pr. øvelse, justeret efter tolerance [8, 54].
- **Progression:** Gradvis øgning af gentagelser og/eller elastikmodstand samt overgang fra simple til mere krævende øvelser [8, 54].
- **Muskelgrupper:** Helkropsorienteret fokus i siddende stilling – overekstremiteter (arm- og skuldermuskulatur), truncus samt hofte-, knæ- og ankelmuskulatur [8, 54].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

B

Studier

Én metaanalyse undersøger effekten af siddende elastikbaseret styrketræning hos ældre i plejesektoren, herunder raske, skrøbelige, personer med kognitiv svækkelse eller demens samt kørestolsbrugere. Fælles for populationen er udtalt mobilitetsbegrænsning og behov for struktureret støtte til fysisk aktivitet [54].

Udvidet konklusion og klinisk anvendelse

Der foreligger høj evidens for, at siddende elastikbaseret styrketræning kan forbedre centrale funktionelle mål hos mobilitetsbegrænsede ældre. Selvhjulpenhed forbedres med lille, men konsistent effekt og lav heterogenitet, ligesom håndgrebsstyrke, rejse-sætte-sig-test og Timed Up and Go viser signifikante forbedringer med overvejende lav heterogenitet mellem studier [54]. Disse resultater er direkte relevante for daglig funktion i plejesektoren. Selvom forbedringer forventes at være små til moderate, er der stor enighed om effekt på tværs af studier. Evidensen begrænses af mangelfuld rapportering af træningsvolumen (sæt × gentagelser), hvilket reducerer sikkerheden for præcise dosisanbefalinger [54]. Klinisk kan siddende elastikbaseret styrketræning anvendes som et lavtærskel-tilbud til ældre, der ikke kan deltage i stående styrketræning, med fokus på at vedligeholde eller forbedre basal styrke og funktion i over- og underekstremiteter samt understøtte selvhjulpenhed.

Yderligere kan effekt forventes på neuromuskulær funktion, muskeludholdenhed og basal kraftudvikling, selv ved lavere absolut belastning, når styrketræning gennemføres systematisk og progressivt. Evidens fra generelle anbefalinger for ældre viser, at også lav- til moderat belastning, udført tæt på udtrætning og med planlagt progression, kan bidrage til forbedret funktionel kapacitet og bevægelseshastighed. Dette er særligt relevant hos meget svækkede ældre, hvor selv små styrkeforbedringer kan have stor funktionel betydning [8].

Multisygdom: Osteosarkopenisk overvægt

Centralt budskab

Hos ældre med osteosarkopenisk overvægt (kombination af osteopeni eller osteoporose, sarkopeni og fedme) kan elastikbaseret styrketræning udført 3×/uge i 12 uger forbedre funktionel styrke (rejse-sætte-sig-test). Effekter på ganghastighed, mobilitet (Timed Up and Go) og håndgrebsstyrke er derimod inkonsistente eller ikke statistisk signifikante. Styrketræning kan derfor overvejes med fokus på funktionel styrke, men den samlede evidens for bred funktionel forbedring er svag [75, 111].

Anbefalet dosering i klinikken

- **Frekvens:** 3×/uge [75, 111].
- **Varighed:** 12 uger [75, 111].
- **Intensitet:** Ikke rapporteret i %1RM; elastikmodstand til moderat anstrengelse [75, 111]. Generelt anbefales moderat intensitet svarende til ca. 60–80 % 1RM, hvor dette kan operationaliseres sikkert [8].
- **Volume:** Begrænset rapportering; ét studie angiver 1–3 sæt × 10–15 gentagelser [111]. Generel anbefaling: 2–3 sæt × 8–12 gentagelser pr. øvelse [8].
- **Progression:** Ikke systematisk rapporteret; generelt anbefales at det bør planlægges gradvist via øget elastikmodstand eller gentagelser [8, 111].
- **Muskelgrupper:** Store muskelgrupper i under- og overekstremiteterne [8, 75, 111].
- **Anbefalet:** Fokus på flerledsøvelser og evt. funktionel træning, hvis individuelt fokus kræver dette [8-9, 21].

D

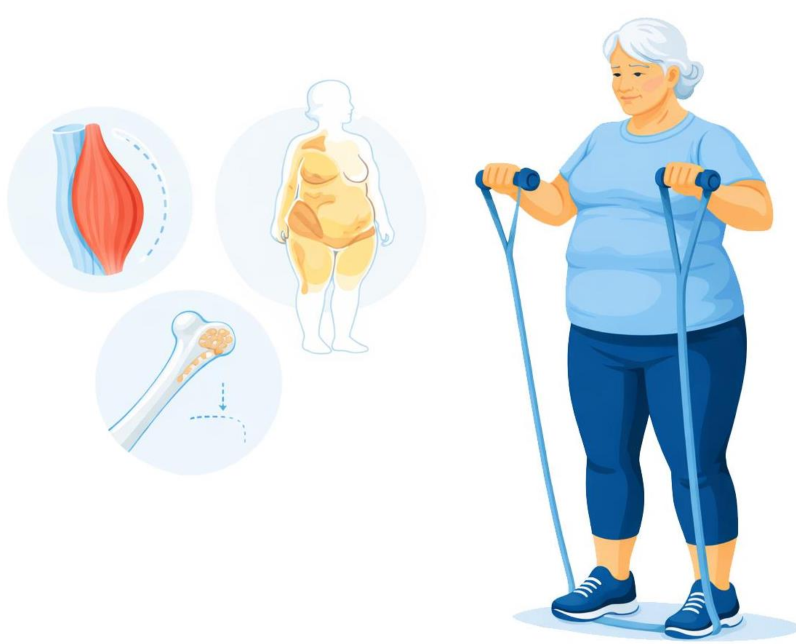
Studier

To metaanalyser, der omfatter ældre med osteosarkopenisk overvægt, undersøger primært elastikbaseret styrketræning. Studierne har hovedfokus på kropssammensætning, men rapporterer også funktionelle tests såsom Timed Chair Rise, ganghastighed, Timed Up and Go og håndgrebsstyrke [75, 111].

Udvidet konklusion og klinisk anvendelse

Der foreligger svag evidens for, at elastikbaseret styrketræning kan forbedre funktionel styrke (rejse-sætte-sig-test) hos ældre med osteosarkopenisk overvægt, når træningen udføres 3 gange ugentligt i 12 uger [75, 111]. For centrale funktionelle mål som ganghastighed, Timed Up and Go og håndgrebsstyrke er resultaterne enten ikke statistisk signifikante eller modstridende, og der foreligger ingen robuste fund i de samlede analyser. Den kliniske anvendelse bør derfor være målrettet forbedring af funktionel styrke snarere end forventning om bredere forbedringer i mobilitet eller gangfunktion.

Yderligere kan effekt forventes på muskelmasse, neuromuskulær funktion og basal kraftudvikling, når styrketræning gennemføres systematisk og med progression, også hos ældre med kompleks multisygdom. Generelle anbefalinger for ældre understøtter, at træning af større muskelgrupper kan bidrage til vedligeholdelse af funktionel reserve og fysisk kapacitet, selv når evidens for specifikke geriatriske tilstande er begrænset [8].



Diskussion

Denne gennemgang af evidens har haft til formål at vurdere evidensen for styrketræning som intervention til forebyggelse og behandling af funktionstab hos ældre på tværs af en bred vifte af geriatriske problemstillinger. Samlet viser resultaterne, at styrketræning – udført i mange forskellige former og doser – er sikker og forbundet med positive effekter på muskelstyrke og funktionelle parametre hos ældre, uanset om de er raske, lever med én geriatrisk tilstand eller har multiple samtidige geriatriske tilstande.

Samlet viser studierne for de 14 geriatriske tilstande, at styrketræning hos ældre på tværs af helbredstilstande er forbundet med positive effekter på især muskelstyrke og i flere grupper også på funktionsevne, mens effekter på mere komplekse funktionelle mål (fx ganghastighed, Timed Up and Go og fald) er mere variable og afhænger af population, træningsindhold og målemetode [42, 46, 54-55, 61, 63-65, 71-72, 74-75, 81-82, 87, 91, 96-97, 99, 101, 111-112, 115-116].

Hierarkisk opsummering af effekter

På tværs af de geriatriske tilstande fremstår effekten på muskelstyrke som det mest konsistente og robuste resultat af styrketræning. Forbedringer i muskelstyrke er dokumenteret hos grupperne: raske, sarkopeni, overvægt og sarkopen fedme, diabetes, kronisk obstruktiv lungesygdom (KOL), kroniske nyresygdomme, demens og mild kognitiv svækkelse (MCI), mobilitetsbegrænsning og multisygdom: osteosarkopenisk overvægt. Evidensen for styrkeeffekter vurderes overvejende som moderat til høj (C–B), og på tværs af de geriatriske tilstande ses en entydig positiv effektretning, men samtidig betydelig heterogenitet i træningsprotokoller, populationskarakteristika og styrkemålinger.

I flere af grupperne, herunder sarkopeni, overvægt og sarkopen fedme, mobilitetsbegrænsning og kronisk obstruktiv lungesygdom (KOL), når evidensen for styrkeforbedringer et højt niveau (B), mens evidensen i andre grupper vurderes som moderat til lav (C-D). Den lavere evidensstyrke i disse områder relaterer sig primært til inkonsistente resultater på tværs af studier og mangelfuld rapportering af træningsdosis og funktionelle mål, snarere end fravær af effekt. Samlet understøtter resultaterne, at styrketræning har en robust og bredt anvendelig effekt på muskelstyrke hos ældre på tværs af helbredstilstande.

Forbedringer i funktionel kapacitet ses typisk sekundært i forhold til forbedringer i muskelstyrke og manifesterer sig primært i øget funktionsevne (rejse-sætte-sig-test), mobilitet (præstation i tests som Timed Up and Go og gangtest) samt selvhjulpenhedsrelaterede resultater. Disse viser mere varierende, men overordnet positive effekter, især hos ældre med sarkopeni, skrøbelighed, øget faldrisiko og mobilitetsbegrænsning. Evidensen er her ofte præget af heterogenitet, hvilket afspejler stor variation i både populationer, interventionsdesign og valg af endemål.

Balance og fald udgør et særskilt område, hvor styrketræning alene ikke reducerer faktiske faldhændelser, men bidrager til forbedring af styrke og visse funktionelle mål. Evidensen peger her på, at styrketræning bør indgå som et kapacitetsopbyggende element, men kombineres med opgave-specifik reaktiv balance- og gangtræning, hvis målet er egentlig faldforebyggelse.

Endelig ses der for flere geriatriske tilstande enten manglende funktionelle mål eller betydelig usikkerhed (fx hjertesygdomme og sygdomme i kredsløbet, osteoporose, artrose), hvilket begrænser muligheden for entydige kliniske anbefalinger. Alligevel peger resultaterne på, at styrketræning kan anvendes som et sikkert supplement, særligt når målet er vedligeholdelse af muskelstyrke og fysisk kapacitet.

Når resultaterne opstilles hierarkisk efter "mest robuste fælles fund", fremstår følgende mønster:

1. **Styrke i store muskelgrupper** er den mest konsistente effekt. Dette ses hos raske [61, 91], ved sarkopeni [87, 96, 101], ved overvægt og sarkopen fedme [90, 108], ved demens og mild kognitiv svækkelse (MCI) [71, 112], ved mobilitetsbegrænsing (håndgreb og rejse-sætte-sig-test/over-/underekstremitetsstyrke) [54], ved diabetes (over-/underkropsstyrke), men med ekstrem heterogenitet [55], ved kroniske nyresygdomme (en gangtest og håndgreb) [42] samt ved kronisk obstruktiv lungesygdom (KOL) (overekstremitetsstyrke), men uden funktionelle mål [64].
2. **Funktionsevne målt med rejse-sætte-sig-testen** fremstår som et relativt robust funktionelt endemål, og effekt målt med denne test ses især ved skrøbelighed [74, 82], mobilitetsbegrænsede [54], sarkopeni (især i kombinationsforløb) [87, 96] og ved multisygdom: osteosarkopenisk overvægt [75, 111].
3. **Mobilitet målt med gangtest og Timed Up and Go** viser mere heterogene fund. Ved skrøbelighed er effekt på mobilitet ofte ikke statistisk signifikante (ganghastighed og Timed Up and Go) [74, 82]. Ved kognitiv skrøbelighed ses forbedringer, men med høj heterogenitet i flere tests (Timed Up and Go og ganghastighed) [112]. Ved mobilitetsbegrænsede ses signifikant

forbedring (Timed Up and Go) [54]. Ved hjertesygdomme og sygdomme i kredsløbet ses styrketræning alene med effekt på gangfunktion, men uden effekt på VO_2max (en gangtest og VO_2max). Evidensen for at nå effekt på VO_2max er mest robust for aerob eller kombineret træning [97, 115].

4. **Faktiske fald** reduceres ikke af styrketræning alene, men styrketræning kan forbedre funktionelle resultater (Timed Up and Go/ganghastighed) og styrke; mest målrettet effekt ses ved opgave-specifik reaktiv balancetræning, og powerstyrketræning rangerer højt som supplerende element [46, 65, 72].
5. **Livskvalitet** vurderes ved hjertesvigt, hvor der ses forbedringer i livskvalitet ved træning overordnet, især ved aerob/kombineret træning [97, 115]. Ved skrøbelighed rapporteres livskvalitet mere inkonsistent og med lav evidens [102]. Det understøtter samlet, at livskvalitet kan forbedres, men at effekten ikke kan tilskrives isoleret styrketræning på tværs af områder med høj sikkerhed.

Et samlet klinisk princip

På tværs af de geriatriske tilstande understøttes et samlet klinisk princip af Fragala et al.s Position Statement (2019) fra the National Strength and Conditioning Association [8]:

Systematisk, progressiv styrketræning af større muskelgrupper kan forbedre muskelstyrke, muskelpower og neuromuskulær funktion, og disse tilpasninger er funktionelt relevante, fordi de understøtter hurtige og tidskritiske bevægelser (fx oprejsning, opbremsning, korrigerende skridt og retningsskift) [8]. Dette perspektiv er særlig vigtigt, fordi studier for flere af de specifikke geriatriske tilstande har begrænset eller inkonsistent rapportering af intensitet, volumen og progression (fx kronisk nyresygdom, hjertesygdomme og sygdomme i kredsløbet, multisygdom: osteosarkopenisk overvægt), men stadig peger i retning af, at styrketræning kan indgå sikkert og meningsfuldt, når den doseres og tilpasses klinisk [42, 75, 97, 111, 115].

Hypotetisk perspektiv: Den multisyge ældre med alle 14 geriatriske tilstande og valg af rette dosering

Hvis man konstruerer en hypotetisk patient, der samtidig kan placeres i alle 14 grupper (inkl. raske som referencepunkt), bliver det afgørende at vælge en dosering, der **(1) er gennemførlig ved laveste funktionsniveau, (2) er sikker ved multisygdomme, og (3) stadig har sandsynlig effekt på de mest robuste udfald.**

I et sådant scenarie vil det være relevant at prioritere:

- **Styrketræning** som kerneintervention for bevarelse af muskelstyrke og funktion.
- **Intensitet** bør være moderat–høj, hvor det er muligt, og lavere intensitet/alternative metoder, hvor tolerancen er begrænset.
- **Ved faldrisiko** kombineres styrketræning med balance- og gangrelaterede elementer.

Dette stemmer overens med pointer fra Fragala et al.s *Position Statement* [8], som fremhæver, at individualiseret styrketræning med passende tilpasning af intensitet, volumen og øvelsesvalg er sikker og effektiv på tværs af ældre populationer – også med betydelig forskel i helbredstilstand.

Et fælles udgangspunkt på tværs af de alle 14 geriatriske tilstande peger på, at man primært bør sigte efter:

- **Mål:** Overordnet styrke og funktionel benstyrke (rejse-sætte-sig-test) som ses som det sikreste effektmål på tværs.
- **Struktur:** Helkropsstyrketræning med fokus på store muskelgrupper og funktionelle bevægemønstre.
- **Dosis:** 2–3 ugentlige sessioner, moderat intensitet og moderat volumen, med gradvis progression.
- **Tilpasning:** Mulighed for lavtærskel-alternativer ved lav tolerance (fx stolbaseret elastiktræning eller lavintensiv træning med BFR) samt supplerende reaktiv balance/gangtræning ved udtalt faldrisiko.

Denne tilgang afspejler både den hyppigst anvendte frekvens (2–3×/uge) i flere områder (raske, overvægt og sarkopen fedme, risiko for fald, skrøbelighed, demens og mild kognitiv svækkelse (MCI), mobilitetsbegrænsning, kronisk obstruktiv lungesygdom (KOL)) og den generelle ramme for effektiv træning til ældre i Fragala et al.s *Position Statement* [8, 54, 61, 64, 72, 74, 81-82, 90-91, 108, 112].

Et fælles mønster på tværs af de 14 geriatriske tilstande

Når man identificerer et fælles mønster på tværs af de 14 inkluderede geriatriske tilstande, fremstår følgende principper som gennemgående:

- **Styrketræning er tolerabel og sikker**, også ved høj alder, multimorbiditet og nedsat funktionsevne.
- **Selv ved lavere intensiteter** (eller alternative tilgange som elastiktræning og BFR) kan der opnås relevante styrke- og funktionsforbedringer.
- **Manglende eller inkonsistent rapportering af træningsdosis** begrænser præcisionen i anbefalinger, men retningen i effekterne er konsekvent positiv.

Dette indikerer, at styrketræning kan anvendes bredt som et fundament i træning af ældre – også når funktionsniveauet er lavt, eller sygdomsbyrden er høj.

Træningsprincipper og øvelsesvalg: Store muskelgrupper og flerledsøvelser

Ud fra de inkluderede metaanalyser og tidligere anbefalinger bør der lægges vægt på, at træningen målrettes store muskelgrupper, og at flerledsøvelser prioriteres.

På tværs af de 14 geriatriske tilstande fremgår det tydeligt, at **styrketræning i praksis primært er rettet mod store muskelgrupper** og ofte anvender funktionelt orienterede øvelser. Der findes desuden overordnet ikke evidens i metaaalyserne, der understøtter et isoleret fokus på enkeltledsøvelser som primær strategi til forbedring af funktion hos ældre. Dette understøttes af Fragala et al.s *Position Statement* fra 2019, der er en tidligere styrketræningsanbefaling for ældre, der **anbefaler brug af flerledsøvelser frem for enkeltledsøvelser** [8]. Ligeledes har et studie fra 2017 påvist bedre styrkefremgang efter træning i flerledsøvelser sammenlignet med træning med enkeltledsøvelser [21] og et andet studie fra 2015 fandt, at der ikke er additiv effekt på hverken styrke eller hypertrofi af tilføjelse af enkeltledsøvelser, hvis man i forvejen træner flerledsøvelser [9]. Med dette kan det være et vigtigt fokus at **fravælge enkeltledsøvelser, for ikke at udtrætte de ældre** med øvelser, hvor evidensen viser en samlet mindre effekt, og i stedet udelukkende fokusere på flerledsøvelser. Således kan energiressourcer hos de ældre anvendes optimalt og dermed opnå størst mulige effekt. Dette understøtter et funktionelt og overførbart træningsprincip, hvor styrketræning anvendes til at understøtte daglige bevægelser og fysisk funktion.

Konklusion

På baggrund af gennemgang af evidens om de 14 geriatriske tilstande konkluderes, at ***styrketræning er en central, sikker og bredt anvendelig intervention*** *til forebyggelse og behandling af funktionstab hos ældre – uanset helbredsstatus.*

Den stærkeste og mest konsistente evidens foreligger for forbedring af muskelstyrke, mens funktionelle resultater viser mere varierende, men overordnet positive effekter. Styrketræning hos ældre er samlet forbundet med forbedringer i især muskelstyrke og i flere grupper også i funktionelle tests, hvor rejse-sætte-sig-testen fremstår som et af de mest robuste funktionelle mål på tværs af skrøbelighed, mobilitetsbegrænsning og multisygdom [54, 61, 74-75, 82, 87, 91, 96, 101, 111]. Effekter på ganghastighed, Timed Up and Go og fald er mere heterogene, og ved faldrisiko peger evidensen på, at styrketræning bør suppleres med opgave-specifik reaktiv balance- og gangtræning, da styrketræning alene ikke reducerer faktiske fald [46, 65, 72]. Ved hjertesvigt ses forbedringer i aerob kapacitet og livskvalitet ved træning samlet, men den mest robuste evidens er knyttet til aerob- eller kombineret træning frem for isoleret styrketræning [97, 115].

Fragala et al.s *Position Statement* understøtter, at progressiv styrketræning i 2–3 ugentlige sessioner kan forventes at forbedre ikke kun styrke, men også muskelpower og neuromuskulær funktion, hvilket har direkte klinisk relevans for ældres funktion og robusthed i hverdagen [8].

Hypotetisk patient med maksimal kompleksitet: Anbefalet dosering i klinikken på tværs af 14 geriatriske tilstande

En patient med maksimal kompleksitet (alle 14 geriatriske tilstande repræsenteret), baseret på den mest gennemgående dosisramme i syntesen, bør træne efter følgende principper:

- **Frekvens:** 2×/uge som minimum (ofte 2–3×/uge) [8, 54, 61, 64, 72, 74, 108, 112].
- **Intensitet (standard):** Moderat belastning svarende til ca. 60–70 % 1RM (kan skaleres op mod 70–85 % ved tolerance og mål om styrke) [8].
- **Intensitet (alternativ ved lav tolerance):** Lav belastning tæt på moderat anstrengelse, fx 20–30 % 1RM med BFR, eller elastik- eller stolebaseret træning styret af RPE [54, 72].
- **Volume:** 2 sæt × 8–12 gentagelser pr. øvelse som minimum; kan øges til 3 sæt ved tolerance [8].

- **Power-element (hvis sikkert):** 40–60 % 1RM udført eksplosivt i koncentrisk fase (relevant for reaktion, opbremsning og funktionel hastighed) [8, 81, 91].
- **Muskelgrupper og øvelsesvalg:** Store muskelgrupper med fokus på funktionelle bevægemønstre; flerledsøvelser prioriteres [9, 21].
- **Progression:** Planlagt og gradvis (flere gentagelser; højere belastning/modstand; flere sæt), styret af teknik og tolerance [8, 54].
- **Supplerende elementer ved høj faldrisiko:** Opgave-specifik reaktiv balancetræning og perturbationsbaseret gangtræning, evt. suppleret med power-orienterede øvelser [65, 72]

Denne anbefalede dosering prioriterer de mest robuste og tværgående effekter (generel styrke og funktionel benstyrke), samtidig med at den rummer sikre alternativer ved lav belastningstolerance og supplerende elementer ved faldrisiko.

Når evidensen vurderes på tværs af raske ældre, ældre med enkeltstående geriatriske tilstande og multisyge ældre, fremstår styrketræning således som et fælles fundament, der kan tilpasses individuelt i intensitet, volumen og øvelsesvalg. Der er ikke grundlag for diagnosespecifikke fravalg af styrketræning; tværtimod peger resultaterne på, at **individualiseret styrketræning kan anvendes på tværs af alle inkluderede geriatriske tilstande.**

I klinisk praksis bør styrketræning derfor struktureres med fokus på store muskelgrupper og flerledsøvelser, med progression hvor muligt, og suppleres med andre træningselementer (fx balance og gang), når det funktionelle mål kræver det. Denne tilgang understøttes både af litteraturen for de 14 geriatriske tilstandes specifikke resultater og af overordnede principper for styrketræning hos ældre [8].

På baggrund af det samlede evidensgrundlag kan styrketræning anbefales som et grundelement i træning af ældre med henblik på at bevare eller forbedre muskelstyrke og funktion – også i komplekse, multisyge populationer – med den erkendelse, at præcise dosis–respons-anbefalinger fortsat begrænses af heterogen og ufuldstændig rapportering i den eksisterende litteratur.

Træning under rette hensyn er sikkert, men bør altid individualiseres.

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Referencer

1. ***American College of Sports Medicine (2009):*** *American College of Sports Medicine (2009). American College of Sports Medicine position stand. Progression models in resistance training for healthy adults. Med Sci Sports Exerc. 2009 Mar;41(3):687-708. doi: 10.1249/MSS.0b013e3181915670. PMID: 19204579.*
2. ***Berlingske (2019):*** *Berlingske nuancerer: Hvor stor er ældrebyrden – og hvor tung er den egentlig?: https://www.berlingske.dk/danmark/berlingske-nuancerer-hvor-stor-er-aeldrebyrden-og-hvor-tung-er-den*
3. ***Bojsen-Møller et al. (2006):*** *Bojsen-Møller J, Løvind-Andersen J, Olsen S, Trolle M, Zacho M, Aagaard P. (2006). Styrketræning [Internet]. 2. udg. Brøndby: Danmarks Idrætsforbund; 2006 [cited 2026 Mar 10]. Available from: https://www.dif.dk/media/e55f1imd/styrketr%C3%A6ning-h%C3%A6fte.pdf*
4. ***Brignardello-Petersen et al. (2021):*** *Brignardello-Petersen R, Guyatt GH, Mustafa RA, Chu DK, Hultcrantz M, Schünemann HJ, Tomlinson G. (2021). GRADE guidelines 33: Addressing imprecision in a network meta-analysis. J Clin Epidemiol. 2021 Nov;139:49-56. doi: 10.1016/j.jclinepi.2021.07.011. Epub 2021 Jul 19. PMID: 34293434.*
5. ***Castellini et al. (2018):*** *Castellini G, Bruschettini M, Gianola S, Gluud C, Moja L. (2018). Assessing imprecision in Cochrane systematic reviews: a comparison of GRADE and Trial Sequential Analysis. Syst Rev. 2018 Jul 28;7(1):110. doi: 10.1186/s13643-018-0770-1. PMID: 30055658; PMCID: PMC6064621.*
6. ***DST (2018):*** *Danmarks Statistik (2018). Markant flere ældre i fremtiden. Danmarks Statistik: https://www.dst.dk/da/Statistik/nyheder-analyser-publ/nyt/NytHtml?cid=26827*
7. ***Ferreira et al. (2022):*** *Ferreira LF, Scariot EL, da Rosa LHT. (2022). The effect of different exercise programs on sarcopenia criteria in older people: A systematic review of systematic reviews with meta-analysis. Arch Gerontol Geriatr. 2023 Feb;105:104868. doi: 10.1016/j.archger.2022.104868. Epub 2022 Nov 13. PMID: 36402001.*
8. ***Fragala el al. (2019):*** *Fragala MS, Cadore EL, Dorgo S, Izquierdo M, Kraemer WJ, Peterson MD, Ryan ED. (2019). Resistance Training for Older Adults: Position Statement From the National Strength and Conditioning Association. J Strength Cond Res. 2019 Aug;33(8):2019-2052. doi: 10.1519/JSC.0000000000003230. PMID: 31343601.*
9. ***França et al. (2015):*** *França HS, Branco PA, Guedes Junior DP, Gentil P, Steele J, Teixeira CV. (2015). The effects of adding single-joint exercises to a multi-joint exercise resistance training program on upper body muscle strength and size in trained men. Appl Physiol Nutr Metab. 2015 Aug;40(8):822-6. doi: 10.1139/apnm-2015-0109. PMID: 26244600.*
10. ***Grgic et al. (2020):*** *Grgic J, Lazinica B, Schoenfeld BJ, Pedisic Z. (2020). Test-Retest Reliability of the One-Repetition Maximum (1RM) Strength Assessment: a Systematic Review. Sports Med Open. 2020 Jul 17;6(1):31. doi: 10.1186/s40798-020-00260-z. PMID: 32681399; PMCID: PMC7367986.*
11. ***Herman et al. (2010):*** *Herman T, Giladi N, Hausdorff JM. (2010). Properties of the 'timed up and go' test: more than meets the eye. Gerontology. 2011;57(3):203-10. doi: 10.1159/000314963. Epub 2010 May 20. PMID: 20484884; PMCID: PMC3094679.*
12. ***Higgins et al. (2011):*** *Higgins J P T, Altman D G, Gøtzsche P C, Jüni P, Moher D, Oxman A D et al. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials BMJ 2011; 343 :d5928 doi:10.1136/bmj.d5928. https://www.bmj.com/content/343/bmj.d5928?utm_source=perplexity*
13. ***ISM (2020):*** *Sundheds- og Ældreministeriet (2020). REDEGØRELSE OM ÆLDREOMRÅDET 2020. Sundheds- og Ældreministeriet: https://www.ism.dk/Media/5/A/8503_SUM_Aeldreomraadet_TILG.pdf*
14. ***Jüni et al. (2024):*** *Jüni P, Antoniou S, Arbelo E, Buccheri S, Cikes M, da Costa BR, Fauchier L, Gale CP, Halvorsen S, James S, Koskinas KC, Kotecha D, Landmesser U, Lewis BS, Løchen ML, Nielsen JC, Rosselló X, Vaartjes I, Prescott EB, Baigent C. (2024). Revision of the level of evidence grading system for ESC clinical practice guideline recommendations I: therapy and prevention. Eur Heart J. 2025 May 21;46(20):1885-1894. doi: 10.1093/eurheartj/ehaf009. PMID: 40116721.*
15. ***KL (2023):*** *Kommunernes Landsforening (2923). ALDERSFORDELTE SUNDHEDS- OG PLEJEUDGIFTER PÅ TVÆRS AF SEKTORER. Kommunernes Landsforening: https://www.kl.dk/media/lofdnzqf/aldersfordelte-sundhedsudgifter.pdf*
16. ***Kulkarni et al. (2022):*** *Kulkarni D, Gregory S, Evans M. (2022). Effectiveness of eccentric-biased exercise interventions in reducing the incidence of falls and improving functional performance in older adults: a systematic review. Eur Geriatr Med. 2022 Apr;13(2):367-380. doi: 10.1007/s41999-021-00571-8. Epub 2021 Oct 11. PMID: 34633637; PMCID: PMC8503729.*
17. ***Madsen et al. (2023):*** *Madsen AS, Madsen A, Andersen M (2023). Fysioterapeuter mangler fokus på intensitet i styrketræning til ældre. Bachelorprisen2023: https://www.fysio.dk/globalassets/documents/fafo/priser/bachelorprisen/vinderartikel-bachelorprisen-2023.pdf*
18. ***Mandal (2023):*** *Mandal, A. (2023). Heart Rate Reserve. News Medical Life Science. https://www.news-medical.net/health/Heart-Rate-Reserve.aspx*
19. ***Olesen (2025):*** *Olesen L (2025). Maxtest - test din one rep max (1RM) i styrketræning. https://www.motionsplan.dk/rm-maxtest/#gsc.tab=0*

20. ***Page et al. (2024):*** *Page MJ, Higgins JP, Sterne JAC. (2024). Chapter 13: Assessing risk of bias due to missing evidence in a meta-analysis [last updated August 2024]. In: Higgins JP, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al, editor(s). Cochrane Handbook for Systematic Reviews of Interventions version 6.5. Cochrane, 2024. Available from cochrane.org/handbook.*
21. ***Paoli et al. (2017):*** *Paoli A, Gentil P, Moro T, Marcolin G, Bianco A. (2017). Resistance Training with Single vs. Multi-joint Exercises at Equal Total Load Volume: Effects on Body Composition, Cardiorespiratory Fitness, and Muscle Strength. Front Physiol. 2017 Dec 22;8:1105. doi: 10.3389/fphys.2017.01105. PMID: 29312007; PMCID: PMC5744434.*
22. ***Peterson et al. (2010):*** *Peterson MD, Rhea MR, Sen A, Gordon PM (2010). Resistance exercise for muscular strength in older adults: A meta-analysis. Ageing Research Reviews, 9(3), 226–237. https://doi.org/10.1016/j.arr.2010.03.004*
23. ***Prasad (2024):*** *Prasad M. (2024). Introduction to the GRADE tool for rating certainty in evidence and recommendations, Clinical Epidemiology and Global Health, Volume 25, 2024, 101484, ISSN 2213-3984, https://doi.org/10.1016/j.cegh.2023.101484. https://www.sciencedirect.com/science/article/pii/S2213398423002713*
24. ***Sterne et al. (2019):*** *Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, Cates CJ, Cheng H-Y, Corbett MS, Eldridge SM, Hernán MA, Hopewell S, Hróbjartsson A, Junqueira DR, Jüni P, Kirkham JJ, Lasserson T, Li T, McAleenan A, Reeves BC, Shepperd S, Shrier I, Stewart LA, Tilling K, White IR, Whiting PF, Higgins JPT. (2019). RoB 2: a revised tool for assessing risk of bias in randomised trials. BMJ 2019; 366: l4898. https://sites.google.com/site/riskofbiastool/welcome/rob-2-0-tool?authuser=0*
25. ***Sundhedsstyrelsen (2023):*** *Sundhedsstyrelsen (2023). Tab af muskelfunktion og muskelmasse – sarkopeni og effekten af fysisk træning: https://www.sst.dk/udgivelser/2023/tab-af-muskelfunktion-og-muskelmasse-sarkopeni-og-effekten-af-fysisk-traening*
26. ***Sundhedsstyrelsen (2016)****: Sundhedsstyrelsen (2016). NATIONAL KLINISK RETNINGSLINJE FOR Ernærings- og træningsindsatser til ældre med geriatriske problemstillinger. https://www.sst.dk/media/0h5h55yw/endelig-rapport-nkr-for-traening-og-ernaering-til-aeldre-med-geriatriske-problemstillinger.pdf*
27. ***Treacy & Hassett (2017):*** *Treacy D, Hassett L. (2017). The Short Physical Performance Battery. J Physiother. 2018 Jan;64(1):61. doi: 10.1016/j.jphys.2017.04.002. Epub 2017 Jun 20. PMID: 28645532.*
28. ***With et al. (2023):*** *With D, Bendtsen M, Hansen NG. (2023). Fysioterapeutisk anbefaling til osteoporose – Forebyggelse, Screening og behandling. Dansk Selskab for Fysioterapi i Gerontologi og Geriatri. 2023 - Link: https://www.gerontofys.dk/kliniske-retningslinier/kliniske-retningslinjer*

Inkluderede studier

29. ***Antoniak & Greig (2017):*** *Antoniak AE, Greig CA. (2017). The effect of combined resistance exercise training and vitamin D3 supplementation on musculoskeletal health and function in older adults: a systematic review and meta-analysis. BMJ Open. 2017 Jul 20;7(7):e014619. doi: 10.1136/bmjopen-2016-014619. PMID: 28729308; PMCID: PMC5541589.*
30. ***Bai et al. (2022):*** *Bai X, Soh KG, Omar Dev RD, Talib O, Xiao W, Soh KL, Ong SL, Zhao C, Galeru O, Casaru C. (2022). Aerobic Exercise Combination Intervention to Improve Physical Performance Among the Elderly: A Systematic Review. Front Physiol. 2022 Jan 4;12:798068. doi: 10.3389/fphys.2021.798068. PMID: 35058805; PMCID: PMC8764279.*
31. ***Balachandran et al. (2022):*** *Balachandran AT, Steele J, Angielczyk D, Belio M, Schoenfeld BJ, Quiles N, Askin N, Abou-Setta AM. (2022). Comparison of Power Training vs Traditional Strength Training on Physical Function in Older Adults: A Systematic Review and Meta-analysis. JAMA Netw Open. 2022 May 2;5(5):e2211623. doi: 10.1001/jamanetworkopen.2022.11623. PMID: 35544136; PMCID: PMC9096601.*
32. ***Bao et al. (2020):*** *Bao W, Sun Y, Zhang T, Zou L, Wu X, Wang D, Chen Z. (2020). Exercise Programs for Muscle Mass, Muscle Strength and Physical Performance in Older Adults with Sarcopenia: A Systematic Review and Meta-Analysis. Aging Dis. 2020 Jul 23;11(4):863-873. doi: 10.14336/AD.2019.1012. PMID: 32765951; PMCID: PMC7390512.*
33. ***Barajas-Galindo et al. (2021):*** *Barajas-Galindo DE, González Arnáiz E, Ferrero Vicente P, Ballesteros-Pomar MD. (2021). Effects of physical exercise in sarcopenia. A systematic review. Endocrinol Diabetes Nutr (Engl Ed). 2021 Mar;68(3):159-169. doi: 10.1016/j.endien.2020.02.007. Epub 2021 Jun 11. PMID: 34167695.*
34. ***Beckwée et al. (2019):*** *Beckwée D, Delaere A, Aelbrecht S, Baert V, Beaudart C, Bruyere O, de Saint-Hubert M, Bautmans I. (2019). Exercise Interventions for the Prevention and Treatment of Sarcopenia. A Systematic Umbrella Review. J Nutr Health Aging. 2019;23(6):494-502. doi: 10.1007/s12603-019-1196-8. PMID: 31233069; PMCID: PMC12280365.*
35. ***Borde et al. (2015):*** *Borde R, Hortobágyi T, Granacher U. (2015). Dose-Response Relationships of Resistance Training in Healthy Old Adults: A Systematic Review and Meta-Analysis. Sports Med. 2015 Dec;45(12):1693-720. doi: 10.1007/s40279-015-0385-9. PMID: 26420238; PMCID: PMC4656698.*

36. **Buch et al. (2017):** *Buch A, Kis O, Carmeli E, Keinan-Boker L, Berner Y, Barer Y, Shefer G, Marcus Y, Stern N. (2017). Circuit resistance training is an effective means to enhance muscle strength in older and middle aged adults: A systematic review and meta-analysis. Ageing Res Rev. 2017 Aug;37:16-27. doi: 10.1016/j.arr.2017.04.003. Epub 2017 Apr 27. PMID: 28457933.*

37. **Carcelén-Fraile et al. (2023):** *Carcelén-Fraile MDC, Lorenzo-Nocino MF, Afanador-Restrepo DF, Rodríguez-López C, Aibar-Almazán A, Hita-Contreras F, Achalandabaso-Ochoa A, Castellote-Caballero Y. (2023). Effects of different intervention combined with resistance training on musculoskeletal health in older male adults with sarcopenia: A systematic review. Front Public Health. 2023 Jan 6;10:1037464. doi: 10.3389/fpubh.2022.1037464. PMID: 36684863; PMCID: PMC9853907.*

38. **Caristia et al. (2021):** *Caristia S, Campani D, Cannici C, Frontera E, Giarda G, Pisterzi S, Terranova L, Payedimarri AB, Faggiano F, Dal Molin A. (2021). Physical exercise and fall prevention: A systematic review and meta-analysis of experimental studies included in Cochrane reviews. Geriatr Nurs. 2021 Nov-Dec;42(6):1275-1286. doi: 10.1016/j.gerinurse.2021.06.001. Epub 2021 Sep 21. PMID: 34555570.*

39. **Centner et al. (2019):** *Centner C, Wiegel P, Gollhofer A, König D. (2019). Effects of Blood Flow Restriction Training on Muscular Strength and Hypertrophy in Older Individuals: A Systematic Review and Meta-Analysis. Sports Med. 2019 Jan;49(1):95-108. doi: 10.1007/s40279-018-0994-1. Erratum in: Sports Med. 2019 Jan;49(1):109-111. doi: 10.1007/s40279-018-1013-2. PMID: 30306467; PMCID: PMC6349784.*

40. **Chen et al. (2025a):** *Chen SR, Chen MC, Hou WH, Lin PC. (2025). Effects of Resistance Exercise in Older Adults With Sarcopenic Obesity: A Systematic Review and Meta-Analysis. J Nurs Res. 2025 Aug 1;33(4):e406. doi: 10.1097/jnr.0000000000000685. PMID: 40586735; PMCID: PMC12316160.*

41. **Chen et el. (2025b):** *Chen L, Zhou H, Gong Y, Tang Y, Su H, Zhang Z, Tong P, Chen G. (2025). Clinical outcome changes in sarcopenic obesity: a meta-analysis of exercise training methods. BMC Geriatr. 2025 Jan 15;25(1):33. doi: 10.1186/s12877-024-05655-1. PMID: 39815241; PMCID: PMC11734427.*

42. **Chen et al. (2024):** *Chen CC, Huang YY, Hua-Zhang, Xia-Liu, Li XQ, Long YQ, Chen ZW, Jin T. (2024). Impact of resistance exercise on patients with chronic kidney disease. BMC Nephrol. 2024 Mar 26;25(1):115. doi: 10.1186/s12882-024-03547-5. PMID: 38532316; PMCID: PMC10967118.*

43. **Chen et al. (2021):** *Chen N, He X, Feng Y, Ainsworth BE, Liu Y. (2021). Effects of resistance training in healthy older people with sarcopenia: a systematic review and meta-analysis of randomized controlled trials. Eur Rev Aging Phys Act. 2021 Nov 11;18(1):23. doi: 10.1186/s11556-021-00277-7. PMID: 34763651; PMCID: PMC8588688.*

44. **Choi & Lee (2025):** *Choi S, Lee J. (2025). Effects of resistance exercise programs on older adults: a systematic review and meta-analysis. J Exerc Rehabil. 2025 Aug 31;21(4):182-189. doi: 10.12965/jer.2550362.181. PMID: 40917577; PMCID: PMC12409148.*

45. **Choi et al. (2024):** *Choi Y, Kim D, Kim SK. (2024). Effects of Physical Activity on Body Composition, Muscle Strength, and Physical Function in Old Age: Bibliometric and Meta-Analyses. Healthcare (Basel). 2024 Jan 13;12(2):197. doi: 10.3390/healthcare12020197. PMID: 38255085; PMCID: PMC10815094.*

46. **Claudino et al. (2021):** *Claudino JG, Afonso J, Sarvestan J, Lanza MB, Pennone J, Filho CAC, Serrão JC, Espregueira-Mendes J, Vasconcelos ALV, de Andrade MP, Rocha-Rodrigues S, Andrade R, Ramirez-Campillo R. (2021). Strength Training to Prevent Falls in Older Adults: A Systematic Review with Meta-Analysis of Randomized Controlled Trials. J Clin Med. 2021 Jul 20;10(14):3184. doi: 10.3390/jcm10143184. PMID: 34300350; PMCID: PMC8304136.*

47. **da Rosa Orssatto et al. (2019):** *da Rosa Orssatto LB, de la Rocha Freitas C, Shield AJ, Silveira Pinto R, Trajano GS. (2019). Effects of resistance training concentric velocity on older adults' functional capacity: A systematic review and meta-analysis of randomised trials. Exp Gerontol. 2019 Nov;127:110731. doi: 10.1016/j.exger.2019.110731. Epub 2019 Sep 7. PMID: 31505227.*

48. **da Silva Gonçalves et al. (2023):** *da Silva Gonçalves L, Santos Lopes da Silva L, Rodrigues Benjamim CJ, Tasinafo Junior MF, Bohn L, Ferreira Abud G, Ortiz GU, de Freitas EC. (2023). The Effects of Different Exercise Training Types on Body Composition and Physical Performance in Older Adults with Sarcopenic Obesity: A Systematic Review and Meta-Analysis. J Nutr Health Aging. 2023;27(11):1076-1090. doi: 10.1007/s12603-023-2018-6. PMID: 37997730; PMCID: PMC12876720.*

49. **Daryanti et al. (2022):** *Daryanti Saragih I, Yang YP, Saragih IS, Batubara SO, Lin CJ. (2022). Effects of resistance bands exercise for frail older adults: A systematic review and meta-analysis of randomised controlled studies. J Clin Nurs. 2022 Jan;31(1-2):43-61. doi: 10.1111/jocn.15950. Epub 2021 Jul 21. PMID: 34289511.*

50. **Debes et al. (2024):** *Debes WA, Sadaqa M, Németh Z, Aldardour A, Prémusz V, Hock M. (2024). Effect of Resistance Exercise on Body Composition and Functional Capacity in Older Women with Sarcopenic Obesity-A Systematic Review with Narrative Synthesis. J Clin Med. 2024 Jan 13;13(2):441. doi: 10.3390/jcm13020441. PMID: 38256574; PMCID: PMC10817090.*

51. **de Mello et al. (2019):** *de Mello RGB, Dalla Corte RR, Gioscia J, Moriguchi EH. (2019). Effects of Physical Exercise Programs on Sarcopenia Management, Dynapenia, and Physical Performance in the Elderly: A Systematic Review of Randomized Clinical Trials. J Aging Res. 2019 Nov 20;2019:1959486. doi: 10.1155/2019/1959486. PMID: 31827927; PMCID: PMC6886343.*

52. **de Labra et al. (2015):** *de Labra C, Guimaraes-Pinheiro C, Maseda A, Lorenzo T, Millán-Calenti JC. (2015). Effects of physical exercise interventions in frail older adults: a systematic review of randomized controlled trials. BMC Geriatr. 2015 Dec 2;15:154. doi: 10.1186/s12877-015-0155-4. PMID: 26626157; PMCID: PMC4667405.*

53. ***Di Lorito et al. (2021):*** *Di Lorito C, Long A, Byrne A, Harwood RH, Gladman JRF, Schneider S, Logan P, Bosco A, van der Wardt V. (2021). Exercise interventions for older adults: A systematic review of meta-analyses. J Sport Health Sci. 2021 Jan;10(1):29-47. doi: 10.1016/j.jshs.2020.06.003. Epub 2020 Jun 7. PMID: 32525097; PMCID: PMC7858023.*
54. ***Efendi et al. (2022):*** *Efendi F, Tonapa SI, Has EMM, Ho KHM. (2022). Effects of chair-based resistance band exercise on physical functioning, sleep quality, and depression of older adults in long-term care facilities: Systematic review and meta-analysis. Int J Nurs Sci. 2022 Dec 26;10(1):72-81. doi: 10.1016/j.ijnss.2022.12.002. PMID: 36860706; PMCID: PMC9969069.*
55. ***Feng et al. (2025):*** *Feng M, Gu L, Zeng Y, Gao W, Cai C, Chen Y, Guo X. (2025). The efficacy of resistance exercise training on metabolic health, body composition, and muscle strength in older adults with type 2 diabetes: A systematic review and Meta-Analysis. Diabetes Res Clin Pract. 2025 Apr;222:112079. doi: 10.1016/j.diabres.2025.112079. Epub 2025 Mar 14. PMID: 40090422..*
56. ***Ghiotto et al. (2022):*** *Ghiotto L, Muollo V, Tatangelo T, Schena F, Rossi AP. (2022). Exercise and physical performance in older adults with sarcopenic obesity: A systematic review. Front Endocrinol (Lausanne). 2022 Jul 28;13:913953. doi: 10.3389/fendo.2022.913953. PMID: 35966077; PMCID: PMC9366852.*
57. ***Gronlund et al. (2020):*** *Gronlund C, Christoffersen KS, Thomsen K, Masud T, Jepsen DB, Ryg J. (2020). Effect of blood-flow restriction exercise on falls and fall related risk factors in older adults 60 years or above: a systematic review. J Musculoskelet Neuronal Interact. 2020 Dec 1;20(4):513-525. PMID: 33265079; PMCID: PMC7716683.*
58. ***Guizelini et al. (2018):*** *Guizelini PC, de Aguiar RA, Denadai BS, Caputo F, Greco CC. (2018). Effect of resistance training on muscle strength and rate of force development in healthy older adults: A systematic review and meta-analysis. Exp Gerontol. 2018 Feb;102:51-58. doi: 10.1016/j.exger.2017.11.020. Epub 2017 Nov 28. PMID: 29196141.*
59. ***Guo et al. (2025):*** *Guo C, Dai T, Zhang H, Luo M, Gao J, Feng X. (2025). Effect of resistance training on body composition and physical function in older females with sarcopenic obesity-a systematic review and meta-analysis of randomized controlled trials. Front Aging Neurosci. 2025 Apr 30;17:1495218. doi: 10.3389/fnagi.2025.1495218. PMID: 40370749; PMCID: PMC12075210.*
60. ***Hortobágyi et al. (2015):*** *Hortobágyi T, Lesinski M, Gäbler M, VanSwearingen JM, Malatesta D, Granacher U. (2015). Effects of Three Types of Exercise Interventions on Healthy Old Adults' Gait Speed: A Systematic Review and Meta-Analysis. Sports Med. 2015 Dec;45(12):1627-43. doi: 10.1007/s40279-015-0371-2. Erratum in: Sports Med. 2016 Mar;46(3):453. doi: 10.1007/s40279-016-0498-9. PMID: 26286449; PMCID: PMC4656792.*
61. ***Hoseinpour et al. (2024):*** *Nejatian Hoseinpour A, Bassami M, Ahmadizad S, Donath L, Setayesh S, Mirzaei M, Mohammad Rahimi GR. (2024). The influence of resistance training on inflammatory markers, body composition and functional capacity in healthy older adults: A systematic review and meta-analysis. Arch Gerontol Geriatr. 2025 Mar;130:105731. doi: 10.1016/j.archger.2024.105731. Epub 2024 Dec 25. PMID: 39740358.*
62. ***Hua-Rui et al. (2025):*** *Hua-Rui L, Shouliang H, Zhengze Y, Ning J, Peihua L, Yifei Z, Fenglin P. (2025). Optimal dose of resistance training to improve handgrip strength in older adults with sarcopenia: a systematic review and Bayesian model-based network meta-analysis. Front Physiol. 2025 Jul 2;16:1564988. doi: 10.3389/fphys.2025.1564988. PMID: 40671711; PMCID: PMC12263917.*
63. ***Juhl et al. (2014):*** *Juhl C, Christensen R, Roos EM, Zhang W, Lund H. (2014). Impact of exercise type and dose on pain and disability in knee osteoarthritis: a systematic review and meta-regression analysis of randomized controlled trials. Arthritis Rheumatol. 2014 Mar;66(3):622-36. doi: 10.1002/art.38290. PMID: 24574223.*
64. ***Karagiannis et al. (2023):*** *Karagiannis C, Savva C, Korakakis V, Ploutarchou G, Adamide T, Georgiou A, Xanthos T. (2023). The effects of upper limb exercise training on upper limb muscle strength in people with chronic obstructive pulmonary disease: a systematic review and meta-analysis of randomized controlled trials. Ther Adv Respir Dis. 2023 Jan-Dec;17:17534666231170813. doi: 10.1177/17534666231170813. PMID: 37165688; PMCID: PMC10184263.*
65. ***Kim et al. (2022):*** *Kim Y, Vakula MN, Bolton DAE, Dakin CJ, Thompson BJ, Slocum TA, Teramoto M, Bressel E. (2022), Which Exercise Interventions Can Most Effectively Improve Reactive Balance in Older Adults? A Systematic Review and Network Meta-Analysis. Front Aging Neurosci. 2022 Jan 18;13:764826. doi: 10.3389/fnagi.2021.764826. PMID: 35115917; PMCID: PMC8804322.*
66. ***Kirk et al. (2024):*** *Kirk A, Steele J, Fisher JP. (2024). Machine-Based Resistance Training Improves Functional Capacity in Older Adults: A Systematic Review and Meta-Analysis. J Funct Morphol Kinesiol. 2024 Nov 16;9(4):239. doi: 10.3390/jfmk9040239. PMID: 39584892; PMCID: PMC11586963.*
67. ***Kong et al. (2022):*** *Kong J, Li Z, Zhu L, Li L, Chen S. (2022). Comparison of blood flow restriction training and conventional resistance training for the improvement of sarcopenia in the older adults: A systematic review and meta-analysis. Sports Med Health Sci. 2022 Dec 17;5(4):269-276. doi: 10.1016/j.smhs.2022.12.002. PMID: 38314044; PMCID: PMC10831374.*
68. ***Kumar et al. (2016):*** *Kumar A, Delbaere K, Zijlstra GA, Carpenter H, Iliffe S, Masud T, Skelton D, Morris R, Kendrick D. (2016). Exercise for reducing fear of falling in older people living in the community: Cochrane systematic review and meta-analysis. Age Ageing. 2016 May;45(3):345-52. doi: 10.1093/ageing/afw036. PMID: 27121683.*
69. ***Labata-Lezaun et al. (2023):*** *Labata-Lezaun N, Rodríguez-Rodríguez S, López-de-Celis C, Rodríguez-Sanz J, Canet-Vintró M, R-Oviedo G, González-Rueda V, Pérez-Bellmunt A. (2023). Effectiveness of Different Training Modalities on Static Balance in Older Adults: A Systematic Review and Meta-Analysis. Life (Basel). 2023 May 16;13(5):1193. doi: 10.3390/life13051193. PMID: 37240838; PMCID: PMC10222379.*

70. ***Lai et al. (2018):*** *Lai CC, Tu YK, Wang TG, Huang YT, Chien KL. (2018). Effects of resistance training, endurance training and whole-body vibration on lean body mass, muscle strength and physical performance in older people: a systematic review and network meta-analysis. Age Ageing. 2018 May 1;47(3):367-373. doi: 10.1093/ageing/afy009. PMID: 29471456.*

71. ***Lee (2020):*** *Lee J. (2020). Effects of Aerobic and Resistance Exercise Interventions on Cognitive and Physiologic Adaptations for Older Adults with Mild Cognitive Impairment: A Systematic Review and Meta-Analysis of Randomized Control Trials. Int J Environ Res Public Health. 2020 Dec 9;17(24):9216. doi: 10.3390/ijerph17249216. PMID: 33317169; PMCID: PMC7764103.*

72. ***Li et al. (2023):*** *Li S, Wang P, Xin X, Zhou X, Wang J, Zhao J, Wang X. (2023). The Effect of Low Intensity Resistance Training with Blood Flow Restriction on Fall Resistance in Middle-Aged and Older Adults: A Meta-Analysis. Int J Environ Res Public Health. 2023 Mar 7;20(6):4723. doi: 10.3390/ijerph20064723. PMID: 36981632; PMCID: PMC10049074.*

73. ***Lim et al. (2020):*** *Lim SER, Cox NJ, Tan QY, Ibrahim K, Roberts HC. (2020). Volunteer-led physical activity interventions to improve health outcomes for community-dwelling older people: a systematic review. Aging Clin Exp Res. 2021 Apr;33(4):843-853. doi: 10.1007/s40520-020-01556-6. Epub 2020 Apr 30. PMID: 32356136; PMCID: PMC8084781.*

74. ***Lopez et al. (2023):*** *Lopez P, Rech A, Petropoulou M, Newton RU, Taaffe DR, Galvão DA, Turella DJP, Freitas SR, Radaelli R. (2023). Does High-Velocity Resistance Exercise Elicit Greater Physical Function Benefits Than Traditional Resistance Exercise in Older Adults? A Systematic Review and Network Meta-Analysis of 79 Trials. J Gerontol A Biol Sci Med Sci. 2023 Aug 2;78(8):1471-1482. doi: 10.1093/gerona/glac230. PMID: 36378500; PMCID: PMC10395570.*

75. ***Liu & Lee (2024):*** *Liu HW, Lee OK. (2024). Effects of resistance training with elastic bands on bone mineral density, body composition, and osteosarcopenic obesity in elderly women: A meta-analysis. J Orthop. 2024 Apr 6;53:168-175. doi: 10.1016/j.jor.2024.03.039. PMID: 38633989; PMCID: PMC11018988.*

76. ***Lu et al. (2021):*** *Lu L, Mao L, Feng Y, Ainsworth BE, Liu Y, Chen N. (2021). Effects of different exercise training modes on muscle strength and physical performance in older people with sarcopenia: a systematic review and meta-analysis. BMC Geriatr. 2021 Dec 15;21(1):708. doi: 10.1186/s12877-021-02642-8. PMID: 34911483; PMCID: PMC8672633.*

77. ***Martínez-Amat et al. (2018):*** *Martínez-Amat A, Aibar-Almazán A, Fábrega-Cuadros R, Cruz-Díaz D, Jiménez-García JD, Pérez-López FR, Achalandabaso A, Barranco-Zafra R, Hita-Contreras F. (2018). Exercise alone or combined with dietary supplements for sarcopenic obesity in community-dwelling older people: A systematic review of randomized controlled trials. Maturitas. 2018 Apr;110:92-103. doi: 10.1016/j.maturitas.2018.02.005. Epub 2018 Feb 13. PMID: 29563041.*

78. ***Martins et al. (2022):*** *Martins AD, Fernandes O, Pereira A, Oliveira R, Alderete Goñi FD, Leite NJC, Brito JP. (2022). The Effects of High-Speed Resistance Training on Health Outcomes in Independent Older Adults: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022 Apr 28;19(9):5390. doi: 10.3390/ijerph19095390. PMID: 35564788; PMCID: PMC9099943.*

79. ***Meereis et al. (2020):*** *Meereis EC, Guadagnin EC, Mota CB. (2020). Influence of strength training and multicomponent training on the functionality of older adults: systematic review and meta-analysis. Rev Bras Cineantropom Desempenho Hum. 2020;22:e6070. doi:10.1590/1980-0037.2020v22e6070.*

80. ***Mo et al. (2024):*** *Mo Y, Chen L, Zhou Y, Bone A, Maddocks M, Evans CJ. (2024). Sarcopenia interventions in long-term care facilities targeting sedentary behaviour and physical inactivity: A systematic review. J Cachexia Sarcopenia Muscle. 2024 Dec;15(6):2208-2233. doi: 10.1002/jcsm.13576. Epub 2024 Sep 18. PMID: 39291586; PMCID: PMC11634478.*

81. ***Morrison et al. (2023):*** *Morrison RT, Taylor S, Buckley J, Twist C, Kite C. (2023). High-velocity power training has similar effects to traditional resistance training for functional performance in older adults: a systematic review. J Physiother. 2023 Jul;69(3):148-159. doi: 10.1016/j.jphys.2023.05.018. Epub 2023 Jun 14. PMID: 37328359.*

82. ***Nagata et al. (2023):*** *Nagata CA, Garcia PA, Hamu TCDDS, Caetano MBD, Costa RR, Leal JC, Bastos JAI, Cadore EL, Durigan JLQ. (2023). Are dose-response relationships of resistance training reliable to improve functional performance in frail and pre-frail older adults? A systematic review with meta-analysis and meta-regression of randomized controlled trials. Ageing Res Rev. 2023 Nov;91:102079. doi: 10.1016/j.arr.2023.102079. Epub 2023 Sep 27. PMID: 37774931.*

83. ***Nejatian et al. (2025):*** *Nejatian Hoseinpour A, Bassami M, Ahmadizad S, Donath L, Setayesh S, Mirzaei M, Mohammad Rahimi GR. (2025). The influence of resistance training on inflammatory markers, body composition and functional capacity in healthy older adults: A systematic review and meta-analysis. Arch Gerontol Geriatr. 2025 Mar;130:105731. doi: 10.1016/j.archger.2024.105731. Epub 2024 Dec 25. PMID: 39740358.*

84. ***O'Bryan et al. (2022):*** *O'Bryan SJ, Giuliano C, Woessner MN, Vogrin S, Smith C, Duque G, Levinger I. (2022). Progressive Resistance Training for Concomitant Increases in Muscle Strength and Bone Mineral Density in Older Adults: A Systematic Review and Meta-Analysis. Sports Med. 2022 Aug;52(8):1939-1960. doi: 10.1007/s40279-022-01675-2. Epub 2022 May 24. PMID: 35608815; PMCID: PMC9325860.*

85. ***Papa et al. (2017):*** *Papa EV, Dong X, Hassan M. (2017). Resistance training for activity limitations in older adults with skeletal muscle function deficits: a systematic review. Clin Interv Aging. 2017 Jun 13;12:955-961. doi: 10.2147/CIA.S104674. PMID: 28670114; PMCID: PMC5479297.*

86. ***Pearson et al. (2022):*** *Pearson, L.T., Behm, D.G., Goodall, S., Mason, R., Stuart, S., Barry, G. (2022). Effects of maximal-versus submaximal-intent resistance training on functional capacity and strength in community-dwelling older adults: a systematic review and meta-analysis. BMC Sports Sci Med Rehabil 14, 129 (2022). https://doi.org/10.1186/s13102-022-00526-x*

87. ***Peng et al. (2024):*** *Peng D, Zhang Y, Wang L, Zhang S. (2024). Effects of over 10 weeks of resistance training on muscle and bone mineral density in older people with sarcopenia over 70 years old: A systematic review and meta-analysis of randomized controlled trials. Geriatr Nurs. 2024 Nov-Dec;60:304-315. doi: 10.1016/j.gerinurse.2024.09.016. Epub 2024 Oct 4. PMID: 39368450.*

88. ***Pinheiro et al. (2022):*** *Pinheiro ÉP, Cavalheiro do Espírito Santo R, Peterson Dos Santos L, Gonçalves WV, Forgiarini Junior LA, Xavier RM, Filippin LI. (2022). Multicomponent or Resistance Training for Nursing Home Residents: A Systematic Review With Meta-Analysis. J Am Med Dir Assoc. 2022 Dec;23(12):1926.e1-1926.e10. doi: 10.1016/j.jamda.2022.06.009. Epub 2022 Jul 13. PMID: 35841975.*

89. ***Polo-Ferrero et al. (2025):*** *Polo-Ferrero L, Navarro-López V, Fuentes M, Lacal J, Cancelas-Felgueras MD, Santos-Blázquez N, Méndez-Sánchez R, Sánchez-González JL. (2025). Effect of Resistance Training on Older Adults with Sarcopenic Obesity: A Comprehensive Systematic Review and Meta-Analysis of Blood Biomarkers, Functionality, and Body Composition. Nurs Rep. 2025 Mar 4;15(3):89. doi: 10.3390/nursrep15030089. PMID: 40137662; PMCID: PMC11944422.*

90. ***Qiu et al. (2025):*** *Qiu H, Zheng W, Zhou X, Liu Q, Zhao X.(2025). Training modalities for elder sarcopenic obesity: a systematic review and network meta-analysis. Front Nutr. 2025 Feb 19;12:1537291. doi: 10.3389/fnut.2025.1537291. PMID: 40046765; PMCID: PMC11879820.*

91. ***Rocha et al. (2024):*** *Rocha JNS, Pereira-Monteiro MR, Vasconcelos ABS, Pantoja-Cardoso A, Aragão-Santos JC, Da Silva-Grigoletto ME. (2024).Different resistance training volumes on strength, functional fitness, and body composition of older people: A systematic review with meta-analysis. Arch Gerontol Geriatr. 2024 Apr;119:105303. doi: 10.1016/j.archger.2023.105303. Epub 2023 Dec 7. PMID: 38128241.*

92. ***Rodrigo-Mallorca et al. (2021):*** *Rodrigo-Mallorca D, Loaiza-Betancur AF, Monteagudo P, Blasco-Lafarga C, Chulvi-Medrano I. (2021). Resistance Training with Blood Flow Restriction Compared to Traditional Resistance Training on Strength and Muscle Mass in Non-Active Older Adults: A Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2021 Oct 30;18(21):11441. doi: 10.3390/ijerph182111441. PMID: 34769957; PMCID: PMC8583588.*

93. ***Šarabon et al. (2020):*** *Šarabon N, Kozinc Ž, Löfler S, Hofer C. (2020). Resistance Exercise, Electrical Muscle Stimulation, and Whole-Body Vibration in Older Adults: Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Clin Med. 2020 Sep 8;9(9):2902. doi: 10.3390/jcm9092902. PMID: 32911822; PMCID: PMC7563530.*

94. ***Šarabon & Kozinc (2020):*** *Šarabon N, Kozinc Ž. (2020). Effects of Resistance Exercise on Balance Ability: Systematic Review and Meta-Analysis of Randomized Controlled Trials. Life (Basel). 2020 Nov 15;10(11):284. doi: 10.3390/life10110284. PMID: 33203156; PMCID: PMC7697352.*

95. ***Sharma et al. (2023):*** *Sharma N, Chahal A, Balasubramanian K, Sanjeevi RR, Rai RH, Bansal N, Muthukrishnan R, Sharma A. (2023) Effects of resistance training on muscular strength, endurance, body composition and functional performance among sarcopenic patients: a systematic review. J Diabetes Metab Disord. 2023 Sep 2;22(2):1053-1071. doi: 10.1007/s40200-023-01283-5. PMID: 37975091; PMCID: PMC10638274.*

96. ***Shen et al. (2023):*** *Shen Y, Shi Q, Nong K, Li S, Yue J, Huang J, Dong B, Beauchamp M, Hao Q. (2023). Exercise for sarcopenia in older people: A systematic review and network meta-analysis. J Cachexia Sarcopenia Muscle. 2023 Jun;14(3):1199-1211. doi: 10.1002/jcsm.13225. Epub 2023 Apr 14. PMID: 37057640; PMCID: PMC10235889.*

97. ***Slimani et al. (2018):*** *Slimani M, Ramirez-Campillo R, Paravlic A, Hayes LD, Bragazzi NL, Sellami M. (2018). The Effects of Physical Training on Quality of Life, Aerobic Capacity, and Cardiac Function in Older Patients With Heart Failure: A Meta-Analysis. Front Physiol. 2018 Nov 12;9:1564. doi: 10.3389/fphys.2018.01564. PMID: 30483145; PMCID: PMC6241114.*

98. ***Smart et al. (2022):*** *Smart TFF, Doleman B, Hatt J, Paul M, Toft S, Lund JN, Phillips BE. (2022). The role of resistance exercise training for improving cardiorespiratory fitness in healthy older adults: a systematic review and meta-analysis. Age Ageing. 2022 Jun 1;51(6):afac143. doi: 10.1093/ageing/afac143. PMID: 35737600; PMCID: PMC9220026.*

99. ***Smedslund et al. (2022):*** *Smedslund G, Kjeken I, Musial F, Sexton J, Østerås N. (2022). Interventions for osteoarthritis pain: A systematic review with network meta-analysis of existing Cochrane reviews. Osteoarthr Cartil Open. 2022 Feb 15;4(2):100242. doi: 10.1016/j.ocarto.2022.100242. PMID: 36475286; PMCID: PMC9718209.*

100. ***Song et al. (2023):*** *Song S, Kim G, Kim H.(2023). A Systematic Review and Meta-Analysis of Exercise Beneficial for Locomotion in Community-Dwelling Elderly People with Sarcopenia. J Funct Morphol Kinesiol. 2023 Jun 29;8(3):92. doi: 10.3390/jfmk8030092. PMID: 37489305; PMCID: PMC10366781.*

101. ***Sun et al. (2025):*** *Sun R, Wan J, Tang J, Deng Y, Zhang M, Liu C, Li J, Zhang Q. (2025). Effectiveness of resistance training on body composition, muscle strength, and biomarker in sarcopenic older adults: A meta-analysis of randomized controlled trials. Arch Gerontol Geriatr. 2025 Jan;128:105595. doi: 10.1016/j.archger.2024.105595. Epub 2024 Jul 31. PMID: 39191151.*

102. ***Sun et al. (2023):*** *Sun X, Liu W, Gao Y, Qin L, Feng H, Tan H, Chen Q, Peng L, Wu IXY. (2023). Comparative effectiveness of non-pharmacological interventions for frailty: a systematic review and network meta-analysis. Age Ageing. 2023 Feb 1;52(2):afad004. doi: 10.1093/ageing/afad004. PMID: 36746389.*

103. ***Talar et al. (2021):*** *Talar K, Hernández-Belmonte A, Vetrovsky T, Steffl M, Kałamacka E, Courel-Ibáñez J. (2021). Benefits of Resistance Training in Early and Late Stages of Frailty and Sarcopenia: A Systematic Review and Meta-Analysis of Randomized Controlled Studies. J Clin Med. 2021 Apr 12;10(8):1630. doi: 10.3390/jcm10081630. PMID: 33921356; PMCID: PMC8070531.*

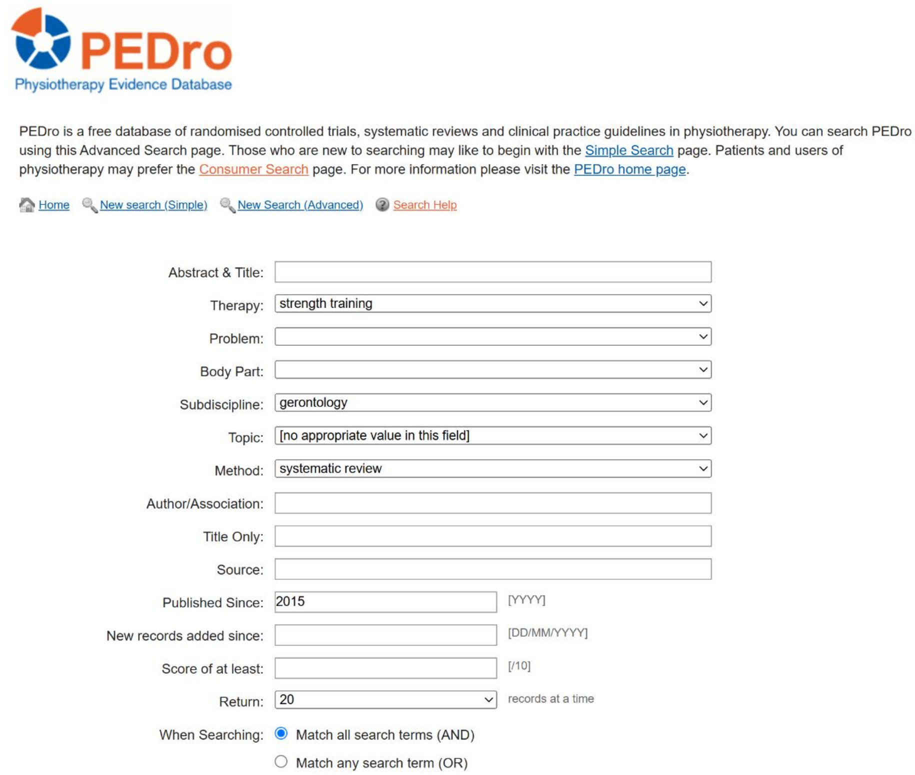
104. ***Thomas et al. (2019):*** *Thomas E, Battaglia G, Patti A, Brusa J, Leonardi V, Palma A, Bellafiore M. (2019)Physical activity programs for balance and fall prevention in elderly: A systematic review. Medicine (Baltimore). 2019 Jul;98(27):e16218. doi: 10.1097/MD.0000000000016218. PMID: 31277132; PMCID: PMC6635278.*

105. ***Tsai et al. (2022):*** *Tsai YT, Su HH, Chou CH, Chen YH, Chiang MH, Kuo YJ, Chen YP. (2022). Impact of elastic band training on functional outcomes and muscle mass in the elderly with sarcopenia: a meta-analysis. Int J Gerontol. 2022;16(3):224-230. doi:10.6890/IJGE.202207_16(3).0011.*
106. ***Van Abbema et al (2015):*** *Van Abbema R, De Greef M, Crajé C, Krijnen W, Hobbelen H, Van Der Schans C. (2015). type, or combination of exercise can improve preferred gait speed in older adults? A meta-analysis. BMC Geriatr. 2015 Jul 1;15:72. doi: 10.1186/s12877-015-0061-9. PMID: 26126532; PMCID: PMC4488060.*
107. ***Wang et al. (2022):*** *Wang H, Huang WY, Zhao Y. (2022). Efficacy of Exercise on Muscle Function and Physical Performance in Older Adults with Sarcopenia: An Updated Systematic Review and Meta-Analysis. Int J Environ Res Public Health. 2022 Jul 5;19(13):8212. doi: 10.3390/ijerph19138212. PMID: 35805870; PMCID: PMC9266336.*
108. ***Wei et al. (2025):*** *Wei H, Zhang J, Cui K, Su H. (2025). Exercise interventions of ≥8 weeks improve body composition, physical function, metabolism, and inflammation in older adults with stage I sarcopenic obesity: a systematic review and meta-analysis. Front Nutr. 2025 Aug 12;12:1575580. doi: 10.3389/fnut.2025.1575580. PMID: 40873450; PMCID: PMC12378051.*
109. ***Wong et al. (2020):*** *Wong RMY, Chong KC, Law SW, Ho WT, Li J, Chui CS, Chow SKH, Cheung WH. (2020). The effectiveness of exercises on fall and fracture prevention amongst community elderlies: A systematic review and meta-analysis. J Orthop Translat. 2020 Jun 1;24:58-65. doi: 10.1016/j.jot.2020.05.007. PMID: 32695605; PMCID: PMC7349939.*
110. ***Wu et al. (2021):*** *Wu PY, Huang KS, Chen KM, Chou CP, Tu YK. (2021). Exercise, Nutrition, and Combined Exercise and Nutrition in Older Adults with Sarcopenia: A Systematic Review and Network Meta-analysis. Maturitas. 2021 Mar;145:38-48. doi: 10.1016/j.maturitas.2020.12.009. Epub 2020 Dec 31. PMID: 33541561.*
111. ***Yang et al. (2022):*** *Yang JM, Ye H, Zhu Q, Zhang JH, Liu QQ, Xie HY, Long Y, Huang H, Niu YL, Luo Y, Wang MY. (2022). Effects of resistance training on body composition and physical function in elderly patients with osteosarcopenic obesity: a systematic review and meta-analysis. Arch Osteoporos. 2022 Jun 3;17(1):82. doi: 10.1007/s11657-022-01120-x. PMID: 35654981; PMCID: PMC9163017.*
112. ***Yuan et al. (2025):*** *Yuan Y, Wang S, Zhou C, Zhang A, Zhang S, Wang Y. (2025). Effects of exercise interventions on cognition, physical function and quality of life among older adults with cognitive frailty: A systematic review and meta-analysis. Geriatr Nurs. 2025 Mar-Apr;62(Pt A):96-107. doi: 10.1016/j.gerinurse.2025.01.006. Epub 2025 Jan 30. PMID: 39889512.*
113. ***Zeng et al. (2023):*** *Zeng D, Ling XY, Fang ZL, Lu YF. (2023). Optimal exercise to improve physical ability and performance in older adults with sarcopenia: a systematic review and network meta-analysis. Geriatr Nurs. 2023 Jul-Aug;52:199-207. doi: 10.1016/j.gerinurse.2023.06.005. Epub 2023 Jul 1. PMID: 37400288.*
114. ***Zhang et al. (2025):*** *Zhang S, Qian G, Xu H, Gu M, Mao S, Wang Y, Zhang Y, Zhou W. (2025). Effects of different exercise modalities on balance performance in healthy older adults: a systematic review and network meta-analysis of randomized controlled trials. BMC Geriatr. 2025 Jul 31;25(1):570. doi: 10.1186/s12877-025-06212-0. PMID: 40745584; PMCID: PMC12315335.*
115. ***Zhang et al. (2016):*** *Zhang Y, Xu L, Yao Y, Guo X, Sun Y, Zhang J, Fu Q. (2016). of short-term exercise intervention on cardiovascular functions and quality of life of chronic heart failure patients: A meta-analysis. J Exerc Sci Fit. 2016 Dec;14(2):67-75. doi: 10.1016/j.jesf.2016.08.001. Epub 2016 Nov 9. PMID: 29541121; PMCID: PMC5801721.*
116. ***Zhao et al. (2025):*** *Zhao F, Su W, Sun Y, Wang J, Lu B, Yun H. (2025). Optimal resistance training parameters for improving bone mineral density in postmenopausal women: a systematic review and meta-analysis. J Orthop Surg Res. 2025 May 27;20(1):523. doi: 10.1186/s13018-025-05890-1. PMID: 40420105; PMCID: PMC12107943.*
117. ***Zhao et al. (2022):*** *Zhao H, Cheng R, Song G, Teng J, Shen S, Fu X, Yan Y, Liu C. (2022). The Effect of Resistance Training on the Rehabilitation of Elderly Patients with Sarcopenia: A Meta-Analysis. Int J Environ Res Public Health. 2022 Nov 22;19(23):15491. doi: 10.3390/ijerph192315491. PMID: 36497565; PMCID: PMC9739568.*

Bilag 1: Litteratursøgning, -gennemgang og resultater

Søgestrenge

Litteratursøgning	
PubMed/ MEDLINE	Søgning 1: *"resistance training"[tiab] OR "strength training"[tiab] OR "resistance exercise"[tiab] OR "weight training"[tiab] OR "progressive resistance"[tiab]* Søgning 2: *elderly[tiab] OR senior*[tiab] OR geriatric*[tiab] OR "aged"[MeSH] OR frail*[tiab] OR "frailty"[MeSH] OR "sarcopenia"[MeSH] OR sarcopeni*[tiab] OR "osteoporosis"[MeSH] OR osteoporos*[tiab] OR "dementia"[MeSH] OR dementia[tiab] OR "cognitive impairment"[tiab] OR "mild cognitive impairment"[tiab] OR MCI[tiab] OR "diabetes mellitus"[MeSH] OR diabet*[tiab] OR "obesity"[MeSH] OR obes*[tiab] OR "sarcopenic obesity"[tiab] OR "cardiovascular diseases"[MeSH] OR cardiovasc*[tiab] OR heart[tiab] OR cardiac[tiab] OR "kidney diseases"[MeSH] OR renal*[tiab] OR nephropath*[tiab] OR kidney[tiab] OR "osteoarthritis"[MeSH] OR arthros*[tiab] OR "degenerative joint disease"[tiab] OR "pulmonary disease, chronic obstructive"[MeSH] OR COPD[tiab] OR "chronic obstructive"[tiab] OR multimorbid*[tiab] OR "multimorbidity"[MeSH] OR fall [tiab] OR "accidental falls"[MeSH] OR mobility[tiab] OR "mobility limitation"[tiab] OR "mobility disability"[tiab]* Søgning 3: *"systematic review"[Publication Type] OR "meta-analysis"* Søgning 4: *physical function OR functional ability* OR functional capacity OR functionality OR strength OR aerobic capacity OR gait speed OR chairstand OR physical fitness [mesh] OR fatigue [tiab] OR exercise test* Uden filter: 1,234 results - 15/10/2025 Filter: (de seneste) "10 years" - <u>1,014 results</u> - 15/10/2025
Cochrane Library	Søging 1: *resistance training OR strength training OR resistance exercise OR weight training OR progressive resistance* Søging 2: *frail OR frailty OR sarcopenia OR sarcopeni OR osteoporosis OR osteoporos* OR dementi OR cognitive impairment OR mild cognitive impairment OR MCI OR diabetes mellitus OR diabet* OR obesity OR obes* OR sarcopenic obesity OR cardiovascular diseases OR cardiovasc* OR heart OR cardiac OR kidney diseases OR renal* OR nephropath* OR kidney OR osteoarthritis OR arthros* OR degenerative joint disease OR COPD OR chronic obstructive OR multimorbid* OR multimorbidity OR fall OR mobility OR mobility limitation OR mobility disability* Søging 3: *physical function OR functional ability OR functional capacity OR functionality OR strength OR aerobic capacity OR gait speed OR chairstand OR physical fitness OR fatigue OR exercise test* Søging 4: *elderly OR senior OR senior* OR geriatric* OR geriatric OR aged* (Title, Abstract, Keyword) med AND imellem søgninger, kun reviews = 67 Cochrane Reviews Filter 2015 og frem: <u>53 resultater</u> - 15/10/2025

Pedro	 PEDro Physiotherapy Evidence Database PEDro is a free database of randomised controlled trials, systematic reviews and clinical practice guidelines in physiotherapy. You can search PEDro using this Advanced Search page. Those who are new to searching may like to begin with the Simple Search page. Patients and users of physiotherapy may prefer the Consumer Search page. For more information please visit the PEDro home page. Home New search (Simple) New Search (Advanced) Search Help Abstract & Title: Therapy: strength training Problem: Body Part: Subdiscipline: gerontology Topic: [no appropriate value in this field] Method: systematic review Author/Association: Title Only: Source: Published Since: 2015 [YYYY] New records added since: [DD/MM/YYYY] Score of at least: [/10] Return: 20 records at a time When Searching: Match all search terms (AND) Match any search term (OR) = Found 972 records Filter: 2015 og frem: Found <u>686 records</u> - 15/10/2025

Fuldtekstgennemgang

Reviewer: MNH

Group	**Reference**	**Population:** Elderly ≥60 years	**Intervention:** Resistance training	**Comparator**: Any	**Outcomes:** Loss of function in the elderly is prevented/treated	**Inclusion/exclusion**	**year**
stroke	40990157	average age 63	Resistance training	none relevant	no clear conclusion	exclusion/ no age division)	**2025**
heart disease	40132891	unspecific	Resistance training	none relevant	none relevant	exclusion/ no age division	
obesity	40005372	no division, over 18 years old	Resistance training	strength training and aerobics, or aerobics alone	that exercise makes a difference in cardiovascular health, but it varies based on lipid status and type of exercise	exclusion/ no age division	
hypertension	39798217	older/ unspecific	Resistance training	aerobic, and strength plus aerobic.	decrease in LDL, and increased HDL. However, the phrase tai chi	exclusion/ biomarkers	
pain/hip arthritis	39663077	unspecific	resistance: exercises aimed at muscle contraction strength; 2) aerobic: cardiorespiratory resistance training; 3) neuromotor skills: balance and proprioception training; 4) mixed	different types of training	pain relief	exclusion/ no age division	
osteoporosis in postmenopause.	39973439	postmenopaused	Resistance training	training/ none	RT had some beneficial effects on BTMs (bondeturnover markers) but it is not an effective tool for modifying BTMsin womenwith osteoporosis or osteopenia	exclusio/	
atherosclerosis in postmenopause.	40858980	post menopausal women	different training	Inclusion of at least one intervention (continuous aerobic training [CAE], interval aerobic training [IAE], high-intensity interval training [HIIT], sprint interval training [SIT], resistance training [RT], and continuous aerobic training combined with resistance training [CAE&RT]) and a control group or at least two interventions	improvement	exclusion/ biomarkers	
hypertension	39609644	people over 18	training	exercise and non-exercise on office, home, or ambulatory blood pressure	ll exercise significantly reduced systolic BP (SBP) and diastolic BP (DBP) compared to non-exercise	exclusion/ no age division	
type 2 diabetes	39797630	postmenopause. several different groups	erobic exercise combined with resistance training exercise on metabolic markers in in postmenopausal women with T2DM	combining resistance training with aerobic exercise is more effective than either form of exercise alone in reducing glycated hemoglobin (HbA1c)	improved insulin sensitivity, but not much effect on HbA1c	exclusion: biomarkers	
sarcopenic obesity	10.1186/s12877-024-05655-1 // 39815241	people with sarcopenia, probably older	aerobic training, combination of resistance and aerobic exercises, resistance exercises, weighted exercises, and aerobic exercises	aerobic, against mix training	forbedring i mange af mål	inclusion / if age can be used	
healthy elderly	40194665	over 60	ocomotion, vitality, cognitive function, psychological health, sensory function, sleep, and continence.	various comparison and control	improvement, but not relevant for our purposes	exclusion/not relevant for training recommendation	

healthy elderly	10.1016/j.archger. 2024.105731 // 39740358	over 60	RT on inflammatory biomarkers, body composition, and functional capacity in healthy adults aged 60 years and over	resistance training and aerobics, or aerobics alone	RT effectively reduces CRP concentrations and enhances functional capacity in healthy older adults	inclusion/ but only some results	
sarcopenic obesity	10.3390/nursrep1 5030089// 40137662	over 65	resistance training interventions in older adults with SO	intervention compared to a control intervention	Resistance training benefits older adults with SO, improving body composition and physical function, whereas there were no significant differences in blood biomarkers	inclusion/relevant to our recommendation	
sarcopenic obesity	Abstract// 40362811	over 45	Exercise protocols (resistance/aerobic training), nutritional optimization (protein supplementation, vitamin D), or neuromuscular electrical stimulation (NMES	Non-pharmacological comparators, usual care, a placebo, or a blank control	the primary endpoints included body composition (body fat percentage, BMI, waist circumference) and physical performance (gait speed, grip strength). The secondary endpoints included physiologic indicators (blood pressure, lipid profiles).	exclusion / age division not clear	
healthy elderly	10.1186/s12877-025-06212-0 // 40745584	over 65	various forms of exercise, including resistance training, aerobic exercise, balance training, and activities such as T-Bow and balance board training	the experimental group received single-exercise training or a combination of exercises (including two or more types of exercise), while the control group either maintained their usual daily activities or received a different type of exercise intervention than the experimental group	improvements	inclusion/ strength/balance	
healthy elderly	40956936	over 60	EXG	Interventions with or without an active control group	Balance outcome (eg, BBS, Mini-BESTest, TUG), and fall risk (eg, FES-I)	exclusion/lack of comparison	
sarcopenia	10.3389/fphys.20 25.1564988 // 40671711	older, average 68	resistance training	resistance training and control	Resistance training effectively improves handgrip strength in older adults with sarcopenia. A	inclusion	
healthy elderly	10.12965/jer.2550 362.181 // 40917577	over 65	resistance training	The intervention group performed resistance exercise, and the control group did not engage in structured exercise programs	esistance exercise significantly improved various fall-related physical outcomes, including grip strength, flexibility, static and dynamic balance, lower body strength, and coordination	inclusion/ relevant for out focus	
healthy elderly wome	10.3389/fnagi.202 5.1495218 // 40370749	women over 60	resistance training	intervention was resistance exercise, including but not limited to muscle training, progressive strength and/or resistance training, weight training and/or elastic band training.he control group was non-exercise treatment or telephone follow-up	nalysis of body composition and/or physical function were included;	inclusion/relevant for older women with sarcopenia	
healthy elderly	40832852	80 plus, 65-79, and elderly in nursing homes		strength training, but also other interventions		exclusion/ is not just training. Effect Not divided into training vs. other	
arthritis	39592397	35-65, and over 65. different groups	Aerobic, isometric, and resistance training showed positive effects and presented improvements in physical function, quality of life, and pain	training and control	different effects on arthritis	exclusion/ measured on arthritis, etc., however less relevant	**2024**

atrial fibrillation	39240677	female: 68 ± 7 years, male: 66 ± 8 years	resistance training	training and control, in relation to cardiorespiratory fitness	anges in CRF did not differ between sexes (MD = 0.15: 95% CI, -1.08 to 1.38 mL O2/kg/min; P = .81; I2 = 27%). Severity of AF (MD = 1.00: 95% CI, 0.13-1.87 points; I2 = 0%), general health perceptions (MD = -3.71: 95% CI, -6.88 to -0.55 points; I2 = 22%), and systolic blood pressure (MD = 3.11: 95% CI, 0.14-6.09 mmHg; I2 = 42%) improved less in females than in males.	exclusion, age for men are younger than 60
diabetes	37352215	35-65	fitness and resistance training	training and control	CET is effective in improving metabolic markers, body composition, lipid profile, inflammation, and CRF in people with T2DM	exclusion/ age not divided. not suitable target/ biomarker
postmenopausal women	37788790	over 45 and over 65	resistance training	training and control	biomarker	exclusion/ biomarker
healthy elderly	39593159	over 65	different exercise	usual care	many different but ot relevant	exclusion/irrelevant to our objective
diabetes	37875170		Combined aerobic and resistance exercise		cognition (SMD=0.34, 95% CI: 0.13 to 0.55), metabolic health on HbA1c (SMD=-0.35, 95% CI: -0.48 to -0.22) and lipid profile (total cholesterol SMD=-0.20, 95% CI: -0.34 to -0.07; low-density lipoprotein SMD=-0.19, 95% CI: -0.33 to -0.05; high-density lipoprotein SMD=0.25, 95% CI: 0.12 to 0.39; and triglycerides SMD=-0.18, 95% CI: -0.31 to -0.04), physical function on aerobic oxygen uptake (SMD=0.58, 95% CI: 0.21 to 0.95) and body mass index (MD=-1.33, 95% CI: -1.84 to -0.82), and physical HRQoL (MD=4.17, 95% CI: 0.86 to 7.48)	excluded/ biomarkers primarily
secondary sarcopenia	39567607	mean age 57.28 ± 2.66 to 79.6 ± 5.4 years	different exercise			Excluded: not relevant, secondary to condition
primary sarcopenia/ age	10.1016/j.gerinurse.2024.09.016 // 39368450	over 70	resistance training	exercise vs control	Resistance exercise significantly affected handgrip strength (MD = 1.67 kg; P = 0.02) and isometric muscle strength (standard mean difference [SMD] = 0.53; P = 0.02). Significant differences in chair stand test (SMD = 0.40; P = 0.02) and skeletal muscle mass index (mean difference [MD] = 1.67 kg/m2; P = 0.0002) were found between the RT and control groups CONCLUSION	inclusion/ fits our segment
healthy elderly	10.1016/j.archger.2023.105303 // 38128241	over 60	resistance training	hard vs. low intensity	HV-RT performed better than LV-RT for lower limb muscle strength, regardless of the intervention duration	inclusion/fits age segment, as well as training assessment
elderly with Alzheimer's	10.1186/s11556-024-00357-4 // 39215230	60 and 92 years, with a mean age of 75.09 ± 6.13 years	different resistance training intensities	hard vs. low intensity	all exercise types demonstrated a favorable impact on executive function	exclusion/ fits our segment, and training form, plus good quality, but they do not assess the effect of functional outcomes
healthy elderly	38739588		elastic training			exclusion/not relevant form of training

ældre kvinder med sarcopeni- taget	10.3390/jcm1302 0441 // 38256574	over 60	effect of resistance exercise on body composition and functional capacity	resistance training of different kinds, different timelines.	different, both improvement in some, others not significant.	inclusion/fits on segment, and training type, plus time indication.	
older	39266933	over 60	hiit	HIIT vs. no training and resistanve training	HIIT in improving resting HR, SBP, CRF, BF%, MS, ME and balance among older adults.but not as significantly as strength training.	excluded by data extraction: exclude/ segment and training, but not strength training which is the focus. Focus on HIIT (interval cardio training) and broader fitness parameters. It includes resistance training (RT) as a comparator, but it does not estimate the effect of RT and thus does not allow to assess the effect of RT in isolation.	
patients on maintenance hemodialysis	39650714	52–73 years	different training interventions	different	improvement on some parameters	exclusion/not divided into age groups	
sarcopenia	38667529	over 60	different training interventions	training and controls	improvement, but it is not divided in age	exclusion/not divided into age groups	
healthy elderly	10.1186/s12877-024-05243-3 // 39085773	over 60		Different exercise interventions and control groups		excluded by data extraction: excluded/ Focused on muscle quality (architecture/compositio n), not primarily physical function. Focus on muscle quality via imaging/diagnostic techniques – not physical function	
healthy elderly	10.1007/s40520-020-01556-6 // 32356136	over 65	strength and balance exercises	training and controls	improvements in many parameters	inclusion/ super relevant to our focus.	**2023**
elderly with sarcopenia	10.1186/s11556-021-00277-7 // 34763651	over 65	resistance training	resistance training and controls	improvement in many parameters	inclusion/fits the outcome and target group	
healthy elderly	34819097	over 60, mean age 73,4	exergaming and general resistance training	exergame and training		exclusion/no real control without intervention, is either exergame or training	
elderly - not active	10.3390/ijerph182 111441 // 34769957	over 65	resistance training, placebo or blood occlusion	training and controls	both progress and no significant difference	inclusion/relevant goals and segment	
osteoporosis	34055018					exclusion/ age not stated	
healthy elderly	10.1038/s41598-021-00600-3 // 34702909	over 60	resistance training	training and controls	improvements	excluded by data extraction: exclusion/ in connection with data extraction	
elderly	10.3390/jcm1014 3184 // 34300350	over 60	resistance training	resistance training and other forms of exercise as control	improvements	inclusion/time perspective, goal and segment	
telomere length	34335309					exclusion/ biomarker	
elderly	34660612	72, plus or minus 11 years	resistance training	resistance training and controls	unclear	exclusion/maybe inclusion if lacking, it does not appear to be divided into control and intervention	
women at risk of fracture	33367736	over 50				exclusion/not relevant division	
postmenopausal women and older women	33880736	50 and 80 years	resistance training	There is no clear indication of a control and intervention group, but the length of training is measured by how often.		ekslusion/ 50 and 80 years	

elderly with sarcopenia	10.1016/j.endien.2020.02.007 // 34167695	over 60	Hight intensity training, with or without resistens training.	different gruops	different	inclusion/ fits with segment, however, division is a bit tricky.	
elderly, frail or with sarcopenia	10.3390/jcm10081630 // 33921356	over 65	resistance training	controls are other interventions	different	Inclusion/ fits with segment and focus	
elderly	10.1016/j.jshs.2020.06.003 // 32525097	over 65	various training and cognitive interventions	grouping based on intervention		inclusion/ but note on group	
elderly with sarcopenia	10.1186/s12877-021-02642-8 // 34911483	over 60	resistance training	strength training and control (as well as grouping of intensity)	different	Inclusion/ fits with segment and focus	
	34385688		resistance training and blood pressure			exclusion/ blood pressure	
OA	34373507	mean age 60	exercise			exclusion/ not divided into age groups	
elderly	34174085		exercise			exclusion/measurement of muscle composition, CT and MRI	
elderly	32702280	59-88	exercise			exclusion/ target on fibers and hypertrophy, not target in clinic	**2020**
elderly	10.3390/jcm9092902 // 32911822	over 65	different types of training, strength, vibration and electrical stimulation	Control groups, receiving no intervention or placebo intervention	Muscular strength or power, not limited to type of testing or body part	Inclusion/ fits with segment and focus	
not relevant	32622352		different training, but is rehabilitation focused			exclusion/ very specific - rehabilitation focused	
elderly with MCI	10.3390/ijerph17249216 // 33317169	not clear	resistance training og aerobic	intervention and controls	Older adults with MCI participating in exercise interventions received positive effects	Inclusion/ fits with segment and focus if we can find age	
elderly	30512983		resistance training and more	intervention and controls	quantitative or qualitative evaluation of ability to get up off the floor.	Inclusion/ (perhaps exclusion) determines groups	
elderly	33265079	over 60	resistance training	strength training, control or other form of training	different. decline and strength	Inclusion/ fits with segment, measures and focus	
	31628720					exclusion/ measures hypertrophy	
not relevant	32615210					exclusion/ biomarker	
elderly (preventive measures for osteoporosis)	33239014	over 65	different physical activity			exclusion/biomarkers scanning, and not so well defined around strength training	
elderly with sarcopenia	10.1155/2019/1959486 // 31827927	over 65	training program	intervention and control	muscle mass, muscle strength, physical performance, and muscle quality	inclusion/relevant to segment and target	**2019**
elderly	10.1016/j.exger.2019.110731 // 31505227	over 60	resistance training based intervention for lower limbs	resistance training performed with moderate concentric velocity (duration of concentric phase ≥2 s), versus training performed with the intention of maximising concentric velocity	Outcome: at least one functional test for lower limbs, with pre- and post-intervention measurement	inclusion/ however, it is the lower body	
elderly	31026723	over 65	resistance training	exercise training	experimental set-up, and exercise modalities, the ET programs increased the MVC (with large effect sizes), in older adults	exclusion/not clear groupings in training form	
not relevant	31853817					exclusion/ biomarker	

elderly	10.1007/s12603-019-1196-8 // 31233069	over 65	resistance training, resistance training + nutritional supplementation, multimodal exercise programmes and bloodflow restriction training.	exercise; Comparison: no exercise or other form of exercise	sarcopenia	inclusion/target and segment	
not relevant	30676214					exclusion/ biomarker	
elderly frail	30510094	over 65	various interventions, general training and a lot of others	different forms of exercise, and walking, are not clearly shown to have controls	reversal of frailty	exclusion/maybe included if we are missing in this group but it is Recommendations for routine frailty screening	
elderly with heart failure	10.3389/fphys.2018.01564 // 30483145	over 65	effects of physical training on QoL, aerobic capacity, and cardiac function in older patients with HF	different groups	quality-adjusted happiness	inclusion/segment and target disease	**2018**
elderly	10.1093/ageing/afy009 // 29471456	over 60	resistance training, endurance training and whole-body vibration	exercise vs. "normal care"	Resistance training is the most effect intervention to improve muscle strength and physical performance in older people	inclusion/ goals and objectives	
elderly	10.1016/j.exger.2017.11.020 // 29196141	over 60	resistance training	controls and different interventions	strength and rapid force development	inclusion/ segment and measurability	
overweight elderly	29596307	over 57	strength training to prevent lean body mass, in a calorie deficit	comparing CR with and without RT have shown t		exclusion/grouping not clear	
elderly frail	30518122		strength training and protein supplements	controls and training		excluded by data extraction: excluded/groups are divided	
	29380857					exclusion/ diet	
not relevant	28932015	elderly/not clear	elastic training			eksklusion/ age not clear	**2017**
elderly	28382531	over 60	resistance training		Blood glucose is the primary goal	exclusion/ Blood glucose	
elderly and middle-aged	10.1016/j.arr.2017.04.003 // 28457933	mean age 64	resistance training	controls and training	measured strength, body composition, and/or cardiac capacity	inclusion/ however review age	
elderly with skeletal muscle impairment	10.2147/CIA.S104674 // 28670114		resistance training	controls and training	physical function	inclusion/ segment and target	
healthy elderly	28587957	elderly/not clear	resistance training		cognitive function	exclusion/not suitable target	
elderly	28410504		To determine the effects of different modality of exercise training programs on muscle oxygenation in older adults			exclusion/not suitable target	
ot relevant	28809927					exclusion/biomarkers	
elderly / not relevant	27559744		exercise	controls and training	prevent falls	excluded by data extraction: exclusion/ not the best though	**2016**
elderly	10.1093/ageing/afw036 // 27121683	over 65	Exercise interventions included gait, balance and function; strength or resistance; flexibility; 3-dimensional (e.g. Tai Chi) and endurance	controls and various interventions	exercise interventions probably reduce fear of falling to a small to moderate degree immediately post-intervention in community-living older people	inclusion/target and segment included	
not relevant	27471784					exclusion/ hypertension	
not relevant	27555299					exclusion/ biomarkers	
elderly, chronic heart failure	10.1016/j.jesf.2016.08.001 // 29541121	50-75	resistance training	aerobic exercise or resistance exercise or combination aerobic and resistance exercise	cardiovascular functions and quality of life (QoL)	inclusion/ however only one out of 5 of their goals fits in ours	
not relevant	26467494					exclude/ blood pressure	

elderly	10.1007/s40279-015-0385-9 // 26420238	over 60 and over 65	machine-based RT containing a description of at least one training variable	dose response, different groups	comparator: non-physically active	inclusion/ extremely relevant to both goals and age	**2015**
frail elderly	10.1186/s12877-015-0155-4 // 26626157	frail older people/ mean age of 82.5 ± 4. 3 years old	exercise	intervention and control groups	the effects of the intervention on the domains of frailty and/or physical capacity and/or functional capacity	inclusion/ relevant target	
healthy elderly	10.1007/s40279-015-0371-2 // 26286449	over 65	resistance, coordination, and multimodal training on gait speed	intervention and control groups	effects of strength, power, coordination, and multimodal exercise training on healthy old adults' habitual and fast gait speed.	inclusion/target and segment	

Reviewer: KGH

Group	**Reference**	**Population:** Elderly ≥60 years	**Intervention:** Resistance training	**Comparator**: Any	**Outcomes:** Loss of function in the elderly is prevented/treated	**Inclusion/exclusion**	**year**
Risk of sarcopenia in patients with chronic pancreatitis	40077740	unclear, elderly	Pancreatic enzyme replacement therapy (PERT); Nutritional interventions; special training programs (resistance training)			Exclude: Focus is routine screening tool. The aim of this meta-analysis was to determine the overall prevalence and risk of sarcopenia among CP patients.	**2025**
stroke + quality of life	**39825230**	**50-70**	**Any form of exercise intervention**	**effects between different types of exercise intervention**	**quality of life: Strength Training had the best effect on Pain and Vitality**	**Exclude: (no age division) / but quality of life is focus. RT has effect on Pain and Vitality**	
sarcopenic obesity	10.3389/fnut.2025.1537291 // 40046765	≥60 years	any ET mode alone without incorporating other treatments was one of the intervention arms	The control group included either educational or psychological intervention or no intervention	Outcome measurements encompassed at least one aspect of body composition [e.g., body fat percentage [BFP], body mass index [BMI], or fat-free mass (53)], muscle strength (assessed in upper or lower extremities), or physical performance (measured by gait speed and the 30-s chair stand test). Results: MCT outperformed other exercise intervention models in enhancing body composition and gait speed. Moreover, RT showed a significant advantage in enhancing muscle strength, while MCT's efficacy in strength improvement was comparable to that of RT	Inclusion: effect of strength training on elderly people with SO	
physical frailty	40097929	≥ 50	More, incl. RT	More, please RT	physical activity containing an aspect of resistance training is beneficial at reversing frailty status and preventing frailty progression	Exclude: No clear division of age	
sarcopenic obesity	10.3389/fnut.2025.1575580 // 40873450	≥60	**More, incl. RT**	More, please RT	Physical function (grip strength, gait speed, and the timed Up and Go test) improved significantly. **Konklusion**: results indicating a significant increase in grip strength (effect size=1.560, 95% confidence interval [CI]=[0.178, 2.941]; p=.027) and significant reduction in body fat percentage (effect size=−1.737, 95% CI=[−2.563, −0.912], p<.001) (...) gait speed and body mass index were not significantly improved by resistance exercise interventions.	Include: physical function but also bio-markers	
Sarcopenic Obesity	10.1097/jnr.0000000000000685 // 40586735	≥ 60 years of age with sarcopenia and obesity;	RT	control groups	the effects of resistance exercise on body composition and physical functioning	Include: RT effect with functional outcomes	

sarcopenia	40926882	≥58	aerobic training, resistance training, resistance aerobic training, whole-body electrical stimulation (WB-EMS) and whole-body electrical stimulation plus protein supplementation (ES&P)	Control group: The control group had no therapy or other non-invasive treatments	Results Body composition (Skeletal Muscle) was assessed by ASM (appendicular skeletal muscle mass), TSM (total skeletal muscle mass), FFM (fat-free mass) and SMI (Skeletal Muscle mass Index); PBF (Percentage body fat), TFM (total fat mass), BFM (body fat mass) and FM (fat mass) were selected for body composition; Strength, grip strength and handgrip strength were selected for body function. Quality of life was evaluated using objective physical function measures that directly impact daily living activities: gait velocity, maximum walking speed, and 2-min walk distance. These parameters serve as well-established physical proxies for QoL in elderly sarcopenia patients, as they correlate strongly with independence in basic and instrumental activities of daily living	Exclude: a single study (Wang et al. (2019)) has age down to under 60 (63.6 ± 5.2). The rest are over but cannot sort results	
healthy	10.3390/jfmk9040239 // 39584892	>60	Machine-Based RT	control groups	Improves Functional Capacity in Older Adults	Include: Improves Functional Capacity in Older Adults	**2024**
fragile	39426607	≥60	**Multicomponent exercise**	More, please RT	Multicomponent exercise intervention can improve frailty status in older adults and promote enhancement of physical functional abilities	Exclude: Does not look at RT in isolation	
healthy	39461107	>60	functional exercise	not clear	FIHT regimens led to improvements in all physical functioning indicators	Exclude: not RT.	
sarcopenia in long-term care facilities	10.1002/jcsm.13576 // 39291586	mean ages ranging from 72.5 to 90.4 years	physical inactivity, with resistance training being the most common intervention type	More, please RT	resistance training being the most common intervention type	Include: RT effect is assessed on relevant targets	
healthy and fragile	39376725	≥65 or on average older than 65 (younger included). Average: 74.6 total + 80.3 in frail elderly	Physical Exercis	control groups	In the healthy aged, a significant benefit of multicomponent exercises (p=0.006, SMD=1.40, CI=0.41, 2.40) and tai chi (p=0.01, MD=0.51, CI=0.12, 0.91) on physical function was revealed, while strength exercise benefitted cognitive function (p=0.04, SMD=0.86, CI=0.03, 1.68). In frail older adults, there was a significant benefit of multicomponent exercises on physical function (p < 0.0001, SMD=−10.85, CI=5.66, 16.04) and mental health (p=0.0002, SMD=−0.39, CI=-0.18, 0.59). Strength exercise had a significant benefit on activity of daily living (ADL) (p < 0.0003, SMD=15.78, CI=7.28, 24.28).	Exclude: RT is included, but results are not divided by age. There are two studies with participants under 60 (55 years and up + 57 and up)	
Type 2 Diabetes Mellitus	37875170	51.4-87.0	structured combined aerobic and resistance exercise	compared with the control group receiving usual care.		Exclude: No clear division of age	
type 2 diabetes	38965721	≥ 60 or mean age ≥ 55	any treatment to improve the glycemic control and physical performance	sham interventions, control intervention, or routine or standard health care	HbAc1[%], fasting plasma glucose (FBG, mmol/l), and indicators of assessing physical performance	Exclude: No clear division of age	
women over 55	39015223	women ≥ 55	flow restriction training	control groups	BFR training had a significant effect on the increase of the maximum dynamic force of 1RM and decrease of blood pressure in middle-aged and elderly women, but there was no significant difference found in heart rate and leg compression force	Exclude: No clear division of age	

frailty, mobility, or cognitive disability	37975811	≥60	telehealth exercise	included RCTs that compared telehealth to any comparator	mobility, strength, balance, falls, and quality of life (QoL) - moderate improvement on mobility (n = 5 studies; standardized mean difference [SMD] = 0.63; 95% confidence interval [CI] = -0.25 to 1.51; p = 0.000, I2 = 86%) and strength (n = 4; SMD = 0.73; 95% CI = -0.10 to 1.56; p = 0.000, I2 = 84%), a small improvement on balance (n = 3; SMD = 0.40; 95% CI = -035 to 1.15; p = 0.012, I2 = 78%), and no effect on QoL. **- Interventions that included an exercise dose of more than 3 h per week and included balance and strength exercises reduced falls by 34%**	Exclude: Strength training is only mentioned once together with balance training and cannot conclude on its effect.
cognitive frailty	38908349	≥65	multicomponent exercise ink RT (strength) - structured physical activity program encompassing at least two components from aerobic, strength/resistance, balance, or flexibility exercises	Any control was deemed acceptable, except those incorporating a physical activity component.	The study outcomes included at least one of the following: cognitive function, frailty status, grip strength, lower limb muscle strength, daily living activities, depression, and health-related quality of life.	Exclude: Strength training is only mentioned together with other training and cannot conclude on its effect.
sarcopenic obesity	38571676	≥60	More, incl. RT	control groups	Resistance training is the best intervention in treating the patient with sarcopenic obesity, because it directly focuses on direct muscle bulk improvement by acting on muscle fibers.	Exclude: Only muscle mass (not function). RT has the best effect on muscle mass.
healthy	39579806	≥65	RT	control groups	Muskelhypertrofi og og fiberareal (størrelse), ikke direkte funktionelle mål. Belyser træningsrespons på muskelstruktur, men ikke funktionstab. Effekt af styrketræning på muskelstørrelse og fiberareal.	Exclude: Muscle mass only. RT effect on muscle size.
osteosarcopenic obesity, women	10.1016/j.jor.2024.03.039 // 38633989	≥60	RT	control groups or placebo	Resistance exercise effectively improves body composition, increasing body fat percentage and the skeletal muscle mass index. age-related osteoporosis (OSO), in older persons Elastic bands improve physical performance securely and efficiently. O: The OSO T-score and physical function measures like HGS and GS were the secondary objectives, whereas body composition measures like BFP, SMI, and BMD were the primary ones. DXA examined BMD, SMI, and BFP; standard dynamometry measured HGS; a 10-m walk test evaluated gait speed	Include: Effect of RT. However, not many functional results.
healthy	10.3390/healthcare12020197 // 38255085	mean: 70.0 (±4.7) **and** 93.4 (±3.2)	RT was administered to the experimental group and mostly combined with other types of training, such as aerobic exercise, balance, gait, mobility, and flexibility training. The mean duration of the RT programs was approximately 10–12 weeks (range 8–36 weeks), and the most common training frequency was 2–3 times per week.	control groups	Combining the effects of RT on various measurements from the meta-analysis, our results demonstrate that RT counteracts or postpones aging-associated declines in intrinsic capacity (body composition, muscle strength, and physical function). Therefore, it can be concluded that PA is important for healthy aging - **Outcomes på muskelstyrke**: The heterogeneity in the outcomes was high for handgrip strength (I2 = 86%) and moderate for lower limb strength (I2 = 68%). These results demonstrate that the RT group exhibited higher handgrip strength and lower limb muscle strength (isometric knee extension and isokinetic knee flexion), compared with the control group.	Include: effect of RT is assessed

healthy and Parkinsons	39777047	≥50	healthy older adults aged 50 years and older, as well as patients with mild to moderate PD	The control group received no exercise intervention, or alternative forms of movement and exercise were utilized.	The study incorporated at least one or more of the following assessments: the BBS, Timed Up and Go (TUG) test, movement speed, force plate measurements, and functional balance test. - The aim was to investigate the effects of different exercise types (Tai Chi, yoga, and resistance training) on balance function in both healthy older adults and Parkinson's patients. **Konklusion**: This systematic review and meta-analysis indicate that Tai Chi, yoga, and resistance training significantly enhance brain network function in both healthy older adults and patients with PD. These exercises improve connectivity in subcortical structures, thus enhancing balance and motor function. The study identified resistance training as having the most significant effect on improving balance in healthy older adults, while Tai Chi proved particularly effective for Parkinson's patients. It is recommended that these exercises be practiced for 50–60 min, three to four times a week, and continued for at least 12 weeks to achieve optimal results.	Exclude: you have to go into the data of the individual studies to ensure that the age for the results is not too low. RT in healthy older people has an effect. If we look exclusively at RT results, then age is over 60 years. The younger ones are, with one exception (who is on Tai Chi), only in the group with Parkinson's.	
Fall prevention in nursing homes: cognitive (57%) and mobility (41%) impairments	10.1136/bjsports-2023-107505 // 38658135	≥65	structured programmes including strength exercises (resistance training with weights and/or body weight), gait, balance and functional exercises mirroring daily movements (eg, stepping, sit-to-stand), flexibility, general physical activity and 3D exercises like Tai Chi.	The reporting of almost two-thirds of trials did not describe allocation concealment, with some not clearly describing their control group	Trialists suggest sufficiently resourced, tailored balance and strength exercises delivered at moderate intensity may prevent falls.	exclude: not correct study design: however relevant, as RT looks at in relation to falls. It is not a systematic review or meta-analysis. But it can contribute with insight into which training components work	
cognitive impairment	37711255	not clear	physical activity combined with cognitive stimulation	ot clear	Physical activity interventions in older adults with a cognitive impairment: a critical review of reviews	exclude: no clear age division	**2023**
sarcopenia	10.1007/s40200-023-01283-5 // 37975091	mean: 72.4 (± 9.22)	Effects of RT on muscular strength, endurance, body composition and functional performance	a comparison or control group undergoing no exercise or other interventions (such as education training)	body composition, muscle strength and endurance	Include: RT effect measured on relevant disease	
sarcopenia	10.3390/jfmk8030092 // 37489305	≥60 older people in the community diagnosed with sarcopenia	a range of exercises and training programs incorporating physical activity	usual care or control groups	focused exclusively on variables (gait speed, walking speed, locomotion, muscle activity, muscle strength, and lower extremity strength) related to locomotion . **Conclusion**: Exercise interventions in community-dwelling elderly individuals with sarcopenia did not result in a significant increase in muscle mass, but they did yield positive improvements in lower extremity strength and gait speed, thereby enhancing locomotion.	Include: RT effect is measured on functional outcomes	
frail	10.1093/ageing/afad004 // 36746389	≥60	All non-pharmacological interventions for frailty	usual care, placebo, no treatment or other non-pharmacological interventions	frailty as the primary outcome. Secondary outcomes included cognition, depression, activity of daily living and quality of life. **Conclusion:** Resistance exercise could be considered as a priority choice to reduce frailty in older adults based on the results of this NMA. This finding might be useful to clinicians in selecting interventions for older adults with frailty. However, the certainty of the evidence for this finding was moderate to very low. Future studies with a rigorous methodology, adequate sample sizes and explicit reporting of safety-related information are needed to	Include: RT effect is measured on functional outcomes	

					increase the confidence of the effect estimates of the results in this NMA.	
elderly on nursing homes	10.1016/j.ijnss.2022.12.002 // 36860706	≥65 on nursing homes	resistance band exercise performed on the wheelchair or chair and delivered as a single exercise or compound exercise interventions	the control groups received the usual care or non-exercise interventions	**outcome**: measured physical functioning, sleep quality, and depression as outcomes with quantifiable scales that had been psychometrically validated. **Results:** Nine studies met the eligibility criteria and were synthesized. The results revealed that CRBE significantly promoted the activity of daily living (six studies; SMD = 0.30, P = 0.001), lung capacity (three studies; MD = 40.35, P < 0.001), handgrip strength (five studies; MD = 2.17, P < 0.001), upper limb muscle endurance (five studies; MD = 2.23, P = 0.012), lower limb muscle endurance (four studies; MD = 1.32, P < 0.001), upper body flexibility (four studies; MD = 3.06, P = 0.022), lower body flexibility (four studies; MD = 5.34, P < 0.001), dynamic balance (three studies; MD = −0.35, P = 0.011), sleep quality (two studies; MD = −1.71, P < 0.001), and reduced depression (two studies; SMD = −0.33, P = 0.035). **Conclusion:** The evidence suggests that CRBE improved physical functioning parameters, and sleep quality, and lowers depression among older adults in LTCF. This study could be used to persuade long-term care facilities to allow people with limited mobility to engage in physical activity.	Include: RT effect is measured, among other things, on functional outcomes
menopause	36675477	mean total: 62. mean på studie med yngste 55.3	clinical trials that analyzed the effects of strength exercises versus other types of interventions	considering all the outcome measures of interest, were included in this review	**The results** showed improvements in the strength of the legs and pelvic floor, physical activity, bone density, metabolic and hormonal changes, heart rate and blood pressure and a change in hot flashes. **Conclusions**: There is evidence that strength exercises can be beneficial for improving strength, physical activity, bone density and hormonal and metabolic levels. In terms of the appropriate type of strength training, the evidence is still unclear given that the same benefits are achieved by various types of exercises.	Exclude: no clear division of age
post-menopausal women	37229231	~53 to 90: post-menopausal women with mean age and BMI ranging from ~53 to 90 years and 22 to 35 kg/m2	More, incl. RT	non-exercise control groups	egarding exercise type, aerobic, resistance, and combined training significantly increased CRF and lower-body muscular strength, while resistance and combined training effectively increased handgrip strength. However, only resistance training increased the upper-body muscular strength in women.	Exclude: no clear division of age

sarcopenia	38030985	mean age range:55.0 ± 9.6 to 89.5 ± 4.4 years	More, incl. RT	More: control, supplements, other training, etc.	This network meta-analysis suggests that RT with or without nutritional supplementation improves physical performance, ASMI, and handgrip strength in older adults suffering from sarcopenia. Higher RT intensity potentially generates more benefits on lower body strength and muscle mass compared to lower RT intensity.	Exclude: if you look exclusively at results from RT, the age drops to under 60 (59.5)
healthy + balance	10.3390/life 13051193 // 37240838	≥65	balance ud fra resistance training, aerobic training, balance training or multicomponent training	control group	**Conclusions**: interventions based on different types of exercise improved static balance in elderly population, but without statistically significant difference in comparison with the control groups	Include: RT effect on balance/risk of falls
sarcopenic obesity, community-dwelling	36882046	50-70: Community-dwelling persons with sarcopenia and obesity for whom the mean age, together with the standard deviation, did not surpass 50–70 years at baseline	Any nutritional and/or exercise intervention with a duration of at least 8 weeks - the exposure “resistance training” and the exposure “training (resistance or aerobic)” in combination with the exposure “added protein” as compared with “no intervention” or “training alone.”	No intervention control group	Body composition (eg, fat mass, muscle mass, lean mass), body mass index, muscle strength, physical functioning - Primary endpoint was body composition, and secondary endpoints were body mass index, muscle strength, and physical function. **Konklusion**: Resistance training led to a significant body fat reduction of −1.53% (95%CI, −2.91 to −0.15), an increase in muscle mass of 2.72% (95%CI, 1.23–4.22), an increase in muscle strength of 4.42 kg (95%CI, 2.44–6.04), and a slight improvement in gait speed of 0.17 m/s (95%CI, 0.01–0.34). Protein combined with an exercise intervention significantly reduces fat mass (−0.80 kg; 95%CI, −1.32 to −0.28)	Exclude: no clear division of age
functional performance	10.1016/j.jphys.2023.05.018 // 37328359	> 60 regardless of health status, baseline functional capacity or residential status.	High-velocity power training with the intent to perform the concentric phase as quickly as possible compared with traditional moderate-velocity resistance training performed with a concentric phase of ≥ 2 seconds.	control group - compared with traditional moderate-velocity resistance training	Short Physical Performance Battery (SPPB), Timed Up and Go test (TUG), five times sit-to-stand test (5-STS), 30-second sit-to-stand test (30-STS), gait speed tests, static or dynamic balance tests, stair climb tests and walking tests for distance. The quality of intervention reporting was assessed with the Consensus on Exercise Reporting Template (CERT) score. **Conclusion:** HVPT had similar effects to TRT for functional performance in older adults, but there is considerable uncertainty in most estimates. HVPT had better effects on the SPPB and TUG, but it is unclear whether the benefit is large enough to be clinically worthwhile.	Include: various forms of RT on functional parameters
healthy middle aged and elderly	10.1007/s40279-022-01764-2 // 36222981	50-73	the effects of CT versus passive controls on measures of physical fitness in healthy middle-aged and older adults aged between 50 and 73 years.	passive controls	Older adults > 65 years (SMD = 1.04) and females (SMD = 1.05) displayed larger improvements in muscle strength compared with adults ≤ 65 years old (SMD = 0.60) and males (SMD = 0.38), respectively. (...) **Conclusion**: CT is an effective method to improve measures of physical fitness (i.e., muscle strength, power, and CRE) in healthy middle-aged and older adults aged between 50 and 73 years, regardless of sex. Results of independent single training factor analysis indicated that the largest effects on muscle strength were observed after 12 weeks of training, > 30–60 min per session, three sessions per week, higher ET intensities and when ST preceded ET within the same session. For CRE, the largest effects	exclude: Results are divided into over and under 65 - but CT is a combination of RT and conditioning and therefore cannot be used

					were noted after 21 weeks of training, four sessions per week, > 60–90 min per session, higher ET intensities and when ET and ST sessions were performed separately. Regarding muscle power, the largest effects were observed after 12 weeks of training and > 30–60 min per session.	
Sarcopenia, men	10.3389/fpubh.2022.1037464 // 36684863	63-81: male adults with sarcopenia or osteosacorpenia	intervention on resistance exercise combined with another treatment	control groups eller "intervention without resistance training"	musculoskeletal health measured through strength, the skeletal muscle index, muscular quality, or the bone mineral density. **Conclusion:** Interventions based on RT have beneficial effects on different variables associated with musculoskeletal health in older male adults with sarcopenia. RT training can be used at any intensity as long as the objective is to improve functionality; additionally, when combined with AT, the AT should be low intensity to optimize results. Nutritional supplementation enhances the effects of RT, but by itself is not sufficient treatment for this population, and doses should be carefully adjusted to avoid potential health problems in the future. RT must be constant for maintaining the results obtained. Finally, RT is a cost-effective, low-risk strategy for treating sarcopenia, and is always recommended to be combined with another type of intervention, either aerobic exercise or nutritional supplementation to enhanced the effects.	Include: The effect of RT is measured on several parameters, including relevant
physical function	10.1093/gerona/glac230 // 36378500	≥60	high-velocity strength training greater physical function benefits than traditional strength training	control group	physical function measured by fast walking speed, timed-up and go, 5-times sit-to-stand, 30-second sit-to-stand, and 6-minute walking tests, while maximal muscle power and muscle strength were secondary. **In conclusion**, our study provides evidence that resistance exercise effects on physical function are velocity specific, as evidenced by physical function test dependence in older adults. While high-velocity resistance exercise promoted greater improvements in physical function tests with a time component, traditional resistance exercise was the most effective intervention for improving performance where participants had to work longer. These results are of clinical importance as they indicate that resistance exercise prescription based on the velocity of contraction should be individualized and specific to target the relative deficits of participants' and their needs within the resistance exercise program. Moreover, older adults will often present with a range of deficits in physical function and consequently, both high-velocity and traditional resistance exercise may be required to enhance multiple domains of physical function.	Include: RT effect at the functional level

Fall prevention	10.3390/ijerph20064723 // 36981632	50–82 (subgroups: 55–64 and 65–75)	low-intensity resistance training with blood flow restriction	control group	the dose-effect relationship between low intensity resistance training with **blood flow restriction** and lower limb muscle strength in terms of age, exercise cycle, exercise frequency, exercise intensity, and vascular blocking pressure, and found that the intervention effect of blood flow restriction intervention low-intensity resistance training on lower limb muscle strength was more significant at age 55–64 years, exercise cycle 4–8 weeks, exercise frequency 3 times/week, exercise intensity 20–30% 1 RM, and vascular blocking pressure ≥120 mmHg. Scientific exercise intervention is recommended for middle-aged and older adults as early as possible	Include: results in the over 65 group and effect can be assessed
Sarcopenic Obesity	10.1007/s12603-023-2018-6 // 37997730	≥60	physical exercise as an intervention: Resistance exercise, combined exercise, or aerobic exercise	control group was considered a group that did not receive any intervention. We did not include studies that classified the control group as one that received any traditional intervention (e.g., a new exercise method vs. the usual exercise method)	Primary outcome indicators: (1) handgrip strength (HGS); (2) timed up and go test (TUGT); (3) chair stand test (CS); (4) gait speed (GS). In conclusion, not all exercise modalities can improve all aspects of muscle strength and physical performance in older adults with sarcopenia. In older adults with sarcopenia, the findings show that resistance training (RT) has positive effects on handgrip strength (HGS) and physical performance tests of the timed up and go test (TUGT), but did not improve performance in the chair stand (CS) and gait speed (GS). Resistance training (RT), comprehensive training (CT) and comprehensive training under self-management (CT_SM) have a positive effect on the TUGT times. There were no significant changes in chair stand test (CS) and gait speed (GS) with any of the exercise training modes. Plausible reasons can explain these findings to include differences in the exercise training movements, exercise-specific demands on the body, and variations in exercise training protocols. Overall, RT is worthwhile exercise modes to achieve various improvements on muscle strength and physical performance in older adults with sarcopenia. It is suggested that the elderly should carry out targeted strengthening exercise training according to their own physical insufficiency on the basis of adopting a variety of exercise methods. The results of this study provide some important references concerning exercise treatment strategies for clinical professionals and researchers. body composition and/or muscle function. Resultater: A decrease in body fat (%) favoring the exercise group was identified (SMD: −0.34 [95% CI: −0.53 to −0.16]; p=0.0003) (GRADE: ⊕⊕⊕○ Moderate). Only resistance training showed fat reduction (SMD: −0.27 [95% CI: −0.48 to −0.06]; p=0.01). Increases in upper (SMD: 0.41 [95% CI: 0.04 to	Include: RT effect is measured and can be separated from various other results

0.78]; p=0.03) (GRADE: ⊕⊕○○ Low) and lower (SMD: 0.80 [95% CI: 0.22 to 1.39]; p=0.007) (GRADE: ⊕⊕⊕⊕ High) limb strength was identified with exercise. Chair stand test showed increases with exercise (SMD: 0.73 [95% CI: 0.40 to 1.07]; p<0.0001) (GRADE ⊕⊕⊕⊕ High), especially for resistance training (SMD: 0.62 [95% CI: 0.21 to 1.02]; p=0.003) and combined training (SMD: 0.99 [95% CI: 0.40 to 1.57]; p=0.0005). The PEDro scale for the studies in our review ranged from 3 to 8 (mean = 5.8 (1.6)), meaning fair methodological quality, and most studies were overall judged with at least low/some concerns in terms of risk of bias.

7 different forms of exercise and nutrition interventions can improve muscle strength, muscle mass, and physical function; in terms of improving muscle strength, resistance exercise has the most significant effect on improving grip strength (MD = 2.58, 95% confidence interval [CI] [1.06–4.07]); resistance exercise combined with nutrition lifting performed best in chair standing test (MD = −2.37, 95% CI [−4.73 to −0.33]). For muscle mass gains, resistance training increased appendicular skeletal muscle mass significantly (MD = 0.90, 95% CI [0.11–1.73]), while resistance exercise combined with nutrition significantly increased fat-free mass (MD = 5.15, 95% CI [0.91–9.43]). For physical activity, resistance training improved walk speed best (MD = 0.28, 95% CI [0.15–0.41]), and resistance exercise combined with nutrition in the best results were seen in the timed up and go test (MD = −2.31, 95% CI [−4.26 to −0.38]). Conclusion: Compared with aerobic exercise, mixed exercise, nutrition, resistance combined with nutrition, mixed exercise combined with nutrition, and electric stimulation combined with nutrition, resistance exercise has more advantages in improving muscle mass, strength, and physical function performance. The clinical treatment of sarcopenia

					with resistance exercise intervention has a better curative effect.	
sarcopenia	37400288	≥60	The expetal group had an additional exercise intervention only compared to the control group; the duration of the exercise intervention was ≥ 8 weeks, with at least 60 min of exercise per week	control group		Include: relevant group and results are measured on RT effect on function
sarcopenia	37417618	52 and over in intervention group, Younger in control (no one measuring RT is younger than 60, however)	7 different forms of exercise and nutrition interventions	control group		exclude: you can assess the effect of strength alone, but the control groups are not all over 60 years old

sarcopenia	10.1002/jcsm.13225 // 37057640	≥60: median age: 72.9 years, female: 73.3%	mixed exercise interventions, without further classification of the specific type of exercise	control group	outcomes that include mortality, quality of life, muscle strength and physical function measures. High or moderate certainty evidence suggested that resistance exercise with or without nutrition and the combination of resistance exercise with aerobic and balance training were the most effective interventions for improving quality of life compared to usual care (standardized mean difference from 0.68 to 1.11). Moderate certainty evidence showed that resistance and balance exercise plus nutrition (mean difference [MD]: 4.19 kg) was the most effective for improving handgrip strength (minimally important difference [MID]: 5 kg). Resistance and balance exercise with or without nutrition (MD: 0.16 m/s, moderate) were the most effective for improving physical function measured by usual gait speed (MID: 0.1 m/s). Moderate certainty evidence showed that resistance and balance exercise (MD: 1.85 s) was intermediately effective for improving physical function measured by timed up and go test (MID: 2.1 s). High certainty evidence showed that resistance and aerobic, or resistance and balance, or resistance and aerobic exercise plus nutrition (MD from 1.72 to 2.28 s) were intermediately effective for improving physical function measured by the five-repetition chair stand test (MID: 2.3 s)	Include: different forms of exercise and supplements are compared and RT's effect is included in the comparison.
osteoarthritis	37723233	65 ± 6.9 years; 70% female (pain) + 63 ± 7.0 years; 69% female (depression)	Only nonpharmacological interventions were included that involved either exercise, lifestyle education, therapeutic and/or multimodal approaches. These were categorized into groups as they emerged and refined during the screening process. The final groups were 'multimodal approaches', 'movement mediation' (including yoga, tai chi, and chi gong), 'resistance activity only', 'aerobic activity only', and 'therapeutic approaches only'. Studies were included if they had one or more active interventions and an inactive control group (e.g. treatment as usual).	inactive control group (e.g. treatment as usual)	Effect sizes were significant ($p<0.001$) for movement meditation (ES = 0.52; 95% CI [0.35, 0.69]), multimodal approaches (ES = 0.37; 95% CI [0.22, 0.51]), and psychological therapy (ES = 0.21; 95% CI [0.11, 0.31]), and significant ($p=0.046$) for resistance exercise (ES = 0.43, 95% CI [− 0.07, 0.94]. Aerobic exercise alone did not improve pain. significant effect on reducing depressive symptoms (ES = 0.29, 95% CI [0.08, 0.49], $p<0.001$). Effect sizes were significant for movement meditation (ES = 0.30; 95% CI [0.06, 0.55], $p=0.008$) and multimodal interventions (ES = 0.12; 95% CI [0.07, 0.18], $p<0.001$). Resistance/aerobic exercise or therapy alone did not improve depressive symptoms. Mind–body approaches were more effective than aerobic/resistance exercise or therapy alone for reducing pain and depression in people with osteoarthritis	exclude: age is too low
Intermittent Claudication	36880959	≥50	Interventions duration ranged from 6-24 wk and included aerobic exercise (treadmill walking, ergometer, and Nordic walking), resistance training (lower and/or upper body), a combination of both, and underwater exercise	control group	hile not statistically superior to aerobic walking, combined exercise seems to be the most promising training modality. Aerobic walking and underwater training also improved walking capacity for patients with symptomatic PAD.	exclude: age is too low

fall risk + physical function	34633637	≥60	eccentric strengthening or eccentric-biased strengthening intervention	control (no exercise intervention) or concentric exercise.	trials assessing at least one of the following- incidence of falls, Berg balance scale (BBS) measure, timed-up and go (TUG) score, maximal walking speed (MWS), stair climb test (SCT), minute walking distance (MWD), and chair stand time (CST). Rate of perceived exertion and incidence of muscle soreness were secondary outcomes of this review. We included studies that reported at least one of our primary outcomes. Studies were still included if they did not report the secondary outcomes. **conclusion**: The findings of our review suggest that eccentric-biased exercises exhibit significant improvements in balance, mobility, and endurance in healthy older adults. Furthermore, hardly any significant differences were observed, when the magnitude of these improvements was compared to those in response to concentric exercises in this population. However, the reduction in incidence of falls was greater in response to concentric exercise than to eccentric exercise. However, data on the falls' incidence were limited and reported only in one study. (...) **Results**: eccentric exercises were as effective as conventional resistance exercises in improving the selected outcomes by most studies. Additionally, when pre-exercise and post-eccentric exercise functional performance measures were compared, there was a statistically significant improvement in nearly all measures. The quality of trials was mixed (one high, four moderate, two low–moderate, and three low risk of bias).	Include: a different but effective approach to strength training	
frail elderly, nursing home/home residents	34289511	≥65	resistance bands exercise	control group	Resistance band exercise might be considered a viable strategy for frail older adults in the community or in long-term care facilities.	Include: Measures relevant factors such as hand strength, dexterity, etc.	**2022**
sarcopenia	35186999	≥60	compared any category of exercise intervention with a control group of older patients	control group	Positive effect, but which type of exercise has an effect cannot be assessed	Exclude: training types are not evaluated in subgroups	
healthy, community-living older adults	35544136	≥60	Power Training vs Traditional Strength Training on Physical Function: compared strength training with instructions to move the weight as fast as possible in the lifting phase with traditional strength training in healthy, community-living older adults (age ≥60 years).. PT vs traditional strength training is associated with physical function improvement in older adults	Power Training vs Traditional Strength Training	Primary outcomes included physical function and self-reported physical function. Secondary outcomes included power, strength, muscle mass, walk speed, balance, and adverse effects.	include: two types of RT are compared	
sarcopenia	https://doi.org/10.6890/IJGE.202207_16(3).0011	64.0–73.4	the effectiveness of elastic band resistance exercises in improving the physical performance of individuals with sarcopenia	control group	**conclusion**: EBT is an ideal and safe instrumented resistant exercise to enhance the physical performance and muscle mass of older adults with sarcopenia. Future large-scale and well-controlled studies are warranted to further elucidate the effect of EBT on the muscle mass and physical function and to compare EBT with other single or combination treatment options for older adults with sarcopenia. **resultats**: After 12 weeks of training, significant improvements were observed in the timed up and go test result, maximal grip strength, gait speed, and	include: relevant approach to RT	

					appendicular skeletal muscle index in the elastic band training group compared with the control group (95% CI, –2.93 to –1.41, 1.14 to 5.27, –0.06 to –0.02, and 0.03 to 0.26, respectively). However, no significant differences were observed in performance in the 6-minute-walk test (95% CI, –11.00 to 27.00). Elastic band resistance training may benefit older adults with sarcopenia. Further randomized controlled studies with larger samples and longer follow-up periods are warranted to strengthen the clinical evidence regarding the effectiveness of elastic band training for sarcopenia	
with or susceptible to sarcopenia	36045750	>55	**blood flow restriction training** - BFR was the sole intervention difference between the groups	active control groups	Results: No studies of BFR training in individuals with sarcopenia were found and no study included individuals with FP values below the EWGSOP criteria. However, four studies of BFR training in older adults in which FP was examined were found. BFR training significantly improved the timed up and go (MD = −0.46, z = 2.43, p = 0.02), 30-s chair stand (MD = 2.78, z = 3.72, p < 0.001), and knee extension strength (standardized MD = 0.5, z = 2.3, p = 0.02) in older adults.	exclude: no clear age division
healthy	35953775	mean > 65	**power training** compared to strength training	power training compared to s**trength training**	outcome measures for muscle power, activity based tests, or a measure for physical functioning in daily life. These measurements had to be performed in a laboratory or clinical setting. We divided these tests in two categories, 'generic tests' and test with an emphasis on the speed of execution ('speed tests'); **Results**: Fifteen trials and 583 participants were included in the meta-analysis. Results indicated a statistically significant benefit of power training on all reported outcomes (muscle power SMD: 0.99, 95% CI: 0.54 to 1.44, p < 0.001; generic activity-based tests SMD: 0.37, 95% CI 0.06 to 0.68; p = 0.02, activity-based tests emphasizing movement speed SMD: 0.43, 95% CI 0.23 to 0.62, p < 0.001). None of the included studies used physical activity level in daily life as outcome.	exclude: It cannot be excluded that there are participants younger than 60, as age is stated in mean age - two types of RT are compared
elderly living at home	doi.org/10.1186/s13102-022-00526-x	≥60 community-dwelling older adults aged≥60 years	Concentric muscle action. Participants must have been instructed to move "as fast as possible" during the concentric phase, or instructions of a similar description	Comparison between RT performed whilst being encouraged to concentrically move as fast as possible (MIRT) vs. slow-to-moderate velocity (T-STR). Studies that reported pre- and post-intervention scores for changes in SPPB score.	Primary outcome measure was SPPB score, or any individual test derived from the SPPB tests (30-s chair stand (STS), timed-up-and-go (TUG), or balance testing). Secondary outcomes were dynamic leg press 1RM and knee-extension 1RM, 400-m (400 m) walk, 6-min walk test	include: RT effect on functional outcomes
sarcopenic obesity	36091394	58.4-88.4	the effects of three modes of physical activity (PA) (aerobic training [AT], resistance training [RT], and aerobic combined with resistance	Compared with a no-PA control group	Conclusion: PA is an effective treatment to improve body composition, muscle mass, muscle strength, physical performance, and IGF-1 in older people with SO.	exclude: no clear age division

			training [MT]) on body composition (body weight [BW], body mass index [BMI] and percentage of body fat [BF%]), muscle mass (skeletal muscle mass [SM], appendicular skeletal muscle mass [ASM] and appendicular skeletal muscle mass index [ASMI]), muscle strength (handgrip strength [HG] and knee extension strength [KES]), physical performance (gait speed [GS]) and hematological parameters (inflammatory markers, insulin-like growth factor 1 [IGF-1] and lipid profiles) in older people with sarcopenic obesity (SO).			
healthy and ill	35498525	>55	Resistance exercise interventions focusing on (or emphasizing) eccentric contraction. This includes flywheel training and functional tasks such as loaded stair descent. Duration of the intervention > 4 weeks.	Resistance exercise interventions, performed in a traditional manner or emphasizing concentric contraction.	Outcomes describing muscle performance (muscle strength or power), body composition outcomes (e.g., lean mass, muscle thickness, body fat mass) and functional performance tests (e.g., 6-min walking test, sit-stand tests, stair walking, etc.). **koklusion**: ECC exercise is superior to, or at least as good as CON exercise for preserving health and overall function in older adults	exclude: no clear age division
at risk for sarcopenia	38314044	≥60	Comparison of **blood flow restriction** training and conventional resistance training	the experimental group completed an LL-BFR intervention while the control group did a conventional HL-RT or LL-RT intervention	the outcome metrics included muscle strength and muscle mass, and the indicator data were expressed as mean ± standard deviation (M ± SD) (...) the data suggest the possibility that BFR training improves age-related sarcopenia.	Include: two types of RT are compared
circulation, healthy elderly	35737600	≥60, healthy	identify the role of RET for improving CRF in healthy older adult - identify improvements in established CRF parameters (VO2 peak, aerobic threshold (AT), 6-minute walking distance test (6MWT) following RET intervention. **The intervention** was defined as strength or resistance-based exercise training involving multiple training sessions. Studies were excluded if the intervention provided combined exercise training (involving both aerobic and RET), or if assessment was conducted after a single training session (i.e. no training program was delivered). Studies with exercise programs longer than 24 weeks were included in separate sub-analysis to improve homogeneity between short-term and long-term studies.	A control group was defined as a group performing no exercise or a sham exercise intervention.	In conclusion, this systematic review demonstrates that short-term RET improves CRF in healthy older adults, based on evidence using multiple measures of this health-related parameter. This finding, combined with the already established evidence base that RET improves muscle mass and function [24], suggests that RET should be an integral aspect of exercise promotion for an ageing population. Further, that 'lack of time' is a commonly cited barrier to exercise in older adults [76] and that older adults commonly face time-limited clinical pathways where improvements in physiological resilience have been shown to be beneficial (i.e. surgical prehabilitation [77]), RET may be able to elicit benefit in two key components of whole body health (i.e. muscle and CRF) in older adults.	include: RT (RET) is measured on functional parameters and circulation
strenght: Lower limbs muscles	35508279	≥ 50	**blood flow restriction** combined with low-intensity training on the lower limbs muscle strength and function. **Intervention Method**: (i) The study design allows comparisons between LI training with and without simultaneous BFR. (ii) If multiple flow restriction training groups or control groups are reported in the same literature,	control group	BFR-LI can significantly improve the lower limbs muscle strength and function of older adults, in combined with low-intensity (LI) RT, WT and FT. BFR-RT and BFR-WT contribute to greater strength gain than those without BFR, but the effect of BFR-RT is weaker than that of regular high-intensity (HI) RT. Furthermore, training duration may be an important regulator variable for the positive effect of BFR-RT on muscle strength. Our results suggest that the strength gain achieved by BFR-RT is close to that contributed by HI-RT when training is longer than 10 weeks and	exclude: age is too low

			they are analyzed separately [HI (≥70% 1RM) or LI (<50% 1RM) training or Daily exercise].		BFR-RT is significantly superior to LI-RT when training lasts for 16 weeks.	
osteosarcopenic obesity	35654981	≥60 - People with OSO (participants were required to have a combination of osteopenia, sarcopenia, and obesity and to have no other diseases, such as fractures, heart failure, and diabetes). Participants were required to be elderly (age≥60), but there were no restrictions for sex or environment (such as hospitals, communities, or nursing homes).	Investigate effects of resistance training on body composition and physical function in elderly osteosarcopenic obesity (OSO) patients.	Control group or placebo	Twelve weeks of resistance training improved bone mineral density (BMD, mean difference (MD) = 0.01 g/cm2, 95% confidence interval (CI): 0.001, 0.02, P = 0.03, I2 = 0%), skeletal muscle mass (SMM, MD = 1.19 kg, 95% CI: 0.50, 1.89, P = 0.0007, I2 = 0%), Z score, timed chair rise test (TCR), and body fat percentage (BFP, MD = - 1.61%, 95% CI: - 2.94, - 0.28, P = 0.02, I2 = 50%) but did not significantly affect skeletal muscle mass index (SMI, MD = 0.20 kg/m2, 95% CI: - 0.25, 0.64, P = 0.38, I2 = 0%) or gait speed (GS). **Conclusions**: Resistance training is a safe and effective intervention that can improve many parameters, including BFP, SMM, and Z score, among OSO patients and is a good option for elderly individuals to improve their physical fitness. **Outcomes (O):** Primary outcomes: body composition (e.g., body fat percentage (BFP), skeletal muscle mass index (SMI), bone mineral density (BMD)); secondary outcomes: physical function (e.g., hand grip strength (HGS), gait speed (GS)) and OSO Z score. Among them, BFP, SMI, and BMD were calculated using data obtained from the dual-energy X-ray absorptiometry (DXA). The HGS of the subject’ s dominant hand was measured using a standard hydraulic hand dynamometer. A 10-m walk test (10 MWT) was measured to obtain the GS of the participants.	Include: Effects of resistance training on body composition and physical function
termination of RT effect	36360927	≥65	resistance training followed by a period of training cessation (detraining)	pre-intervention, post-intervention, and post-detraining data	muscle size evaluated using ultrasound, magnetic resonance imaging, computed tomography, or muscle biopsies. **conclusion**: explored the effects of resistance training and detraining on muscle hypertrophy in older adults. While resistance training increased muscle size in older adults, training cessation was associated with a decrease in muscle size. However, the decrease in muscle size might be related to detraining duration, with greater muscle loss occurring during longer duration detraining periods. From a practical perspective, these results are of importance for older adults who might be unable to participate in resistance training at specific periods due to various reasons (e.g., travel, loss of motivation).	Exclude: looks at muscle size, not strength. However, shows effect if initiative is not sustained (decay)
Independent Older Adults	35564788	≥ 65 years old, from both sexes, without any clinical condition and physically independent	High-Speed Resistance Training on Health Outcomes - focusing on velocity-based training and health outcomes - at least one of the protocols under study was an HSRT program with maximal concentric velocity (i.e., as fast as possible, ≤1 s) lasting 2 weeks or longer	control group - Compared the EG with the CG at post-intervention	The main results showed that HSRT interventions would improve health measures, mostly cognitive function (large effects, p = 0.001, SMD = 0.94), neuromuscular function (moderate effects, p = 0.003, SMD = 0.70), and physical function (moderate effects, p = 0.04, SMD = 0.55 and p = 0.009, SMD = −0.59). P**hysical function** was analyzed in seven studies [54,57,58,61,63,66,67]. Four studies	Include: looking at physical outcomes, among other things

					showed improvements in physical function in only the EG between pre- and post-training [58,61,63,67]. Outcomes of muscle strength, such as grip strength, were assessed in six studies [56,57,61,64,66,67]; three out of seven studies [61,64,67] reported differences between CG and EG at post-training in these outcomes ($p < 0.05$). Lastly, outcomes of muscle power were described in four studies [54,55,59,65]; of these four studies, two [59,65] demonstrated significant differences between CG and EG at post-training in peak power outcomes at different %RM (40 to 90% 1 RM) ($p < 0.05$).	
strenght + BMD	35608815	mean ≥65 (65–77)	the effect of progressive resistance training only or resistance plus weight-bearing/impact-loading training of≥4 weeks duration against a non-training prescribed control group; (iii) changes in BMD for hip, lumbar spine and/or femur (no limitations on assessment method); and (iv) changes in muscle strength of the lower limbs assessed via leg press/knee extension 1RM or isometric/isokinetic knee extension strength	non-training prescribed control group	The certainty for improvement was greater for muscle strength compared with BMD, evidenced by less heterogeneity (I2 = 78.1% vs 98.6%) and a higher overall quality of evidence. No training characteristic significantly affected both outcomes ($p > 0.05$), although concomitant increases in strength and BMD were favored by higher training frequencies, increases in strength were favored by resistance only and higher volumes, and increases in BMD were favored by combined resistance plus weight-bearing exercises, lower volumes, and higher loads.	Include: two types of RT are compared
sarcopenia	35318104	mean ≥ 80 - regardless of their health status. Study populations with hospitalised older people were excluded. The selected studies provided interventions for older people living in retirement homes as well as community-dwelling older adults.	Progressive machine-based resistance training. To ensure high-intensity progressive strength training and a high comparability of the interventions, only studies which contained strength training interventions performed on weight machines for at least 3 months (12 weeks) were included in this review. Studies combining resistance training with other non-physical interventions, e.g. cognitive training or in conjunction with a multimodal training intervention (with additional endurance, coordination, and flexibility training)	control group: non-physical interventions	**Highlights** •Muscle strength and physical performance can be improved even in the very old. •Evidence of muscle mass improvement due to machine-based resistance training is rare. •Sarcopenic status of physical performance improved throughout the interventions. **Conclusion** This systematic review indicated that progressive machine-based resistance training was an efficacious training method to enhance muscle strength, muscle quantity and physical performance in the oldest old. Although the data for muscle quantity were still insufficient for further meta-analysis. The results of the meta-analysis revealed that the primary outcome measures which identify sarcopenia based on the EWGSOP improved significantly in terms of CST but not in terms of GS. As a secondary outcome of the meta-analysis, the physical performance tests TUG, gait speed test, SPPB and 6MWT also showed significant improvements. Thus, leg strength, gait balance, risk of falling and endurance may be specifically addressed through machine-based progressive resistance training in this age group. Further analysis revealed that progressive resistance training interventions have the potential to shift sarcopenic into non-sarcopenic group mean values (threshold of the EWGSOP) especially for leg strength (CST) and physical performance (TUG). The evidence comprised studies with high risk of bias, heterogeneity of measurement methods, and small	exclude: mean age is over 80, but again clearly sees lower grass. if it should be included: assesses effect of best type RT

					sample sizes. More research is needed to address muscle quantity and upper-body strength in training and testing among the oldest old.	
sarcopenia	35805870	≥60	different exercise types were used, including resistance training, aerobic exercise (e.g., Taichi, Qigong and Yi Jin Jing exercise), and combined exercise	control group	primary outcomes include muscle function and physical performance indicators. Exercise can effectively improve muscle function and physical performance in older adults with sarcopenia, but has limited effects on the muscle mass of the upper extremities. In addition, it is highly recommended to apply group-based and supervised resistance training and multicomponent exercise to prevent sarcopenia among the older population.	include: RT is assessed with effect on several relevant parameters
					Physical capacity decreases with age and the decline is steeper in sedentary adults with sarcopenic obesity. Physical exercise, and progressive resistance training in particular, is the most used training modality in adults aged 60-80 years. Of note, none of the previous trials explored differences in exercise prescription by classifying participants in subgroups based on age-level. This is a key aspect to develop in the future.	
osteosarcopenic obesity	35966077	≥60 years with a detailed diagnosis of sarcopenic obesity, ability to undertake bipedal locomotion	All exercise interventions included		Outcomes show that physical performance is improved or at least maintained as assessed with SPPB, PPT, Gait Speed, TCR, Chair Stand, and SLS tests. Nonetheless, whether better results can be achieved with other types of training remains to be elucidated. It follows then that other types of functional tests for evaluating muscle function (i.e., muscle mechanical power) should be applied.	include: RT effect on functional outcomes
Alzheimer's	36281664	50–90 - patients diagnosed with AD in any of its stages.50–90	any type of (Physical Exercise) PE-based intervention in any of its multiple modalities.	control group	physical-functional capacity, cognitive performance, neuropsychiatric symptoms, and quality of life.	exclude: age is too low

Rehabilitation, Sarcopenia	36497565	60–91	interventions: resistance training	control group	outcome measures included at least one of the following factors: grip strength, gait speed, and skeletal muscle index	Include: divides over and under 70 years, so can be assessed based on multiple older groups + assesses effect of RT	
Women with Osteoporosis	36361073	>50	Multicomponent Exercise Training. The studies combined two to four different exercise types, including strength, aerobic, balance, flexibility, and/or functional fitness training. The practice of multicomponent training with an average of 27.2 weeks, 2.6 sessions per week, and 45 min per session showed improvements in strength, flexibility, quality of life, bone mineral density, balance, and functional fitness and reduced the risk of falls in older women with osteoporosis.	control group	Multicomponent training was shown to be effective in improving health-related variables in older women with osteoporosis.	exclude: for young people and do not investigate on RT alone	
Knee osteoarthritis	34549541	49,9-69,1	Efficacy and Safety of Blood Flow Restriction Training in Patients With Knee Osteoarthritis	control group: RT	Conclusion: Data from pooled studies showed that BFRT may not have greater efficacy for treating patients with knee OA, and it is less likely to have a higher risk of adverse events. However, limited evidence supports the idea that BFRT is likely safer than HLRT. More evidence with high quality is needed in further research on efficacy and safety.	Exclude: age is too low	
healthy, Community-dwelling	33632117	mean 65 years or older, community-dwelling 72.4 ± 4.3	Multimodal exercise training intervention that included aspects of training with at least two different domains (strength, balance, endurance) and an agility-related component (coordination or change of direction and velocity). Exercise intervention lasting for at least 6 weeks with a minimum of two weekly training sessions. Exercise training in a supervised group setting.	One or more control group(s), receiving no intervention (= inactive control group, IC) and/or receiving an alternative exercise-based training program (= active control group, AC)	Outcome measures that included at least one of the following domains: strength, gait, mobility, balance, endurance, cognition - Trials comprised the following study arms: MAT (n = 655), IC (n = 570), computer-training group (n = 92), fitness intervention (n = 108), strength training (n = 104), balance training (n = 37), coordination training (n = 20), strength and balance training (n = 19) and strength and endurance training (n = 16)	Exclude: the focus is on multimodal agility-like exercise training (combination training and does not look at the effect of RT alone.	**2021**
Gait & Balance	33670281	median age of 60+ (Three studies reported mean ages of ≥65–69.9 years [27,28,33], 6 studies reported mean ages between 70–79.9 years [24,25,26,29,31,32], two studies reported mean ages between 80–89.9 years [30,34], and one study reporting a mean age of >90 years [35].) - Nine of the twelve studies recruited participants that were community-dwelling [24,25,26,27,28,31,32,33,34],	Resistance training interventions that measured at least one variable relating to gait and/or balance	intervention group	**Conclusions**: This work aimed to review the general impact that an RT program has on key measures relating to gait and balance in older adults. With the studies included in this review, RT has a positive influence on both gait and balance in an aging population. RT enhances gait parameters, but specifically straight-line walking speed, in older adults. It appears that the improvement can be highly attributed to the significant improvements in lower body strength. Nonetheless, it appears that RT is an adequate and safe method to improve balance and gait parameters in people over 65 years of age.	exclude: It cannot be ruled out that there are participants younger than 60, as age is stated in mean age. Should it be included: RT effect on gait and balance in the elderly. Useful in relation to outcome, however not certain with controls	

		whereas three studies recruited participants from residential care facilities [29,30,35].				
Sarcopenic	34095166	67.6–86 - over 65 years were diagnosed as sarcopenia	Effects and Moderators of Exercise on Sarcopenic Components in Sarcopenic Elderly: Exercise (e.g., aerobic exercise, resistance training, whole-body variation, or a combination of strength and aerobic exercise program) was used in the intervention group.	No exercise intervention (e.g., usual care or waitlist) was given in the control group	The outcomes were muscle strength, body composition (skeletal muscle mass index, appendicular muscle mass, lean mass, body fat, and fat-free mass), and physical performance (gait speed and timed up and go test).**conclusion**: These meta-analysis results suggest that exercise interventions have positive effects on muscle strength, physical performance, and skeletal muscle mass for sarcopenic elderly, but no effect is found in body composition (e.g., fat mass, lean mass, and fat-free mass).	Exclude: RT effect is not assessed alone
Fald (otago)	34358276	>65 years without any neurological diseases	Intervention: the intervention must comprise the original OEP with either an individual or group format	Comparison: the comparison group must be alternative active treatment methods or no treatment	Outcome: the reported outcomes must include actual and perceived balance-related parameters. **Results**: Resistance [68] or balance training [69] or a combination of both [70] have been shown to improve balance confidence and fall self-efficacy. In line with the findings of previous studies, the results of our meta-analysis indicated that the OEP, with its resistance and balance training, can reduce the fear of falling and enhance balance confidence. Interventions to overcome the fear of falling and build balance confidence are crucial because fall-related psychological factors can lead to various adverse health outcomes	Exclude: Otago includes resistance training and is measured on falls and fear of falls. However, it is not clear how they use weights/counterweights and the effect is not measured per se
falls	34886293	60–95 (I: >50)	Physical activity at baseline levels is the same in both groups, and the duration of the intervention is greater than or equal to 4 weeks.	control group	Fall risk index, fall risk score. According to the different types of exercise interventions, we divided them into three subgroups: integrated training (resistance training, core training, and balance training), physical training and fitness training (Pilates, Ba Duan Jin, and Tai Chi). The subgroup analysis results showed that the within-group heterogeneity was high for integrated training (I2 = 95%) and physical training (I2 = 85%), and it was low for fitness training (I2 = 31%), indicating that all kinds of exercise interventions were effective in reducing the fall risk in older adults. **Conclusions**: The exercise intervention is effective in reducing the fall risk in older adults. Integrated training (resistance training, core training, and balance training) with a duration of over 32 weeks and a frequency of more than five times a week is more effective in reducing the fall risk in older adults. It is a long-term and continuous method to reduce the risk of falls of the elderly through exercise.	Exclude: RT is measured as one part of a subgroup consisting of resistance training, core training, and balance training and therefore cannot be assessed alone.

falls	34969039	>60 community or NH setting, patients with a history of falls or cognitive impairment		control group	Balance exercise training increased balance at 6 and 12-month intervals involving balance, strength, and cognitive training.	Exclude: Rt is not measured alone
falls + balance	35115917	65.3–80.9: mean age of 65 years or above	intervention and comparison: at least two distinct exercise interventions or one exercise intervention with a no-exercise controlled intervention (NE) compared in each trial	intervention and comparison: at least two distinct exercise interventions or one exercise intervention with a no-exercise controlled intervention (NE) compared in each trial	outcome: at least one measure of reactive balance. **In conclusion**, our NMA indicates that SBR, which simulates a real-life fall scenario and induces a specific balance recovery, is generally more efficacious in improving reactive balance than any other exercise intervention in older adults. Importantly, power training also appears to have greater impacts on reactive balance than other exercise interventions. Our results highlight the importance of task-specific exercise interventions with respect to the targeted postural perturbation and reactions. **Power training**: By utilizing the comparability between muscle power and reactive balance, such as forceful and controlled movements with high velocity, all power training groups in the current analysis demonstrated improvements in measures of reactive balance. There are a handful of studies investigating the correlations between muscle power and reactive balance performances (Muehlbauer et al., 2015); however, the effectiveness of power training on reactive balance has been explored only in a few, recent trials (Pamukoff et al., 2014; Inacio et al., 2018; Cherup et al., 2019). The results of this study may have implications for future directions in assessing the relationship between muscle power and reactive balance.	Include: power training combines strength and speed and shows power

Physical Performance	35058805	60-94	The purpose of this study is to examine the effects of combined aerobic exercise on physical performance among the elderly, as opposed to single aerobic exercise	control group	Studies have shown that aerobics combined resistance/strength training (CEX), multi-component training (ME), and dance combined training has positive and significant effects on the physical performance (upper body strength and lower body strength, dynamic balance, fall risk, mobility, gait, agility, flexibility) of the elderly. CEX had additional benefits compared to aerobic training (AER) and resistance/strength training (RES) in gait speed, lower limb strength, and trunk fat. Furthermore, CEX was more effective than AER in improving sitting and stretching, elbow flexion, knee flexion, shoulder flexion and stretching, strength and body fat, function reach test, 30-s chair standing test and 6-min walking test, self-evaluation of body function. Therefore, the combination of multiple components contributes to the overall improvement in physical fitness of the elderly, thus preventing them from losing balance and reducing susceptibility to injury. **Conclusion** There is strong evidence to prove that aerobic combined training has a more comprehensive and practical effect on the physical performance of the elderly than AER alone. However, evidence for the effect of most combination exercises on the physical performance of the elderly is still lacking. ACSM's Exercise for Older Adults point out: Elderly should combine multiple sports with exercising their physical strength, endurance, flexibility, and balance (Chodzko-Zajko, 2014). However, most of the research in this review involves a combination of strength/resistance and aerobic exercise. National Institute on Aging (NCOAging, 2021) has shown that diversified exercises help reduce the elderly's boredom and the risk of injury and at the same time improve their balance and flexibility which were essential to protect the stability of the elderly and prevent falls but commonly neglected in the exercise program carried out by the elderly (U.S. Department of Health and Human Services, 2021). Therefore, there should be a combination of multiple components, more than two or all. It will promote the overall improvement of the physical fitness of the elderly and prevent the body from losing balance and injury due to the improvement of part of the physical fitness (Cissik, 2019).	Include: different forms of training are evaluated together with aerobic training, but Rt can be used based on comparison with others. see section: Aerobic and Strength/Resistance Training on Physical Performance

falls, community-dwelling	34388281	≥65, community-dwelling	This study aimed to identify physical exercise interventions for fall prevention and to determine the best practice for implementing them in local community-dwelling older adults.		**Conclusions:** Exercise has been proven to be highly effective in reducing falls among elderly home residents. Structured exercise programs reduce social isolation, retard psycho-physical decline, and improve self-efficacy and quality of life. The cost incurred by the implementation of operational programs is compensated by the reduction of costs related to falls and their outcomes. To propose programs tailored to individuals' needs, it is important to evaluate their risk of falling. Such assessments must be performed by trained professionals according to their clinical judgment and, if deemed appropriate, with the help of validated tools. The involvement of families and caregivers positively correlates with long-term adherence. The recruitment of trained voluntary staff is necessary for reducing costs and ensuring the participation of people at a medium-low risk of falling. Family and community nurses, where available and with the support of physiotherapists and experts in motor sciences, seem to be adequate for the implementation of interventions for high risk people at home, where they can also offer counseling for the reduction of other modifiable risk factors, such as changes in the home environment.	exclude: It has a section with "3.3 Best type of physical exercise for reducing falls", but does not clearly assess the effect of RT alone
chronic obstructive pulmonary disease (COPD)	**http://dx.doi.org/10.1002/14651858.CD013569.pub2**	≥18 (52-88) - The average age of the participants was 67.3 years	**(supervised physical training, often focusing on endurance and strength, but not necessarily pure strength training) All participants in the intervention group underwent a supervised maintenance programme at the centre, home-based, or in the community, but with considerable variation in the frequency of supervision, from weekly until every three months.**	**All control groups received the usual care standards.**	**The primary outcomes studied** were HRQoL, exercise capacity, and hospitalisation, which are of the greatest interest or concern for people with COPD, practitioners, and researchers. The secondary outcomes were exacerbation, mortality, costs of care, and adverse events, which are also important outcomes of concern for people involved in providing rehabilitation, as well as funding organisations and policymakers. **Conclusion:** Evidence from our systematic review suggests that maintenance programmes that include physical exercise (aerobic or resistance training or both) may improve health-related quality of life (HRQoL) at six to 12 months of people with chronic obstructive pulmonary disease (COPD) following pulmonary rehabilitation. (...) For some people with COPD, it might be reasonable to refer to maintenance for its effect on HRQoL and exercise capacity, but it is likely that some patients may experience no noticeable benefits. It is uncertain whether there would be benefits to the health system, such as reduced costs related to hospitalisation and also the commissioning of maintenance programmes after pulmonary rehabilitation.	**Exclude: age is too low**

healthy: functionality	DOI:10.1590/1980-0037.2020v22e6070	healthy older adults 60 years or over residing in the community or in asylum institutions	The training performed should be only of strength or strength combined with other exercise modalities (multicomponent), with a total duration of at least 8 weeks and a weekly frequency of at least two sessions supervised by professionals.	studies that did not have a control group which did not perform any type of exercise were not included	Regarding the outcomes, articles that evaluated one or more of the following tests were included: TUG, BBS and 30-second sit-to-stand test (30STS) or ve repetitions (5STS). - It was verified improvement in all the investigated outcomes when performing multicomponent training in comparison to control groups. Strength training, compared to control groups, showed benefit only for sit to stand test. Studies comparing the two trainings found no difference between them. (...) In conclusion, both types of training were effective to improve functionality and are good strategies of training for older individuals. However, as the comparison between the two types of training was performed in few studies, it is not possible to infer which is more effective for the functionality, suggesting the realization of new clinical trials.	Include: RT is compared with multicomponent training, both are assessed based on the effect on training form vs. control group	**2020: 5 inkluderede/ 9**
sarcopenia	DOI: 10.1016/j.physio.2019.08.005	>60 (inclusion: adults (>18 years) diagnosed with sarcopenia)	exercise interventions included: resistance; mixed and whole body vibration training programmes. **Exercise Interventions:** Exercise interventions used within the reviews are summarised in Table 2. Mixed training, combining resistance exercise with aerobic, balance and gait training, was the most common type of exercise used in five out of the seven trials (23, 24). The other two trials used resistance training (28) and whole body vibration (22). Only one study used a home based unsupervised exercise intervention (29), with five of the other interventions delivered in supervised groups (22-24, 28, 30) and one intervention incorporating supervised groups and unsupervised home exercise programme (25) .	Comparator groups within trials eligible for inclusion included: standard care; comparison of one active treatment versus another or comparisons of different doses, intensities or timing of the same intervention. **Comparator interventions**: Four of the studies compared exercise alone to nutrition, nutrition + exercise and general health education/relaxation (23-25, 30). The nutritional supplements included tea catechins (23), amino acid supplementation (24), a combination of tea catechin and amino acid supplementation (30) and protein supplementation (25). Global sensorimotor training, vibratory mechanical-acoustic focal therapy and no training were compared in the fifth study (28). The final two studies comparator groups were advised to maintain usual levels of physical activity (29) or received	Review findings demonstrate limited low quality evidence of positive effects of mixed and resistance training in treating sarcopenia	exclude: umbrella review. may include: RT in an umbrella review. However, there are no promising results.	

				no training (22). .		
falls, community-dwelling	32695605	>60	investigating the effect of exercise interventions - physical exercises as intervention were included	control group	3) outcome measures of fall reported 4) outcome measures of fracture reported **conclusion**: In conclusion, our results show that physical exercise can prevent falls and fall related fractures in elderlies. There are two important components for fall prevention which are balance and strength training and should be involved in fall prevention programs. Future incorporation of resistance exercises and balance-jump exercises into Fracture Liaison Services should be performed. Currently, the exact mechanisms as to why the effectiveness of exercise interventions on fracture prevention have more significant effect on women is still unclear.	include: RT is measured with effect on fall

Sarcopenia	32765951	60.51-85.90	The exercise programs included resistance exercise, home-based exercise, aerobic exercises, power training, whole-body vibration training and combination training. The duration of the interventions ranged from 6 to 36 weeks, and the exercise sessions consisted of 30 to 80 min training. (with 1 to 5 training sessions weekly)	control group	resistance exercise is aimed at improving neuromuscular adaptations with increased muscle strength. In addition, weight training serves as an alternative to resistance training and aerobic training, it is good for balance performance and muscular coordination. - Muscle strength (grip strength [SMD 0.57, 95 % CI 0.42 to 0.73, P <0.00001] and timed five chair stands [SMD -0.56, 95 % CI -0.85 to -0.28, P < 0.0001]) and physical performance (gait speed [SMD 0.44, 95 % CI 0.26 to 0.61, P < 0.00001] and the timed up and go test [SMD -0.97, 95 % CI -1.22 to -0.72, P < 0.00001]) showed significant improvement following exercise treatment, while no differences in muscle mass (ASM [SMD 0.15, 95 % CI -0.05 to 0.36, P = 0.15] and ASM/height2 [SMD 0.21, 95 % CI -0.05 to 0.48, P = 0.12]) were detected. Exercise programs showed overall significant positive effects on muscle strength and physical performance but not on muscle mass in sarcopenic older adults.	Include: RT is measured on functional outcomes for sarcopenia
balance	33203156	Population (P): The population of interest included all age groups and both genders. Therefore, children and adolescents (≤18 years of age), adults (18–65 years of age), and older adults (≥65 years of age) were considered.	Intervention (I): Studies were included if at least one experimental group performed an intervention consisting of RE. We imposed no limits regarding the RE type (e.g., maximal strength training, speed-power training, strength endurance training), regarding the type of the load used (e.g., elastic, free weight, machine, bodyweight). No exclusion criteria were determined for different RE intensity or volume,	Comparisons (C): The main inclusion criteria were an inclusion of a control group, that received no RE intervention. The exceptions (see also above) were possible when both experimental and control groups received an additional non-exercise intervention (e.g., if the experimental group included RE and nutritional supplement, a control group was only considered if only the supplement was used).	**Outcomes (O):** The studies were considered if the outcome measures included any type of functional balance/postural control test, or dynamic mobility test scores (including, but not limited to functional reach test, timed-up-and-go test, single-leg stance test, Y-balance test, star-excursion balance test, Romberg test). The mobility tests, such as the timed-up-and-go test were included because it was expected that such tests are commonly performed in the elderly populations, and although these tests are not stressing the balance ability, they were shown to be associated with the risk of falling in elderly and to reflect the balance ability in addition to mobility [37]. **Conclusions** This systematic review has shown that RE interventions may significantly improve balance ability in adult and older adult participants. This finding has important practical implications, as RE could be used to improve both muscular strength and power, as well as balance at the same time. Strength training, power training, and strength-endurance training targeting primarily lower limb musculature, with different types of load (bodyweight, elastic, free weight, and resistance machines) were shown to be effective. RE interventions designed for improvements in balance ability should be sufficiently long (4 weeks and more) and be conducted in accordance with general RE. Although multi-component exercise programs should still be prioritized when possible, performing RE alone could be a time-efficient compromise when trying to improve overall physical fitness.	Include: RT on balance, falls, strength, etc.

cardiovascular diseases: orthostatic hypotension, people w neurological condition	32773495	18-89: The review considered people aged 50 years and older, and people aged 18 years and elderly people with a neurological condition. elderly (≥50 years)	Non-pharmacological interventions to treat OH included compression garments, neuromuscular stimulation, physical counter-maneuvers, aerobic or resistance exercises, sleeping with head tilted up, increasing fluid and salt intake, and timing and size of meals.	The comparator was usual care, no intervention, pharmacological interventions, or other non-pharmacological interventions.	**Outcome** measures included systolic blood pressure, diastolic blood pressure, heart rate, cerebral blood flow, observed/perceived symptoms, duration of standing or sitting in minutes, tolerance of therapy, functional ability, and adverse events/effects. **Results**: Meta-analyses of three interventions (resistance exercise, electrical stimulation, and lower limb compression bandaging) showed no significant effect of these interventions. Results from individual studies indicated physical maneuvers such as leg crossing, leg muscle pumping/contractions, and bending forward improved orthostatic hypotension. Abdominal compression improved OH. Sleeping with head up in combination with pharmacological treatment was more effective than sleeping with head up alone. Eating smaller, more frequent meals was effective. Drinking 480 mL of water increased blood pressure. **Conclusions**: The review found mixed results for the effectiveness of non-pharmacological interventions to treat OH in people aged 50 years and older, and people with a neurological condition. There are several non-pharmacological interventions that may be effective in treating OH, but not all have resulted in clinically meaningful changes in outcome. Some may not be suitable for people with moderate to severe disability; therefore, it is important for clinicians to consider the patient's abilities and impairments when considering which non-pharmacological interventions to implement.	exclude: age is too low
arthritis of the hip	32741435	> 50	supervised progressive resistance training (a minimum intensity of 60% of 1 RM), two weekly supervised exercise sessions for six weeks)	compared with common treatment (without resistance training)	the primary outcome: patient-reported function at end of treatment; and secondary outcomes: hip-related pain, health-related quality of life, performance-based function at end of treatment and at 6-12 months for patient-reported function. The following outcomes measures were eligible: **Patient-reported function:** The Hip Disability and Osteoarthritis Outcome Score (HOOS) function scale, The Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) physical function scale and The Short Form Health Survey (SF36) physical function scale. **Patient-reported pain:** The HOOS pain scale, the WOMAC pain scale, visual analogue scale and the numerical rank scale. Patient-reported health-related quality of life: The HOOS quality of life scale, the SF36 mental scale and the EuroQoL 5 Dimensions (EQ-5D). **Performance-based function:** Sit-to-stand test, walking speed and stair test. The exclusion criteria were previous surgery of the affected hip and other types of hip arthritis among participants. Studies involving neuromuscular stimulation or blood-flow-restricted resistance training were excluded.	exclude: age is too low

falls, community-dwelling	33239019 (næsten ens med 31792067 (den ande er slettet som dublikat)	≥65	evaluating effects of any form of physical activity as a single intervention on falls in people aged 60+ years living in the community	control group	Results: This review included 116 studies, involving 25,160 participants; nine new studies since the 2019 Cochrane Review. Exercise reduces the rate of falls by 23% (pooled rate ratio (RaR) 0.77, 95% confidence interval (CI) 0.71 to 0.83, 64 studies, high certainty evidence). Subgroup analysis showed variation in effects of different types of exercise (p < 0.01). Rate of falls compared with control is reduced by 24% from balance and functional exercises (RaR 0.76, 95% CI 0.70 to 0.82, 39 studies, high certainty evidence), 28% from programs involving multiple types of exercise (commonly balance and functional exercises plus resistance exercises, RaR 0.72, 95% CI 0.56 to 0.93, 15 studies, moderate certainty evidence) and 23% from Tai Chi (RaR 0.77, 95% CI 0.61 to 0.97, 9 studies, moderate certainty evidence). The effects of programs that primarily involve resistance training, dance or walking remain uncertain. Interventions with a total weekly dose of 3+ h that included balance and functional exercises were particularly effective with a 42% reduction in rate of falls compared to control (Incidence Rate Ratio (IRR) 0.58, 95% CI 0.45 to 0.76). Subgroup analyses showed no evidence of a difference in the effect on falls on the basis of participant age over 75 years, risk of falls as a trial inclusion criterion, individual versus group exercise, or whether a health professional delivered the intervention.	Exclude: RT is not measured alone + They are uncertain of the effect: We are uncertain of the effect of resistance exercise (without balance and functional exercises)	
(PAD/intermittent claudication), pre-habilitation context (before surgery)	http://dx.doi.org/10.1002/14651858.CD013407.pub2	18 years and older, diagnosed with PAD Fontaine Classifications II, IIA, IIB, III, and IV, or Rutherford Class 2 to 6, diagnosed by a clinician using a combination of general and systemic examination and diagnostic tools (ankle brachial pressure index, toe pressure index, Doppler scan), who were undergoing lower limb surgery	prehabilitation interventions with an exercise component or in combination with a nutritional or psychological component (together or separately) compared to control (standard treatment).	control group	We found no RCTs conducted to determine the effects of prehabilitation on mortality or other postoperative outcomes when compared to usual care for patients with PAD. As a consequence, we were unable to provide any evidence to guide the treatment of patients with PAD undergoing surgery. To perform a randomised controlled trial of presurgery conditioning would be challenging but trials are warranted to provide solid evidence on this topic.	exclude: age is too low	
healthy and specific diseases and conditions	30387072	≥ 60 (mean age ranged from 58.4 to 79.4) both healthy subjects and patients with specific diseases and conditions were eligible.	evaluate the safety and efficacy of plyometric training in older adults. The plyometric training lasted from 4 weeks to 12 months. Compared plyometric training or multicomponent training with plyometric component in older adults	with either a control group or another exercising group	Muscular strength, bone health, body composition, postural stability, and jump and physical performance were the most often reported outcomes.	exclude: mean age is too low	**2019**

healthy		subjects were healthy older people (aged > 50 years)	he study design allowed comparisons between resistance training with and without vascular occlusion [HL (> 70% 1RM) or LL (< 50% 1RM) resistance training] or between walking with and without simultaneous BFR,	muscle mass and/or strength were assessed pre- and post-training.	Our results revealed that during both low-load training and walking, the addition of BFR elicits significantly greater improvements in muscular strength with pooled effect sizes (ES) of 2.16 (95% CI 1.61 to 2.70) and 3.09 (95% CI 2.04 to 4.14), respectively. Muscle mass was also increased when comparing walking with and without BFR [ES 1.82 (95% CI 1.32 to 2.32)]. In comparison with high-load training, LL-BFR promotes similar muscle hypertrophy [ES 0.21 (95% CI - 0.14 to 0.56)] but lower strength gains [ES - 0.42 (95% CI - 0.70 to - 0.14)].	include/ look at two types of RT
falls/balance+physical activity, healthy	31277132	≥65 (mean age of 75.1±4.4)	the intervention periods from 8 to 32 weeks. The articles investigated the effects of resistance and aerobic exercise, balance training, T-bow© and wobble board training, aerobic step and stability ball training, adapted physical activity and Wii Fit training on balance outcomes. Balance measures of the studies showed improvements between 16% and 42% compared to baseline assessments.	control group	**3.1. Resistance and aerobic exercise** Two of the retrieved records used resistance exercise as a form of exercise to increase balance in the elderly.[29,30] The study of Ansai et al[29] used a randomized, 3-arm controlled trial, in which a group of elderly performed a multicomponent exercise intervention which comprised a combination of aerobic and resistance exercise, another group performed a resistance exercise protocol and a control group which received no-intervention. The resistance exercise group carried out 3 sets of 10 to 12 maximal repetitions at moderate speed with a 1 minute rest between each set, with exercises for both upper and lower limbs. The aerobic component in the combined group consisted in 13 minutes on a cycle ergometer at an intensity of 60% to 85% of reserve heart rate (the protocol consisted of intensity increases and decreases every 3 minutes), adjusted for age and gender. The balance measure taken into account was the one leg stance, measured in seconds. The results indicated that after a 16 week intervention period both the multicomponent (pre 7.1±8.6s, post 11.1±11.7s) and resistance exercise intervention (pre 6.0±6.7s, post 6.7±7.4s) increased the balance measures compared to the control group which instead showed a decrease (pre 5.1±6.5s, post 5.5±5.9s). Also, the number of reported falls measured by the authors decreased after the intervention period (Multicomponent pre 10, post 2, Resistance exercise pre 7, post 1, control pre 8, post 5). It has to be noted that the multicomponent exercise intervention showed greater results compared to the resistance exercise protocol alone. Similar research design has been carried out by Sousa et al,[30] where aerobic exercise alone has been compared to a combined aerobic and resistance exercise protocol to a control group in order to improve risk factors for fall preventions in the elderly. The combined exercise comprised an aerobic session once a week and a resistance exercise session once a week. The resistance training comprised 3 sets of 10 to 12 repetitions using a pyramidal method with increasing intensity from the first to the eighth training week. As in the study of Ansai et al, the exercises targeted both the upper and lower limbs. The aerobic component was composed of a 30 min brisk walking protocol. The time up and go test was used to assess balance	include: effect of RT can be assessed

performance. The results reported that both the aerobic and the combined intervention showed positive increases in the balance measures with a greater magnitude in the combined exercise program (Aerobic pre 7.7±1.1, post 7.0±0.8; Combined pre 7.4±1.0, post 5.9±0.7). The control group showed a mild decrease in the functional measures (pre 7.5±0.7, post 7.7±1.3).

Risk of Falls, Fractures, Hospitalizations, and Mortality	30592475	≥60	nvestigate the association of long-term exercise interventions (≥1 year) with the risk of falls, injurious falls, multiple falls, fractures, hospitalization, and mortality in older adults.	we prioritized comparisons in which the sole difference between groups was the exercise intervention. In studies with multiple exercise groups vs a control group, we selected for the meta-analysis the group with higher amount of exercise sessions performed.	Six binary outcomes for the risk of falls, injurious falls, multiple falls (≥2 falls), fractures, hospitalization, and mortality. **Result:** Forty-six studies (22 709 participants) were included in the review and 40 (21 868 participants) in the meta-analyses (mean [SD] age, 73.1 [7.1] years; 15 054 [66.3%] of participants were women). The most used exercise was a multicomponent training (eg, aerobic plus strength plus balance); mean frequency was 3 times per week, about 50 minutes per session, at a moderate intensity. Comparator groups were often active controls. Exercise significantly decreased the risk of falls (n = 20 RCTs; 4420 participants; RR, 0.88; 95% CI, 0.79-0.98) and injurious falls (9 RTCs; 4481 participants; RR, 0.74; 95% CI, 0.62-0.88), and tended to reduce the risk of fractures (19 RTCs; 8410 participants; RR, 0.84; 95% CI, 0.71-1.00; P = .05). Exercise did not significantly diminish the risk of multiple falls (13 RTCs; 3060 participants), hospitalization (12 RTCs; 5639 participants), and mortality (29 RTCs; 11 441 participants). Sensitivity analyses provided similar findings, except the fixed-effect meta-analysis for the risk of fracture, which showed a significant effect favoring exercisers (RR, 0.84; 95% CI, 0.70-1.00; P = .047). Meta-regressions on mortality and falls suggest that 2 to 3 times per week would be the optimal exercise frequency. **Conclusions and Relevance:** Long-term exercise is associated with a reduction in falls, injurious falls, and probably fractures in older adults, including people with cardiometabolic and neurological diseases.	exclude: It does not provide isolated effect estimates for strength training alone, but it contributes to the assessment of the role of strength training // It does not provide isolated effect estimates for strength training alone, but it contributes to the assessment of the role of strength training in relation to falls, loss of function and mortality
community-dwelling, fokus på Physical Activity	31311165	65+ community-dwelling	assess the effect of exercise-based interventions, implemented in community-dwelling older adults, at least six-months post-intervention, on the sustainability of PA - S**tudies were included if** they were randomized clinical trials (RCT) involving any type of exercise program (e.g., exercise referral scheme, aerobic and/or strength exercise programs, tai-chi) in community-dwelling older adults aged 65 years or older of both genders. Studies had to report at least pre-, post-, and at least six-month post-intervention follow-up exercise intervention measurements. Furthermore, at least one valid PA outcome had to be assessed (e.g., self-report, activity monitor) as a primary or secondary outcome measure.	The effect of exercise-based interventions was assessed compared to active (e.g., a low-intensity type of exercise, such as stretching or toning activities) and non-active (e.g., usual care) control. Studies were included if the exercise-based intervention was compared to either a non-active control, such as usual care, or an active control, if participants performed a low intensity type of exercise such as stretching or toning activities, or physiotherapy.	We included studies aimed at assessing the sustainability of PA and studies that assessed PA as a health-related outcome measure.	exclude: RT is not seen alone, but as part of a broader term: activity vs. non-activity

frail	DOI: 10.1590/18 09- 2950/18004 826022019	65-94	n the effects of physical exercise on frail older people.	control group	in all phases there were benefits with the recommended physical training **CONCLUSION:** We can conclude that physical exercises are beneficial effects to frail older people in terms of quality of life and physical and cognitive aspects. In addition, we suggest that physical exercise is capable of attenuating frailty in older adults, proving to be more efficient when compared with other interventions. The studies have shown multicomponent physical training as a beneficial intervention for frail older adults, considering that it is ideal to include **resistance**, balance, gait and muscular strength exercises for this population. // a multicomponent exercise program that includes **strength, resistance,** and balance training is considered to be the most effective strategy for improving gait, balance and strength, decreasing fall rates, and consequently maintaining the functional capacity during the aging process. **Some studies suggest that physical exercise is more beneficial to frail people when compared with other types of interventions, and resistance and balance training should precede aerobic training3**	Exclude: It does not provide isolated effect estimates for strength training alone, but it contributes to the assessment of the role of strength training	
chronic obstructive pulmonary disease	https://doi.org/10.1002/14651858.CD010821.pub2	Adult 19-44 years + Middle Aged 45-64 years + Young Adult 19-24 years + Chronic Obstructive Pulmonary Disease	Neuromuscular Stimulation + Physical therapy exercises	Sham Intervention / Physical therapy exercises / Usual Care	Finding Of Size Of Skeletal Muscle / Able To Get Off A Bed / Exercise Test Finding / Borg Breathlessness Scale Finding / Quality of Life / Adverse Event / Muscle Fatigue / Mu scle Strength	exclude: does not evaluate RE alone	**2018**
cognitive impairment and dementia	DOI: 10.1016/j.jp hys.2017.12 .001	**age not clear:** People with mild cognitive impairment or dementia as the primary diagnosis.	**I: Physical exercise.** The details extracted from each included study about the exercise intervention were: frequency, intensity, duration and type of physical exercise.	kontrolgruppe	Strength, flexibility, gait, balance, mobility, walking endurance, dual-task ability, activities of daily living, quality of life, and falls.	Exclude: Age not clear.	
muscle + bone + balance: What are the health benefits of muscle and bone strengthening and balance activities across life stages and specific health outcomes?	32300695	≥18	**Resistance + balance + skeletal impact training**. Intervention(er): Højintens modstandstræning (resistance/strength) + Impact-/stød-belastning (løb, hop, skipping) + Balancetræning + Typisk superviseret, 1–3×/uge (ofte 2–3×/uge).	Varies across the included SR/MA, but predominantly: Usual care / no exercise / Low-intensity alternatives / Other forms of exercise (e.g. Tai Chi vs. usual care/other). (This is an overview of SR/MA, so the comparator is not one uniform thing.)	Outcomes: Gang/TUG/chair rise, faldrate/-risiko, BMD, (ADL/QoL blandet), samt assoc. til mortalitet. PMC	Exclude: review of reviews with age ranges that do not clearly divide the older and the younger. RT can be assessed on various parameters, but age means it is not useable	
musculoskeletal health and function	28729308	≥65 years or mean age ≥65 years	effect of combined resistance exercise training and vitamin D3 supplementation on musculoskeletal health and function in older adults	Group 1: Exercise alone (for the effect of vitamin D supplementatio n) vs Group 2: Vitamin D alone (for the effect of exercise)	**Outcomes (O) Primært**: Muskelstyrke (især underekstremitet) **Sekundært**: Funktionelle tests (SPPB, TUG), muskelmasse, knoglemineraltæthed, livskvalitet // **Indeholder funktionelle outcomes** (gang, mobilitet, styrke). Muskelstyrke forbedres signifikant ved træning (uanset vitamin D) Funktionelle mål (SPPB, TUG) forbedres også i interventionsgrupperne	Exclude: Cannot isolate the effect of strength training. Studies are divided into two groups: Group 1: Vitamin D3 + training vs training alone → Here you can isolate the effect of vitamin D. Group 2: Vitamin D3 + training vs vitamin D alone → Here you can	**2017**

						isolate the effect of training + vitamin D	
motor and cognitive functions	DOI: 10.1186/s11556-017-0189-z	55-97 years old and mean group ages ranged from 65.5 ± 6.3 [89] to 81.9 ± 6.3 years old [97]. // mean age (> 65 years) females - health condition of the included population (no reported neurodegenerative diseases, chronic illnesses and/or overt cognitive impairments)	physical intervention or combined physical and cognitive intervention (dual-task), and (iii) combined motor and cognitive outcomes as an endpoint // Studies included in this review reported multiple outcome measures, and an extensive range and diverse types of intervention protocols. The most frequent intervention protocol (11 of the 19 included studies) was combined exercise training (e.g. aerobic training followed by resistance training) [82–84, 88, 90, 91, 97–100]. The second most frequent intervention protocol (9 of 19 included studies) was combined physical-cognitive training. Here physical exercise training was either conducted simultaneously with a cognitive task in a dual-task manner [84, 91, 93, 94, 96, 100], or was followed by separate cognitive interventions [83, 92, 97]. The remaining intervention protocols consisted of single-exercise training paradigms, involving aerobic training [89, 95], resistance training [85, 89], balance training [86, 89] or dance [87, 88]. Nine studies included a passive control group [85, 86, 89–91, 93, 94, 96, 98]. Alternatively, participants in control groups underwent health education classes [87, 92, 99] or were subjected to lesser physical (or cognitive) training, for example training of gross motor activities [82] or training of a single cognitive task [96].	at least one comparison group (i.e. single group pre- and post-test design) or cross-sectional study design	Due to the large heterogeneity in exercise protocols and testing methods, it was difficult to arrive at a synthesis of the search findings. Therefore, we performed a descriptive analysis where performance gains (or negative effects) were sorted and summed according to four motor outcome measures and five cognitive outcome measures. The four motor outcome measures were: functional lower limb mobility and gait characteristics [82–84, 86–90, 92–94, 96–100], static and/or dynamic balance [86, 87, 89, 94, 97–99], muscle strength [82, 85, 89, 90, 92, 99], and psychomotor (RT) tasks [83, 85, 91, 93–95, 97, 98]. The five cognitive outcome measures were: processing speed [85–99], working memory [82, 84, 88, 90, 92, 95, 96, 98, 99], inhibition [82, 84, 89, 93–96, 98, 99], attention [85, 87–99], and dual-task cost [82–84, 86, 88, 92–94, 96, 97, 100]. Other outcome measures were aerobic fitness [82, 95], depression scores [87, 90, 92], quality-of-life and life-satisfaction scores [87, 90, 92], and markers of brain plasticity (brain-derived neurotrophic factor – BDNF) [85, 98]. Battery of tests used for the assessments of the aforementioned motor/cognitive outcome measures in each of the included studies are specified in Table 1.	Exclude: age too low	
diabetes mellitus, ofte med flere samtidige sygdomme (polypatologi)	DOI: 10.1007/s11357-015-9800-2	mean age ≥60	studies must refer to the effects of diabetes on neuromuscular function and/or cardiovascular function and/or functional capacity in elderly or refer to the effects of exercise interventions in the neuromuscular function and/or cardiovascular function and/or functional capacity in elderly, frail elderly, elderly with polypathology, and elderly at severe functional decline, and for the second purpose of study, studies must refer to the effects of resistance training, endurance training, or concurrent resistance and endurance training on glycemic control in elderly with type 2 diabetes		Improve muscle strength, power output, aerobic power and functional capacity … reduce falls and improve quality of life.	exclude: age is not divided into groups and therefore too low	**2015**
healthy	DOI: 10.1186/s12877-015-0061-9	≥65 år,without serious illness	to determine the meta-effects of different types or combinations of exercise interventions from randomized controlled trials on improvement in preferred gait speed.	compared an exercise intervention with no intervention (usual activity) or a control type of intervention consisting of general health education classes,	Progressive resistance training with high intensities, is the most effective exercise modality for improving preferred gait speed. Sufficient muscle strength seems an important condition for improving preferred gait speed. The addition of balance-, and/or endurance training does not contribute to the significant positive effects of progressive resistance training. A promising component is exercise with a rhythmic component. Keeping time	Include: compared an exercise intervention for elderly	

				general stretching, or social visits. We only included control interventions that performed general or upper body stretching exercise not aiming to specifically increase range of motion in hips and ankles in order to improve step length, and thereby gait speed	to music or rhythm possibly trains higher cognitive functions that are important for gait.	

MNH:

added to full text with MNH's SDU access: Not accessible// (MNH)

Group	Reference	**Population:** Elderly ≥60 years	**Intervention:** Resistance training	**Comparator**: Any	**Outcomes:** Loss of function in the elderly is prevented/treated	Inclusion/exclusion
ældre med sarcopen fedme	DOI: 10.1016/j.maturitas.2018.02.005	over 60	various forms of exercise and protein intake	controls	Outcome measures were skeletal muscle mass, any measure of adiposity such as body mass index (BMI) or fat mass, muscle strength and physical function/performanc	include: relevant area
dementia	10.1016/j.gerinurse.2025.01.006	Individuals aged ≥60 years; evaluated by healthcare professionals using specific assessment tools or established criteria related to cognitive and physical function; exhibiting both physical frailty and cognitive impairment	The exercise intervention strategies for the experimental group include but are not limited to aerobic exercise, resistance exercise, Tai Chi, etc	The comparison group consists of maintaining the daily lifestyle without additional interventions, or "routine nursing measures" including diet, medication guidance, disease-related knowledge, and general health education that excludes specialized exercise interventions	The findings revealed that the cognition of the exercise intervention group outperformed the control group	include: relevant area
diabetes	10.1016/j.diabres.2025.112079	participants were men or women aged 60 years or older diagnosed with T2DM, adhering to the age threshold established in previous research	t examined the impacts of RET interventions-defined as dynamic exercise modalities requiring force exertion against resistance	intervention vs. control	glycemic control, lipid profiles, body composition, muscle strength, and blood pressure,	include: relevant area
sarcopaponia	10.1016/j.archger.2024.105595	the cases where eligibility criteria were of people Someone received a sarcopenia diagnosis based on the consensus definitions and lifespan less than or equal to 60 years old	the intervention group involved RT and included a description of at least one training variable	a comparison or control group that faced no exercise or performed only health education training;	with at least one proxy of body composition (e.g., muscle mass, BF%), or muscle strength (e.g., HS, KES), or biomarkers	include: relevant area
elderly	10.1016/j.archger.2023.104954	over 50	exercise	controls	progress	exclusion/ not divided by age

sarcopaponia	10.1016/j.archger.2022.104868	over 65	exercise	controls	progress	exclusion/ not right studidesign (umbrella review) - but relevant areaand segment
fragile	10.1016/j.arr.2023.102079	over 65	investigates the impact of resistance training (RT)	controls	Our meta-analysis summarized the influence of crucial resistance training variables, including intensity, duration, and frequency, on enhancing functional performance in frail and pre-frail older adult	include: relevant area
healthy	10.1016/j.jamda.2022.06.009	participants age >60 years, living in nursing homes or other institutions of long-term living facilities of geriatric care	Multicomponent and/or resistance training. Any combinations of at least 3 different exercise modalities in the weekly frequency of institutionalized older adults were considered as multicomponent training. Any that used some type of overload, which may or may not be associated with stretching/flexibility or balance/vibrating platform exercises, were considered as resistance training	usual care, sham interventions, social activities, or other exercise interventions.	outcome of at least 1 of the tests that assess physical performance, especially the Short Physical Performance Battery (SPPB), 30-second chair-stand (CST), and Timed Up and Go (TUG)	include: relevant area
elderly	DOI: 10.1016/j.arr.2022.101746	over 60	exercise	controls		exclusion/ target not correct for our focus
healthy	10.1016/j.maturitas.2020.12.009 10.1016/j.gerinurse.2021.06.001	adults aged 65 years and older with sarcopenia; community-dwelling apparently healthy people with a mean age ≥ 50 years	interventions of exercise, nutrition, or the combination of both any type of physical exercise defined as planned, structured, and repetitive physical activity with the final or intermediate aim of improving or maintaining physical fitness or health	randomized control trials. For each outcome measurement, a network meta-analysis was conducted to determine the direct and indirect effects of each intervention compared with each of the other interventions compared with any type of intervention or minimal or no intervention.	the outcomes include at least one of the following: muscle mass, muscle strength (hand grip and knee extension strength), or physical performance (gait speed and dynamic balance); Compared with the control group, exercise alone and the combination of exercise and nutrition significantly increased handgrip strength (1.12 kg, 95% CI: 0.12, 2.11; 2.03 kg, 95% CI: 1.10, 2.97) and improved dynamic balance (-1.76 seconds, 95% CI: -2.24, -1.28; -1.02 seconds, 95% CI: -1.64, -0.39). Both exercise alone and the combination of exercise and nutrition have beneficial effects on muscle strength and physical performance in older adults with sarcopenia. This network meta-analysis showed the superiority of exercise for improving handgrip strength, gait speed and dynamic balance in older adults with sarcopenia. However, no significant differences were found between the effects of the different interventions on muscle mass. Further, exercise combined with nutrition has similar effects to exercise alone. In non-pharmacological interventions for sarcopenic older adults, exercise should be considered as the priority to improve handgrip strength, gait speed and dynamic balance. fallers, accidental falls, fear of falling, fractures from falls, people sustaining fractures from falls, and the occurrence of at least one fall.	include: relevant area of outcome measures effect of RT: actual measurements

KGH:

added by further searching: found via chain searches related to reference lists from existing sources (KGH)							
arthritis	10.1002/art.38290	2014	Patients had to have (explicitly stated) OA in either one or both knees, as defined by the American College of Rheumatology (ACR) criteria. The mean age of the patients in the included trials was on average 64.3 years (range 52.2–73.8 years)	Interventions for OA included in the Cochrane Library.	comparing at least one exercise group to a non-exercise intervention control group	he outcomes for evaluation of clinical efficacy were pain and disability, as recommended by Outcome Measures in Rheumatology III	Forty-eight trials were included. Similar effects in reducing pain were found for aerobic, resistance, and performance exercise (SMD 0.67, 0.62, and 0.48, respectively; P = 0.733). These single-type exercise programs were more efficacious than programs that included different exercise types (SMD 0.61 versus 0.16; P < 0.001). The effect of aerobic exercise on pain relief increased with an increased number of supervised sessions (slope 0.022 [95% confidence interval 0.002, 0.043]). More pain reduction occurred with quadriceps-specific exercise than with lower limb exercise (SMD 0.85 versus 0.39; P = 0.005) and when supervised exercise was performed at least 3 times a week (SMD 0.68 versus 0.41; P = 0.017). No impact of intensity, duration of individual sessions, or patient characteristics was found. Similar results were found for the effect on patient-reported disability.
arthritis	10.1016/j.ocarto.2022.100242	2022	Patients with knee, hip or hand OA.	Interventions for OA included in the Cochrane Library.	placebo, no intervention, other intervention or standard treatment.		Exercise (131 studies) showed consistent small to moderate effects across network/direct/indirect analyses (SMDs: −0.38/-0.45/-0.31).
osteoporosis	10.1186/s13018-025-05890-1	2025	postmenopausal women, with a mean age ranging from 50 to 72 years, and BMD was consistently measured using dual-energy X-ray absorptiometry	resistance training	untrained healthy postmenopausal women	bone density at the LS, FN, TH and Troch	"The impact of resistance training on LS bone density 13 studies were included in the meta-analysis, comprising a total of 293 participants in the resistance training group and 233 participants in the control group. The analysis results are illustrated in Fig. 4. There was substantial heterogeneity among the 13 studies (I2 = 91%, P < 0.00001). Employing a random-effects model, the pooled effect size was SMD = 0.88, 95% CI [0.21, 1.56], Z = 2.58, P = 0.01, indicating significant differences (P < 0.05). This suggests that resistance training has statistically significant impact on LS bone density in postmenopausal women. The impact of resistance training on FN bone density 15 studies were included in the meta-analysis, comprising a total of 314 participants in the resistance training group and 301 participants in the control group. The analysis results are illustrated in Fig. 5. There was substantial heterogeneity among the 15 studies (I2 = 87%, P < 0.00001). Employing a random-effects model, the pooled effect size was SMD = 0.89, 95% CI [0.40, 1.39], Z = 3.53, P = 0.0004, indicating significant differences (P < 0.01). This suggests that resistance training has a statistically significant impact on FN bone density in postmenopausal women. The impact of resistance training on TH bone density 9 studies were included in the meta-analysis, comprising a total of 240 participants in the resistance training group and 195 participants in the control group. The meta-analysis results are presented in Fig. 6. There was relatively low heterogeneity among the seven studies (I2 = 25%, P = 0.20). Employing a fixed-effects model, the pooled effect size was SMD = 0.30, 95% CI [0.10, 0.50], Z = 2.94, P = 0.003, indicating significant differences (P < 0.01). This suggests that resistance training has a statistically significant impact on TH bone density in postmenopausal women. The impact of resistance training on Troch bone density 7 studies were included in the meta-analysis, comprising a total of 141 participants in the resistance training group and 130 participants in the control group. The meta-analysis results are presented in Fig. 7. There was relatively low heterogeneity among the six studies (I2 = 19%, P = 0.28). Employing a fixed-effects model, the pooled effect size was SMD = 0.23, 95% CI [-0.01, 0.47], Z = 1.86, P = 0.06, indicating nonsignificant differences (P >0.05). Results of subgroup analysis We conducted subgroup analyses on LS, FN, TH, and Troch bone density in postmenopausal women. The subgroups included Intervention frequency, Intervention intensity, Intervention cycle, and Duration per time. The specific results are shown in Table 2."
kidney disease	10.1186/s12882-024-03547-5	2024	Patients diagnosed with CKD	resistance exercise	Compared studies with and without resistance exercise	The primary outcome was assessed by glomerular filtration rate (GFR)(ml/(min•1.73m2)). The secondary outcomes were assessed by C-reactive protein (CRP) (mg/L), serum creatinine (mg/dL), hemoglobin (g/dL), Glycosylated Hemoglobin, Type A1C (HBA1c) (%), high Density	"6-min walk Two studies presented the data of 6-min walk. The pooled analysis revealed that CKD patients with resistance exercise had a longer 6-min walk compared to the control group and the difference was statistically significant (WMD 89.93; 95%CI 50.12 to 129.74; P = 0.000). The forest plot is presented in Fig. 3K. Grip strength Grip strength was evaluated in 7 studies. The grip strength of CKD patients in the resistance exercise group was significantly better than that of the control group according to the pooled outcome (WMD 3.97; 95%CI 1.89 to 6.05; P = 0.000). The forest plot is shown in Fig. 3L. The pooled WMDs of all indicators included in this study are summarized in Table 3."

						Lipoprotein (HDL) (mg/dL), low Density Lipoprotein (LDL) (mg/dL), 6-min walk(m), body mass index (BMI) (kg/m2), fat-free mass (kg), fat mass (kg), grip strength (kgf).	
COPD	10.1177/17534666231170813	2023	"adults (⩾18 years) at any stage of COPD, who participated in a PR program lasting at least 6 weeks (P). Results: mean age of the participants was 65.3 years (range = 49–71.5 years). PR: pulmonary rehabilitation"	"comparing (directly or indirectly) a form of ULET (I) ULET : upper limb exercise training"	with lower extremity exercise training only or sham intervention or other type of ULET (C)	Outcomes included any objective measure of UL muscle strength with no restrictions regarding the assessment method used [e.g. 1 repetition maximum (1RM), hand-held dynamometry] (O)	"ULET compared with no exercise or sham intervention (...) Significant differences in favor of the ULET group were observed (Table 3 and Figure 5) at the short-term follow-up in elbow flexors (SMD = 0.77, 95% CI = 0.27, 1.26) and chest press strength (SMD = 1.51, 95% CI = 0.90, 2.11), and at the long-term follow-up in the upper-body strength (SMD = 0.72, 95% CI = 0.11, 1.34). Sensitivity and subgroup analyses did not change the direction or the size of the effect (Figure 5(c) and Supplementary Figure 8). Comparison of different types of ULET (...) Very low certainty evidence indicates a nonsignificant difference between elastic resistance exercise and weight machines training in all muscle groups at the short-term follow-up (Figure 6 and Table 3). In sensitivity analysis (Supplementary Figures 20 and 21 and Supplementary Table 3) by removing heterogeneous studies,56,57 results did not change."

Dataekstraktion & logføring

Forkortelser:

Ref: Reference

S-T: Study type

Ant: Number of primary studies included

P: Population

I: Intervention

C: Comparator

O: Outcomes

H-R: Main results

Con: Conclusion

Qual-V: Quality assessment

V-E: Assessment of evidence

Raske

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Ali Nejatian Hoseinpour et al.	2025	systemic review and meta analysis	19	Healthy individuals aged 60 and over	Any type of RT served as the intervention, in which participants had not participated in an exercise training program in the past 6 months	RT intervention to a non-exercise control group	Secondary outcome measures included body composition variables such as body mass index (BMI), body weight, lean mass, fat mass, and fat percentage	According to the results from five studies, RT did not have a significant effect on body weight (mean difference [MD]: −0.08; [95 % CI: −2.51, 2.35], p = 0.12) when compared with the control groups. Changes in BMI were reported in eight studies, and the results demonstrated that RT did not have a significant effect on BMI (MD: −0.13; [95 % CI: −0.75, 0.50], p = 0.69) compared to the control groups. According to the data from eight studies (nine intervention arms), RT significantly (MD: −1.62; [95 % CI: −2.73, −0.51]; p = 0.004) reduced fat percentage. Meta-analysis of the effect of RT studies on lean mass found no evidence of a change ((MD: 0.29; [95 % CI: −0.70, 1.28]; p = 0.57, three studies). Our results from three studies demonstrated that RT significantly increased **knæstræk-strength** (MD: 10.04; [95 % CI: 0.32, 19.75]; p = 0.04] compared with the control groups. Based on four studies, RT significantly improved **6-MWD** (MD: 0.97;	Derudover fandt vi et fald i fedtprocent og en forbedring i funktionel kapacitet målt ved Derudover fandt vi et fald i fedtprocent og en forbedring i funktionel kapacitet målt ved knæstræk og 6-MWT. Ikke desto mindre blev der ikke observeret signifikante ændringer i andre kropssammensætningsvariabler, herunder kropsvægt, BMI, fedtmasse (kg) og muskelmasse. og 6-MWT. Ikke desto mindre blev der ikke observeret signifikante ændringer i andre kropssammensætningsvariabler, herunder kropsvægt, BMI, fedtmasse (kg) og muskelmasse.	**ADEQUATE** + protocol: PROSPERO ID: CRD42023487573 + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 19 = Enough for real conclusion	ikke signitfikant forskel i kropssammensætning, dog 6 minutes walk test relevant.	**DOI: 10.1016/j.archger.2024.105731**	**D** **Funktionelle outcomes:** Effect of RT versus CON on: ((3 studies/ n = 29) knee extension: 10.04 (0.32, 19.75) = significant in favor of intervention. = C + high disagreement (4 studies/ n = 51) 6-MWD: 1.36 (0.25, 2.47) = significant in favor of intervention. = C + high disagreement functional capacity

								[95 % CI: 0.51, 1.42]; p < 0.001) in comparison with the control groups				
Shikun Zhang et al.	2025	systemic review	93	participants was ≥65 years, and they were healthy older adults	single-exercise training or a combination of exercises (including two or more types of exercise	the experimental group received single-exercise training or a combination of exercises (including two or more types of exercise), while the control group either maintained their usual daily activities or received a different type of exercise intervention than the experimental group;	static/dynamic steady-state balance, proactive balance, and reactive balance	The PMA results indicated that various exercise modalities could significantly improve the BBS, TUG, GS, and OLSEO balance outcomes in healthy older adults.	This study confirms that exercise improves balance in healthy older adults.	**ADEQUATE** + protocol: PROSPERO ID: CRD42024591308 + rob2/risk of bias: The article includes rob2 - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 93 = Enough for real assessment	**DOI: 10.1186/s12877-025-06212-0**	no forest plot found
Seongho Choi 1, Junga Lee	2025	systemic review and meta nalysis	12	participants were older adults aged 65 years or older without major health issues	The resistance exercise programs were implemented for an average of 8–12 weeks, 2–3 sessions per week, with each session lasting 40–70 mi	resistance exercise, and the control group did not engage in structured exercise programs comparisons involved control groups that maintained their usual daily activities without intervention	The results revealed that resistance exercise significantly improved various fall-related physical outcomes, including grip strength, flexibility, static and dynamic balance, lower body strength, and coordination were defined as improvements in physical and psychological factors following exercise interventions;	These findings suggest that resistance exercise is an effective intervention for improving physical function and psychological stability in older adults.	The results consistently indicated a statistically significant improvement in handgrip strength, reflecting the positive effect of resistance training on muscular strength in older adults These findings suggest that resistance exercise is an effective intervention for improving physical function and psychological stability in older adults.	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 12 = Enough for real conclusion	**10.12965/jer.2550362.181**	**C** **Effect size of resistance training on:** (4 studies) skeletal muscle mass: 0.186 (-0.217, 0.590) = non-significant effect (moderate heterogeneity) = C (3) handgrip strength: 0.476 (0.045, 0.9.07) = significant effect in favor of intervention (absence of heterogeneity) = B (5) Static balance: 1.067 (0.422, 1.712) = significant in favor of intervention (moderate heterogeneity) = C (3) dynamic balance: -1.812 (-2.336; -1.289) = significant in favor of intervention (low heterogeneity) = B (5) limb strength: 1.489 (0.882, 2.097) = significant in favor of intervention (moderate heterogeneity) = C (2) coordination: -1.210 (-1.809, -0.611) = significant in favor of intervention (low heterogeneity) = B (2) fall self-efficacy: 1.141 (0.639, 1.643) = significant in favor of intervention (absence of heterogeneity) = B
Jackson Neris de Souza Rocha et al.	2024	systemic review and meta nalysis	31	The population consisted of independent older individuals aged ≥ 60	We implemented RT as the intervention, compared different volumes of RT	compared different volumes of RT, examined outcomes related to muscle strength, functional fitness, and body	On average, HV-RT (High-Volume Resistance Training) induced significant adaptations in muscle strength of the upper limbs (g = 0.36; 95 % CI = 0.11–0.61) and lower limbs (g = 0.41; 95 % CI = 0.23–0.59), with superiority	our study, 24 randomized clinical trials (RCTs) assessed muscle strength parameters in older individuals, and after meta-analysis, we found that HV-RT performed better than LV-RT for lower limb muscle strength, regardless of the intervention duration. However, we observed that this	Resistance exercise effectively improves body composition, increasing body fat percentage and the skeletal muscle mass index. age-related osteoporosis (OSO), in older persons Elastic bands improve physical performance securely and efficiently. The findings of this study	**ADEQUATE** + protocol: PROSPERO ID: CRD42022338578 + rob2/risk of bias: The article includes rob2 - GRADE: GRADE level not stated	**10.1016/j.archger.2023.105303**	**B** (14) upper limb muscle strength comparing HV-RT and LV-RT with a subgroup analyze

				years		composition, and included Randomized Controlled Trials as the study types	more pronounced after 12 weeks of training. Regarding functional fitness, there was a tendency favoring HV-RT (g = 0.41; 95 % CI = 0.23–0.59). examined outcomes related to muscle strength, functional fitness, and body composition,	superiority became more evident in longer interventions (>12 weeks). Additionally, we identified the superiority of HV-RT for upper limb strength only in longer interventions	indicate that HV-RT outperformed LV-RT in ULMS for interventions lasting longer than 12 weeks. Additionally, HV-RT was superior in LLMS regardless of intervention duration. Furthermore, our results suggest a trend of functional fitness improvement in favor of HV-RT compared to LV-RT, irrespective of intervention duration. Regarding body composition, we did not detect any differences between the groups, regardless of intervention duration	+ sufficient number of studies (systematic review/meta-analysis): 31 = Enough for real conclusion		**for training duration (shorter (≤12 weeks) vs. longer (>12 week))** + moderate disagreement under/=12 weeks: non-significant in favor of high volume (heterogeneity: 45%) over 12 weeks: significant effect in favor of high volume (heterogeneity: 0%). Random effects model: significant effect in favor of high volume (heterogeneity: 48%) = C (21) lower limb muscle strength relative to HV-RT and LV-RT and shorter (≤12 weeks) or longer (>12 week) training duration + no disagreement Up to 12 weeks: significant effect in favor of high volume (heterogeneity0%). Over 12 weeks: significant effect in favor of high volume (heterogeneity 0%). Random effect model: significant effect in favor of high volume (heterogeneity 0%). = A (6) functional fitness relative to HV-RT and LV-RT: + high disagreement up to 12 weeks: non-significant with benefit to HV (heterogeneity 72%). Over 12 weeks: non-significant with benefit to HV (heterogeneity 0%). Random effects model: non-significant with benefit to HV (heterogeneity 62%) = C
Archie Kirk et al.	2024	Systematic Review and Meta-Analysis	31	the age of participants had to be older than 60 years. the population sampled was characterized as being healthy or asymptomatic. Age from 63.9 to 78.9 years, and when considered in view of the participant samples from each study, the mean age across the	**Machine-Based Resistance Training Improves Functional Capacity**: The inclusion criteria were for strength training interventions to be a minimum of 6 weeks, using only resistance machines, with pre- and post-intervention measurements of **Inclusion**: (5)	we focus on reporting the between-condition relative contrast for non-training control vs. machine-based RT	functional capacity of either a timed up-and-go and/or a sit-to-stand test, and including healthy older adults (>60 years) pre- and post-test measurement for functional capacity by including either a timed up-and-go and/or a sit-to-stand test. We fit two models, with one for all of the function outcomes reported and one for all of the strength outcomes reported.	**3.7. Functional Outcomes** The model examining functional outcomes included 15 studies containing 33 separate arms (8 non-training control and 25 machine-based RT) reporting 54 within arm effects. The global grand mean estimate for the between-condition relative contrast (i.e., machine-based RT minus non-training control) was 0.63 [95% credible interval: 0.23,1.04], though there was considerable heterogeneity in the magnitude of effects between studies (τ_Condition (training) = 0.66 [95% credible interval: 0.37,1.07]). An ordered forest plot of conditional study level estimates for the absolute within-condition effects, the global grand mean estimates for absolute within-condition	The present systematic review and meta-analysis have shown that uncomplicated, machine-based resistance training can **increase strength, as well as functional capacity**. Such improvements might serve to preserve independence and improve quality of life. When considering the practical implications of these findings, it is important to recognize the consistently positive outcomes in relation to the heterogeneous manipulation of training variables. We propose that personal trainers or clinicians working with older adults can prescribe a strength training intervention using resistance machines with leniency around other variables without a need to challenge	**POOR** - protocol: "not pre-registered using Prospero, OSF, or any other" - rob2/risk of bias: The article does not clearly include risk of bias - GRADE: GRADE level is not clearly stated + sufficient number of studies (systematic review/meta-analysis): 31 = Enough for real conclusion	10.3390/jfmk9040239	D (15) functional outcomes. 8 non-training control and 25 machine-based RT. The global grand mean estimate for the between-condition relative contrast (i.e., machine-based RT minus non-training control) though there was considerable heterogeneity in the magnitude of effects between studies (τ_Condition

				17 studies was 70.2 years.	the training intervention had to be at least 6 weeks in duration, and (6) the training intervention could not include free-weight or other (e.g., dumbbells, barbells, kettlebells, sandbags, resistance bands, etc.) resistance types that might represent functionally similar/specific exercise Three studies considered only lower-body resistance training exercises [40,43,45], and the remainder included both upper- and lower-body exercises. The lower body exercises used with the highest frequency were leg press, knæstræk, and leg curl, in 15, 10, and 8 studies, respectively. The upper-body exercises used with the highest frequency were chest press, latissimus dorsi pulldown, and seated row, in 11, 8, and 8 studies, respectively. On average, the studies included 6 different exercises (3 upper body and 3 lower body), with a maximum of 12 different exercises [27] and a minimum of 2 different [43].			effects, and the global grand mean estimate for the between-condition relative contrast, including interval estimates and posterior probability distributions, are shown in Figure 2. **3.8. Strength Outcomes** The model examining strength outcomes included 11 studies containing 24 separate arms (6 non-training control and 18 machine-based RT) reporting 60 within arm effects. The global grand mean estimate for the between-condition relative contrast (i.e., machine-based RT minus the non-training control) was 0.61 [95% credible interval: 0.21,1.01], though there was considerable heterogeneity in the magnitude of effects between studies (τ_Condition (training) = 0.57 [95% credible interval: 0.32,1.00]). An ordered forest plot of conditional study level estimates for absolute within-condition effects, the global grand mean estimates for absolute within-condition effects, and the global grand mean estimate for the between-condition relative contrast, including interval estimates and posterior probability distributions, are shown in Figure 3. **3.6. Volume, Effort, Load, and Repetition Duration** fremgår	balance or replicate movement patterns. Further research, considering strength transference and specificity of adaptation, should continue to compare strength and performance increases between superficially similar and seemingly unrelated tasks.			(training) = 0.66 [95% credible interval: 0.37,1.07]) = significant effect in favor of intervention + high disagreement (11) Strength Outcomes: The global grand mean estimate for the between-condition relative contrast (i.e., machine-based RT minus the non-training control) was 0.61 [95% credible interval: 0.21,1.01], though there was considerable heterogeneity in the magnitude of effects between studies (τ_Condition (training) = 0.57 [95% credible interval: 0.32,1.00]) = significant effect in favor of intervention + high disagreement
Robert T Morrison et al.	2023	Systematic review and meta-analysis	19	Older adults (aged > 60 years), regardless of health status, baseline functional capacity or residential status.	**the effect of high-velocity power training (HVPT) compared with traditional resistance training (TRT) on functional performance in older adults**: High-velocity power training with the intent to perform the concentric phase as quickly as	comparison group allocated TRT (traditional moderate-velocity resistance training)	Short Physical Performance Battery (SPPB), Timed Up and Go test (TUG), five times sit-to-stand test (5-STS), 30-second sit-to-stand test (30-STS), gait speed tests, static or dynamic balance tests, stair climb tests and walking tests for distance. The quality of intervention reporting was assessed with the Consensus on Exercise Reporting Template (CERT) score.	Nineteen trials with 1,055 participants were included in the meta-analysis. Compared with TRT, HVPT had a weak-to-moderate effect on change from baseline scores for the SPPB (SMD 0.27, 95% CI 0.02 to 0.53; low-quality evidence) and TUG (SMD 0.35, 95% CI 0.06 to 0.63; low-quality evidence). The effect of HVPT relative to TRT for other outcomes remained very uncertain. The average CERT score across all trials was 53%, with two trials rated high quality and four rated moderate quality.	HVPT had similar effects to TRT for functional performance in older adults, but there is considerable uncertainty in most estimates. HVPT had better effects on the SPPB and TUG, but it is unclear whether the benefit is large enough to be clinically worthwhile.	**ADEQUATE** +/- protocol: PROSPERO ID: "prospectively registered on PROSPERO, conducted in accordance with the Cochrane guidelines for systematic reviews of interventions,53 and reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement." - but ID is not found, so cannot be searched + rob2/risk of bias: The article includesrisk of bias + GRADE: GRADE level is stated	**10.1016/j.jphys.2023.05.018**	**C** (6/ n = 245) SPPB: small significant/INT + low uncertainty (10/ n = 305) TUG: moderately significant/INT + moderate uncertainty (n = 102) Usual gait speed (n = 179) 30-STS (n = 41) static balance

					possible compared with traditional moderate-velocity resistance training performed with a concentric phase of ≥ 2 seconds.					+ sufficient number of studies (systematic review/meta-analysis): 19 = Enough for real conclusion			
Alexandre Duarte Martins et al.	2022	Systematic Review and Meta-Analysis	14	participants with age ≥ 65 years old, from both sexes, without any clinical condition and physically independent	The Effects of High-Speed Resistance Training on Health Outcomes in Independent Older Adults: at least one of the protocols under study was an HSRT program with maximal concentric velocity (i.e., as fast as possible, ≤1 s) lasting 2 weeks or longer	studies included pre- and post-intervention measurements	the study compared the EG with the CG at post-intervention	**3.5. Results of the Studies** Table 4 presents the aim, outcome variable, and main results of the fourteen studies in this review. Only outcomes addressed in more than three studies will be described here. Physical function was analyzed in seven studies [54,57,58,61,63,66,67]. Four studies showed improvements in physical function in only the EG between pre- and post-training [58,61,63,67]. Outcomes of muscle strength, such as grip strength, were assessed in six studies [56,57,61,64,66,67]; three out of seven studies [61,64,67] reported differences between CG and EG at post-training in these outcomes ($p < 0.05$). Lastly, outcomes of muscle power were described in four studies [54,55,59,65]; of these four studies, two [59,65] demonstrated significant differences between CG and EG at post-training in peak power outcomes at different %RM (40 to 90% 1 RM) ($p < 0.05$). **3.6. Meta-Analysis** The meta-analysis with ten studies showed moderate to large effects of the HSRT interventions on some health outcomes (cognitive function, neuromuscular function, and physical function) in older adults. Four studies revealed large effects on cognitive function (analyzed through frontal assessment battery (FAB) and mini-mental state examination (MMSE)) in favor of intervention groups compared to control groups ($p = 0.001$, SMD = 0.94 [0.20, 1.68], $I^2 = 71\%$); see Figure 2. (...) moderate effects on neuromuscular function (analyzed through grip strength and muscle and power outcomes) (...) physical function was divided into approaches in order to facilitate the interpretation of the results (...) moderate effects on physical function (...)	The present systematic review confirms that HSRT interventions that progressively increase in training intensity can improve several health outcomes in older people, mostly cognitive, neuromuscular, and physical function (moderate to large effects). Furthermore, the results suggest that interventions with ten weeks or more and performed three times a week result in significant improvements in neuromuscular function.	**ADEQUATE** + protocol: PROSPERO ID: CRD42021272242 + rob2/risk of bias: The article includesrisk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough for real conclusion	cognitive, neuromuscular, and physical function (cf. conclusion)	**10.3390/ijerph19095390**	**C** **high-speed resistance-training-induced changes in physical function** (5/7 outcomes) SPBB and gait velocity; small significant/INT + high disagreement (2) TUG: non-significant/INT + moderate disagreement (6) neuromuscular function (grip strength and muscle strength/power); significant/INT + high disagreement
Steven J O'Bryan et al.	2022	Systematic Review and Meta-Analysis	14	male and female participants with a mean age≥65 years; The mean age across studies was 70±6.1 years (range 65–77 years). Most studies described participants	the effect of progressive resistance training only or resistance plus weight-bearing/impact-loading training of≥4 weeks duration against a non-training prescribed control group	non-training prescribed control group	changes in BMD for hip, lumbar spine and/or femur (no limitations on assessment method); and changes in muscle strength of the lower limbs assessed via leg press/knee extension 1RM or isometric/isokinetic knee extension strength	**Concomitant Changes in Muscle Strength and BMD Following Resistance Training** (...) Progressive resistance training programs concomitantly increased muscle strength and femur/hip BMD with a Riley's correlation of r = 0.28 (Fig. 2). When muscle strength was reported as changes in leg press 1RM, the pooled MD was 25.06%. The likelihood for positive change in muscle strength was more certain than femur/hip BMD, evidenced by lower heterogeneity, a higher	Progressive resistance training programs concomitantly increase lower-limb muscle strength and femur/hip BMD in older adults. However, whereas **improvements in muscle strength occur regardless of manipulation to well-known training characteristics**, positive adaptations in femur/hip BMD are less certain. As such, to promote concomitant increases in muscle strength and BMD, we recommend adopting training characteristics more likely to facilitate improvements in BMD, which may include resistance training with a weight-bearing/impact-loading component, training frequency three times weekly, training volume of one or two sets per exercise, and an external load	**GOOD/ADEQUATE** +/- protocol: PROSPERO ID: 220210 - **does not appear in search** + rob2/risk of bias: The article includesrisk of bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough for real conclusion	BMD	**10.1007/s40279-022-01675-2**	**C** (10/12 outcomes) effect of age on changes in muscle strength (lower limb): significant/INT + high disagreement (9/11 outcomes) effect of age on changes in muscle strength (femur/hip BMD): significant/INT + high disagreement

				as being apparently healthy, not engaged in regular physical activity, and having no/limited previous resistance training experience				lower limit of the prediction interval, and higher overall quality of the evidence (high vs moderate). (...) lumbar spine BMD (...) no change in this outcome was detected following the resistance training intervention (Δ MD = 1.60%; 95% CI −1.44, 4.63; $p = 0.30$). **<u>Effect of Participant Characteristics on Concomitant Changes in Muscle Strength and BMD Following Resistance Training</u>** From the differences in participant characteristics identified in Sect. 3.2, a sub-group meta-regression determined the effects of age (mean age 65–70 years vs. > 70 years) and BMI (normal BMI vs. overweight BMI) on strength and BMD outcomes. Age had no significant effect on the positive change in strength or femur/hip BMD following the resistance training intervention (both $p \geq 0.05$), although the magnitude of the increase tended to be greater for the 65- to 70-year-old group (Fig. 3a, b). Participants with a normal BMI demonstrated greater improvements in muscle strength (Δ SMD = 1.05%; 95% CI 0.7, 1.41; $p = 0.02$) but no difference in BMD compared to the overweight group (Fig. 4a, b, c). **<u>Effect of Resistance Training Characteristics on Concomitant Changes in Muscle Strength and BMD</u>** None of the individual training characteristics showed a significant combined effect on both muscle strength and BMD, presumably because of significant heterogeneity and noticeably large 95% CIs for BMD (Fig. 5 and Table 3). However, similar positive main effects on muscle strength and femur/hip BMD were observed with higher training frequencies, whereas differences in the magnitude and direction of the main effect for muscle strength and femur/hip BMD were observed for mode, volume (sets and repetitions), and load. For example, strength improvements were significantly better following resistance training only (Fig. 6a) and enhanced with a higher number of sets, whereas improvements in femur/hip BMD were enhanced following resistance plus weight-bearing/impact-loading training, lower volumes, and higher loads. Program length had a minimal effect on both outcomes.	of 75–80% 1RM.			
Thomas F F Smart et al.	2022	systematic review and meta-analysis	37	The population was determined to be healthy older adults (male or female, aged over 60 years), Given the high	The intervention was defined as strength or resistance-based exercise training involving multiple training	A control group was defined as a group performing no exercise or a sham exercise intervention.	The primary outcome measures of CRF included were maximal oxygen consumption (VO2 Peak), 6-minute walking test (6MWT) distance and anaerobic threshold (AT).	**<u>Six-minute walk test</u>** There was an increase in 6MWT in the shorter (24 weeks and less) but not the longer (more than 24 weeks) studies. There was no evidence of statistical heterogeneity for either duration of intervention. There was no funnel plot asymmetry on visual inspection and there was no evidence of	In conclusion, this systematic review demonstrates that short-term RET improves CRF in healthy older adults, based on evidence using multiple measures of this health-related parameter. This finding, combined with the already established evidence base that RET improves muscle mass and function, suggests that	**GOOD** + protocol: PROSPERO ID: CRD42020223356 + rob2/risk of bias: The article includesrisk of bias + GRADE: GRADE level is stated	**<u>10.1093/ageing/afac143</u>**	**B** resistance exercise training on **6MWT** in healthy older adults: (11/13 outcomes) Under 24 weeks:

				prevalence of chronic diseases within the older population, studies were included if they included a participant with chronic illnesses; however, studies were excluded if participants were recruited according to a disease profile (e.g. a group of participants all suffering from chronic obstructive pulmonary disease or heart failure would be excluded).	sessions. (...) Studies with exercise programs longer than 24 weeks were included in separate sub-analysis to improve homogeneity between short-term and long-term studies.			possible publication bias on statistical testing. (...) The certainty of evidence was moderate for interventions less than 24 weeks given the number of studies included with no evidence of publication bias, however with high weighting on a single study with a high risk of bias concerns remain. VO2 peak Overall, there was a significant increase in VO2 peak with RET if the intervention was 24 weeks or less. There was no difference in VO2 peak with RET intervention periods longer than 24 weeks. There was no funnel plot asymmetry on visual inspection and there was no evidence of possible publication bias on statistical testing. There was considerable statistical heterogeneity when the intervention was 24 weeks or less, but not when the intervention was longer than 24 weeks. (...) The certainty of evidence was moderate to high due to no evidence of publication bias and narrow confidence intervals with a large sample size, however given the risk of bias across the papers some concerns remained.	RET should be an integral aspect of exercise promotion for an ageing population. Further, that 'lack of time' is a commonly cited barrier to exercise in older adults [76] and that older adults commonly face time-limited clinical pathways where improvements in physiological resilience have been shown to be beneficial (i.e. surgical prehabilitation [77]), RET may be able to elicit benefit in two key components of whole body health (i.e. muscle and CRF) in older adults.	+ sufficient number of studies (systematic review/meta-analysis): 37 = Enough for real conclusion			significant/INT + moderate disagreement (1) Over 24 weeks: Non-significant/INT + no disagreement
Liam T. Pearson et al.	2022	systematic review and meta-analysis	12	community-dwelling older adults aged≥60 years	Concentric muscle action. Participants must have been instructed to move "as fast as possible" during the concentric phase, or instructions of a similar description. A minimum four-week intervention	Comparison between RT performed whilst being encouraged to concentrically move as fast as possible (MIRT) vs. slow-to-moderate velocity (T-STR). Studies that reported pre- and post-intervention scores for changes in SPPB score.	**Primary outcome** measure was SPPB score, or any individual test derived from the SPPB tests (30-s chair stand (STS), timed-up-and-go (TUG), or balance testing). **Secondary outcomes** were dynamic leg press 1RM and knee-extension 1RM, 400-m (400 m) walk, 6-min walk test	**Leg press 1RM**: No statistical significance was found with the nine studies (237 participants) for changes in leg press. **30 s sit-to-stand (STS)**: Statistical significance was found for improvements in 30 s sit-to-stand scores, favouring T-STR **Timed-up-and-go (TUG)**: Statistical significance was found for improvements in TUG scores, favouring MIRT **400m walk**: There was no statistical significance (...). MIRT fell short of clinically meaningful difference by 0.6 s, with T-STR being over 10 s adrift. **6-minute walk test (6MWT)**: Statistical significance was severely lacking for improvements in 6MWT scores	In conclusion, this systematic review highlights the lack of sufficient and quality evidence for maximal-versus submaximal-intent resistance training on functional capacity and strength in community-dwelling older adults. **No statistical significance was present in combined FC outcomes** (p = 0.17), **but MIRT observed near-significance for improvements in strength** (p = 0.06). **Clinically meaningful improvements were observed in SPPB scores, showing potential for MIRT over T-STR resistance training recommendations** if further research continues to support these findings. (...). Due to the less time-consuming and lesser short-term and long-term fatiguing nature of MIRT over T-STR, MIRT has a greater chance of being adopted by the community-dwelling older adult community.	**POOR** - protocol: No clear protocol + rob2/risk of bias: The article includesrisk of bias - GRADE: GRADE level is not stated + sufficient number of studies (systematic review/meta-analysis): 12 = Enough for real conclusion	https://link.springer.com/article/10.1186/s13102-022-00526-x	**10.1186/s13102-022-00526-x**	**C** maximal-intent resistance training (MIRT) traditional strength training (T-STR) (8/9 outcomes) Leg press 1RM: No non-significant/very small benefit to MIRT + high disagreement (3) 30 s sit-to-stand (STS): significant/ T-STR + high disagreement (4) Timed-up-and-go (TUG): significant/MIRT + high disagreement (2) 400m walk: non-significant/benefit to MIRT + high disagreement (3/4 outcomes) 6-minute walk test (6MWT): non-significant/very small benefit to MIRT + high disagreement
Anoop T Balachandran et al.	2022	Systematic Review and Meta-analysis	20	healthy, community-living older adults (age ≥60 years). (mean age, 70.1 years; [65%] women)	**Power Training** vs Traditional Strength Training is associated with physical function improvement in older adults: resistance training (eg, machines, free weights, elastic tubing, weighted vests, or cycle ergometry) with instructions to move the resistance as fast as possible in the concentric	compared strength training with instructions to move the weight as fast as possible in the lifting phase with traditional strength training For the comparator group, we excluded nonstrength training control groups	Primary outcomes included physical function and self-reported physical function. Secondary outcomes included power, strength, muscle mass, walk speed, balance, and adverse effects.	For the primary outcomes, PT was associated with an improvement in physical function with low-certainty evidence in 13 RCTs (n = 383) (SMD, 0.30; 95% CI, 0.05-0.54) and self-reported function with low-certainty evidence in 3 RCTs (n = 85) (SMD, 0.38; 95% CI, -0.62 to 1.37). The evidence was downgraded by 2 levels for high risk of bias and imprecision for physical function and very serious imprecision for self-reported physical function. <u>**Primary Outcomes**</u> The main model for physical function revealed a small SMD, with moderate heterogeneity. The main model for self-reported physical function revealed a small SMD favoring PT, with moderate heterogeneity.	PT was associated with a modest improvement in physical function compared with traditional strength training in healthy, community-living older adults.	**GOOD** + protocol: PROSPERO ID: CRD42020149015 + rob2/risk of bias: The article includes Risk of bias + GRADE: GRADE level stated + sufficient number of studies (systematic review/meta-analysis): 20 = Enough for real conclusion		**10.1001/jamanetworkopen.2022.11623**	**C** PT: power training Traditional Strength Training (13) Primary Outcomes (33 outcomes): non-significant/PT + moderate disagreement. (3) self-reported physical function (4 outcomes): non-significant/PT + moderate disagreement

					phase			**<u>Secondary Outcomes</u>** For power, the main model for all pooled power outcomes revealed a moderate association favoring PT. For strength showed no association. Muscle mass and size showed no association. Gait speed showed no association. Balance showed no association.				
Édila Penna Pinheiro et al.	2022	systematic review and meta analysis	30	participants age >60 years, living in nursing homes or other institutions of long-term living facilities of geriatric care	Multicomponent and/or resistance training. Any combinations of at least 3 different exercise modalities in the weekly frequency of institutionalized older adults were considered as multicomponent training. Any that used some type of overload, which may or may not be associated with stretching/flexibility or balance/vibrating platform exercises, were considered as resistance training	usual care, sham interventions, social activities, or other exercise interventions.	outcome of at least 1 of the tests that assess physical performance, especially the Short Physical Performance Battery (SPPB), 30-second chair-stand (CST), and Timed Up and Go (TUG)	Multicomponent training and resistance training showed statistically significant difference (P ≤ .05) in the physical performance of institutionalized older adults compared with the control groups (usual care); this was evaluated with the Short Physical Performance Battery (+1.2 points; +2 points), 30-second chair-stand (approximately +3 repetitions; both), and Timed Up and Go (−4 seconds on mean; both) tests. Comparisons between multicomponent and resistance training did not show statistically significant differences in any of the physical outcomes evaluated.	meta-analysis shows that both training modalities improve functional parameters compared with the usual care group in the intermediate-term because most studies included in the meta-analysis had a follow-up close to 12 weeks. Moreover, we did not find statistical significant difference between multicomponent training and resistance training on physical performance tests in older adults, living in long-term care facilities. Therefore, both modalities improved the physical performance.	**POOR** + sufficient number of studies +/- protocol: "A protocol for our review was published in the international database of prospectively registered systematic reviews in health and social care (PROSPERO).51" - **but no ID foud** - rob2/risk of bias: The article does not clearly include Risk of bias - GRADE: The GRADE level is not clearly stated + sufficient number of studies (systematic review/meta-analysis): 30 = Enough for real conclusion	**10.1016/j.jamda.2022.06.009**	**B** + sufficient number of studies Short Physical Performance Battery (SPPB) SPPB in trials comparing physical training (4) multicomponent and (3) resistance training vs control (usual Care) = significant/both/INT (RT slightly better) + high agreement CST in trials comparing physical training (4) multicomponent and (3) and resistance training vs control (usual care); = significant/both/INT (SPPB slightly better) + high agreement TUG in trials comparing physical training (8) multicomponent and (3) resistance training vs control (usual care) = significant/both/INT (SPPB slightly better) + high agreement
Xiaorong Bai et al.	2022	systematic review	18	older adults participants healthy (not including obesity and frail)	aerobic exercise with other exercises such as strength/resistance, multi-component and aerobic exercise remain unknown. The purpose of this study is to examine the effects of combined aerobic exercise on physical performance among the elderly, as opposed to single aerobic exercise.	mix, or aerobic alone	Performance is defined as physical function aspects (such as strength, endurance, flexibility, speed and agility) associated with daily activities important in maintaining independence among older adults	. Studies have shown that aerobics combined resistance/strength training (CEX), multi-component training (ME), and dance combined training has positive and significant effects on the physical performance (upper body strength and lower body strength, dynamic balance, fall risk, mobility, gait, agility, flexibility) of the elderly. CEX had additional benefits compared to aerobic training (AER) and resistance/strength training (RES) in gait speed, lower limb strength, and trunk fat. Furthermore, CEX was more effective than AER in improving sitting and stretching, elbow flexion, knee flexion, shoulder flexion and stretching, strength and body fat, function reach test, 30-s chair standing test and 6-min walking test, self-evaluation of body function.	Therefore, the combination of multiple components contributes to the overall improvement in physical fitness of the elderly, thus preventing them from losing balance and reducing susceptibility to injury	**POOR** - protocol: no clear indication of protocol - rob2/risk of bias: The article does not clearly include risk of bias - but PEDro scale - GRADE: GRADE level is not stated + sufficient number of studies (systematic review/meta-analysis): 18 = Enough for real assessment	**10.3389/fphys.2021.798068**	
Claudio Di Lorito et al.	2021	systemic review and meta analysis	35	participants in the studies meta-analyzed were adults aged 65+ or had a mean age of 70+;	any type of exercise, including its duration, frequency, intensity, and mode of delivery;	control and intervention	Resistance training and multimodal exercises may improve general physical performance measures. The evidence for exercise interventions in reducing falls and fear of falling was inconsistent.	esistance training and multimodal exercises may improve general physical performance measures. The evidence for exercise interventions in reducing falls and fear of falling was inconsistent. The effect may depend on the place where the individual lives, whether the individual was part of a clinical group, the setting of the intervention, and the integration of additional strategies into the	This review found that exercise interventions for older adults are extremely diverse and that the findings from the included studies were mostly inconsistent	**POOR** - protocol: no clear indication of protocol - rob2/risk of bias: The article does not clearly include risk of bias - GRADE: GRADE level is not stated + sufficient number of studies (systematic	**<u>10.1016/j.jshs.2020.06.003</u>**	

								intervention, such as home modifications and nutritional supplementation. It was found, however, that multimodal exercise interventions reduced the risk of falling. The evidence regarding exercise in reducing falls-related injuries was inconsistent, and the effectiveness of interventions may depend on additional intervention components, such as environmental or visual assessments. Overall, our review showed that quality of life may be improved through some forms of exercise (whole-body vibration) and in some groups (healthy older adults) but not in others (people with frailty)		review/meta-analysis): 35 = Enough for real conclusion		
Darío Rodrigo-Mallorca	2021	systematic review and meta analysis	12	: Participants over 65 years, physically inactive, and characterized as healthy by the authors, defined as not achieving 150 min of moderate-to-vigorous-intensity physical activity per week or 75 min of vigorous-intensity physical activity per week or an equivalent combination of moderate and vigorous-intensity activity	ow-intensity blood flow restriction training (LI-BFR), based on the restriction of afferent and efferent blood flow during the performance of a low-intensity dynamic resistance exercise (20–50% of 1RM), causing a local hypoxia effect on the muscle using a pneumatic pressure cuff placed in the proximal region of the limb	Resistance training (RT) interventions were considered as any form of physical activity that is designed to improve muscular fitness by exercising a muscle or a muscle group against external resistance, performed systematically in terms of frequency, intensity, and duration, and is designed to maintain or enhance health-related outcomes. Resistance can come from fixed or free weights, elastic bands, body weight (against gravity), and water resistance. It may also involve static or isometric strength (holding a position or weight without moving against it). Often presented as a percentage of the participant's one-repetition maximum (1-RM), the maximum weight they can lift/move if they only must do it once [26].Randomized controlled trial (RCT) where the intervention was RT with a follow-up period of at least 4 weeks. RCT is understood as a study in which many similar people are randomly assigned to 2 (or more) groups to test a specific drug, treatment, or other intervention.	All studies that measured strength gains by direct RM test (kg) indicated significant improvements in weight lifted ($p < 0.05$). However, in the case of the studies that measured strength employing the MVC (Nm). the evidence is a bit more uncertain, as two of the seven studies that performed this test did not find significant improvements in strength ($p > 0.05$) , In the measurements concerning muscle mass of the included studies, those that measured changes in quadriceps thickness reported significant differences. however, for the lower limb, one study found no significant differences for adductors, hamstrings, and gluteus maximus [36]. In the case of upper extremities, one study reported significant differences in elbow flexor and extensor muscles. LI-BFR vs. RT Alone on Muscular Strength via RM Test As shown by Figure 5, when compared to resistance training alone, LI-BFR may have little to no effect in muscular strength measured by the RM test	We included 6 randomized controlled trials in the meta-analysis, revealing that low-intensity blood flow restriction led to larger significant improvements in muscular strength (MVC test) compared to traditional resistance training. This larger benefit was reduced to a trend when considering the effect on the muscle mass (cross-sectional area, in cm) and even disappeared when comparing differences in muscular strength improvements assessed utilizing the RM test. Particularly, all these outcomes shared a very low level of certainty due to poor quality study designs and disparities in the methodological approach.	The findings of this systematic review point out that strength training with blood flow restriction may induce increased muscular strength and muscle mass in non-active older adults, at least at a similar extent to that in the traditional high-intensity resistance training. However, caution should be when considering these findings, since the evidence is very uncertain about the effect of low-load BFR-RT when compared with RT alone on our outcomes	**GOOD** + protocol: PROSPERO ID: CRD42020214901 + rob2/risk of bias: The article includes Rob2 + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 12 = Enough for real conclusion	**10.3390/ijerph182111441**	**C** (4 studies, 9 outcomes) LI-BFR versus RT on muscular strength (RM test): non-significant/very small benefit to BFR + no disagreement. (3 studies, 12 outcomes) LI-BFR versus RT on muscular strength (MVC test): significant/very small benefit to BFR + high disagreement. (3 studies, 5 outcomes) LI-BFR versus RT on muscle mass: non-significant/very small benefit to BFR + moderate disagreement.

						One group (the experimental group) has the intervention being tested, the other (the comparison or control group) has an alternative intervention, a sham dummy intervention (placebo), or no intervention at all. The groups are followed up to see how effective the experimental intervention was. Outcomes are measured at specific times and any difference in response between the groups is assessed statistically. This method is also used to reduce bias.							
S E R Lim et al.	2021	systematic review	8	ommunity-dwelling older people aged ≥ 65 years	As an intervention, we selected any type of physical exercise defined as planned, structured, and repetitive physical activity with the final or intermediate aim of improving or maintaining physical fitness or health	Volunteer-led exercises. compared with any type of intervention or minimal or no intervention.	functional status measured using the short physical performance battery, timed up and go test, Barthel Index, single leg stand, step touch test, chair stand test, and functional reach	Volunteer-led exercises led to improvements in functional status measured using the short physical performance battery, timed up and go test, Barthel Index, single leg stand, step touch test, chair stand test, and functional reach. Frailty status identified by grip strength measurement or the use of long-term care insurance improved with volunteer-led exercises. Interventions led to improvement in fear of falls and maintained or improved the quality of life. The impact on PA levels were mixed.	Limited evidence suggests that volunteer-led PA interventions that include resistance exercise training, can improve outcomes of community-dwelling older adults including functional status, frailty status, and reduction in fear of falls	**POOR** + protocol: PROSPERO ID: CRD42020154607 - rob2/risk of bias: The article does not include Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 8 = Limited evidence: There may be enough for qualitative patterns.		**10.1007/s40520-020-01556-6**	
Silvia Caristia PhD, MSocSc, MHSc et al.	2021	systematic review and meta-analysis	32	community-dwelling apparently healthy people with a mean age ≥ 50 years	any type of physical exercise defined as planned, structured, and repetitive physical activity with the final or intermediate aim of improving or maintaining physical fitness or health	compared with any type of intervention or minimal or no intervention.	fallers, accidental falls, fear of falling, fractures from falls, people sustaining fractures from falls, and the occurrence of at least one fall.	Overall, 19 RCTs (28 comparisons) showed the effectiveness of exercises for fall reduction, When observing by type of exercise, the most effective was 3D exercises. This was followed by strength/resistance, multicomponent, and mixed exercises. This analysis did not show any effect of GBCFT exercises, and there was only one RCT about flexibility ,Five studies for seven comparisons reported an association between exercises and fear of falling and observed mixed exercises,42 strength/resistance,67 3D exercises,68,69 GBCFT,67 and endurance activity.70 However, only endurance exercises were effective (Fig. 5). Finally, only one study reported sufficient details about the health status of participants at baseline,42 showing none effect of mixed exercises 24 months from the baseline.	The aim of this SR and meta-analyses was to assess what type of exercise is associated with fall risk reduction among apparently healthy adults aged 50 years and older. The implication for clinical practice includes regular programs with a mix of exercises. Further studies regarding the effect of physical exercises on fall prevention among healthy senior citizens are needed.	**POOR** - protocol: "We conducted an SR and meta-analyses of RCTs reviewed by Cochrane SRs on the effects of exercises on accidental falls. The study protocol was planned according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis protocols guidelines (PRISMA-P) ,27 and the resulting report was written according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) .28,29 This SR is part of a wider review that focuses on the type of physical exercises effective for healthy aging in people over 50. The protocol was not registered." + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 32 = Enough for real conclusion		**10.1016/j.gerinurse.2021.06.001**	
Estele	20	syste	28	healthy older	The training	studies that	articles that	Comparisons were made	Both strength and	**ADEQUATE**	https://ww	**DOI:1**	**B**

Caroline Welter Meereis Lemos et al.	20	matic review and meta-analysis	adults 60 years or over residing in the community or in asylum institutions	performed should be only of strength or strength combined with other exercise modalities (multicomponent), with a total duration of at least 8 weeks and a weekly frequency of at least two sessions supervised by professionals.	did not have a control group which did not perform any type of exercise were not included	evaluated one or more of the following tests were included: TUG, BBS and 30-second sit-to-stand test (30STS) or five repetitions (5STS)	between control group and strength training, between control group and multicomponent training (which included strength training and some training associated with it) and between multicomponent training and strength training. **Timed up & go (TUG)** In the comparison of the effect of multicomponent training group to control group, it was observed that the multicomponent training significantly improved ($p<0.001$) the TUG test performance, reducing the time needed to perform the test in -1.48 seconds (95% CI -2.09; -0.88, $I^2 = 0\%$) compared to the control group (Figure 2a). When comparing the effect of the strength training groups to control groups, strength training did not improve significantly ($p=0.14$) the TUG performance [95% confidence interval (CI) -1.10, 0.15, $I^2 = 63\%$] (Figure 2b). Due to the fact that high heterogeneity occurred for this analysis, sensitivity analyses were performed. Through these analyses, it was not possible to identify which factor was related to the high heterogeneity, once that doing the analysis separately for studies that included only women or men or both, studies with different duration or different exercises did not reduce the heterogeneity. None of the included studies compared the effect of a multicomponent workout with a strength training for this outcome. **Sit-to-stand (30 seconds) - 30STS** Comparing the effect of a multicomponent training with control group, it was verified that the multicomponent training significantly improved ($p<0.001$) the performance of the 30STS test, increasing the number of repetitions performed in 1.79 repetitions (IC 95% 0.76, 2.83, $I^2 = 52\%$) (Figure 3a). In a sensitivity analysis, it was observed that when studies that included a balance component in the training (in addition to aerobic and strength exercises which were performed in all studies), were withdrawn from the analysis, the heterogeneity changed from moderate (52%) to low (0%), while still maintaining the significant difference between the control group and the multicomponent group. However, the improvement without these studies was lower (0.89 repetitions), showing that studies which also included balance exercises in the training program presented better results. Strength training compared to the control group significantly improved the performance of the 30STS test, increasing the number of repetitions performed in 2.51 repetitions (95% CI 0.98; 4.03; $I^2 = 0\%$) (Figure 3b). For the 30STS test only one study examined the effects of a strength training versus multicomponent workout. 8 Therefore, no meta-analysis was performed. It can be observed from the change between pre and post training that the group that trained only strength increased 3.00 repetitions in the test and that who trained strength and other exercises increased 2.90 repetitions, on average, after the training, both groups had a very similar improvement.	multicomponents exercises are good strategies to improve the functionality and decrease the risk of falls in older subjects, since both presented significant benefits when compared to the control group. However, multicomponent training demonstrated improvement in all outcomes analyzed in the present meta-analysis, while strength training showed benefit only for the 30STS outcome. As the comparison between the two types of training was performed in few studies, it is not possible to infer which is more effective for the functionality, suggesting the realization of new clinical trials.	+ protocol: PROSPERO ID: CRD42017071887 + rob2/risk of bias: The article includes Risk of bias - GRADE: No GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 28 = Enough for real conclusion	w.researchgate.net/publication/339800831_Influence_of_strength_training_and_multicomponent_training_on_the_functionality_of_older_adults_systematic_review_and_meta-analysis	**0.1590/1980-0037.2020v22e6070**	(4) Timed Up and Go (strength and control group): non-significant/INT + moderate disagreement (8) sit-to-stand (30 seconds) (strength and control group): significant/INT + no disagreement

								Sit-to-stand (5 repetitions)-5STS The multicomponent training group significantly improved the performance of the 5STS test, reducing the time to perform it in -2.29 seconds (95% CI -4.19, -0.39, I² = 0%) when compared to the control group (Figure 4a). Comparing strength training group to the control group, it was found that strength training did not improve significantly (p=0.16) the performance in the 5STS test (95% CI -1.90, 0.30, I² = 15%) (Figure 4b). There was no difference (p=0.56) between the effects of strength training versus multicomponent training for the 5STS test (95% CI -3.27, 1.78, I² = 0%) (Figure 4c). **Berg Balance Scale** It was verified that multicomponent training group significantly increased the performance of the Berg Balance Scale by 3.17 points (95% CI 0.77, 5.57, I² = 0%) compared to the control group (Figure 5). None of the included studies compared the effect of a multicomponent workout with a strength training for this outcome, nor of a strength training group comparison to a control group.			
Nejc Šarabon	2020	systemic review and meta analysis	63	Male or female older adults. The criterion for inclusion was mean sample age ≥ 65.0 years. Patients with sarcopenia were included if they met this criterion (age ≥ 65.0 years); however, sarcopenia was not an inclusion criterion.	RT, EMS, or WBW interventional programs of any duration. Studies exploring multimodal interventional programs (e.g., RT programs combined with stretching exercise) were excluded.	Control groups, receiving no intervention or placebo intervention. Groups that received cognitive training or other non-physical interventions were also accepted as control groups. Studies in which control groups received any type of exercise, vibration intervention, electrical stimulation, or nutritional supplementation were excluded.	(a) Muscular strength or power, not limited to type of testing or body part; (b) body composition and muscle architecture (including body fat, fat free mass, muscle mass, regional muscle mass, skeletal muscle mass, cross-sectional muscle area, circumference measures, and sarcopenia index) and (c) functional mobility outcomes (timed up-and-go test, stepping tests, sit-stand tests, functional reach tests, etc.)	The results showed that RT and WBV are comparably effective for improving muscle strength, while the effects of EMS remains debated. RT interventions also improved some outcome measures related to functional performance, as well as the cross-sectional area of the quadriceps. Muscle mass was not significantly affected by RT. A limitation of the review is the smaller number of WBV and particularly EMS studies. For this reason, the effects of WBV and EMS could not be comprehensively compared to the effect of RT for all outcome measures. For the moment, RT or combinations of RT and WBV or EMS, is probably the most reliable way to improve muscle strength and functional performance	It was found that RT and WBV are effective for increasing muscle strength, while the data was very limited for EMS. RT interventions also improve functional performance and increase muscle-cross sectional area but have no effect on muscle mass.	**POOR** - protocol: no clear indication of protocol - rob2/risk of bias: The article does not include Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 63 = Enough for real conclusion	10.3390/jcm9092902
Lucas Bet da Rosa Orssatto et al	2019	sysstemic review and meta analysis	15	Participants aged ≥60 years	resistance training based intervention for lower limbs	resistance training performed with moderate concentric velocity (duration of concentric phase ≥2 s), versus training performed with the intention of maximising concentric velocity (i.e., as fast as possible); Outcome: at least one functional test for lower	t least one functional test for lower limbs, with pre- and post-intervention measurements;	The results presented heterogeneity and small-studies publication bias, leading to a biased advantage for fast-intended-velocity resistance training (95%CI = 0.18, 0.65; I2 = 45%). Short physical performance battery indicated an advantage for fast-intended-velocity resistance training (95%CI = 0.10, 0.94; I2 = 0%). There was no difference for timed up and go (95%CI = -0.07, 0.94; I2 = 48%), 30-s chair stand (95%CI = -0.24, 1.39; I2 = 71%), 5-times chair stand (95%CI = -1.63, 1.27; I2 = 57%) stair climb (95%CI = -1.89, 2.81; I2 = 0%), short walk (95%CI = -0.99, 0.96; I2 = 21%) and long walk (95%CI = -0.59, 1.00; I2 = 0%).	These results suggest that there is inconclusive evidence to support the superiority of fast-intended-velocity resistance training to improve functional capacity when compared to moderate-velocity resistance training. These results may have been influenced by the lack of high-quality and pre-registered studies, high heterogeneity, and small-studies publication bias.	**ADEQUATE** + protocol: PROSPERO ID: CRD42019122251 + rob2/risk of bias: The article includes Risk of bias - GRADE: No GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 15 = Enough for real conclusion	10.1016/j.exger.2019.110731

						limbs, with pre- and post-intervention measurements;					
Renato Gorga Bandeira de Mello et al.	2019	systemic review	5	elderly (>65 years) with diagnosed sarcopenia	RCT testing effects of physical exercise programs	ompared to those of a physically inactive control group on sarcopenia clinical variables in elderly populations previously diagnosed with sarcopenia	Muscle mass, Skeletal muscle mass,Muscle quality,Physical capacity and function outcomes Timed Up and Go (TUG in s); gait speed (GS in m/s) Quality of life (qol measured	Muscle mass was only significantly improved in the RCT conducted by Liao et al. [7] Sarcopenic elder patients submitted to 12 weeks intervention of resistance training (RT) gained almost 1 kg of appendicular muscle mass (AMM) compared to the control group. All other 4 studies did not show muscle mass differences compared to control. However, when muscle quality was analyzed, significant results were found by both Strasser et al. [6] and Liao et al. [7]. Kim et al. did not access the muscle quality in neither 3 studies. Muscle strength was not improved after RT intervention.RT exercise protocols significantly improved the muscle function measured by gait speed (GS) as well as by the Timed Up and Go test (TUG) in 3 of 5 studies as described in Table 3. Kim et al. [8, 9] did not evidence the muscle function improvement after RT.In [7], quality of life was accessed before and after exercise interventions and it was possible to show significant improvement in QoL in the RT group when compared to control (mean difference 13.62 (6.47, 20.76); P < 0.001), especially a relevant difference in the physical component of the SF-36 questionnaire	RCTs results according to sarcopenia component varied significantly. Only one study evidenced muscle mass gain; muscle quality, on the other hand, was improved in both studies that this factor was measured. Although effects over muscle strength and muscle mass were not clear, muscle function—walking speed and Timed Up and Go test—was homogeneously improved among studies, but the size effect seems to be limited.	**POOR** - protocol: "This systematic review protocol followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) recommendations [5]." **but cannot know if the protocol was registered in advance** + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 5 = Limited evidence: There may be enough for qualitative patterns	10.1155/2019/1959486
Christoph Centner et al	2019	systemic review and meta analysis	11	subjects were healthy older people (aged > 50 years)	he study design allowed comparisons between resistance training with and without vascular occlusion [HL (> 70% 1RM) or LL (< 50% 1RM) resistance training] or between walking with and without simultaneous BFR,	muscle mass and/or strength were assessed pre- and post-training.	muscle mass and strength	Our results revealed that during both low-load training and walking, the addition of BFR elicits significantly greater improvements in muscular strength with pooled effect sizes (ES) of 2.16 (95% CI 1.61 to 2.70) and 3.09 (95% CI 2.04 to 4.14), respectively. Muscle mass was also increased when comparing walking with and without BFR [ES 1.82 (95% CI 1.32 to 2.32)]. In comparison with high-load training, LL-BFR promotes similar muscle hypertrophy [ES 0.21 (95% CI - 0.14 to 0.56)] but lower strength gains [ES - 0.42 (95% CI - 0.70 to - 0.14)].	This systematic review and meta-analysis reveals that LL-BFR and walking with BFR is an effective interventional approach to stimulate muscle hypertrophy and strength gains in older populations	**ADEQUATE** + protocol: PROSPERO ID: CRD42018089980 + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 11 = Enough for real conclusion	10.1007/s40279-018-0994-1
Pedrode Camargo Guizelini et al.	2018	systemic review and meta analysis	10	health individuals with a mean age ≥ 60 years	control and intervention groups	studies that included a test to determine maximal strength and RFD pre- and post-training	were muscle strength and RFD	The resistance training program had a moderate beneficial effect on both muscle strength. Results of the meta-regression revealed that the variables age, training type (i.e., strength and explosive), training duration (4–16 weeks) and sessions per week had no significant effects on muscle strength and RFD improvement. Moreover, there was no significant relationship (p = 0.073) between the changes in muscle strength and RFD.	It can be concluded that explosive training and heavy strength training are effective resistance training methods aiming to improve both muscle strength and RFD after short-to-medium training period. However, muscle strength and RFD seem to adapt differently to resistance training programs, suggesting caution for their interchangeable use in clinical assessments of the elderly.	**POOR/ADEQUATE** + protocol: PROSPERO ID: CRD42019122251 +/- rob2/risk of bias: The article includes PEDro quality scores "for the 10 studies were good and very similar, ranging from 6 to 7 points" - but not rob2 or risk of bias - GRADE: GRADE level not stated. + sufficient number of studies (systematic review/meta-analysis): 10 = sufficient for real conclusion	10.1016/j.exger.2017.11.020
Chih-Chin Lai	2018	systemic review an network meta analysis	30	Adults aged 60 and over.	. The exercise intervention protocols were classified in accordance with the American College of Sports Medicine recommendations for older adults	n the usual care control group, trials incorporating a placebo-based intervention were also included (education, stretching, etc.	outcomes of lean body mass, strength or physical performance.	No significant differences were found between the effects of exercise or usual care on lean body mass. Resistance training (minimum 6 weeks duration) achieved greater muscle strength improvement than did usual care (12.8 kg; 95% confidence interval [CI]: 8.5-17.0 kg). Resistance training and whole-body vibration were associated with greater physical performance improvement	Resistance training is the most effect intervention to improve muscle strength and physical performance in older people. Our findings also suggest that whole-body vibration is beneficial for physical performance. However, none of the three exercise interventions examined had a significant effect on lean body mass.	**ADEQUATE/POOR** +/- protocol: "used a predetermined protocol" - "Complete details of the electronic search strategy and protocol are reported in Supplementary Table S1, Supplementary Material S1 are available in Age and Ageing online and on	10.1093/ageing/afy009

								compared with usual care (2.6 times greater [95% CI: 1.3-3.9] and 2.1 times greater [95% CI: 0.5-3.7], respectively).		the departmental website (http://ah.ntu.edu.tw/web/Teacher!one.action?tid = 545#researcher-tab-2)." **link does not work** + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 10 = Enough for real conclusion		
Anneka Elizabeth Antoniak & Carolyn A Greig	2017	systematic review and meta-analysis	7	male and/or female participants (aged ≥65 years or mean age ≥65 years)	enlisted RET and vitamin D3 supplementation (studies using vitamin D3 and calcium supplementation were included)	compared results with a control group (sedentary/usual care/no vitamin D3 supplementation)	included measures of muscle strength, function, muscle power, body composition, serum vitamin D/calcium status or quality of life	mangler	This review provides tentative support for the additive effect of combined RET (resistance exercise training) and vitamin D3 supplementation for the improvement of muscle strength in older adults. For other aspects of musculoskeletal function, such as SPPB and TUG, no additional benefit beyond that gained from exercise training was found. This review showed no evidence of benefit of vitamin D3 supplementation alone, however, few studies were identified during the literature search, highlighting that further evidence is required to draw any firm conclusions or make explicit recommendations regarding vitamin D3 supplementation for musculoskeletal health and function in older adults. Our recommendations to enable future studies to definitively answer questions regarding the additive effects of the combined vitamin D3 supplementation and RET include common outcomes relevant to the condition studied, for example, the SPPB, 400 m walk and gait speed are recommended to assess physical performance,53 which would allow for a more detailed assessment of results. Additionally, exercise interventions of similar durations would allow for a more accurate comparison between studies; it has been suggested that interventions with older adults should be of a minimum duration of 3 months to obtain significant differences in relevant outcomes.53 Reporting of confounding factors would allow for adjustment of results via the use of covariates, for example, objective measures of physical activity using accelerometers, baseline serum vitamin D3 status and participant characteristics, which may bias the participant pool. Separate analysis of male and female participants, or the addition of sex as a covariate in any analysis models would help to address sex-related differences in performance. Regarding study design, four-armed RCT studies are best placed to answer combined effects research questions, that is, exercise intervention, vitamin D intervention, both exercise and vitamin D, neither exercise nor vitamin D (true control). A true control group was lacking from a number of the included studies within this review.	**ADEQUATE** + protocol: "The review was informed by a preregistered protocol (http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015020157)." + rob2/risk of bias: The article includes Risk of bias + GRADE: GRADE level is stated - Enough studies (systematic review/meta-analysis): 7 = Some evidence, but not robust	**Exclude**: Cannot isolate the effect of strength training. Studies are divided into two groups: Group 1: Vitamin D3 + training vs training alone → Here you can isolate the effect of vitamin D. Group 2: Vitamin D3 + training vs vitamin D alone → Here you can isolate the effect of training + vitamin D	10.1136/bmjopen-2016-014619
Assaf Buch et al.	2017	systemic review	10	CRT was applied in diverse older adult	CRT sessions typically involved 10 exercises,	The meta-analysis found that CRT led to significant	CRT led to a modest increase in upper body strength (1.14 kg) and a larger	Upper body strength modestly increased, by 1.14kg (95% CI; 0.28-2.00), whereas larger increment was seen in lower	CRT is a valid alternative to conventional RT. Its shorter duration and lower intensity relative to traditional RT, may	**POOR** - protocol: "The full protocol of this study		10.1016/j.arr.2017.04.003

		and meta analysis		populations, including those with conditions like obesity, hypertension, heart disease, diabetes, and stroke	each targeting a different muscle group with 12-15 repetitions.The intensity of the CRT exercises was usually moderate, around 40-60% of the 1-rep max.	improvements in upper and lower body strength compared to control groups that did not receive CRT	increase in lower body strength (11.99 kg) compared to control groups.The overall effect of CRT on LBM was moderate (2 kg) but not statistically significant. The pooled change in peak oxygen consumption with CRT was 1.28 ml/kg/min, which did not reach statistical significance.	body strength (11.99; 2.92-21.06). Higher program volume (>24 sessions) positively influenced upper body strength and aerobic capacity.	increase adherence to training in older adults	includes this manuscript as well as the online supplementary data and was not a priori published." + rob2/risk of bias: The article includes PEDro quality scores "for the 10 studies were good and very similar, ranging from 6 to 7 points" - GRADE: GRADE level not stated + link does not work + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 10 = Enough for real conclusion robust studies (systematic review/meta-analysis): 10 = Enough for real conclusion	
Arun Kumar et al.	2016	systemic review and meta analysis	30	community-living people aged ≥65.	Exercise interventions included gait, balance and function; strength or resistance; flexibility; 3-dimensional (e.g. Tai Chi) and endurance	The comparators of interest were usual care and non-exercise interventions such as education.	Fear of falling: single-item question (e.g. Are you afraid of falling?). alls efficacy: the Falls Efficacy Scale FES [18], mFES [19], rFES [20] and FES-UK [21]. Balance confidence: the Activities-specific Balance Confidence scale (ABC) [22] and the ABC-UK [21]. Concern about falling: the FES-I [23], Short FES-I [24], Mobility Efficacy Scale (MES) [25], aFES [25] and amFES [25. Worry about falling: the Survey of Activities and Fear of Falling in the Elderly (SAFFE).	Meta-analyses showed a small to moderate effect of exercise interventions on reducing fear of falling immediately post-intervention (standardised mean difference (SMD) 0.37, 95% CI 0.18, 0.56; 24 studies; low-quality evidence). There was a small, but not statistically significant effect in the longer term (<6 months (SMD 0.17, 95% CI -0.05, 0.38 (four studies) and ≥6 months post-intervention SMD 0.20, 95% CI -0.01, 0.41 (three studies))	exercise interventions probably reduce fear of falling to a small to moderate degree immediately post-intervention in community-living older people. The high risk of bias in most included trials suggests findings should be interpreted with caution.	**ADEQUATE** + protocol: "Our review was undertaken as a Cochrane systematic review, and full details are reported in the published review [17]. The protocol is available from http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD009848/full." + rob2/risk of bias: The article includes Risk of bias - GRADE: No GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 30 = Enough for real conclusion	10.1093/ageing/afw036
Tibor Hortobágyi et al.	2015	systematic review and meta analysis	42	human species, journal articles, clinical trials, randomized controlled trials, English as publication language, and age ≥65 years	resistance training, (2) power training, (3) coordination training, and (4) multimodal training and search term variants within each category	ntervention and control groups	outcome term, focusing on gait speed and its variant	Of the three interventions, resistance and coordination training improved habitual gait speed similarly (0.09 vs. 0.08 m/s or 6.8 vs. 6.3 %), with resistance training having nearly twice the ES (1.15 vs. 0.66). Multimodal training had an ES of 0.77 (change of 0.05 m/s and 4.4 %). All three interventions improved fast gait speed numerically identically by 0.12 m/s. Resistance, coordination, and multimodal training improved fast gait speed by 9.0 % (ES: 0.90), 8.7 % (0.73), and 10.5 % (0.94), respectively.	Based on data from 42 studies, the overall increase in gait speed was 0.10 m/s or 8.4 % with a large ES of 0.84 in 2495 healthy old adults aged 74.2 years. Additional analyses revealed that resistance (0.09 m/s, 6.8 %) and coordination training (0.08 m/s, 6.3 %) were somewhat more effective than multimodal training (0.05 m/s, 4.4 %) to increase habitual gait speed, but all three modalities increased fast gait speed dramatically and numerically identically	**POOR** - protocol: No clearly stated protocol - rob2/risk of bias: The article does not include Risk of bias - GRADE: GRADE level is not stated, not detailed enough to assess methodological rigor. + sufficient number of studies (systematic review/meta-analysis): 42 = Enough for real conclusion	10.1007/s40279-015-0371-2
Renske Van Abbema et al.	2015	systematic review and meta - analysis	25	≥65 years, without serious illness (2389 participants with a mean age of 75.8)	Different types or combinations of training interventions on improving preferred walking speed	compared an exercise intervention with no intervention (usual activity) or a control type of intervention consisting of general health education classes, general stretching, or	The pooled change in peak oxygen consumption with CRT was 1.28 ml/kg/min, which did not reach statistical significance. 3	Data from six types or combinations of exercise interventions were pooled into sub-analyses. First, there is a significant positive meta-effect of resistance training progressed to 70-80 % of 1RM on preferred gait speed of 0.13 [CI 95 % 0.09-0.16] m/s. The difference between intervention- and control groups shows a substantial meaningful change (>0.1 m/s). (...) Thirdly, there is a small significant positive meta-effect of	Progressive resistance training with high intensities, is the most effective exercise modality for improving preferred gait speed. Sufficient muscle strength seems an important condition for improving preferred gait speed. The addition of balance-, and/or endurance training does not contribute to the significant positive effects of progressive resistance training.	**POOR** - protocol: No clearly stated protocol - rob2/risk of bias: The article does not include Risk of bias - GRADE: GRADE level not stated, not detailed enough to assess methodological rigor. + sufficient number of	DOI: 10.1186/s12877-015-0061-9

						social visits. We only included control interventions that performed general or upper body stretching exercise not aiming to specifically increase range of motion in hips and ankles in order to improve step length, and thereby gait speed		progressive resistance training, combined with balance-, and endurance training of 0.05 [CI 95 % 0.00-0.09] m/s. The other sub-analyses show non-significant small positive meta-affects.		studies (systematic review/meta-analysis): 25 = Enough for real conclusion			
Ron Borde et al.	2015	systematic review and meta analysis	25	healthy subjects who were aged ≥60 years, with a study mean age ≥65 years	machine-based RT containing a description of at least one training variable (e.g., training intensity)	non-physically active (e.g., health education, no intervention) control groups	t least one proxy of muscle strength [e.g., 1RM, maximum voluntary contraction under isometric conditions (MVC)] and/or muscle morphology [e.g., CSA (cm2, mm), volume (kg, cm3), thickness (mm)]	Meta-regression of data from 25 studies revealed that a resistance training (RT) program with the goal to increase healthy old adults' muscle strength is characterized by a training period of 50–53 weeks, a training intensity of 70–79 % of the one-repetition maximum (1RM), a time under tension of 6 s per repetition, and a rest in between sets of 60 s. Selecting a training frequency of two sessions per week, a training volume of two to three sets per exercise, seven to nine repetitions per set, and a rest of 4.0 s between repetitions could also improve efficacy of training.	This systematic literature review and meta-analysis confirmed the effectiveness of RT on specific measures of upper and lower extremity muscle strength and muscle morphology in healthy old adults. In addition, we were able to extract dose–response relationships for key training variables (i.e., volume, intensity, rest), informing clinicians and practitioners to design effective RTs for muscle strength and morphology. Training period, intensity, time under tension, and rest in between sets play an important role in improving muscle strength and morphology and should be implemented in exercise training programs targeting healthy old adults.	**POOR** - protocol: No clearly stated protocol - rob2/risk of bias: The article does not include a clear Risk of bias - GRADE: No GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 25 = Enough for real conclusion		10.1007/s40279-015-0385-9	

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Li Hua-Rui et al.	2025	systematic review and Bayesian model-based network meta-analysis	13	older adults with sarcopenia	Resistance Training as intervention,	the control group (CON) included non-intervention, regular daily activities, health education or usual care.	To be considered, had to include the outcome measures of muscle strength: handgrip strength.	the optimal dose of resistance training to improve handgrip strength in older adults with sarcopenia is 3 times per week, 49% 1RM, 19 weeks, 15 exercises, 16 reps, 6 sets, 1,400 reps/week A total of 13 studies involving 711 participants (mean age: 68.29 ± 5.30 years; mean BMI: 24.03 ± 3.43; female: 79.5%) were included in this study. The results of our network meta-analysis showed that resistance training variables (e.g., frequency, intensity, period, and training volume) were effective in improving handgrip strength in older patients with sarcopenia. Among them, the effective dose range for frequency of resistance training was 2-5 times/week, resistance training intensity was 30%-75%, resistance training period was 4-24 weeks, resistance training exercise was 3-17 exercises per set, resistance training repetitions was 10-24 reps, resistance training sets was 2-8 sets, resistance training volume was 528-2,200 reps per week. The optimal dose	Resistance training effectively improves handgrip strength in older adults with sarcopenia. A recommended 19-week program includes 3 sessions per week at 49% 1RM, featuring 15 exercises per set, 6 sets, and 16 repetitions per exercise, totaling up to 1,400 reps weekly. This systematic review and meta-analysis identified a dose-response relationship between different variables of resistance training and handgrip strength in older adults with sarcopenia, that confirmed our initial research hypothesis that each training variable has an optimal window for maximizing handgrip strength. Our findings support that resistance training can effectively improves handgrip strength in older adults with sarcopenia. A recommended 19-week program (MD = 7.87, 95% CrI [3.89, 11.85]) includes 3 sessions per week (MD = 7.02, 95% CrI [4.62, 9.42]) at 49% 1RM (MD = 7.11, 95% CrI [2.69, 11.52]), featuring 15 exercises per set (MD = 8.16, 95% CrI [3.65, 12.66]), 6 sets (MD = 8.63; 95% CrI [5.06, 12.21]), and 16 repetitions per exercise (MD = 7.62; 95% CrI [4.77, 10.46]), totaling up to 1,400 reps weekly (MD = 8.45; 95% CrI [5.50, 11.40]). In addition, errors in data recording and fitting models to experimental data can introduce uncertainty to the estimation results. Therefore, this study aimed to establish quantitative analysis evidence of resistance training dose and grip strength enhancement in order to guide elderly patients with sarcopenia on how to scientifically	**POOR** - protocol: PROSPERO ID: CRD4202024618543- BUT no results when searching - rob2/risk of bias: The article does not include a clear risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 13 = Enough for conclusion		10.3389/fphys.2025.1564988	

								of resistance training to improve handgrip strength in older adults with sarcopenia is 3 times per week (MD = 7.02, 95% CrI [4.62, 9.42]), 49% 1RM (MD = 7.11, 95% CrI [2.69, 11.52]), 19 weeks (MD = 7.87, 95% CrI [3.89, 11.85]), 15 exercises (MD = 8.16, 95% CrI [3.65, 12.66]), 16 reps (MD = 7.62; 95% CrI [4.77, 10.46]), 6 sets (MD = 8.63; 95% CrI [5.06, 12.21]), 1,400 reps/week (MD = 8.45; 95% CrI [5.50, 11.40]).	perform resistance training to enhance handgrip strength.			
Ruiqing Sun et al.	2025	meta analyse	22	(aged 64.8 ± 3.0 to 86.1 ± 8.2) the cases where eligibility criteria were of people Someone received a sarcopenia diagnosis based on the consensus definitions and lifespan less than or equal to 60 years old	the intervention group involved RT and included a description of at least one training variable	a comparison or control group that faced no exercise or performed only health education training;	with at least one proxy of body composition (e.g., muscle mass, BF%), or muscle strength (e.g., HS, KES), or biomarkers	The impact of RT on muscle strength was assessed using the 30-second chair stand test (CST-30 s), HS, and KES. Overall, the findings indicated that RT had a large effect size on HS.but no impact on CST-30 s. Regarding the training variables, meta-regression analysis revealed that the training intensity (Fig. 7A, p = 0.01) and number of sets (Fig. 7B, p = 0.04) were significant predictors of the effect of RT on HS	Overall, compared to the non-exercise group, the results with the RT group suggested a significant and systematic training effect of RT on HS, KES	**ADEQUATE** + protocol: PROSPERO ID: CRD42023395062 + rob2/risk of bias: The article includes RoB 2 - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 22 = Enough to conclude	10.1016/j.archger.2024.105595	**C** (12) relative muscle mass: significant/INT + high disagreement. (7) Absolute muscle mass: significant/INT + moderate disagreement. (12) Hand strength: significant/INT + low disagreement. (4/ n = 143) 30-sec chair stand test: non-significant/INT high disagreement

Di Peng et al.	2024	systematic review and meta analysis	13	In the older people aged over 70 years with sarcopenia,	more than 10 weeks of resistance training (RT)	participants randomized into the intervention and control groups	muscle structure, muscle function, and bone mineral density (BMD) assessment of muscle structure, including muscle mass or fat mass or muscle CSA or skeletal muscle mass index (SMI) or body mass index (BMI); muscle function, including muscle strength, or natural gait speed, or maximum gait speed, balance or SPPB; BMD; quality of life (QoL);	The combination of exercise and nutrition improves muscle strength and physical performance, but the effects are similar to those of exercise alone. It is not yet clear whether nutritional intervention alone improves sarcopenia indicators in older adults. Handgrip strength significantly differed between the exercise training group with or without nutrition and the control group (MD = 1.67 kg; 95 % CI: 0.3 to 3.04; P = 0.02; I2 = 57 %. A significant difference in chair stand test was found between the exercise training group with or without nutrition and the control group (SMD = 0.40; 95 % CI: 0.13 to 0.67; P = 0.02; I2 = 2 %, Fig. 4B). No difference in usual gait speed or maximum gait speed was found between RT group with or without nutrition and the control group.No difference in balance was found between exercise training group with or without nutrition and the control group (Fig. 4D). No difference in SPPB was found between the exercise training group with or without nutrition and the control group (Fig. 4E).No significant difference in BMD was found between the experimental and control groups (Fig. 5). No difference in QoL was found between RT with or without nutrition and control groups (Appendix S3.1). No significant difference in BMI was found between the experimental and control groups (Appendix S3.2).The meta-analysis found a significant effect of RT on SMI (MD = 1.67 kg/m2; 95 % CI: 0.15 to 0.48; P = 0.0002; I2 = 0 %, (Appendix S3.3). The meta-analysis found no significant effect of RT on body weight (MD = -0.58 kg; 95 % CI: -3.13 to 1.97; P = 0.65; I2 = 0 %, (Appendix S3.4). In a subgroup analysis with only the other guideline not AWGS or EWGSOP, RT showed a significant effect on isometric muscle strength (SMD = 0.78; 95 % CI: 0.17 to 1.39; P = 0.01; I2 = 65 %).When only exercise within 6 months was included, RT showed a significant effect on handgrip strength (MD = 3.34 kg; 95 % CI: 1.40 to 5.27; P = 0.0007; I2 = 19 %; Appendix S4.2.1) and on chair stand test (SMD = 0.76; 95 % CI: 0.31 to 1.20; P = 0.0008; I2 = 0 %; Appendix S4.2.3.	This systematic review indicated that RT over 10 weeks did not increase muscle structure in the elderly over 70 years old with sarcopenia This systematic review and meta-analysis found that RT for more than 10 weeks can improve handgrip strength, isometric strength, and chair stand test performance of older people with sarcopenia over 70 years old. Resistance exercise improved SMI among elderly with sarcopenia. However, no significant changes were found in usual gait speed, maximum gait speed, SPPB, and BMD outcomes after RT of over 10 weeks. These findings can be used to guide the optimal RT treatment among older adults with sarcopenia in clinical nursing. Further research is necessary on the effects of RT on muscle structure and muscle function in this group.	**ADEQUATE** + protocol: PROSPERO ID: CRD42023453866 + rob2/risk of bias: The article includes rob2 - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 13 = Enough for conclusion	10.1016/j.gerinurse.2024.09.016	**C** (n = 2.079) (6/ n = 250) muscle mass: not significant/INT + moderate disagreement. (8/ n =) Handgrip strength: significant/INT + Substantial disagreement. (8/ n =) isometric muscle strength: significant/INT + low disagreement. (6/ n = 224) Chair stand test: significant/INT + low disagreement. (9 (8+3) / n = 355) Usual gait speed and maximum gait speed: not significant/INT + moderate disagreement. (5/ n = 192) Balance: not significant/INT + no disagreement. (4/ n = 1630) SPPB: not significant/INT + moderate disagreement

Yihan Mo et al.	2024	systematic review	21	mean ages ranging from 72.5 to 90.4 years with at risk of sarcopenia or with sarcopenia. Study settings are LTCFs (e.g., residential care homes and nursing homes)	interventions target sedentary behaviour and/or physical inactivity The objectives of this study are to (1) identify, appraise and synthesize the published evidence on interventions targeting sedentary behaviour and physical inactivity in LTCFs for sarcopenia; (2) construct a Theory of Change logic model with the findings to inform complex sarcopenia intervention development; and (3) identify areas for improvement and propose recommendations. // Resultatet inkluderer opbygning af en Theory of Change logic model for, hvordan disse interventioner virker i konteksten af plejeboliger **Characteristics of the included interventions** Several types of interventions targeting sedentary behaviour and physical inactivity for sarcopenia in LTCFs were identified, including **resistance exercise alone** (n = 9); **multicomponent exercise**, which is resistance training combined with aerobic exercise, balance training and/or endurance training (n = 6); **whole-body vibration** training (n = 3); **aerobic exercise** combined with traditional **Chinese medicine exercise** (n = 1) or **cognitive training** elements (n = 1); and **sit-to-stand** training (n = 1). Over half of the included studies performed the intervention three times a week for 12 weeks. Two studies performing	Study types are intervention studies with a comparator (e.g., randomized control trials [RCTs], quasi-experimental trials and pilots) or intervention studies with no comparators (e.g., single-arm pretest–posttest intervention trials)	developed/modified intervention and informed/trained participants. Fokus er især på at håndtere Sarcopenia via interventioner som fx styrketræning, uddannelse, tilrettelæggelse og motivation.	The overall risk of bias in the included studies was moderate. **Interventions primarily targeted physical inactivity, with resistance training being the most common intervention type.** The reporting of intervention adherence was insufficient (only 11 out of 21 included studies provided adherence reports), and adherence overall and by intervention type was not possible to discern due to inconsistent criteria for high adherence across these studies. Four categories of intervention input were identified: **educational resources; exercise equipment and accessories; monitoring and tailoring tools; and motivational strategies**. Intervention activities fell into five categories: **determining the intervention plan; educating; tailoring; organizing, supervising, assisting and motivating; and monitoring.** While sarcopenia-related indicators were commonly used as desired outcomes, intermediate outcomes (i.e., sedentary time and physical activity level) and other long-term outcomes (i.e., economic outcomes) were less considered. Contextual factors affecting intervention use included participant characteristics (i.e., medical condition and education level) and intervention provider characteristics (i.e., trustworthiness).	A novel logic model was devised to depict the components of interventions aimed at addressing sedentary behaviour and physical inactivity to manage sarcopenia in LTCFs. It identifies areas for enhancing these interventions, including the adoption of guidelines tailored for LTCF residents, increased focus on addressing sedentary behaviour and enhancing adherence through improved education, monitoring, tailoring and motivation. Additionally, it recommends developing a standardized set of outcome measures for future sarcopenia interventions in LTCFs. Resultatet inkluderer opbygning af en *Theory of Change logic* model for, hvordan disse interventioner virker i konteksten af plejeboliger	**ADEQUATE** + protocol: PROSPERO ID: CRD42023394385 + rob2/risk of bias: The article includes risk and bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 21 = Sufficient to assess	10.1002/jcsm.13576

	tailored multicomponent exercise with intervention provided 5 days per week, 54 , 56 and one study performing sit-to-stand intervention provided 7 days per week. 46 Among the included studies, the shortest duration of exercise was 4 weeks (n = 1), 56 and the longest was 48 weeks (n = 2) The proportion of female participants ranged from 8.0% to 100.0%. The applied sarcopenia diagnosis criteria varied, including those of the Asian Working Group for Sarcopenia and the European Working Group on Sarcopenia in Older People.	

Yanjiao Shen et al.	2023	systematic review and network meta-analysis	42	The median age was 72.9 (inter-quartile range [IQR]: 69–79.5) years, median female proportion was 73.3% (50–100%)	intervention group (moderate-intensity exercise including aerobic, resistance and balance exercise plus nutrition)	the lifestyle education control group: RCTs with parallel arms if they compared any type of exercise with any type of nutrition, placebo or usual care in older adults (age ≥60 years) with sarcopenia	(1) critical outcomes: all-cause mortality, quality of life, falls, any adverse events, muscle strength (handgrip strength) and physical performance (usual gait speed, TUG test and five-repetition chair stand test) and (2) important but surrogate outcomes: knee extension strength, maximal gait speed and muscle mass (appendicular skeletal muscle mass index [ASMI], skeletal muscle mass index [SMI], appendicular skeletal muscle mass [ASM], fat-free mass and fat mass, and skeletal muscle mass [SMM]).	**Quality of life** Overall, exercise with nutrition or without nutrition is effective for improving quality of life compared to intervention without exercise. **Resistance exercise with or without nutrition and the combination of resistance and aerobic and balance exercise** are the most effective interventions for improving the quality of life compared to usual care (e.g., resistance exercise alone vs. usual care: SMD: 1.11, 95% CI: 0.54 to 1.68, high certainty; details in Figures 3 and 4). **Muscle strength: handgrip strength** Moderate certainty evidence showed that **resistance exercise alone and the combination of resistance and aerobic exercise with nutrition** are the most effective interventions for improving handgrip strength. Nutrition added to exercise shows larger effect sizes than exercise alone. The effect sizes of nutrition added to resistance exercise alone (MD: 3.93 kg, 95% CI: 2.22 to 5.65, high certainty) or the combination of resistance and balance exercise (MD: 4.19 kg, 95% CI: 2.55 to 5.83, moderate) may exceed the pre-set MID threshold for handgrip strength (Figure 4 and Appendix S5.3). **Physical performance** On usual gait speed. Adding nutrition to exercise showed similar effect sizes to exercise alone on physical performance measures. Moderate certainty evidence showed that **resistance and balance exercise with or without nutrition are the most effective** interventions for improving physical function measured by usual gait speed. Their effect size probably exceeds the MID threshold. **Resistance exercise with or without nutrition** are the intermediately effective interventions for improving usual gait speed, and their effect size probably exceeds the pre-set MID threshold with moderate certainty evidence. On TUG test. Moderate certainty evidence showed that **resistance and balance exercise** is the intermediately effective intervention for improving physical function measured by TUG test, and the CIs of	In conclusion, high or moderate certainty evidence shows that resistance exercise with or without nutritional intervention and the combination of resistance and balance or aerobic exercise are the most effective interventions for improving quality of life in older adults with sarcopenia. Adding nutritional interventions to exercise had a larger effect on handgrip strength than exercise alone while showing a similar effect on other physical function measures to exercise alone. Moderate certainty evidence showed that adding balance training to resistance exercise was the most effective intervention for improving physical function measures. These findings can be used to guide the optimal exercise prescription for improving patient-important outcomes among older adults with sarcopenia.	**GOOD** + protocol: PROSPERO ID: CRD42021278038 +rob2/risk of bias: The article includes risk and bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 42 = Enough for conclusion	10.1002/jcsm.13225	**B** N = only for pure RT **(9/ n = 56)** **Quality of life:** RT: significant/INT (best effect) 1.11 (0.54, 1.68) RT + supplements: significant/INT 1.07 (0.23, 1.91) RT + aerobics + balance significant/INT 0.68 (0.32, 1.04) **(18/ n = 308)** **Handgrip strength**: RT+balance+supplements: significant/INT 4.19 (2.55, 5.83) RT+supplements: significant/INT 3.93 (2.22, 5.65) RT+aerobics +supplements: significant/INT 3.02 (1.64, 4.40) RT: significant/IT 2.69 (1.78, 3.61) supplements: significant/INT 2.46 (1.30, 3.63) RT+aerobics: significant/INT 1.94 (0.79, 3.08) RT+aerobics+balance+supplements: non-significant/INT 1.30 (-0.14, 2.73) RT+balance: non-significant/INT 1.23 (-0.16, 2.62) RT+aerobics+balance: non-significant/INT 0.20 (-3.50, 3.90) balance: non-significant/INT 0.38 (-2.32, 3.09) aerobics: non-significant/INT 0.46 (-1.13, 2.04) **(14/ n = 220)** **Usual gait speed:** RT+balance: significant/INT 0.16 (0.08,0.24) RT+balance+supplements: significant/INT 0.16 (0.06, 0.26) RT+supplements:

the effect size crossed the MID threshold (2.1 s). On five-repetition chair stand test. High certainty evidence showed that **resistance exercise combined with balance or aerobic training** are the intermediately effective interventions for improving physical performance measured by the chair stand test. The 95% CIs of these effect sizes (MD: around −1.70 s for exercise alone and −2.28 s for adding nutrition to resistance and aerobic exercise) cross the pre-set MID threshold (2.3 s) (Figure 4 and Appendix S5.3). **Subgroup analyses** We used meta-regression to examine the effects of subgroups and did not identify any subgroup effects except for settings and sex for some outcomes (Appendix S7.1). **Resistance and balance exercise plus nutrition had a larger effect on handgrip strength in hospitalized patients than in community-dwelling older adults**. **Resistance exercise plus nutrition had a larger effect on usual gait speed among males than females**.	significant/INT 0.13 (0.01, 0.25) / RT: significant/INT 0.11 (0.04, 0.18) RT+aerobics: non-significant/IT 0.10 (-0.01, 0.22) RT+aerobics+supplements: non-significant/INT 0.06 (-0.06, 0.18) RT+aerobics+balance: non-significant/INT 0.04 (-0.14, 0.10) supplements: non-significant/INT 0.02 (-0.07, 0.10) **(10/ n = 246) Time up and go:** RT+balance: significant/INT -1.85 (-3.22, -0.49) RT-aerobics+balance: non-significant/INT -1.70 (-3.99, 0.59) R+balance+supplements: non-significant/INT -1.54 (-3.33, 0.25) RT: non-significant/INT -0.83 (-1.68, 0.02) RT+supplements: non-significant/INT -0.77 (-2.16, 0.63) Supplements: non-significant/INT -0.64 (-1.89, 0.62) **(4 n = 16) Five chair stand time:** RT+aerobics+supplements: significant/INT -2.28 (-3.73, -0.83) RT+balance: significant/INT -1.79 (-2.97, -0.60) RT+aerobics: significant/INT -1.75 (-3.17, -0.27) RT+supplements: non-significant/INT -0.75 (-2.58, 1.07) RT: non-significant/INT -0.40 (-2.21, 1.41) Supplements: non-significant/INT -0.21 (-1.92, 1.59)

(6/ n =) Max gait speed: RT+balance: significant/INT 0.33 (0.13, 0.53) RT+balance+supplements: significant/IT 0.28 (0.08, 0.48) RT+aerobics: non-significant/INT 0.19 (-0.09, 0.47) RT+aerobics+balance: non-significant/INT 0.18 (-0.10, 0.46) Supplements: non-significant/INT 0.08 (-0.12, 0.27) RT: non-sig/CON -0.10 (-0.38, 0.18) RT+supplements: non-significant/CON -0.20 (-0.69, 0.29)

Dan Zeng et al.	2023	systematic review and network meta-analysis	20	adults over 60 years old	**Optimal exercise to improve physical ability and performance**: exercise training alone without the addition of other treatments (eg, nutritional supplements, exercise combined with nutrition, medication, ultrasound, or caloric therapy). The experimental group had an additional exercise intervention only compared to the control group; the duration of the exercise intervention was ≥ 8 weeks, with at least 60 min of exercise per week.	The control group included educational or psychological intervention or no intervention.	(1) handgrip strength (HGS); (2) timed up and go test (TUGT); (3) chair stand test (CS); (4) gait speed (GS). //muscle strength (handgrip strength [HGS]), and physical performance (timed up and go test [TUGT], gait speed [GS] and chair stand test [CS])	**Network meta-analysis of handgrip strength** resistance training (RT) intervention was better than the control group. There was no significant difference between the other intervention methods and the control group or between interventions. The ranked results showed that RT was the most effective in improving handgrip strength in older adults with sacropenia **Network meta-analysis of timed up and go test** results of timed up and go test (TUGT) showed that comprehensive training, comprehensive training under self-management, and resistance training (RT) had better effects than the control group. There was no significant difference between the other intervention methods and the control group or between interventions. The ranked results showed that CT was superior to CT_SM and RT, CT was the most effective in improving TUGT in older adults with sarcopenia **Network meta-analysis of gait speed** results of gait speed showed that there were no significant differences between the interventions and the control group or between interventions. The sorted results showed that RT improved gait speed in older adults with sarcopenia, but not significantly **Network meta-analysis of chair stand test** results of chair stand test (CS) showed that there were no significant differences between the interventions and the control group or between interventions. The sorted results showed that RT could improve CS in older adults with sarcopenia, but not significantly	In conclusion, not all exercise modalities can improve all aspects of muscle strength and physical performance in older adults with sarcopenia. In older adults with sarcopenia, the findings show that resistance training (RT) has positive effects on handgrip strength (HGS) and physical performance tests of the timed up and go test (TUGT), but did not improve performance in the chair stand (CS) and gait speed (GS). Resistance training (RT), comprehensive training (CT) and comprehensive training under self-management (CT_SM) have a positive effect on the TUGT times. There were no significant changes in chair stand test (CS) and gait speed (GS) with any of the exercise training modes. Plausible reasons can explain these findings to include differences in the exercise training movements, exercise-specific demands on the body, and variations in exercise training protocols. Overall, RT is worthwhile exercise modes to achieve various improvements on muscle strength and physical performance in older adults with sarcopenia. It is suggested that the elderly should carry out targeted strengthening exercise training according to their own physical insufficiency on the basis of adopting a variety of exercise methods. The results of this study provide some important references concerning exercise treatment strategies for clinical professionals and researchers.	**ADEQUATE** + protocol: PROSPERO ID: CRD42021287820 + rob2/risk of bias: The article includes rob2 - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 20 = Enough for real assessment	10.1016/j.gerinurse.2023.06.005

María Del Carmen Carcelén-Fraile et al.	2023	systematic review	13	older male adults with sarcopenia or osteosacorpenia participated were selected for inclusion in the studies, with an age range of 63 to 81 years	**intervention on resistance exercise combined with another treatment**: evaluated the effects of resistance training in older male adults diagnosed with sarcopenia + studies in which at least one of the groups studied had received an intervention based on resistance training combined with another type of intervention and that evaluated a variable related to muscle health.	263 participants were assigned to control groups while 17 received an intervention without resistance training	musculoskeletal health measured through strength, the skeletal muscle index, muscular quality, or the bone mineral density	**3.4. Characteristics of resistance training-based interventions** 2 studies included an intervention group that performed resistance training without any complementary intervention or used placebos, finding better results when they combined their resistance training protocol with some other intervention. **3.5. Effects of resistance training combined with protein and vitamin supplementation** Regarding protein and vitamin supplementation, it consisted of supplying all participants (GC and GI) with dietary protein, the GI was given 1.5 g/kg/day while the CG only received 1.2 g/kg/day, additionally, both groups received 800 IE/day of vitamin supplements. (...) finding **positive effects on** the Skeletal Muscle Index (SMI), Bone Mineral Density at the lumbar and hip region, **maximal hip and leg extensor strength, handgrip strength**, fat-free mass and abdominal and total body fat measured by DXA, prevalence of sarcopenia measured through z-score, Gait velocity and, finally, muscle quality. Two articles conducted a **6 months follow-up** (...) the IG results were still better and presented statistically significant differences vs. CG. **3.6. Effects of resistance training combined with protein only supplements** **Muscle5**: RT is combined with Muscle5 it generates better results in terms of **fat-free mass, grip strength as well as press RM, functionality, muscle cross-sectional area and total lean mass**. **Epicatechin** (...) reporting favorable effects on **follistatin levels and maximal strength measured in chest and leg press**; **Essential Amino Acids** (EAA) (...) favorable results on the variables analyzed, however, there were no significant differences between the two IG which allowed them to conclude that **RT is favorable for patients with sarcopenia regardless of the type of protein supplementation used**, **Collagen Peptides** as an	Interventions based on RT have beneficial effects on different variables associated with musculoskeletal health in older male adults with sarcopenia. **RT training can be used at any intensity as long as the objective is to improve functionality**; additionally, when combined with AT, the AT should be low intensity to optimize results. Nutritional supplementation enhances the effects of RT, but by itself is not sufficient treatment for this population, and doses should be carefully adjusted to avoid potential health problems in the future. RT must be constant for maintaining the results obtained. Finally, RT is a cost-effective, low-risk strategy for treating sarcopenia, and is always recommended to be combined with another type of intervention, either aerobic exercise or nutritional supplementation to enhanced the effects.	**POOR** + protocol: PROSPERO ID: CRD42022354184 - rob2/risk of bias: The article does not include risk and bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 13 = Enough for real assessment	10.3389/fpubh.2022.1037464

								adjunctive intervention and observed significantly more pronounced changes in the IG in relation to **fat-free mass, isokinetic quadriceps strength and fat mass**, demonstrating that the combination of RT with Collagen Peptides is ideal for improving body composition in men with sarcopenia. **3.7. Effects of resistance training combined with aerobic exercise** Among the variables considered by the studies, it was found that resistance training combined with low-intensity aerobic training improved handgrip strength (26), quality of life (26), muscle mass (26, 29), musculoskeletal mass (33), total fat percentage (29), weight (29), el BMI (29), lower and upper limb power (29, 33), VO2Max (29, 33) and generated favorable modifications in the Satellite Cells related markers (33). Additionally, it was observed that low-intensity aerobic training is more effective than high-intensity training when combined with resistance training (26), irrespective of AT and RT order (29, 33).			
Nidhi Sharma et al.	2023	systematic review	14	mean age of 72.4 ± 9.22. involving participants over the age of 60 years and had pre-frailty, frailty, pre-sarcopenia, or sarcopenia without concomitant illnesses (such as diabetes, cancer, stroke, dementia, or depression) were incorporated	b) RT intervention was to be suggested as potential intervention for treating sarcopenia and boosting muscle strength (c) studies involving at least one type of RT;	comparison or control group undergoing no exercise or other interventions (such as education training)	outcomes involving body composition, muscle strength and endurance.	RT improves body composition, functional performance, postural stability and muscle strength in elderly sarcopenic patients.	A promising intervention for managing sarcopenia is RT. A well convinced prescription is needed to optimise RT's positive effects, just like it is with other treatment approaches. RT should be prioritized to delay and reduce the detrimental effects of sarcopenia and frailty in both early and late stages.	**ADEQUATE** + protocol: PROSPERO ID: CRD42023413153 + rob2/risk of bias: The article includes rob2 - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough to conclude	10.1007/s40200-023-01283-5

Seunghyeok Song et al.	2023	Systematic Review and Meta-Analysis	10	The participants consisted of community-dwelling elderly individuals diagnosed with sarcopenia	The interventions involved a range of exercises and training programs incorporating physical activity. // interventions targeting the improvement of locomotion - The primary intervention modality utilized was resistance exercises, which were supplemented with additional interventions such as nutritional interventions, comprehensive training programs, home exercise programs, and Tai Chi training.	a control group that did not include exercise / Comparisons were made with usual care or control groups.	The outcome measures focused exclusively on variables (gait speed, walking speed, locomotion, muscle activity, muscle strength, and lower extremity strength) related to locomotion	**3.5. Effectiveness of Exercise on Lower Extremity Strength** For lower extremity strength, five papers were selected from the ten registered papers. The experimental groups including exercise showed significant changes in lower extremity strength compared to the control groups heterogeneity and overall effect. **3.6. Effectiveness of Exercise on Gait Speed** The experimental group including exercise showed a significant change in gait speed compared to the control group heterogeneity and overall effect.	Exercise interventions in community-dwelling elderly individuals with sarcopenia did not result in a significant increase in muscle mass, but they did yield positive improvements in lower extremity strength and gait speed, thereby enhancing locomotion.	**ADEQUATE** + protocol: PROSPERO ID: CRD42023391773 + rob2/risk of bias: The article includes rob2 - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 10 = Enough for conclusion	10.3390/jfmk8030092
Haolin Wang et al.	2022	Updated Systematic Review and Meta-Analysis	23	participants were identified with sarcopenia; participants aged 60 years and above	taking exercise as the single intervention component in one group	Control group or placebo group: Maintain daily lifestyle; Telephone monitoring; Health education; No control; Allowed to exercise at home; Not clear	primary outcomes include muscle function and physical performance indicators.	**3.4. Effects of Exercise on Muscle Function and Physical Performance** Muscle function is **the primary outcome** of this study, and it includes muscle strength (i.e., grip strength and knee extension strength) and muscle mass (i.e., muscle mass of lower extremities, free fat mass, skeletal muscle mass, appendicular muscle mass, and muscle mass of upper extremities). **The secondary outcome** is physical performance, including walking speed and functional mobility as tested using the TUG. **3.4.1. Grip Strength** Resistance training was used in nine studies, aerobic training was applied in five studies, and multicomponent training was adopted in seven. The intervention effect size with the fixed-effects model demonstrated that resistance training (MD = 4.31, 95%CI = 3.22–5.39, p < 0.001) and multi-component exercise (MD = 1.59, 95%CI = 0.62–2.56, p = 0.001) can significantly improve grip strength of the target group. Aerobic exercise, however, had a limited effect on the improvement of grip strength **3.4.2. Knee Extension Strength** exercise intervention can significantly improve muscle strength for knee extension (SMD = 0.50, 95%CI = 0.36–0.64, p < 0.001) (...). Results showed that significant and positive effects of both resistance training	Exercise can effectively improve muscle function and physical performance in older adults with sarcopenia, but has limited effects on the muscle mass of the upper extremities. In addition, it is highly recommended to apply group-based and supervised resistance training and multicomponent exercise to prevent sarcopenia among the older population.	**ADEQUATE** + protocol: PROSPERO ID: CRD42021255735 + rob2/risk of bias: The article includes risk and bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 23 = Enough for conclusion	10.3390/ijerph19138212

(SMD = 0.84, 95%CI = 0.43–1.26, p < 0.001) and multi-component exercise (SMD = 0.54, 95%CI = 0.37–0.71, p < 0.001) on knee extension strength, while little is shown in the aerobic exercise on grip strength and is limited (SMD = 0.23, 95%CI = −0.06–0.51, p = 0.12) (Figure 4b).

3.4.3. Muscle Mass
including muscle mass of lower extremities, free fat mass, skeletal muscle mass, appendicular muscle mass, and muscle mass of upper extremities. (...) Hence, the effect size was estimated using the fixed-effects model, and the results revealed significant exercise effects on the muscle mass of lower extremities (MD = 0.28, 95%CI = 0.01–0.56, p = 0.04) (Figure 5a), and limited effects were found in other muscle mass indicators of older adults with sarcopenia (Figure 5b–e).

3.4.4. Walking Speed
(...) The effect size of exercise intervention under the random-effects model indicated that exercise could significantly improve the walking speed of older adults with sarcopenia (SMD = 0.88, 95%CI = 0.49–1.27, p < 0.001) (Figure 6a).

3.4.5. Functional Mobility
assessed functional mobility using the time up ang go test (TUG). (...) Results from the meta-analysis using the fixed-effect model showed that, in comparison with the placebo group, exercise intervention can improve functional mobility (MD = −1.77, 95%CI = −2.11–−1.42, p < 0.001) (Figure 6b).

Haotian Zhao et al.	2022	Meta-Analysis	13	middle-aged and older adults aged 60–91. The study subjects met the diagnostic criteria for sarcopenia stipulated by the European Working Group on skeletal sarcopenia in the elderly (EWGSOP) and the Asian Working Group on skeletal sarcopenia (AWGS)	resistance training	control group	outcome measures included at least one of the following factors: grip strength, gait speed, and skeletal muscle index.	**3.3. Effect of Resistance Training on Grip Strength, Gait Speed, and Skeletal Muscle Index** The effects of resistance training on both grip strength and gait speed showed a high degree of heterogeneity, while the effects of resistance training on skeletal muscle index showed good inter-study heterogeneity. Combining the effect quantities, the results showed that Hedges's g = 0.60, 95%CI = 0.30–0.89 ($p < 0.05$), for the effect of resistance training on grip strength; Hedges's g = 1.50, 95%CI = 0.59–2.40 ($p < 0.05$,) for the effect of resistance training on gait speed; and Hedges's g = 0.52, 95%CI = 0.27–0.76 ($p < 0.05$), for the effect of resistance training on skeletal muscle index. These results suggest that resistance training significantly improves grip strength, gait speed, and skeletal muscle index in elderly patients with sarcopenia. **3.4. Results of Subgroup Analysis** **3.4.1. Gender** In the comparison of subgroup analyses, we did not find any significant differences in grip strength levels after resistance training in older patients with sarcopenia by gender (all tests between subgroups showed $p < 0.05$). Among them, the largest effect was found in the group where gender was not given (Hedges's g = 0.762, 95%CI = 0.269–1.255, $p < 0.01$), followed by the female group (Hedges's g = 0.642, 95%CI = 0.019–1.265, $p < 0.05$), and the mixed-gender group (Hedges's g = 0.575, 95%CI = 0.257–0.893, $p < 0.01$) (Table 3). **3.4.6. Age** In the comparison of subgroup analyses, we did not find a significant difference in the grip strength levels of elderly sarcopenia patients of different ages after resistance training $p < 0.01$ for the over 70 years old group, $p < 0.001$ for the below 70 years old group). The effect of the below 70 years old group was the largest (Hedges's g = 0.719, 95%CI = 0.336–1.102, $p < 0.01$) (Table 3).	In conclusion, this meta-analysis found that resistance training can significantly improve muscle strength and muscle quality in elderly sarcopenia patients. Furthermore, moderate-intensity resistance training in the form of an elastic band may be the best training prescription for elderly sarcopenia patients, and training for more than 12 weeks, over three times a week, and 40–60 min each time were recommended.	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article includes risk and bias - GRADE: GRADE level not stated - sufficient number of studies (systematic review/meta-analysis): 13 = Enough for conclusion	10.3390/ijerph192315491

Jianda Kong et al.	2022	systematic review and meta-analysis	14	the subjects were all older adults over 60 years of age at risk for sarcopenia, and there were no significant differences in their baseline characteristics	Comparison of blood flow restriction training vs conventional resistance training: the experimental group completed an LL-BFR intervention.	the control group did a conventional HL-RT or LL-RT intervention.	the outcome metrics included muscle strength and muscle mass, and the indicator data were expressed as mean ± standard deviation (M ± SD)	**3.6.1. LL-BFR versus HL-RT for muscle mass** Forest plot showed no heterogeneity between studies for comparison of LL-BFR to HL-RT in determining muscle mass (Fig. 5) (I2 = 0, p = 0.90, X2 = 1.58, df = 5), and combining effect sizes revealed that the results were not statistically significant (p = 0.74, Z = 0.34, SMD = 0.07, 95% CI: 0.33 to 0.46). A small number of combined studies prevented subgroup analysis. **3.6.2. LL-BFR versus HL-RT for muscle strength** Forest plot demonstrated that muscle strength comparisons between LL-BFR and HL-RT reveal acceptable variability (I2 = 29%, p = 0.18, Chi2 = 12.63, df = 9), and the combined effect size showed a significant difference between the 2 groups (p = 0.03, Z = 2.16, SMD = -0.34, 95% CI: 0.65 to -0.03; Fig. 6). Fewer studies were pooled, preventing subgroup analysis. **3.6.3. LL-BFR versus LL-RT for muscle strength** Uniform forest plots were produced to compare LL-BFR and LL-RT for determining muscle strength, (I2 = 0, p = 0.03, χ2 = 1.73) (Fig. 7), unlike LL-RT, LL-BFR showed no significant effect on muscle strength (p = 0.26, Z = 1.13, SMD = 0.25, 95% CI: 0.19 to 0.69). There was no subgroup analysis since fewer trials were merged.	In conclusion, both LL-BFR and traditional resistance training have some potential to improve sarcopenia in older adults, and they have similar improvements in muscle mass, but LL-BFR has greater improvements in muscle strength.	**GOOD** + protocol: PROSPERO ID: CRD42022331192 + rob2/risk of bias: The article includes risk and bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough for conclusion	10.1016/j.smhs.2022.12.002

Yu-Ting Tsai et al.	2022	Meta-Analysis	4	The mean age of the enrolled participants was 68.7 (range, 64.0–73.4) years. The mean ages of the participants in the EBT and control group were 69.0 years and 68.3 years, respectively	All 11 articles were prospective studies involving healthy older adults. Eight of the 11 studies were randomized-controlled trials, classified as level II on the AACPDM level of evidence scale.23–30 The remaining three articles did not have an active control group and were therefore, classified as level IV evidence.31–33 Four of the 11 articles were assessed a strong study quality rating,25,28,29,33 six were considered moderate quality,23,24,26,27,30,32 and one article was considered to provide weak individual study quality.31	**Control groups**: two studies compared EBT and control groups; one study compared a control group, EBT group, protein supplementation group, and a group given both EBT and protein supplementation; and the other study compared an EBT group, a waitlist control group, and a group given both EBT and nutrition supplementation.	**The primary outcome** was the change in the timed up and go (TUG) test result after the 12-week study duration. **The secondary outcomes** were changes in maximal grip strength, gait speed, 6- minute walk test (6MWT) result, and appendicular skeletal mass index (ASMI) from baseline to 12 weeks. Any adverse effects during the EBT were recorded. The TUG test assesses an individual's balance, turning, walking, and sit-to-stand ability; the purpose of this test is to determine the muscle power of the lower extremities and fall risk. The gait speed test, which also evaluates the muscle power of the lower extremities, has not only been recommended as a potentially useful clinical indicator of well-being among older adults but has also been shown to be associated with their survival. Grip strength is associated with upper body strength and overall strength and is also a reliable indicator of many health conditions associated with aging.The 6MWT was designed to assess the integrated global response of multiple cardiopulmonary and musculoskeletal systems involved in exercise.24 Appendicular skeletal muscle mass was defined as the sum of the muscle mass of the four limbs, and the ASMI was calculated as the appendicular skeletal muscle mass divided by the square of body height (kg/m2) in accordance with the European Working Group for Sarcopenia guidelines.	**<u>3.5. Primary outcomes</u>** 3.5.1. TUG test Performance in the TUG test was assessed (in 3 studies) after 12 weeks of the intervention, and a significant difference was discovered between the two groups. **<u>3.6. Secondary outcomes</u>** The maximal grip strength test, gait speed test, and ASMI results differed significantly between the EBT and control groups. However, no significant intergroup difference was found in the 6MWT between the two groups. 3.6.1. Maximal grip strength test The EBT group exhibited greater improvement in maximal grip strength. 3.6.2. Gait speed test The EBT group showed greater improvement in gait speed than those in the control group. 3.6.3. ASMI Participants in the EBT group had a greater gain in the ASMI than those in the control group after 12 weeks of the intervention. 3.6.4. 6MWT The 6MWT as an outcome to compare the changes in the EBT and control groups, but the differences between the two groups were not significant. **<u>3.7. Adverse effects</u>** No significant adverse events were reported. However, a few participants (25%) in the EBT group reported muscle soreness, knee pain, and shoulder pain in the first three sessions of training in one of the four included studies.	EBT is an ideal and safe instrumented resistant exercise to enhance the physical performance and muscle mass of older adults with sarcopenia.	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article includes risk and bias - GRADE: GRADE level not stated - sufficient number of studies (systematic review/meta-analysis): 4 = Not enough, more research needed	<u>https://www.researchgate.net/profile/Yu-Chen-186/publication/364733875_Impact_of_Elastic_Band_Training_on_Functional_Outcomes_and_Muscle_Mass_in_the_Elderly_with_Sarcopenia_A_Meta-Analysis/links/6358ba5f8d4484154a36e202/Impact-of-Elastic-Band-Training-on-Functional-Outcomes-and-Muscle-Mass-in-the-Elderly-with-Sarcopenia-A-Meta-Analysis.pdf?origin=scientificContributions</u>	<u>https://doi.org/10.6890/IJGE.202207_16(3).0011</u>
Linqian Lu et al.	2021	systematic review and meta analysis	26	older people with sarcopenia.	(resistance training [RT], whole body vibration training [WBVT], and mixed training [MT, resistance training combined with other exercises such as balance, endurance and aerobic training])	intervention and control	muscle strength (knee extension strength [KES]) and physical performance (Timed Up and Go [TUG], gait speed [GS] and the Chair Stand [CS])	Compared with a control group, RT and MT significantly improved KES (RT, SMD = 1.36, 95% confidence intervals [95% CI]: 0.71 to 2.02, p < 0.0001, I2 = 72%; MT, SMD = 0.62, 95% CI: 0.29 to 0.95, p = 0.0002, I2 = 56%) and GS (RT, SMD = 2.01, 95% CI: 1.04 to 2.97, p < 0.0001, I2 = 84%; MT, SMD = 0.69, 95% CI: 0.29 to 1.09, p = 0.008, I2 = 81%). WBVT showed no changes in KES (SMD = 0.65, 95% CI: - 0.02 to 1.31, p = 0.06, I2 = 80%) or GS (SMD = 0.12, 95% CI: - 0.15 to 0.39, p = 0.38, I2	In older people with sarcopenia, KES and GS can be improved by RT and MT, but not by WBVT. All three training modes improved TUG times, but not improved CS times.	**GOOD** + protocol: PROSPERO ID: CRD42021256110 + rob2/risk of bias: The article includes risk and bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 26 =		<u>10.1186/s12877-021-02642-8</u>

							= 0%). TUG times were significantly improved with all exercise training modes (SMD = -0.66, 95% CI: - 0.94 to - 0.38, p < 0.00001, I2 = 60%). There were no changes in CS times with any of the exercise training modes (SMD = 0.11, 95% CI: - 0.36 to 0.57, p = 0.65, I2 = 87%).		Enough for real assessment	
David E Barajas - Galindo et al.	2021	systematic review	12	people over 65, with sarcopenia	strength, resistance, balance, aerobic, or mixed physical exercises	intervention og kontrol	sarcopenia,hanges in muscle mass and strength	. In studies including high intensity strength exercises in isolation, either alone or combined with aerobic exercise, improvements were seen in muscle mass, muscle strength, and functional test times. There is also a significant increase in fat-free mass in individuals who exercised more frequently (more than two sessions per week). Current evidence shows that strength-resistance training and its combination in multimodal programs with aerobic exercise show significantly beneficial effects on anthropometric and muscle function parameters	Exercise has significant benefits in elderly patients with sarcopenia. Aerobic (walking) exercises routinely prescribed in clinical practice do not achieve significant benefits. Current evidence shows that training based on strength-resistance and its combination in multimodal programs with aerobic and balance exercise have significantly beneficial effects on anthropometric and muscle function parameters, and that exercises should be adapted to the characteristics of each subject	**POOR** - protocol: No clear protocol specified - rob2/risk of bias: No clear risk of bias specified - GRADE: No clear GRADE level specified + sufficient number of studies (systematic review/meta-analysis): 12 = Enough for real assessment	10.1016/j.endien.2020.02.007
Nan Chen et al.	2021	systematic review and meta analysis	14	healthy older adults with sarcopeni	resistance training	intervention and control group	body fat mass, muscle strength, and muscle performance	Compared with the control group, resistance training had positive effects on body fat mass (SMD=-0.53, 95% CI −0.81 to −0.25, p =0.0002, I2 =0%), handgrip strength (SMD=0.81, 95%CI 0.35 to 1.27, p =0.0005, I2 =81%), knee extension strength (SMD=1.26, 95% CI 0.72 to 1.80, p <0.0001, I2 =67%), gait speed (SMD=1.28, 95%CI 0.36 to 2.19, p =0.006, I2 =89%), and the timed up and go test (SMD=-0.93, 95% CI −1.30 to −0.56, p<0.0001, I2 =23%). Resistance training had no effects on appendicular skeletal muscle mass (SMD=0.25, 95% CI −0.27 to 0.78, p =0.35, I2 =68%), skeletal muscle mass (SMD=0.27, 95% CI −0.02 to 0.56, p =0.07, I2 =0%) and leg lean mass (SMD=0.12, 95% CI −0.25 to 0.50, p =0.52, I2 =0%)	Resistance training is an effective treatment to improve body fat mass, muscle strength, and muscle performance in healthy older people with sarcopenia.	**POOR** - protocol: PROSPERO ID: CRD42020221250 -rob2/risk of bias: No clear risk of bias is stated - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough for real assessment	10.1186/s11556-021-00277-7

Pei-Yu Wu et al.	2021	systemic review and network meta analysis	26	adults aged 65 years and older with sarcopenia;	interventions of exercise, nutrition, or the combination of both	randomized control trials. For each outcome measurement, a network meta-analysis was conducted to determine the direct and indirect effects of each intervention compared with each of the other interventions	the outcomes include at least one of the following: muscle mass, muscle strength (hand grip and knee extension strength), or physical performance (gait speed and dynamic balance);	Compared with the control group, exercise alone and the combination of exercise and nutrition significantly increased handgrip strength (1.12 kg, 95% CI: 0.12, 2.11; 2.03 kg, 95% CI: 1.10, 2.97) and improved dynamic balance (-1.76 seconds, 95% CI: -2.24, -1.28; -1.02 seconds, 95% CI: -1.64, -0.39). Both exercise alone and the combination of exercise and nutrition have beneficial effects on muscle strength and physical performance in older adults with sarcopenia.	This network meta-analysis showed the superiority of exercise for improving handgrip strength, gait speed and dynamic balance in older adults with sarcopenia. However, no significant differences were found between the effects of the different interventions on muscle mass. Further, exercise combined with nutrition has similar effects to exercise alone. In non-pharmacological interventions for sarcopenic older adults, exercise should be considered as the priority to improve handgrip strength, gait speed and dynamic balance.	**ADEQUATE** + protocol: PROSPERO ID: CRD42020145371 + rob2/risk of bias: The article includes RoB 2 - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 26 = Enough for real assessment	10.1016/j.maturitas.2020.12.009
D Beckwée	2019	systematic unbrella review	14	Population: older adults	Intervention: exercise	no exercise or other form of exercise	sarcopenia	There is high quality evidence for a positive and significant effect of resistance training on muscle mass, muscle strength, and physical performance. The added effect of nutritional supplementation for resistance training on muscle function appears limited. Blood flow restriction training is a novel training method that has a significant impact on muscle strength.	Since sarcopenia is affecting all skeletal muscles in the body, we recommend training the large muscle groups in a total body approach. Although low-intensity resistance training (≤50% 1RM) is sufficient to induce strength gains, we recommend a high-intensity resistance training program (i.e. 80% 1RM) to obtain maximal strength gains. Multimodal exercises and blood flow restriction resistance training may be considered as well.	**ADEQUATE** -protocol: there is no clear protocol + rob2/risk of bias: The article includes risk and bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough for real assessment	10.1007/s12603-019-1196-8
Evan V Papa et al.	2017	systematic review	11	All older participants were considered healthy, community-dwelling adults with a mean age of 71.7 years	Five studies focused on training the large muscle groups in the lower extremities.24,28,30,32,33 Four of the studies examined the effects of full body resistance training.23,27,29,31 Two studies focused on resistance training for the muscles in the core of the body including abdominals and spine stabilizers	Study designs were included if they met the clinical trial definitions for levels I–IV evidence according to the Methodology to Develop Systematic Reviews of Treatment Interventions developed by the American Academy for Cerebral Palsy and Developmental Medicine (AACPDM) (2008 version, revision 1.2). dvs. at 1-2 opfylder kravet om kontroller, men 2-4 er ikke nødvendigvis nødsaget.	improvements in functional mobility of older adults. The most common outcomes included the Timed Up and Go test (TUG)25,28,29,31,33 and Functional Reach test (FR).24–26,33 The TUG is a dynamic test designed to assess mobility, balance, walking ability, and fall risk in older adults	improvements in functional mobility of older adults. The most common outcomes included the Timed Up and Go test (TUG)25,28,29,31,33 and Functional Reach test (FR).24–26,33 The TUG is a dynamic test designed to assess mobility, balance, walking ability, and fall risk in older adults	Resistance training offers numerous benefits beyond improvements in muscle strength alone for older individuals. Several reports have demonstrated improvements in balance, functional mobility, stability limits, and fall prevention. Resistance training can attenuate age-related changes in muscle function and improve activities of daily living such as walking endurance, gait speed, and stair climbing. Our research demonstrates that a significant increase in functional performance can be achieved even at an elderly age	**POOR** -protocol: No clear protocol specified - rob2/risk of bias: No clear risk of bias specified - GRADE: No clear GRADE level specified + sufficient number of studies (systematic review/meta-analysis): 11 = Enough for assessment	10.2147/CIA.S104674

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Luis Polo-Ferrero et al.	2025	Comprehensive Systematic Review and Meta-Analysis	11 (9 meta)	adults of both sexes who were over 60 years of age with SO. There were no environmental restrictions (e.g., hospitals, nursing homes, community)	Programs in which only RT was performed were included, regardless of the type of RT: exercises with elastic bands, exercises with own weight and external weight, and exercises with guided machines. If RT was combined with other treatments, such as aerobic exercise or diet, the study was excluded.	Comparison groups did not receive any treatment.	Outcome measures of functionality, body composition, and biomarkers were analyzed. Functionality was assessed via the following: the timed up and go test (TUG), chair stand test (CS), hand grip test (HG), short physical performance battery (SPPB), leg press, single-leg stance (SLS) test and chest press. Body composition was assessed via the following: BF%, the skeletal muscle mass index (SMI), appendicular muscle mass (ASM), waist circumference (WC), the waist-to-hip ratio (WHR), body weight (BW), body mass index (BMI), bone mineral density (BMD), and bone mineral content (BMC). Biomarkers were assessed via the following: interleukin-6 (IL-6), LDL, HDL, triglycerides (TG), C-reactive protein (CRP), and a homeostatic model assessment of insulin resistance (HOMA-IR).	The meta-analysis demonstrated that exercise interventions revealed the positive effects of exercise mainly on physical performance ([SMD] = 0.36, [95% CI] = 0.03, 0.69, p = 0.003) and body composition ([SMD] = 0.35, [95% CI] = 0.12, 0.57, p = 0.003), with no significant differences in biomarkers ([SMD] = 0.1, [95% CI] = −0.28, 0.49, p = 0.52).	This meta-analysis confirms the positive effects of RT on body composition and physical performance in older adults with SO. Significant improvements were observed in BF%, a key diagnostic criterion for SO, and in physical performance measures, particularly SLS. These findings reinforce RT as an effective intervention for mitigating the functional decline associated with SO. However, while RT demonstrates immediate benefits in physical function and body composition, its long-term effects on these outcomes, as well as on metabolic and inflammatory biomarkers, remain unclear. The lack of sustained biomarker changes suggests that longer intervention periods and follow-up assessments may be necessary to detect cumulative metabolic adaptations. Additionally, the variability in intervention protocols and biomarker assessments highlights the need for caution in interpreting these results. To build stronger evidence, future research should focus on longitudinal studies evaluating the persistence of functional and compositional benefits over time. Studies with extended intervention durations and long-term follow-ups are required to determine whether the improvements observed in the short term translate into sustained health benefits. Furthermore, research should explore the dose–response relationship of RT and its potential synergy with other interventions, such as nutritional strategies, to optimize long-term metabolic outcomes in this population.	**GOOD** + protocol: PROSPERO ID: CRD42022380499 + rob2/risk of bias: The article includes risk of bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 11 = Enough to conclude		10.3390/nursrep15030089	**C** (2-4/ n = 155) physical performance (the timed up and go test (TUG), chair stand test (CS), hand grip test (HG), short physical performance battery (SPPB), leg press, single-leg stance (SLS) test and chest press): None significant, except for SLS. (3/ n = 155) SLS: significant/INT + no disagreement (n = 324) SMI, ASM, BF%

Hao Qiu et al.	2025	systematic review and network meta-analysis	14	participants ≥60 years with SO	any ET mode alone without incorporating other treatments was one of the interven-tion arms. ET mode included AT, RT, RT, CT, and MCT	The control group included either educational or psychological intervention or no intervention	Outcome measurements encompassed at least one aspect of body composition [e.g., body fat percentage [BFP], body mass index [BMI], or fat-free mass (53)], **muscle strength** (assessed in upper or lower extremities), or **physical performance** (measured by gait speed and the 30-s chair stand test).	**4.2. NMA of HGS (handgrip strength) and 30-s chair stand test:** **HGS** serves as a primary indicator of upper limb strength, and diminished HGS is a robust and independent predictor of sarcopenia (3, 4, 79). In line with previous studies (78, 80, 81), our findings demonstrate that RT significantly enhances HGS. Moreover, our NMA (network meta-analysis) revealed that MCT (multicomponent training) has a comparable positive effect on HGS to that of RT, which aligns with the findings of Labott et al. (82). Several mechanisms are likely responsible for the substantial improvement in HGS following RT. These include alterations in muscle fiber type composition (83, 84), activation and proliferation of satellite cells (85), increased rates of mitochondrial protein synthesis (86), and enhanced motor unit recruitment (87, 88). **Chair stand tests** are widely acknowledged as a reliable indicator of lower limb strength (89) and are frequently utilized in the diagnosis of sarcopenia (90). Consistent with the HGS findings, the 30-s chair stand test also exhibited significant improvements after both RT and MCT interventions, thereby validating the efficacy of these methods in enhancing lower extremity strength. Consequently, our results align with the studies by Poli et al. (91, 92) and the systematic review by Labata-Lezaun et al. (34), which collectively demonstrated that MCT significantly increases strength in both upper and lower extremities. In this study, the intervention duration for the RT group in literature related to HGS and the 30-s chair stand test	The current NMA (network meta-analysis) demonstrated that MCT (multicomponent training) outperformed other exercise intervention models in enhancing body composition and gait speed. Moreover, **RT showed a significant advantage in enhancing muscle strength,** while MCT's efficacy in strength improvement was comparable to that of RT. Given that MCT has been shown to significantly enhance both morphology and function in patients with SO, it appears to be the most optimal and efficacious exercise strategy for addressing this condition.		**ADEQUATE** + protocol: PROSPERO ID: 10.3389/fnut.2025.1537291 + rob2/risk of bias: The article includes risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough to conclude	10.3389/fnut.2025.1537291	B AT =aerobic training, RT =resistance training, (n = 302) CT = combined resistance with aerobic training, MCT= multiple component training **Handgrip strength:** (2) MCT: significant/INT 0.89 (0.23, 1.55) // (4) CT: non-significant/INT 0.34 (-0.34, 1.03) // (2) AT: non-significant/CON -0.17 (-0.64, 0.30) // (5) RT: significant/INT 1.53 (0.64, 2.41) // Overall: significant/INT 0.79 (0.31, 1.28) - moderate disagreement **≤ 12weeks handgrip strength:** AT vs control: non-significant/CON -0.17 (-0.58, 0.25) // RT vs control: significant/INT 0.78 (0.52, 1.04) // CT vs control: non-significant/CON -0.01 (-0.33, 0.31) // RT vs AT significant/RT 0.94 (0.51, 1.37) // CT vs AT: non-significant/CT 0.16 (-.28, 0.59) // CT vs RT: significant/RT - 0.79 (-1.15, -0.42) **>12 weeks handgrip strength:** CT vs control: significant/CT 1.39 (0.47, 2.32) // MCT vs control: significant/MCT 0.87 (0.22, 1.52) // MCT vs CT: non-significant/CT - 0.52 (-1.65, 0.61) **Gait speed:** (3) MCT:

ranged from 8 to 12 weeks, whereas that for the MCT group ranged from 12 to 24 weeks. However, the ranked results indicated that RT performed better than MCT in both measures. This finding is consistent with prior research that has demonstrated the efficacy of RT in enhancing muscle strength, even over relatively brief periods (93).
 	
4.3. NMA on gait speed
Gait speed is the most widely utilized assessment tool for evaluating physical performance in individuals with sarcopenia (3, 4, 79). Consistent with the meta-analyses of Hsu et al. (49) and Zhuang et al. (45), our study demonstrated that CT (combined resistance with AT (aerobic training)) significantly improved gait speed, whereas **RT did not yield significant improvements**. Furthermore, we found that multicomponent training (MCT) also significantly enhanced gait speed in sarcopenic older (SO) patients, with MCT showing superior efficacy compared to CT. Cadore et al. conducted a systematic review of exercise interventions for gait ability in frail elderly individuals and concluded that MCT can significantly improve gait performance, while RT alone has limited efficacy (94). The study by Wang et al. demonstrated that a two-week MCT intervention significantly improved gait speed in very old inpatients with sarcopenia (95). Collectively, these studies highlight the advantages of MCT in improving gait speed, which aligns with our findings. Reduced gait speed has been associated with age-related declines in lower extremity muscle strength, endurance, balance, motor
	significant/INT 0.35 (0.30,0.41) // (3) RT: non-significant/INT (very small) 0.01 (-0.07, 0.08) // (2) CT: significant/INT 0.14 (0.06, 0.21) // Overall: significant/INT 0.20 (0.16, 0.24) - moderate disagreement
	
	Gait speed ≤ 12weeks:
	RT vs control: non-significant/IT 0.01 (-0.07, 0.06) //
	CT vs control: significant/CT (very small) 0.10 (0.01, 0.19) //
	MCT vs cotrol: significant/MCT 0.34 (0.26, 0.41) //
	CT vs RT: non-significant/RT 0.09 (-0.03, 0.21) //
	MCT vs RT: significant/RT 0.33 (0.22, 0.43) //
	MCT vs CT: significant/CT 0.23 (0.12, 0.35)
	
	Gait speed >12 weeks:
	CT vs control: significant/CT 0.19 (0.07, 0.31) // MCT vs control: significant/MCT 0.40 (0.29, 0.51) // MCT vs CT significant/MCT 0.21 (0.05, 0.37)
	
	30 s chair stand test (Chair stand tests are widely acknowledged as a reliable indicator of lower limb strength):
	(2) MCT: significant/INT 2.72 (1.91, 3.53) //
	(1) CT: significant/INT 2.50 (0.73, 4.27) //
	(2) RT: significant/INT 1.86 (0.42, 3.28) //
	overall: significant/INT 2.51 (1.85, 3.16) - slight disagreement

control, and cognition (96–99). Additionally, walking speed has been shown to have an inverse relationship with the proportion of adipose tissue in the quadriceps muscle (80) and a positive correlation with with FFM (97). Previous research has shown that MCT is highly beneficial for reducing fat infiltration and enhancing muscle strength, endurance, and balance in older adults (100, 101), particularly in improving cognitive function (102). Our results further confirm that MCT is the only type of exercise that improves both muscle composition and function. Therefore, MCT demonstrates a significant advantage in enhancing gait speed compared to other forms of exercise, and we recommend MCT as the primary intervention for treating SO, particularly in individuals with pronounced weakness and physical performance impairments.

Huiting Wei et al.	2025	systematic review and meta-analysis	15	≥60 years with stage I SO	Exercise interventions of ≥8 weeks - One study (26) compared hypertrophy training and high-speed circuit training; two studies (28, 33) explored the effects of CE and a control group; eight studies (24, 27, 29, 30, 32, 37–39) compared RT and a control group; one study (31) compared the effects of RT, AR, CE, and control groups; two studies (34, 35) focused on the effects of circuit exercise on SO; and one study (36) focused on the effects of concurrent exercise.	comparison between an exercise intervention and a non-exercise intervention	outcome indicators included at least one of body composition, muscle function, metabolic markers, or inflammatory biomarkers	**3.6.1. Effects of exercise on grip strength and gait speed** Based on the pooled analysis of six studies, **grip strength** increased after the intervention (MD = 2.82, 95% CI: [2.05, 3.59], p < 0.00001). The effects of the different exercise modalities varied. Both RT and CE significantly increased grip strength (RT: MD = 3.43, 95% CI: [2.03, 4.84], p < 0.00001; CE: MD = 2.64, 95% CI: [1.71, 3.57], p < 0.00001), while AR did not (MD = −0.50, 95% CI: [−6.22, 5.22], p = 0.86). Seven studies involving 170 participants evaluated **6-min gait speed and habitual walking speed**. The results showed that gait speed improved after exercise intervention (MD = 0.88, 95% CI: [0.65, 1.11], p < 0.00001). Both RT and CE significantly increased gait speed (RT: MD = 0.96, 95% CI: [0.62, 1.30], p < 0.00001; CE: MD = 0.81, 95% CI: [0.49, 1.12], p < 0.00001) (Figure 5). **3.6.2. Effects of exercise on TUG and knee extension** Three studies evaluated **the timed Up and Go (TUG) test**. The pooled effect size showed that TUG time was significantly shortened after exercise in SO patients (MD = −1.16, 95% CI: [−1.51, −0.80], p < 0.00001).	≥8-week exercise improves body composition in stage I SO, with CE being the most effective for fat loss. Physical function improves with both RT and CE, and **RT is better for muscle strength**, while CE benefits metabolism and inflammation. We recommend that CE (≥3 times/week, 45 min/session) be used for high inflammation and RT (2–3 times/week, 60–80% of 1-RM) for low inflammation. Based on observed data trends, promoting a CE model of three aerobic exercises + two RT sessions weekly is advisable, with the intensity adjusted to 40–50% 1-RM for stage I elderly patients. Future research needs large-sample, long-term RCTs with subgroup analyses and exercise-nutrition combinations.		**ADEQUATE** + protocol: PROSPERO ID: CRD42024619070 + rob2/risk of bias: The article includes risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 15 = Enough to conclude	10.3389/fnut.2025.1575580	**C** (3/ n = 65) grip strength (RT): significant/INT + no disagreement (4/ n= 85) gait speed (RT): significant/INT + high disagreement (3/ n= 78) TUG (RT): significant/INT + no disagreement (n = 31) BMI no disagreement, not significant (n = 91) BF% significant disagreement, significant effect

Exercise showed a trend toward improving knee extension strength (MD = 2.61, 95% CI: [−0.28, 5.50], $p = 0.08$), indicating potential improvements in daily activity function and exercise endurance (Figure 6).

4.2. Effects of exercise on physical function in stage I SO

Physical activity ability is directly linked to enhanced independence in SO patients, as it reduces dependence on assistive devices and expands social activity scope. Regarding exercise-induced improvements in muscle strength, endurance, and physical function in SO patients, both RT and CE significantly enhance grip strength and gait speed, whereas AR shows no similar effect. Grip strength, a core indicator for sarcopenia diagnosis, improves significantly after RT (MD = 3.43) and CE (MD = 2.64) interventions, confirming that resistance training is the gold standard for improving muscle strength. Mechanistically, RT stimulates muscle fiber recruitment and satellite cell activation through mechanical loading, whereas CE indirectly enhances muscular endurance by improving oxygen supply and energy metabolism (46). This can be attributed to RT triggering muscle protein synthesis via resistance contraction, whereas CE improves cardiopulmonary function, enhances muscle oxygenation, and promotes strength development.

AR shows no significant effect on

grip strength (MD = −0.50, $p = 0.86$), indicating that aerobic metabolism alone is ineffective in stimulating muscle protein synthesis. This aligns with the histological findings indicating no alteration in the ratio of skeletal muscle fast-twitch fibers. In physical function tests, seven studies demonstrate that exercise interventions improve gait speed by 0.88 ($p < 0.00001$), and three studies on the TUG test show that exercise shortens TUG time by 1.16 s ($p < 0.00001$), reflecting improved daily activity ability. Knee extension strength shows a marginal improvement (MD = 2.61, $p = 0.08$), potentially limited by (i) insufficient sample size (only three studies) and (ii) variations in testing methods (isometric vs. isotonic contraction). This suggests that larger sample sizes are needed to validate exercise effects on endurance and functional activities. An in-depth analysis of knee joint characteristics and muscle activation sequences during exercise can optimize specific details (e.g., adjusting flexion-extension angles and force timing in knee extension exercises) to develop modules for improving knee function.

Notably, although ASMI shows no significant change, the dissociation between functional improvement and muscle mass suggests that exercise enhances function through neuromuscular coordination rather than pure muscle fiber hypertrophy. This finding provides a theoretical basis for exercise prescriptions in frail elderly populations. Future research should explore integrated exercise programs, for example, low-intensity AR to improve endurance and warm up joints, followed by gradual RT to build strength, or CE with a longer RT duration than AR to enhance overall activity and self-care ability.

Lei Chen et al.	2025	systematic review	8	subjects meeting the latest diagnostic criteria for SO as proposed by ESPEN and EASO in 2022	The experimental group receives exercise interventions	the control group receives health education, placebos, or other non-exercise interventions	grip strength (GS), percentage of body fat (PBF), walking speed (WS), IGF-1, IL-6, weight, knee extension strength (KES)	**<u>Effects of different exercise training modes for sarcopenic obesity on GS</u>** Subgroup analysis further revealed that compared to the control group, **RT significantly enhanced GS** (RT, MD = 3.85,95%CI:1.50 to 6.20, P < 0.01), However, the differences in GS improvement were not statistically significant in the AT group and MT group compared to the control group. **<u>Effects of different exercise training modes for sarcopenic obesity on WS</u>** Subgroup analysis revealed that both RT and MT exercise training groups showed a statistically significant difference in comparison to the control group(RT, MD = 0.23,95%CI:0.01 to 0.46, P = 0.04; MT, MD = 0.15,95%CI:0.04 to 0.26, P < 0.01) **<u>Effects of different exercise training modes for sarcopenic obesity on IGF-1</u>** Subgroup analysis indicated that both RT and MT groups displayed a statistically significant difference compared to the control group[RT,MD = 0.79,95%CI:0.05 to 1.52,P = 0.04;MT, MD = 1.01,95%CI:0.45to 1.56, P < 0.01], however, when AT alone was compared to routine treatment, the difference did not reach statistical significance (AT, MD = 0.01,95%CI:-0.57 to 0.60, P = 0.96)	Overall, RT, AT, and MT are effective forms of exercise intervention, capable of improving the clinical symptoms and physical signs of SO to varying extents. Among these, **RT and MT might exhibit more pronounced improvements** compared to AT, enhancing the physical functionality of SO patients. This suggests that healthcare providers when devising exercise intervention plans for SO patients, should select the most effective intervention form based on the specific intervention requirements. This will allow for the development of scientific and systematic intervention strategies to achieve the best possible outcomes. In addition, Other meta-analyses did not find the relationship and influence between exercise training and IGF-1 and IL-6 in SO patients, which was discussed in this paper, and the results are of certain significance. It is hoped that future researchers can expand new research directions based on this paper for the benefit of patients. This meta-analysis examines the effects of RT, AT, and MT on SO patients and provides reasonable answers to the current controversies.	**POOR** - protocol: PROSPERO ID: CRD42023414555 **MEN forkert studie der dukker op ved søgning** + rob2/risk of bias: The article includes risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 8 = Limited evidence: There may be enough for qualitative patterns.	10.1186/s12877-024-05655-1

Changsheng Guo et al.	2025	systematic review and meta analysis	7	The subjects were females with sarcopenic obesity; Age: ≥60 years old	The intervention was resistance exercise, including but not limited to muscle training, progressive strength and/or resistance training, weight training and/or elastic band training;	RT with non-exercise interventions or health education were included	Outcomes measured included key indicators such as body composition and physical function.	**3.3.1. Effect of RT on physical function in older females with SO** The four studies on 10WMT (Liao et al., 2017; Liao et al., 2018; Vasconcelos et al., 2016; Lee et al., 2021) showed significant heterogeneity (p = 0.0001, I2 = 88%), so a random-effects model was used for analysis. The results showed a statistically significant difference in the 10WMT index between the RT group and the control group among older females with SO (WMD = 0.22, 95% CI: 0.04 to 0.39, p = 0.01). This indicates that RT can effectively improve the physical function of older females with SO, as shown in Figure 7. Subgroup analyses stratified by RT modalities demonstrated that elastic band resistance exercise significantly improved the 10MWT performance in older females with SO (WMD = 0.29, 95% CI: 0.18 to 0.41, p < 0.00001), whereas structured resistance training showed no statistically significant effect on 10MWT in this population (WMD = 0.02, 95% CI: −0.08 to 0.12, p = 0.68), as illustrated in Figure 7. The three studies on TUG (Liao et al., 2017; Liao et al., 2018; Lee et al., 2021) showed no heterogeneity, demonstrating strong homogeneity (p = 0.94, I2 = 0.0%), indicating that the	In conclusion, RT has demonstrated efficacy in improving physical function and specific body composition parameters (BF%) in older females with SO. Furthermore, although RT demonstrated measurable effects on BMI, TSM, and BMD in this population, the between-group comparisons failed to reach statistical significance.	**ADEQUATE** + protocol: Systematic review registration INPLASY202430061 https://inplasy.com/inplasy-2024-3-0061/. + rob2/risk of bias: The article includes RoB 2 + GRADE: GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 7 = Some evidence, but not robust	10.3389/fnagi.2025.1495218	

								conclusions are reliable. The analysis showed a statistically significant difference in the TUG index between the RT group and the control group among older females with SO (WMD = −2.23, 95% CI: −2.96 to −1.49, p = 0.00001), as illustrated in Figure 8. The three studies on TCR (Liao et al., 2017; Liao et al., 2018; Lee et al., 2021) showed no heterogeneity, demonstrating strong homogeneity (p = 0.51, I2 = 0.0%), indicating that the conclusions are reliable. The analysis showed a statistically significant difference in the TCR index between the RT group and the control group among older females with SO (WMD = 5.20, 95% CI: 3.98 to 6.43, p = 0.00001), as illustrated in Figure 9.			
Su-Ru Chen et al.	2025	systematic Review and Meta-Analysis	12	participants restricted to those ≥ 60 years of age with sarcopenia and obesity	**the effects of resistance exercise on body composition and physical functioning in older adults with sarcopenic obesity**: The results of treating older adults with SO have varied in related resistance exercise studies, with no consensus regarding the best types of exercise. Therefore, this study was developed as a systematic review with the goal of conducting a meta-analysis on the effects of resistance exercise on body composition and physical function in older adults with SO.	controlled trials (RCTs) with at least one control group	The primary outcome measure of interest was physical function (i.e., grip strength and gait speed), which is a key criterion for diagnosing sarcopenia. Body composition (i.e., percentage fat and body mass index [BMI]) was evaluated as a secondary outcome. The mean value and SD between baseline and final measures of the outcomes were extracted.	significant effect of resistance exercise on grip strength. indicating no significant effect of resistance exercise on gait speed. **<u>Effect on Grip Strength</u>** Calculating the I 2 and Cochrane Q statistics for grip strength identified lower heterogeneity in six of the trials (Q=9.352, df=5, p=.096, I 2 =46.53). Thus, a fixed-effects model was employed, revealing an effect size (mean difference) of 1.560 (95% CI=[0.178, 2.941]; p=.027), indicating the presence of a significant effect of resistance exercise on grip strength (Figure 2A). Visual evaluation of the grip strength funnel plot revealed an asymmetrical phenomenon. The effect size in some studies was smaller than the average effect, and the intercept of the	The results of this study showed that resistance exercise can effectively increase grip strength in older adults with sarcopenic obesity Sarcopenic obesity is gradually becoming a significant health problem. Exercise, especially resistance exercise, may improve grip strength and percentage body fat in older adults with this condition. However, further subgroup analyses and meta-regressions revealed no significant difference in the effects of resistance exercise between participants in different settings, using different intervention equipment, or participating in different numbers of sessions or treatment regimens.		**ADEQUATE** + protocol: PROSPERO ID: CRD42021274710 +rob2/risk of bias: The article includes risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 12 = Enough to conclude	<u>10.1097/jnr.0000000000000685</u>

effect size of Egger's regression was 2.724 (t=5.936; p=.004), while results of the Begg and Mazumdar test using Kendall's tau with continuity correction were tau=0.400 and Z=1.127 (p=.259), indicating the presence of publication bias (Figure 3A).

Effect on Gait Speed

Calculating the I 2 and Cochrane Q statistics for gait speed identified no heterogeneity among the four trials (Q=0.434, df=3, p=.933, I 2 = 0). Thus, a fixed-effects model was employed, revealing an effect size (mean difference) of 0.043 (95% CI=[−0.024, 0.111]; p=.209), indicating no significant effect of resistance exercise on gait speed (Figure 2B).

As for publication bias, the funnel plot showed slight asymmetry and a lack of studies with larger sample sizes and negative results. The Egger test showed no publication bias (p=.13). The trim and fill method was not utilized because no publication bias was noted (Figure 3B).

Wesam A Debes et al.	2024	systematic review with Narrative Synthesis	7	older women with sarcopenic obesity aged ≥ 60 years.	resistance exercise	intervention og control	ody composition and functional capacity	All of the seven studies included have reported measures related to the participant's body composition; however, these studies have used various outcomes to assess body composition. Six studies have reported percentage of body fat (BF%), one study has reported improvement in BF% in the three sets group but not in the control or one set grous [49], and another three studies have shown a significant decrease in BF% [47,48,50]; however, two studies did not show significant improvements. Two studies reported grip strength; one study stated a significant increase after the intervention compared to the control [45], while the other did not find any difference. Maximal dynamic strength was evaluated using one repetition maximum (1-RM) in a single RCT. Chest press (kg), knee extension strength (kg), and preacher curl (kg) were used in both groups; whey supplementation + exercise and placebo + exercise showed improvements in post-intervention scores compared to pre-intervention scores, but there were no differences between these two groups .Five studies reported ten meter walk tests (10 MW) to measure gait speed, and three studies have reported significant differences between the intervention and control groups. Three studies have reported timed up and go (TUG) test outcomes to measure lower extremity function, mobility, and fall risk, and two studies have revealed significant improvements in the intervention group compared with the control group after intervention. Two studies reported functional forward reach (FFR) test outcomes to measure dynamic balance; one study showed significant	Heterogeneity among trials and the small number of RCTs affected the conclusions and applicability of conducting a data meta-analysis. However, we noted a pattern of improvement in the majority of the included RCTs concerning body composition, muscular strength, and functional capacity even though effects size and clinical implications cannot be determined precisely.	**POOR** + protocol: PROSPERO ID: CRD42023394603 +rob2/risk of bias: The article includes rob2 - GRADE: No clear GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 7 = Limited evidence: There may be enough for qualitative patterns.	10.3390/jcm13020441

								improvement in FFR scores compared to the control group. Two studies reported single leg stance (SLS) tests to measure balance control ability; one of them showed improvement in the intervention group compared to the control group [50], while the other study did not find any difference . Only one study reported raising from a sitting position (RSP), revealing significant improvement between pre- and post-treatment.			
L da Silva Gonçalves et al.	2023	Systematic Review and Meta-Analysis	14	Older adults (≥60 years). Patients with sarcopenic obesity	the effects of different exercise training types on body composition and physical performance in older adults with sarcopenic obesity (SO). **Intervention**: Resistance exercise, combined exercise, or aerobic exercise	Patients with sarcopenic obesity, but no exercise	Body fat (%) / Fat free mass / Upper limb strength / Lower limb strength / Gait speed test / Chair stand test	Physical performance was assessed in different ways and with different tools, but the main outcomes were strength, power, and functional parameters (Short-Physical Performance Battery, gait speed, sit-to-stand, and others). Eleven studies showed improvements in strength after training, while two studies shown improvements in power (38, 43). Resistance training showed improvements in physical performance parameters, both alone and with the addition of aerobic training (combined)	The impact of various exercise types on the body composition and physical performance of older adults with SO is now acknowledged. Considering the GRADE recommendations, moderate to high certainty of evidence was found for body fat, lower limb strength, and chair stand test. On the other hand, low certainty of evidence was found for upper limb strength. Resistance, combined, and aerobic training evoked divergent results between the variables analyzed.	**GOOD** + protocol: PROSPERO ID: CRD42023430721 + rob2/risk of bias: The article includes rob2 + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough to conclude	10.1007/s12603-023-2018-6

Laura Ghiotto et al.	2022	systematic review and meta-analysis	8	women and men of any race, age ≥60 years with a detailed diagnosis of sarcopenic obesity, ability to undertake bipedal locomotion	All exercise interventions included in the analysis	Not clearly reported / The final analysis included 8 studies, 6 of which were randomized controlled trials (RCT) (25–30), 1 was a research report (31), and 1 was an original research article (32)	Physical Performance Test (PPT), Short Physical Performance Battery (SPPB), Single Leg-Stance (SLS), Time Up & Go test (TUG), Timed chair rise (TCR).	**Most of the studies applied a strength training protocol in which improvement was noted post-treatment on the Time Chair Rise (TCR), 30-s Chair Stand, and Single Leg Stance (SLS) tests. Discrepancies between the studies were observed when resistance training was combined with or without elastic bands or electromyostimulation, as measured with the Short Physical Performance Battery (SPPB), Physical Performance Test (PPT), Gait Speed, and Timed Up & Go (TUG) test. Post-intervention SPPB, PPT, and gait speed scores showed an increase or maintenance of performance, while TUG test scores were higher according to one study but lower according to another.** **Effects of exercise on physical performance** Six studies investigated the effects of resistance exercise on physical performance (26, 27, 29–32); one evaluated the effects of strength exercise vs high-speed circuit on physical performance (25), and one with electromyostimulation (28) (Table 2). Overall, there was a statistically significant increase in physical performance scores on the SPPB, PPT, SLS, TUG, TCR, GS, and 30-s chair stand (29–32) after resistance exercise intervention One study reported a statistically significant decreases in TUG scores (32) and 2 studies found no statistically pre/post change in SPPB and 10-m GS (26, 27). One study (25) comparing the effects of a strength exercise vs a high-speed circuit noted an increase in SPPB scores for the high-speed circuit group but no change in	**Engagement in physical exercise, and resistance training in particular, can improve or maintain physical performance in adults with sarcopenic obesity. Study samples should include more men. A future area of focus should be the impact of different types of training (aerobic, power training, combined modalities). Finally, studies with longer intervention periods and follow-up periods are needed to gain a better understanding of the effectiveness of exercise on physical function in adults with sarcopenic obesity.** Physical capacity decreases with age and the decline is steeper in sedentary adults with sarcopenic obesity. Physical exercise, and progressive resistance training in particular, is the most used training modality in adults aged 60-80 years. Of note, none of the previous trials explored differences in exercise prescription by classifying participants in subgroups based on age-level. This is a key aspect to develop in the future. Outcomes show that physical performance is improved or at least maintained as assessed with SPPB, PPT, Gait Speed, TCR, Chair Stand, and SLS tests. Nonetheless, whether better results can be achieved with other types of training remains to be elucidated. It follows then that other types of functional tests for evaluating muscle function (i.e., muscle mechanical power) should be applied. Although most of the studies only involved women, the study sample should include more older men in order to comprehensively investigate different types of training (aerobic, power training, combination of these modalities) and better understand whether different protocols could yield greater and faster benefits for physical performance outcomes. In addition, the most recent definition for sarcopenia screening should be considered. Finally, interventions of longer duration with follow-up assessment after the training period could demonstrate the actual effectiveness of exercise in improving physical function in adults with sarcopenic obesity.	**POOR** + protocol: PROSPERO ID: CRD42022314354 +rob2/risk of bias: The article includes rob2 - GRADE: GRADE level not stated - sufficient number of studies (systematic review/meta-analysis): 8 = Some evidence, but not robust	10.3389/fendo.2022.913953

scores for strength/hypertrophy group. The one study (28) that used electromyostimulation found a post-treatment increase in the 10-m GS

FITT table and adherence to the intervention

Table 3 presents the training protocols following the FITT principle: frequency, intensity, time, and type of training. Furthermore, adherence was added since it is a key component in exercise interventions (33–36). Training frequency differed between studies: 26 weeks of training in (28), and 10-16 weeks in (25–27, 29–32). Exercise intensity during training sessions also varied between studies: one repetition maximum (1RM) in (25, 26, 31, 32), rate of perceive exertion (RPE) in (28–30), and a combination of exercise and weight progression in (27) although the method was not specified. The duration of training sessions ranged between 60 min/day in (25–27, 31) and 15 to 45 minutes in (28–30, 32). Five studies (25, 26, 28–30) reported high adherence (≥81%), while the others 3 studies did not report adherence rates.

Antonio Martínez-Amat et al.	2018	systematic review	8	healthy community-dwelling adults aged ≥60 years with SO	The types of exercises were resistance and aerobic training, either alone or combined, and whole-body electromyostimulation. Protein supplementation was included in three studies.	The types of exercises were resistance and aerobic training, either alone or combined, and whole-body electromyostimulation. Protein supplementation was included in three studies. dvs. forskellige grupper.	Outcome measures were skeletal muscle mass, any measure of adiposity such as body mass index (BMI) or fat mass, muscle strength and physical function/performance.	For the most part, the results of this systematic review agree with what has already been described in the literature, that resistance training produces significant improvements in grip strength [41] and gait speed [42] in obese older adults with sarcopenia compared with nonsarcopenic obese after progressive resistance exercises; and that, in patients with SO from a rehabilitation center [43], elastic resistance training brought about improvements in muscle strength and functional mobility tasks, including single-leg stance, gait speed, timed up-and-go test, and timed chair-rise tasks five of the studies reported improvements in obesity, results were contradictory concerning muscle mass. Increases in muscle strength appeared especially with resistance training and do not seem to be linked to protein supplementation. On the other hand, improvements in physical function were reported in programs combining aerobic and resistance training with nutritional supplementation. We believe that it is of the utmost importance that a certain degree of homogeneity is kept concerning the methods and criteria used in the diagnosis of SO, so that the effects of specific physical exercise programs, whether alone or combined with nutritional supplements, can be assessed with precision.	After performing a systematic review to assess the effects of physical exercise on sarcopenic obese older adults, results do not allow us to draw a clear conclusion, and although they suggest that exercise training programs may have beneficial effects on sarcopenic obesity-related parameters, their disparity indicates that caution should be taken	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article includes Risk of bias + GRADE: GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 8 = Limited evidence	10.1016/j.maturitas.2018.02.005

Hjertesygdomme og sygdomme i kredsløbet

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Maamer Slimani et al.	2018	meta analysis	25	studies recruiting older patients with HF as participants from different countries. Older patient groups includes the younger old (65–74 years), the old (75–84 years), and the older old or oldest old (>85 years)	a) Studies examining the effects of physical training on QoL, aerobic capacity, and cardiac function in older patients with HF; b) Studies describing their training variables (e.g., volume, frequency, and duration).	Studies involving a control group against which an intervention was compared.	Outcome(s): QoL, aerobic capacity, or cardiac function assessed using the Minnesota Living with Heart Failure Questionnaire (MLWHFQ), the 6-MWT (i.e., total distance covered), and left ventricular ejection fraction, respectively. In addition, we examined how moderating variables like training duration (weeks), training frequency (sessions/week), and type of training, influenced physical training related QoL, aerobic capacity and cardiac function enhancements.	Twenty five studies were included with a total of 2,409 patients. Results showed that exercise training improved total QoL	The present meta-analysis showed that physical training has positive effects on QoL, aerobic capacity, and cardiac function in older patients with HF. Practitioners should consider both training volume and mode when designing physical training programs in order to improve QoL and aerobic capacity in older patients with HF.	**POOR** - protocol: no clear protocol - rob2/risk of bias: The article does not include a clear risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 25 = Enough for conclusion		10.3389/fphys.2018.01564	**B** (25 // n = 2,343) quality of life: significant/INT + high disagreement (moderate QoL improvement in females/small QoL improvement in males/small QoL improvement in males and females combined) (11) effect on aerobic capacity: significant/(it says "improvements following intervention", but their forest plot seems to lean towards the control group. + moderate disagreement
Yahui Zhang et al.	2016	meta analysis	28	The participants were patients with CHF (50–75 years old), and participants with CHF evoked by specific conditions or pathologies were excluded.	The exercise intervention was selected for short-term duration (8–24 weeks). The exercise types (aerobic exercise or resistance exercise or combination aerobic and resistance exercise), exercise frequency (more than 3 times per week), exercise intensity (40–80% VO2 reserve) were included in this study. Studies on participants who previously had exercise-based rehabilitations were excluded. The exercise intervention group should receive short-term exercise intervention. The control group must not do any exercise training.	he exercise intervention group should receive short-term exercise intervention. The control group must not do any exercise training.	The parameters of cardiovascular functions and QoL were assessed	The QoL, reported in 299 CHF patients enrolled in four RCTs, was significantly improved after short-term exercise intervention (MLHFQ: n = 299, I2 = 17%; 95% CI, 3.19 to 9.70; $p < 0.00001$	Aerobic exercise and aerobic with resistance exercise can significantly improve the aerobic capacity of CHF patients, whereas resistance exercise cannot. The improvement in aerobic capacity caused by aerobic exercise and aerobic with resistance exercise decreases with age. Systolic blood pressure and ventricle structures and functions of CHF patients show no significant changes after the short-term exercise intervention.	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article include risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 28 = Enough for conclusion		10.1016/j.jesf.2016.08.001	**C** (4 n = 299 CHF patients) short-term exercise intervention on QoL: sig/CON (it says "significantly improved after short-term exercise intervention", but in the forest plot it seems to lean towards the control group) + low disagreement (I^2 = 17%) VO2 max (n = 527) not significant effect with RT alone, high disagreement

Demens og mild kognitiv svækkelse (MCI)

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Yue Yuan et al.	2025	metaanalyse	11	Individuals aged ≥60 years; evaluated by healthcare professionals using specific assessment tools or established criteria related to cognitive and physical function; exhibiting both physical frailty and cognitive impairment	The exercise intervention strategies for the experimental group include but are not limited to aerobic exercise, resistance exercise, Tai Chi, etc	The comparison group consists of maintaining the daily lifestyle without additional interventions, or "routine nursing measures" including diet, medication guidance, disease-related knowledge, and general health education that excludes specialized exercise interventions	outcome measurements, including cognition-function, physical- and quality of life-related targets.	The findings revealed that the cognition of the exercise intervention group outperformed the control group. We found exercise improved overall cognition, physical frailty, walking ability, gait speed, and so on among older adults with cognitive frailty, but the effect on physical fitness and quality of life was insignificant. Subgroup analysis revealed exercise conducted ≥3 times per week, each session lasting 45 min and cycle12 weeks, had better-improved cognition. Traditional mind-body exercises like Baduanjin were more effective than resistance training for enhancing cognition	In our research, 11 relevant studies were systematically analyzed and assessed, involving 698 CF elderly adults. The current findings indicate that exercise interventions effectively enhance overall cognition, frontal function, physical frailty, walking ability, walking speed, grip strength, and lower limb strength in CF elderly adults. However, the effectiveness of physical fitness and quality of life remains uncertain. Whether exercise has a positive impact on other specific cognitive areas, physical functions, and negative emotions has yet to be demonstrated by incorporating more RCTs.	**ADEQUATE** + protocol: PROSPERO ID: CRD42024532608 + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 11 = Enough for real conclusion		10.1016/j.gerinurse.2025.01.006	**C** (8// n = 579) cognition: significant/INT + high disagreement (5// n = 387) effects on physical frailty: significant/INT + high disagreement. (2// n = 102) effects on physical fitness: non-significant/CON + Substantial disagreement. (2// n = 102) walking ability: significant/INT + no disagreement. (2// n = 135) gaint speed: significant/CON + high disagreement. (4// n = 268) grip strength: significant/CON + Substantial disagreement. (2// n = 113) lower limb strength: significant/INT + Substantial disagreement. (2// n = 113) quality of life: non.significant/CON + high disagreement
Junga Lee	2020	systemic review and meta analysis	14	older adults with mild cognitive impairment (MCI)	exercise intervention	exercise vs. control	Handgrip Strength, Body Mass Index, Blood Pressure	Exercise participation in older adults with MCI improved cognitive functions (d = 0.88, 95% confidence interval [CI]; 0.10–1.65, p = 0.01; k = 5]) and handgrip strength (d = 0.62, 95% CI; 0.23–1.01, p = 0.00; k = 4) compared with control groups.	Older adults with MCI who participated in exercise received beneficial effects, including improvement in cognitive functions and handgrip strength, but further studies to confirm the effects are needed.	**POOR** - protocol: no clear protocol - rob2/risk of bias: The article does not include a clear Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 14 = Enough for real conclusion		10.3390/ijerph17249216	**D** (moderate disagreement, under 100 studies. There is no high disagreement or VERY few subjects) (4// n = 73) hadgrip strength: significant/INT + moderate disagreement

Diabetes

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Mingxing Feng et al.	2025	systemic review and meta analysis	19	participants were men or women aged 60 years or older diagnosed with T2DM, adhering to the age threshold established in previous research	t examined the impacts of RET interventions- defined as dynamic exercise modalities requiring force exertion against resistance	intervention vs. controls	glycemic control, lipid profiles, body composition, muscle strength, and blood pressure,	evaluated waist circumference. RET significantly decreased waist circumference, measured body weight. Pooled analysis showed a non-significant improvement in body weight with RET. measured upper-body strength. RET significantly enhanced upper body strength. measured lower-body strength. Pooled analysis revealed a significant increase in lower-body strength with RET.	In conclusion, our results demonstrate that RET is a highly effective intervention for improving glycemic control, lipid profiles, and muscle strength in older adults with T2D. Although the impact on cardiovascular health parameters such as blood pressure and heart rate were limited, the improvements in metabolic health and body composition suggest that RET should be considered an important component of diabetes management approaches for this population. Future research should aim to optimize RET regimens and explore the combined effects of RET with other exercise modalities, such as aerobic training, to further enhance its cardiovascular benefits	**POOR** + protocol: PROSPERO ID: CRD42024600592 - rob2/risk of bias: The article does not include Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 19 = Enough for real conclusion		10.1016/j.diabres.2025.112079	**D** (5// n=198) upper-body strength: non-significant/INT on pooled effect, (however, p-value indicates significant: P = 0.05) + high disagreement. (4// n= 165) lower-body strength: significant/INT + high disagreement

Kroniske nyresygdomme

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Chong-Cheng Chen et al.	2024	meta-analysis	16	Patients diagnosed with CKD	resistance exercise	Compared studies with and without resistance exercise	**The primary outcome** was assessed by glomerular filtration rate (GFR)(ml/(min•1.73m2)). **The secondary outcomes** were assessed by C-reactive protein (CRP) (mg/L), serum creatinine (mg/dL), hemoglobin (g/dL), Glycosylated Hemoglobin, Type A1C (HBA1c) (%), high Density Lipoprotein (HDL) (mg/dL), low Density Lipoprotein (LDL) (mg/dL), 6-min walk(m), body mass index (BMI) (kg/m2), fat-free mass (kg), fat mass (kg), grip strength (kgf).	**6-min walk** Two studies presented the data of 6-min walk. The pooled analysis revealed that CKD patients with resistance exercise had a longer 6-min walk compared to the control group and the difference was statistically significant (WMD 89.93; 95%CI 50.12 to 129.74; P = 0.000). The forest plot is presented in Fig. 3K. **Grip strength** Grip strength was evaluated in 7 studies. The grip strength of CKD patients in the resistance exercise group was significantly better than that of the control group according to the pooled outcome (WMD 3.97; 95%CI 1.89 to 6.05; P = 0.000). The forest plot is shown in Fig. 3L. The pooled WMDs of all indicators included in this study are summarized in Table 3.	This meta-analysis shows that resistance exercise can improve physical function, metabolic condition, inflammatory response and cardiopulmonary function in CKD patients, specifically reflected in the increase of indicators fat-free mass, grip strength, 6-min walk, as well as the decrease of indicators HBA1c and CRP.	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article includes risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 16 = Enough for conclusion		10.1186/s12882-024-03547-5	**C** Functional outcomes: (2/n=103) 6-min walk: significant/INT + Substantial disagreement (7/n=319) Grip strengthB: significant/INT + Substantial disagreement

Osteoporose

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Fang Zhao et al.	2025	systematic review and meta-analysis	17	postmenopausal women, with a mean age ranging from 50 to 72 years, and BMD was consistently measured using dual-energy X-ray absorptiometry	resistance training	untrained healthy postmenopausal women	bone density at the LS, FN, TH and Troch	**<u>The impact of resistance training on LS bone density</u>** 13 studies were included in the meta-analysis, comprising a total of 293 participants in the resistance training group and 233 participants in the control group. The analysis results are illustrated in Fig. 4. There was substantial heterogeneity among the 13 studies (I2 = 91%, P < 0.00001). Employing a random-effects model, the pooled effect size was SMD = 0.88, 95% CI [0.21, 1.56], Z = 2.58, P = 0.01, indicating significant differences (P < 0.05). This suggests that resistance training has statistically significant impact on LS bone density in postmenopausal women. **<u>The impact of resistance training on FN bone density</u>** 15 studies were included in the meta-analysis, comprising a total of 314 participants in the resistance training group and 301 participants in the control group. The analysis results are illustrated in Fig. 5. There was substantial heterogeneity among the 15 studies (I2 = 87%, P < 0.00001). Employing a random-effects model, the pooled effect size was SMD = 0.89, 95% CI [0.40, 1.39], Z = 3.53, P = 0.0004, indicating significant differences (P < 0.01). This suggests that resistance training has a statistically significant impact on FN bone density in postmenopausal women. **<u>The impact of resistance training on TH bone density</u>** 9 studies were included in the meta-analysis, comprising a total of 240 participants in the resistance training group and 195 participants in the control group. The meta-analysis results are presented in Fig. 6. There was relatively low heterogeneity among the seven studies (I2 = 25%, P = 0.20). Employing a fixed-effects model, the pooled effect size was SMD = 0.30, 95% CI [0.10, 0.50], Z = 2.94, P = 0.003, indicating significant differences (P < 0.01). This suggests that resistance training has a statistically significant impact on TH bone density in postmenopausal women. **<u>The impact of resistance training on Troch bone density</u>** 7 studies were included in the meta-analysis, comprising a total of 141 participants in the resistance training group and 130 participants in the control group. The meta-analysis results are presented in Fig. 7. There was relatively low heterogeneity among the six studies (I2 = 19%, P = 0.28). Employing a fixed-effects model, the pooled effect size was SMD = 0.23, 95% CI [-0.01, 0.47], Z = 1.86, P = 0.06, indicating nonsignificant differences (P >0.05). **<u>Results of subgroup analysis</u>** We conducted subgroup analyses on LS, FN, TH, and Troch bone density in postmenopausal women. The subgroups included Intervention frequency, Intervention intensity, Intervention cycle, and Duration per time. The specific results are shown in Table 2.	Resistance training can beneficially influence BMD in postmenopausal women, particularly at the LS, FN, and TH. A high-intensity training regimen (≥70% 1RM) performed three times per week with a longer training duration may be optimal. However, significant heterogeneity among the included studies for LS and FN bone density may affect the accuracy of the pooled results, thereby limiting the generalizability of these findings. More high-quality clinical trials are needed to confirm these findings.	**POOR** - protocol: no clear protocol + rob2/risk of bias: The article includes risk of bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 17 = Enough for real conclusion	"mean age ranging from 50 to 72 years" og ourcomes er bone density at the LS, FN, TH and Troch	<u>10.1186/s13018-025-05890-1</u>	**C** (13/ n = 293) LS bone density: significant/INT + high disagreement. (15/ n = 314) FN bone density: significant/INT + high disagreement. (9/ n = 240) TH bone density: significant/INT + moderate disagreement. (7/ n = 141) Troch bone density: significant-sig/INT + low disagreement.

Artrose

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Geir Smedslund et al.	2022	network meta-analysis	35	Patients with knee, hip or hand OA.	Interventions for OA included in the Cochrane Library. Any intervention for osteoarthritis with pain as outcome	placebo, no intervention, other intervention or standard treatment.	pain If there were more than one measure of pain, we followed the hierarchy described in Fransen et al. [22]. In the pre-registered protocol, we planned to also include physical function, fatigue, patient global assessment of disease activity, quality of life, and adverse events as outcomes, but we started with pain. This was because pain was the most frequently reported outcome in the included systematic reviews, and most relevant from the patient perspective. In addition, space limitations did not allow for more than one outcome in this paper.	Exercise (131 studies) showed consistent small to moderate effects across network/direct/indirect analyses (SMDs: −0.38/-0.45/-0.31).	EXERCISE besrår af: 1aquatic exercise, 2exercise, 3exercise therapy + booster, 4land-based exercise, 5strength training, 6strength training + agility training + aerobic exercise Results in the light of the current guidelines for OA Exercise was the largest category (131 comparisons). The effects were large and consistent, both across direct/indirect estimates and follow-up time. This is in accordance with the EULAR, ACR and OARSI guidelines that recommend exercise as core treatments. These guidelines also recommend self-management and educational interventions, which were included in our category “Combined treatments” and showed small to moderate effects on pain. Mind and body exercises (hatha yoga, tai chi) also showed strong effects. (...) Summing up the comparison between the results of the network meta-analysis and the guideline recommendations, there was consistent evidence for positive effects for exercise, self-management, and educational interventions. Our analysis shows that they are clinically relevant, and they are also recommended by the EULAR, ACR and OARSI guidelines. At the same time, weight loss, which is recommended by all three guidelines did not show clinical relevance in our analysis, most likely due to the inefficiency of the interventions to achieve weight loss. Inconsistencies were found with regard to clinically relevant effects in our analysis and recommendations against in guidelines for: regenerative medicine (ACR), electrotherapy (ACR and OARSI), symptomatic slow-acting drugs (ACR and OARSI), and Herbs (OARSI). For some therapies, which were shown to be effective and clinically relevant in the network meta-analysis such as acupuncture, manual therapies, and mind and body exercise, there is disagreement in the recommendations in the EULAR, OARSI and ACR	**GOOD** + protocol: PROSPERO ID: CRD42019114700 + rob2/risk of bias: The article includes rob2 + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 35 = Enough for conclusion	no age specified. It just says "Patients with knee, hip or hand OA." and does not look at the effect of strength training alone, but of exercise in general.	10.1016/j.ocarto.2022.100242	**B** (22/16 interventioner/ N = 445 (Most studies (n = 339) were performed on patients with knee OA (Table 3) or on a combination of knee and hip OA (n = 67). Few studies examined hip (n = 24) or hand (n = 6) OA, and nine studies only stated OA without specifying the site)) exercise (131 studies) (not RT alone, but general exercise) has a significant effect in both network/direct/indirect meta-analysis: significant/INT

									guidelines. (...) In conclusion, this is the first network meta-analysis to incorporate all treatments for OA pain. We have very low confidence in the ranking of effect estimates among the different treatment categories of this broad overview. Much of the reason for this low confidence is that the risk of bias in the primary studies is generally high and that the method of overviews of overviews tends to miss many details of these primary studies. We are, however, confident that we have included the best evidence provided by RCTs on the effect of treatments for OA in the Cochrane Library and Epistemonikos.				
C Juhl et al.	20 14	systematic review and meta-regression analysis	48	Patients had to have (explicitly stated) OA in either one or both knees, as defined by the American College of Rheumatolog y (ACR) criteria The mean age of the patients in the included trials was on average 64.3 years (range 52.2–73.8 years)	comparing effect of exercise groups	comparin g at least one exercise group to a non-exercise interventi on control group	the outcomes for evaluation of clinical efficacy were pain and disability, as recommen ded by Outcome Measures in Rheumatol ogy III	Forty-eight trials were included. Similar effects in reducing pain were found for aerobic, resistance, and performance exercise (SMD 0.67, 0.62, and 0.48, respectively; P = 0.733). These single-type exercise programs were more efficacious than programs that included different exercise types (SMD 0.61 versus 0.16; P < 0.001). The effect of aerobic exercise on pain relief increased with an increased number of supervised sessions (slope 0.022 [95% confidence interval 0.002, 0.043]). More pain reduction occurred with quadriceps-specific exercise than with lower limb exercise (SMD 0.85 versus 0.39; P = 0.005) and when supervised exercise was performed at least 3 times a week (SMD 0.68 versus 0.41; P = 0.017). No impact of intensity, duration of individual sessions, or patient characteristics was found. Similar results were found for the effect on patient-reported disability.	Optimal exercise programs for knee OA should have one aim and focus on improving aerobic capacity, quadriceps muscle strength, or lower extremity performance. For best results, the program should be supervised and carried out 3 times a week. Such programs have a similar effect regardless of patient characteristics, including radiographic severity and baseline pain.	**POOR** - protocol: protocol, which is available online at http://www.sdu.dk/en/Om_SDU/Institutter_centre/Iob_Idraet_og_biomekanik/Forskning/Forskningsenheder/FoF/Ph,-d-,d,-d-,-projekter/MEREX_carsten. - link does not work + rob2/risk of bias: The article includes risk of bias - GRADE: There is no clear GRADE level + sufficient number of studies (systematic review/meta-analysis): 48 = Enough for conclusion	**focus: pain and disability**	**10.1002/art.38290**	**C** (29) RT effect on pain: non-significant/INT + substantial heterogeneity (I2 = 62.0%) SMD for pain reduction was 0.50 (95% CI 0.39, 0.62) (P < 0.001) in favor of exercise, with substantial heterogeneity (I2 = 62.0%)

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Christos Karagiannis et al.	2023	systematic review and meta-analysis	24	Adults (≥18 years) with COPD who participated in pulmonary rehabilitation for ≥6 weeks. Mean age: 65.3 years (49–71.5 years).	Upper limb exercise training (ULET), including strength training.	Adults (≥18 years) with COPD who participated in pulmonary rehabilitation for ≥6 weeks. Mean age: 65.3 years (49–71.5 years).	Objective measures of upper extremity muscle strength (e.g. 1RM, hand-held dynamometry).	ULET compared to no training/sham resulted in significantly greater strength gains: – Elbow flexors (short term): SMD = 0.77 (95% CI 0.27–1.26) – Chest press (short term): SMD = 1.51 (95% CI 0.90–2.11) – Total upper body strength (long term): SMD = 0.72 (95% CI 0.11–1.34) Sensitivity and subgroup analyses did not change the direction or magnitude of the effect. There was no significant difference between elastic resistance and machine-based strength training (very low evidence).	ULET with strength training improves upper extremity strength in people with COPD compared to no training or lower extremity training only. Elastic training may be an alternative to machine-based strength training.	**GOOD** + protocol: PROSPERO ID: CRD42020210565 + rob2/risk of bias: The article includes risk of bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 24 = Enough for conclusions	mean age "65.3 years (range = 49–71.5 years)"	10.1177/17534666231170813	B (under 100 pers., low disagreement, significant effect) "Nine studies (283 patients) compared UL and LL training with different types of UL exercise" - BUT never over 100 patients in a pooled effect. Fig2: muscle strength comparison for pectoralis major (short term): (a) resistance UL and LL + combined resistance UL and LLET and endurance LL versus endurance LL training alone (4 // n = 87) significant/Upper and lower limb (vs endurance Lower limb (LL) + low disagreement. (b) subgroup analysis of combined resistance UL and LLET and endurance LL versus endurance LL training alone (4 // n = 58) non-significant/combined (vs endurance LL) + Moderate disagreement. (c) subgroup analysis of resistance UL and LLET versus endurance LL training alone (2 // n = 29) significant/resistance (vs endurance) + no disagreement. (d) resistance UL and LLET versus combined resistance UL and LLET and endurance LL (3 // n = 43) non-significant/resistance (vs combined) + low disagreement Fig3: muscle strength comparison for latissimus dorsi (short term): (a) resistance UL and LL + combined resistance UL and LLET and endurance LL versus endurance LL training alone: (4 // n = 87): significant/upper and lower limb + no disagreement (b) subgroup analysis of combined resistance UL and LLET and endurance LL versus endurance LL training alone: (4 // n = 58): significant/combined + no disagreement. (c) subgroup analysis of resistance UL and LLET versus endurance LL training alone: (2 // n = 29) significant/resistance + no disagreement. (d) resistance UL and LLET versus combined resistance UL and LLET and endurance LL: (2 // n = 29): non-significant/resistance + no disagreement

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Noé Labata-Lezaun et al.	2023	Systematic Review and Meta-Analysis	8	healthy older adults 65 years or older: average age between 67.5 and 81.5 years old (most of the articles analyzed both men and women, the distribution was greater for women)	intervention group with a RT, AT, BT or MCT. The training programs varied from 3 to 48 weeks, with a frequency of two to three sessions per week. Resistance Training / Multi-Component Training / Balance Training / Aerobic Training	control group, no training: seven studies included a non-training group, one included educational session and another one included a walking activity. Only the studies by Cadore et al. and Forte et al. included a resistance-training comparison group	static balance: static balance was assessed with the one-legged stance test in five studies, with the Berg balance scale in two studies, with the Romberg test in one study, and with the short physical performance battery (balance test) in another study	**The results showed no significant differences between the intervention groups and the control groups after the exercise programs**. __**Effectiveness of Interventions**__ **3.5.1. Resistance Training** Four articles reported results about resistance training. The study conducted by Earles et al. [32] focused on **speed-based strength training**. Among their results, they found **improvements in strength, but not in functional capacity**, which included the static balance variable. In the studies carried out by Kobayashi et al. and Marques et al. [30,39], they found **improvements in static balance after performing a specific strength training** protocol with respect to the control group. Finally, in the study conducted by Wolfson et al. [31], **non-significant improvements in static equilibrium** were found. For methodological reasons when reflecting the results, and after contacting the corresponding author, the data obtained in the study of **Marques et al. could not be included** in the quantitative analysis, so three studies were included, with a total of 119 participants. Figure 3 shows the comparison between RT and the control group. Analysis shows an overall SMD of 1.99 [95%CI −0.97; 4.95] and an overall effect of Z = 1.32 (p = 0.19). The heterogeneity was considered moderate (I2 = 49%).	**interventions based on different types of exercise improved static balance in elderly population, but without statistically significant difference in comparison with the control groups**. In view of our results, we can conclude that different modalities of training improve functional capacities such as strength, balance and the risk of falls in healthy elderly people, but the difference in static balance is not significant when comparing with the control groups. These results make us see the need to continue studying different modalities of interventions that can significantly improve balance in older adults.	**POOR** + protocol: PROSPERO ID: CRD42021233252 + rob2/risk of bias: The article includes Risk of Bias - GRADE: No GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 9 = Some evidence, but not robust.	9 studies are not quite enough, but close to sufficient for a real meta-analytic conclusion on static balance, since: - The population is relatively homogeneous (elderly ≥60 years) - The interventions are well-defined training modalities - They report consistent effects	10.3390/life13051193	

Shufan Li et al.	**2023**	Meta-Analysis	14	middle-aged and older adults between 45 and 89 years of age; no restriction on gender, race, or country; no psychiatric abnormalities or severe perceptual disorders, no musculoskeletal disorders or surgical history, and no major organic diseases. Results on age: 50–82 years (subgroup 55–64 / 65–75)	ubjects engaged in low intensity resistance training with blood flow restriction (<50% 1RM).	subjects performed daily exercise (maintenance of daily life or regular exercise), low-intensity resistance exercise (<50% 1RM), high-intensity resistance exercise (≥70% 1RM), or other exercise. If more than one group of data were compared in the same literature, they were counted as multiple studies.	the main outcome indicators were muscle strength and muscle mass of the lower limbs. For lower limb muscle strength, 1 or 10 repetitions of maximum strength (1RM/10RM), maximum voluntary contraction (MVC), and isometric moment were selected. For lower limb muscle mass, muscle cross-sectional area (CSA) was selected. The secondary outcome indicators were lower limb muscle function, balance and walking ability. For lower limb muscle function, SPPB (Short Physical Performance Battery) and 30-s sit to stand test were selected. For balance, the balance extension test and single leg stand test (with eyes open and closed) were selected. For walking ability, timed up and go (TUG) and walking time test were selected.	low intensity resistance training with blood flow restriction significantly improved lower limb muscle strength, lower limb muscle mass and walking ability, while there was no apparent intervention effect on lower limb muscle function and balance. The results of subgroup analysis showed that the intervention effect of low intensity resistance training with blood flow restriction on lower limb muscle strength was more significant in subjects aged 55-64 years, with exercise cycles of 4-8 weeks, exercise frequency of three times per week, exercise intensity of 20-30% 1RM, and vascular flow blocking pressure ≥ 120 mmHg.	LIRT + BFR can effectively improve lower limb muscle strength, muscle mass and walking ability, and can serve as an important form of anti-fall training for middle-aged and older adults. The intervention effect of LIRT + BFR on lower limb muscle strength was better than that of the daily exercise group and the low-intensity resistance exercise group, but the effect of high-intensity resistance exercise was superior compared to that of LIRT + BFR. In this paper, we investigated the dose-effect relationship between low intensity resistance training with blood flow restriction and lower limb muscle strength in terms of age, exercise cycle, exercise frequency, exercise intensity, and vascular blocking pressure, and found that the intervention effect of blood flow restriction intervention low-intensity resistance training on lower limb muscle strength was more significant at age 55–64 years, exercise cycle 4–8 weeks, exercise frequency 3 times/week, exercise intensity 20–30% 1 RM, and vascular blocking pressure ≥120 mmHg. Scientific exercise intervention is recommended for middle-aged and older adults as early as possible.	**ADEQUATE** + protocol: PROSPERO ID: CRD42022379662 + rob2/risk of bias: The article includes Risk of Bias - GRADE: No GRADE level is stated + adequate number of studies (systematic review/meta-analysis): 14		**10.3390/ijerph20064723**	**C** **(14/ n = 418)** Low Intensity Resistance Training with Blood Flow Restriction on Lower Limb Muscle Strength: significant/INT + Substantial disagreement (LIRT + BFR improved lower limb muscle strength better compared with daily exercise and low-intensity resistance exercise. The effect of high intensity resistance exercise was superior compared to that of LIRT + BFR. There was no significant difference between the two groups comparing LIRT + BFR with dynamic balance exercise.) (4) (...) Walking Ability: significant/INT + high disagreement
Youngwook Kim et al.	2022	systematic review and network meta analysis	46 (39 meta)	P: older adults with the mean age of 65 years or above; Results: the mean age of 71.9 ± 3.9 years (ranged from 65.3–80.9 years)	intervention and comparison: at least two distinct exercise interventions or one exercise intervention with a no-exercise controlled intervention (NE) compared in each trial;	no-exercise controlled intervention (NE)	at least one measure of reactive balance	Reactive balance training as a single intervention presented the highest probability (surface under the cumulative ranking (SUCRA) score) of being the best intervention for improving reactive balance and the greatest relative effects vs. NE in the entire sample involving all clinical conditions [SUCRA = 0.9; mean difference (95% Credible Interval): 2.7 (1.0 to 4.3)]. The results were not affected by characteristics of participants (i.e., healthy older adults only) or reactive balance outcomes.	The findings from the NMA suggest that a task-specific reactive balance exercise could be the optimal intervention for improving reactive balance in older adults, and power training can be considered as a secondary training exercise. The NMA was used to analyze the data of 39 RCTs including 1,388 participants, which revealed that older adults receiving a balance exercise with a reactive balance component showed the most improvements in reactive balance, followed by power training (second) and gait training with a reactive balance component (third) among 17 different exercise interventions. In conclusion, our NMA indicates that SBR, which simulates a real-life fall scenario and induces a specific balance recovery, is generally more efficacious in improving reactive balance than any other exercise intervention in older adults. Importantly, power training also appears to have greater impacts on reactive balance than other exercise interventions. Our results highlight the importance of task-specific exercise interventions with respect to the targeted postural perturbation and reactions. More trials with high methodological quality, low risk of bias, larger samples, and older adults with a specific disease or disability need to be conducted to construct a comprehensive literature basis, which would facilitate a more thorough NMA. The findings of this study could be used to design exercise-based interventions for improving reactive balance in older adults.	**ADEQUATE** + protocol: PROSPERO ID: CRD42021256638 + rob2/risk of bias: The article includesrisk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 46 = Enough for real conclusion		**10.3389/fnagi.2021.764826**	**C** **(n = 1388)** (16 outcomes) relative effects of exercise interventions with a no-exercise as a reference group: (only significant effect is SBR): PW: not significant/INT (1.5 (-1.3, 4.3) + moderate disagreement // relative effects of exercise interventions with a no-exercise as a reference group in healthy older adults (11 outcomes) relative effects of exercise interventions with a no-exercise as a reference group in healthy older adults: (only significant effect is SBR): PW: not significant/INT 1.9 (-1.8, 5.5) + moderate disagreement (12 outcomes) Movable platform: The only significant effect

													(sig/INT) is MBR: Simulated forward falls: None with significant effect. Being pushed or pulled: None with significant effect. Single balance exercise including reactive balance component SBNR, Single balance exercise not including reactive balance component; MBR, Multiple balance exercises including reactive balance component; MBNR, Multiple balance exercises not including reactive balance component; WBV, Whole body vibration; str, Strength; pw, Power; 3d, 3D exercise; NE, No exercise**.**
Durga Kulkarni et al.	2022	systematic review	10	healthy participants aged≥ 60 years.	eccentric strengthening or eccentric-biased strengthening intervention.	control (no exercise intervention) or concentric exercise.	trials assessing at least one of the following- incidence of falls, Berg balance scale (BBS) measure, timed-up and go (TUG) score, maximal walking speed (MWS), stair climb test (SCT), minute walking distance (MWD), and chair stand time (CST). Rate of perceived exertion and incidence of muscle soreness were secondary outcomes of this review. We included studies that reported at least one of our primary outcomes. Studies were still included if they did not report the secondary outcomes.	Overall, eccentric exercises were as effective as conventional resistance exercises in improving the selected outcomes by most studies. Additionally, when pre-exercise and post-eccentric exercise functional performance measures were compared, there was a statistically significant improvement in nearly all measures. The quality of trials was mixed (one high, four moderate, two low-moderate, and three low risk of bias).	eccentric-biased exercises exhibit significant improvements in balance, mobility, and endurance in healthy older adults. Furthermore, hardly any significant differences were observed, when the magnitude of these improvements was compared to those in response to concentric exercises in this population. However, the reduction in incidence of falls was greater in response to concentric exercise than to eccentric exercise. However, data on the falls' incidence were limited and reported only in one study. This evidence generated by this systematic review is limited by the heterogeneity across studies and small-effect sizes. Healthy older adults comprised the population of this systematic review and, therefore, there is uncertainty if the effect of eccentric exercise would be similar in older adults with any underlying health conditions.		Healthy older adults	10.1007/s41999-021-00571-8	
João Gustavo Claudino et al.	2021	systematic review an meta analysis	5	older individuals (age ≥ 60 years), of any sex. Fragility and/or comorbidities could be either present or absent. They could be community-dwelling older adults or patients living in	strength training (e.g., resistance training, calisthenics). Studies that combined strength training with other exercise protocols (e.g., endurance, stretching) were not considered.	non-exercise controls or multimodal or unimodal exercise interventions (e.g., stretching, balance). Studies that did not provide these types of comparator group(s) were excluded.	the primary outcome was risk of falling as measured by the number of falls or fall rates. Risk of falling was considered as a metric or statistical analysis where actual falls have been reported, and not as more generic, proxy assessments that may place the person at a higher risk of fall. Timepoints for assessments of the outcomes: in case studies that had multiple timepoints, we considered only the endpoint, i.e., the final assessments, performed after the intervention cessation.	Exercise-based programs are effective in reducing the number of falls and fall-associated injuries, and they improve physical function, muscle mass, balance, bone mass and cognition [4,19,83]. These programs are especially relevant in older adults living with clinical conditions and/or comorbidities, as they can also result in a reduced mortality risk	Prevention-focused unimodal exercise programs that include only ST seem as effective as alternative unimodal or multimodal exercise programs in tackling the risk of falls in older adults, but the certainty of evidence is very low and highly heterogeneous, and much research is required before a solid understanding is achieved. Moreover, there is insufficient basis to provide recommendations on the structure and details of the ST, other than following currently existing generic guidelines for exercise prescription.	**ADEQUATE** + protocol: PROSPERO ID: CRD42020222908 + rob2/risk of bias: The article includes Rob2 + GRADE: GRADE level is stated - adequate number of studies (systematic review/meta-analysis): 8 = Some evidence, but not robust	falls, healthy elderly	**10.3390/jcm10143184**	**C** (5 studies, n = 543, 76% women) (5) Risk of falling after participating in ST programs compared to unimodal/multimodal active/passive control conditions: non-significant + high disagreement.

				residential facilities or in the hospital.									
Caroline Gronlund et al.	2020	systemic review	8	older adults 60 years	investigated the effect of low-load resistance training combined with blood-flow restriction (LL-BFR)	Clinical trial with a control group or alternative training form;	falls	Assessing physical performance tests (n=12), 8/12 of the LL-BFR groups showed a significant within-group improvement and 5/12 significant between-group effects comparing LL-BFR to respective controls. For muscle strength tests (n=16), 9/16 showed significant positive within-group improvement and 3/16 significant between-group effects. One study reported data on balance with conflicting results	LL-BFR might increase physical performance and muscle strength in older adults ≥60 years of age.	**POOR** - protocol: PROSPERO ID: 152941 (not found in search) + rob2/risk of bias: The article includes Risk of bias - GRADE: No GRADE level is specified - sufficient number of studies (systematic review/meta-analysis): 8 = Limited evidence: There may be enough for qualitative patterns.		PMC7716683	no forest plot found
R M Y Wong et al.	2020	systematic review and meta analysis	12	community-dwelling elderlies older than 60 years old with physical exercises as intervention were included	Exercise interventions were provided to all participants in the intervention groups. These include resistance or strength exercise, balance training, jumping exercise, flexibility exercise, weight-bearing exercise, gait training, agility exercise, functional exercise and Tai Chi. All studies had balance exercise.	In the control groups, there were no interventions in 6 studies [13,14,19,23,24,26]. Other studies used alternative activities including health education workshops [21], ball games and memory tasks [17], and pamphlet and advice on fall prevention [20,25]. 1 study gave a low-frequency, low-intensity task for 60 min per week for 10 weeks followed by 10 weeks of rest. The tasks included relaxation, games, dances, body sensitivity, deep breathing and general coordination [18]. The control group of another study [22] took a 60-min class once per month for 3 months focusing on nutrition, cognitive function and oral hygiene.	The primary outcomes were falls and fractures	The results of meta-analysis of 11 studies showed that exercise intervention had beneficial effect on fall prevention.. The effect was better when exercise intervention applied to women participants.compared to men and women participants (.The results of meta-analysis of seven studies showed that physical exercise had significant effect on fracture prevention.However, the effect was significant when exercise intervention applied to women participants only.but not significant when exercise intervention applied to both genders	Exercise interventions, especially the combination of strength and balance training, were effective in preventing falls. Resistance exercises and jumping exercises were effective for fracture prevention among community-dwelling older population. The effectiveness of exercise interventions on fracture prevention have more significant effect on women	**POOR** - protocol: no clear indication of protocol + rob2/risk of bias: The article includes Risk of bias - GRADE: GRADE level not stated + sufficient number of studies (systematic review/meta-analysis): 12 = Enough for real conclusion		10.1016/j.jot.2020.05.007	
Nejc Šarabon & Žiga Kozinc	2020	Systematic Review and Meta-Analysis	13	The population of interest included all age groups and both genders. Therefore, children and adolescents (≤18	Effects of Resistance Exercise on Balance Ability: Studies were included if at least one experimental group performed an intervention consisting of RE. We imposed no limits regarding the RE type (e.g., maximal strength training, speed-power	The main inclusion criteria were an inclusion of a control group, that received no RE intervention. The exceptions (see also above) were possible when both experimental and control groups received an additional non-exercise intervention (e.g., if the experimental group included RE and nutritional	The studies were considered if the outcome measures included any type of functional balance/postural control test, or dynamic mobility test scores (including, but not limited to functional reach test, timed-up-and-go test, single-leg stance test, Y-balance test, star-excursion balance test, Romberg test). The mobility tests, such as the timed-up-	(...) the pooled results from the studies that examined older adult participants. The studies showed statistically significant effect positive of RE on functional reach test. (...). Due to the high heterogeneity between the studies (I2 = 72%) in terms of a single-leg standing test, (...) showed statistically significant moderate improvements with resistance exercise (...). Finally, there was also a statistically significant	This systematic review has shown that RE interventions may significantly improve balance ability in adult and older adult participants. This finding has important practical implications, as RE could be used to improve both muscular strength and power, as well as balance at the same time. Strength training, power training, and strength-endurance training targeting primarily lower limb musculature, with different types of load (bodyweight, elastic, free weight, and resistance machines) were shown to be effective. RE interventions designed for improvements in balance ability should be sufficiently long (4 weeks and more) and be conducted in accordance with general RE. Although multi-component exercise programs should still be prioritized when possible,	**POOR** + protocol: PROSPERO ID: CRD42020178520 - rob2/risk of bias: "PEDro scale, which assesses study quality based on ten criteria [40]. Potential disagreements between	balance/ any age	10.3390/life10110284	

				years of age), adults (18–65 years of age), and older adults (≥65 years of age) were considered.	training, strength endurance training), regarding the type of the load used (e.g., elastic, free weight, machine, bodyweight). No exclusion criteria were determined for different RE intensity or volume, however, we excluded the interventions lasting <3 weeks. Studies were also excluded in case the RE was conducted in conjunction with other exercise modalities. In cases when another non-exercise intervention was used (e.g., nutritional supplement), the study was included if it involved a control group that did not perform the RE but received the respective non-exercise intervention.	supplement, a control group was only considered if only the supplement was used).	and-go test were included because it was expected that such tests are commonly performed in the elderly populations, and although these tests are not stressing the balance ability, they were shown to be associated with the risk of falling in elderly and to reflect the balance ability in addition to mobility	improvement in timed-up-and-go test. The effects were large.	performing RE alone could be a time-efficient compromise when trying to improve overall physical fitness.	ratings were resolved by consulting. Studies scoring from 9–10 scores were considered as "excellent", 6–8 as "good", 4–5 as "fair" and less than 4 as "poor" quality. " - but not rob2 or risk of bias - GRADE: No GRADE level given + sufficient number of studies (systematic review/meta-analysis): 13 = Enough to draw a valid conclusion	
Ewan Thomas et al.	2019	systematic review	8	the effects of physical activity on balance on samples of elderly, aging at least 65 or older. Participants had to be healthy without any disabling, physical, neurological, or mental disease and were excluded whether living in a nursing home. Both genders were considered	randomized control trials that have analyzed balance and physical activity in healthy elderly over 65 years of age during the last decade. the effects of resistance and aerobic exercise, balance training, T-bow© and wobble board training, aerobic step and stability ball training, adapted physical activity and Wii Fit training on balance outcomes.	control: the comparison of the intervention effect between the exercise and control groups was analyzed for each manuscript according to post-intervention data, or where accessible, the rate of pre-post improvement	Balance: All analyzed studies, for example, used different assessment tools for the evaluation of balance abilities. Four studies used the one leg stance to evaluate static balance, 1 the berg balance scale, 1 the tinetti balance test, 1 the time up and go test, and another 1 the 8-ft up and go.	**<u>3.1. Resistance and aerobic exercise</u>** The results indicated that after a 16 week intervention period both the multicomponent (pre 7.1±8.6s, post 11.1±11.7s) and resistance exercise intervention (pre 6.0±6.7s, post 6.7±7.4s) increased the balance measures compared to the control group which instead showed a decrease (pre 5.1±6.5s, post 5.5±5.9s). Also, the number of reported falls measured by the authors decreased after the intervention period (Multicomponent pre 10, post 2, Resistance exercise pre 7, post 1, control pre 8, post 5). It has to be noted that the multicomponent exercise intervention showed greater results compared to the resistance exercise protocol alone.	Although the investigated studies exhibited positive effects on balance, indicating a reduction in the risk of falling, there were some aspects of the studies that do not make a comparison possible. The studies reported a concomitant increase in strength together with balance improvements. Multicomponent exercise with aerobic and anaerobic components seems to provide positive outcomes together with specific balance exercises integrated with resistance exercise means. The control groups which received no intervention, showed a decline in the ability to balance, suggesting that inactivity, more than a specific type of physical activity, plays a pivotal role in the elderly, in the mechanisms involved in maintaining balance. Regular physical activity including aerobic, anaerobic and proprioceptive components may be practiced in order to promote static balance in the elderly as a mean to reduce future risk of falling. There is however the need to compare such results with larger population studies.	**POOR** - protocol: There is no clear pre-registered protocol mentioned in the article. - rob2/risk of bias: The article does not include Risk of Bias - GRADE: There is no clear GRADE level - No studies (systematic review/meta-analysis): 0	<u>10.1097/MD.0000000000016218</u>

Skrøbelighed

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Yerim Choi et al.	2024	Bibliometric and Meta-Analyses	18	The mean age of the participants was between 70.0 (±4.7) and 93.4 (±3.2) years, and 630 were female (54%)	RT was administered to the experimental group and mostly combined with other types of training, such as aerobic exercise, balance, gait, mobility, and flexibility training. The mean duration of the RT programs was approximately 10–12 weeks (range 8–36 weeks), and the most common training frequency was 2–3 times per week.	**control group**: Most studies divided participants into a control group that performed routine daily activities, although five studies provided the control group with flexibility training	The frailty-associated variables included in these studies were one or more of the following measurements: three body composition measurements (body mass index, muscle mass, and appendicular muscle mass), three muscular strength measurements (handgrip strength and isometric and isokinetic knee extension), four physical function measurements (one leg standing time, gait speed, timed up and go test (TUG), and short physical performance battery test (SPPB)), and two functional strength measurements (chair stand time and stair-climbing power).	**3.2.4. Muscular Strength** The results demonstrate a significant difference in **handgrip strength** between the training group and control group. Significant changes for lower limb strength (isometric knee extension and isokinetic knee flexion) in the RT group. Sub-measurement analyses were performed for lower limb strength, and significant changes in both isometric knee extension and isokinetic knee flexion were found. **The heterogeneity** in the outcomes was high for handgrip strength and moderate for lower limb strength. **These results demonstrate that the RT group exhibited higher handgrip strength and lower limb muscle strength (isometric knee extension and isokinetic knee flexion), compared with the control group.** **3.2.5. Physical Function** The effects of RT were reported for balance, gait speed, and agility (TUG). The meta-analysis found significant changes in favor of RT group for **balance** and **gait speed**; however, there was **no significant** RT **effect on agility**. Sub-measurement analyses for balance yielded a positive significant effect on one-leg standing time and the SPPB balance test. **The heterogeneity** in the results around these outcomes was moderate for balance and high for gait speed and agility. **In summary, RT demonstrated significant improvements in balance and gait speed but no significant effect on agility.** **3.2.6. Functional Strength** There was not a significant improvement in functional strength compared with the control after pooling the results. As a result of the sub-measurement analyses, the chair stand test results, reported in four studies (95 participants), did not change with RT. A significant change was observed in the stair-climbing test. **The heterogeneity** in the results around the outcomes was high for the total functional strength and chair stand test. but very low for the stair-climbing test. **RT did not show a significant improvement in overall functional strength** compared with the control, although RT did improve stair-climbing ability.	Frailty was found to be the most noteworthy keyword co-occurring with aging and PA. Thus, we further investigated the effects of RT on frail older adults. The meta-analysis found that RT had significant positive effects on physical factors associated with frailty, including handgrip strength, lower limb strength, balance, gait speed, and stair-climbing ability in frail older individuals, with few exceptions such as the TUG or chair stand time tests. These findings indicate that RT is an effective intervention for improving physical function among frail older adults, particularly for tasks that require lower limb muscle strength. (...) In particular, our meta-analysis findings have important implications for the development of PA programs that can help older adults maintain their independence and quality of life by alleviating physical frailty. These emphasize that PA (Physical Activity) is essential for healthy aging.	**POOR** - protocol: no clear protocol - rob2/risk of bias: The article includes no clear Risk of Bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 18 = Enough for conclusion		10.3390/healthcare12020197	
Pedro Lopez et al.	2023	Systematic Review and Network Meta-Analysis	80	median age of 70.2 years (interquartile range [IQR] = 67.3 to 72.6 yrs) and BMI of 27.6 kg.m−2 (IQR = 25.6 to 28.6 kg.m−2). Most	effectiveness of different modes of resistance exercise velocity	traditional resistance exercise versus high-velocity resistance exercise versus control, traditional resistance exercise versus high-velocity	The primary outcome for this review was objectively assessed physical function measured by: (a) fast walking speed (a measure of gait speed), (b) timed-up and go test (ie, time in seconds to	High-velocity resistance exercise was the most effective for improving fast walking speed, timed-up and go, and 5-times sit-to-stand, while traditional resistance exercise was the most effective for 30-second sit-to-stand and 6-minute walking. **Physical function outcomes** **High-velocity resistance exercise** was the most effective for improving fast walking speed	In conclusion, our study provides evidence that resistance exercise effects on physical function are velocity specific, as evidenced by physical function test dependence in older adults. While high-velocity resistance exercise promoted greater improvements in physical function tests with a time	**ADEQUATE** + protocol: PROSPERO ID: CRD42022297254 + rob2/risk of bias: The article includesrisk of bias + GRADE: GRADE level is stated	**Not only healthy**: healthy participants (55 out of 79 studies, 69.2%), followed by	10.1093/gerona/glac230	**C** (n = 3 575) fast walking speed = B HRE: Healthy THREE: Mixed (4/5 outcomes) HVRE = high-velocity resistance exercise; + high disagreement all studies = non-

studies included physically healthy participants (55 out of 79 studies, 69.2%), followed by participants with a self-reported disability or mobility limitations (8 out of 79 studies, 10.1%), sarcopenia (6 out of 79 studies, 7.6%), and frailty (5 out of 79 studies, 6.3%). Five studies included both physically healthy and participants with some physical disability (6.3%).	resistance exercise, traditional resistance exercise versus control, or high-velocity resistance exercise versus control in untrained older adults	rise from the chair, walk a distance, turn, walk back to the chair, and sit down; a measure of lower-limb function and mobility), (c) 5-times sit-to-stand test (ie, time in seconds to rise as fast as possible from the chair 5 times; a measure of lower-limb power and strength), (d) 30-second sit-to-stand test (ie, number of times that a participant can rise to a full stand from a seated position within 30 seconds; a measure of lower-limb strength and endurance), and (e) 6-minute walking test (ie, distance covered in meters when participants were instructed to walk as far as they could during 6 minutes; a measure of cardiorespiratory fitness and walking endurance). Secondary outcomes included maximal muscle power measured by a multijoint lower-limb exercise or task test (eg, leg press exercise, stair climbing, countermovement jump, and sit-to-stand test) and expressed as W or W.kg−1, and maximal muscle strength measured by the leg press 1-repetition maximum test (1-RM).	(p score = 92.8%) and reducing the time to perform the timed-up and go (p score = 89.5%) and the 5-times sit-to-stand test (p score = 82.1%) compared to controls (Table 1). **Traditional resistance exercise** was the most effective intervention for improving 30-second sit-to-stand (p score = 85.1%) and 6-minute walking test (p score = 79.1%; Table 1). Statistically significant differences were not observed between traditional and high-velocity resistance exercise for physical function outcomes (p = .239–.837). **Subgroup analyses for physical health status:** **High-velocity resistance exercise** resulted in significant improvements in fast walking speed, timed-up and go, 30-second sit-to-stand, and 6-minute walking test for those physically healthy but not 5-times sit-to-stand where significant effects were only observed in physically impaired participants. In t**raditional resistance exercise**, significant effects were observed **regardless of physical health status** on timed-up and go, 5-times sit-to-stand, and 30-second sit-to-stand. For fast walking speed and 6-minute walking test, **traditional resistance exercise** resulted in significant effects for mixed physically healthy and physically impaired participants and physically healthy participants, respectively. **Muscle power and muscle strength outcomes** High-velocity resistance exercise was the most effective for improving leg press muscle power (expressed in W) compared to traditional resistance exercise and control condition (p score = 99.9%; Table 2). For leg press muscle strength, traditional resistance exercise was the most effective intervention compared to the control (p score = 86.6%; Table 2). There was a statistical difference between traditional and high-velocity resistance exercises for leg press muscle power (p = .003) but not for leg press muscle strength (p = .538). NMA were not undertaken for leg press muscle power (expressed in W.kg−1), stair climbing, sit-to-stand, and countermovement jump muscle power, given the small number of studies for each comparator (≤1).	component, traditional resistance exercise was the most effective intervention for improving performance where participants had to work longer. These results are of clinical importance as they indicate that resistance exercise prescription based on the velocity of contraction should be individualized and specific to target the relative deficits of participants' and their needs within the resistance exercise program. Moreover, older adults will often present with a range of deficits in physical function and consequently, both high-velocity and traditional resistance exercise may be required to enhance multiple domains of physical function.	- sufficient number of studies (systematic review/meta-analysis): 8 = Some evidence, but not robust	particip ants with a self-reporte d disabilit y or mobility limitatio ns (8 out of 79 studies, 10.1%), sarcope nia (6 out of 79 studies, 7.6%), and frailty (5 out of 79 studies, 6.3%). Five studies include d both physical ly healthy and particip ants with some physical disabilit y (6.3%).	significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = non-significant in favor of intervention Mixed (both healthy and non-healthy): non-significant in favor of intervention = B (8/9 outcomes) TRE = traditional resistance exercise + moderate disagreement all studies = non-significant in favor of intervention physically healthy = non-significant in favor of intervention physically impaired = non-significant in favor of intervention Mixed: significant in favor of intervention = B timed-up and go = B (improves in both groups in healthy + overall. TRE improves mixed + frail) HVRE: Healthy+all TRE: All groups (all+healthy+frail+mixed) (10) HVRE = high-velocity resistance exercise; + low disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = non-significant in favor of intervention Mixed: non-significant in favor of intervention (31/32 outcomes) TRE = traditional resistance exercise + moderate disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = significant in favor of intervention Mixed: non-significant in favor of intervention Five times sit-to-stand = B (improves in both groups in frail and overall. TRE also improves in frail) HVRE: all+frail TRE: all+healthy+frail (3/4 outcomes) HVRE = high-velocity resistance exercise; + moderate disagreement all studies = significant in favor of intervention physically healthy = non-significant in favor of intervention physically impaired = significant in favor of intervention

		(13/14 outcomes) TRE = traditional resistance exercise + moderate disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = significant in favor of intervention Mixed: non-significant in favor of intervention 30-second sit-to-stand = B (improves in both groups in healthy and overall. TRE also improves in frail) HVRE: all+healthy TRE: all+healthy+frail (7) HVRE = high-velocity resistance exercise; + low disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention (18) TRE = traditional resistance exercise + moderate disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = significant in favor of intervention 6-minute walking = B (improves in both groups in healthy and overall) HVRE: all+healthy TRE: all+healthy (4) HVRE = high-velocity resistance exercise; + moderate disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = non-significant in favor of intervention (14) TRE = traditional resistance exercise + moderate disagreement all studies = significant in favor of intervention physically healthy = significant in favor of intervention physically impaired = non-significant in favor of intervention

								Frailty: resistance training (SUCRA = 90.0%) and mind–body exercise (SUCRA = 85.9%) had the highest probability to be the most effective interventions in reducing frailty, followed by mixed physical training (SUCRA = 78.1%), multicomponent intervention (SUCRA = 62.0%) and aerobic training. **Activity of daily living**: mixed physical training had the highest probability to be the most effective intervention to improve the activity of daily living. **Quality of life**: the comprehensive geriatric assessment (SUCRA = 98.9%) had the highest probability to be the most effective intervention to improve the quality of life.					
Xuemei Sun et al.	2023	systematic review and network meta-analysis	69 (56 meta)	interventions for frailty among participants aged ≥60	All non-pharmacological interventions for frailty were included There were seven types of interventions (11 interventions) for frailty among the included RCTs: PA (aerobic training (n = 2), mind–body exercise (n = 4), resistance training (n = 8), mixed physical training (n = 28)), psychosocial or cognitive training (cognitive training (n = 1)), nutrition intervention (nutrition supplementation (n = 13)), multicomponent intervention (n = 21), comprehensive geriatric assessment (n = 3), home telemonitoring (n = 1) and control (active control (n = 21), usual care (n = 56)). Detailed components of each intervention are presented in Appendices 3–5.	the eligible comparators included usual care, placebo, no treatment or other non-pharmacological interventions.	Eligible RCTs must report frailty as the primary outcome measured by one of the validated frailty measurement instruments listed in Appendix 2, as there is no standardised measurement instrument for frailty [9]. Secondary outcomes included cognition, depression, activity of daily living and quality of life	Frailty A total of 56 RCTs (9,530 participants, 10 interventions in 6 types) were included in the NMA for frailty (Appendix 15). For the six types of interventions, NMA results showed that PA (pooled SMD = 0.43, 95% CI: 0.34–0.51), multicomponent intervention (pooled SMD = 0.34, 95% CI: 0.23–0.45), nutrition intervention (pooled SMD = 0.21, 95% CI: 0.06–0.35) were associated with reducing frailty compared with control. PA (SUCRA = 93.2%) had the highest probability to be the most effective type of intervention in reducing frailty (Appendices 16–18). In terms of specific interventions, resistance training (pooled SMD = 0.58, 95% CI: 0.33–0.83), multicomponent intervention (pooled SMD = 0.39, 95% CI: 0.28–0.50), mind–body exercise (pooled SMD = 0.57, 95% CI: 0.24–0.90), mixed physical training (pooled SMD = 0.47, 95% CI: 0.37–0.57), aerobic training (pooled SMD = 0.36, 95% CI: 0.09–0.62) and nutrition supplementation (pooled SMD = 0.24, 95% CI: 0.10–0.38) were associated with a decrease in frailty compared with usual care, with the first two being graded as very low-certainty evidence and the remaining four as low-certainty evidence (Table 2). According to SUCRA, resistance training (SUCRA = 90.0%) and mind–body exercise (SUCRA = 85.9%) had the highest probability to be the most effective interventions in reducing frailty, followed by mixed physical training (SUCRA = 78.1%), multicomponent intervention (SUCRA = 62.0%) and aerobic training (SUCRA = 55.5%) (Figure 3). The results of the subgroup analysis were shown in Appendix 19–25. Activity of daily living Fifteen RCTs (3,290 participants, 9 interventions) provided data on activity of daily living that were included in NMA (Appendix 15). Mixed physical training versus usual care (pooled SMD = 0.29, 95% CI: 0.12–0.46) showed a statistically significant superior effect (Appendix 26), with evidence being graded as very low certainty. According to SUCRA, mixed physical training	Resistance exercise could be considered as a priority choice to reduce frailty in older adults based on the results of this NMA. This finding might be useful to clinicians in selecting interventions for older adults with frailty. However, the certainty of the evidence for this finding was moderate to very low.	**GOOD** + protocol: PROSPERO ID: CRD42021276555 + rob2/risk of bias: The article includes Risk of Bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 69 = Enough to conclude	ekskluder	10.1093/ageing/afad004	**C** **Sample size:** ranged from 25 to 1,637, with the majority RCTs ≤100 (n=38, 55.1%), 18 (26.1%) ranging from 101 to 300, 9 (13.0%) ranging from 301 to 500 and only 4 (5.8%) > 500. (8) resistance training: **Frailty** significant/INT (very low evidence) + low disagreement

								(SUCRA = 86.6%) had the highest probability to be the most effective intervention to improve the activity of daily living (Appendix 27). Quality of life Eleven RCTs (2,338 participants, 6 interventions) provided data on the quality of life that were included in NMA (Appendix 14). Compared with usual care, comprehensive geriatric assessment (pooled SMD = 0.82, 95% CI: 0.37–1.27) and mixed physical training (pooled SMD = 0.17, 95% CI: 0.02–0.32) showed a statistically significant effect in improving the quality of life, with evidence being graded as low certainty (Appendix 28). According to SUCRA, the comprehensive geriatric assessment (SUCRA = 98.9%) had the highest probability to be the most effective intervention to improve the quality of life (Appendix 29).				
Cristiane de Almeida Nagata et al.	2023	meta analyseog meta regression	10	frail and pre-frail adults aged ≥ 65	resistance training, defined as an exercise that involves the participant exerting effort against their body weight or external resistance	non-physically active control group (e.g., health education, no intervention);	the primary outcomes were assessed by functional performance (walking speed, gait, mobility, postural balance, disability, chair rise, stair climbing, timed up and go, Berg Balance Scale) between the intervention and control groups;	RT alone improved STS time and SPPB scores in frail and pre-frail older adults. RT improved STS performance	Our meta-analysis summarized the influence of crucial resistance training variables, including intensity, duration, and frequency, on enhancing functional performance in frail and pre-frail older adult	**GOOD** + protocol: PROSPERO ID: CRD42021258383 + rob2/risk of bias: The article includes Risk of Bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 10 = Enough for real conclusion	10.1016/j.arr.2023.102079	**C** **RT (n =562)** (5) Effects of Resistance Training on Usual Walking Speed: non-significant/INT + high disagreement. (3) Effects of Resistance Training on Timed-up-and-go test: non-significant/INT + high disagreement. (3) Effects of Resistance Training on Short Physical Performance Battery: significant/INT + high disagreement. (3) Effects of Resistance Training on sit-to-stand test: significant/INT + low disagreement.
Ita Daryanti Saragih et al.	2022	systematic review and meta-analysis	15	included frail older adults (≥65 years and frailty phenotype score ≥3)	applied resistance band exercises;	the exercise group and the control group. Each of these comparison groups was associated with a mean ± SD for the pre- and post-intervention measurements. he treatment effect was measured as the change in the mean and SD between the pre- and post-intervention measurements.	the effects of resistance band exercises on frailty, muscle strength (grip strength and leg strength), ADL, depression and quality of life among frail older adults	resistance band exercise reduced frailty after 24 weeks and reduced depression after both 12 weeks and 24 weeks. However, no significant effects were observed for frailty after 12 weeks, and no significant effects were observed for grip strength, leg strength, activities of daily living or quality of life at any time.	**Resistance band exercise might be considered a viable strategy for frail older adults in the community or in long-term care facilities**: resistance band exercises significantly reduced the burden of frailty after 24 weeks and decreased depression at all analysed time points. Overall, this study indicated that resistance exercise using elastic bands provided practical benefits for frail older adults. However, this intervention showed no significant effects against frailty at 12 weeks or against grip strength, leg strength, ADL and quality of life at any of the analysed time points. No substantial conclusions can be made regarding the adequate volume or frequency necessary to improve either of the main outcomes. Different exercise volumes and frequencies were identified among the included studies. However, some studies	**ADEQUATE** + protocol: PROSPERO ID: CRD42020207664 + rob2/risk of bias: The article includes Risk of Bias - GRADE: No clear GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 15 = Enough for real conclusion	10.1111/jocn.15950	

									showed considerable effects on the outcomes measured among frail older adults. The dose–response relationships remain unclear. Further research remains necessary to provide more substantial conclusions regarding the most recommended dose of resistance band exercise to observe beneficial effects among frail older adults. As a safe complementary intervention for frail older adults, health providers should consider resistance band exercises when caring for frail older adults because this intervention has clinical benefits		
Karolina Talar et al.	2021	systematic review and meta analysis	25	participants included older individuals (≥65 years of age) with pre-frailty, frailty, pre-sarcopenia or sarcopenia but without comorbid conditions (e.g., diabetes, cancer, stroke, dementia, depression	resistance training intervention lasted ≥ 8 weeks as this is the recommended minimum intervention duration to increase muscle strength and treat sarcopenia	randomized control trial	at least one outcome of interest (muscular strength, body composition, gait speed, balance, agility) was reported before and after the training intervention	Meta-analysis showed significant changes in favour of resistance training for handgrip (ES = 0.51, p = 0.001) and lower-limb strength (ES = 0.93, p < 0.001), agility (ES = 0.78, p = 0.003), gait speed (ES = 0.75, p < 0.001), postural stability (ES = 0.68, p = 0.007), functional performance (ES = 0.76, p < 0.001), fat mass (ES = 0.41, p = 0.001), and muscle mass (ES = 0.29, p = 0.002). Resistance training during early stages had positive effects in all variables during early stages (ES > 0.12), being particularly effective in improving gait speed (ES = 0.63, p = 0.016) and functional strength (ES = 0.53, p = 0.011). Based on these results, resistance training should be considered as a highly effective preventive strategy to delay and attenuate the negative effects of sarcopenia and frailty in both early and late stages.	Based on these results, resistance training should be considered as a highly effective preventive strategy to delay and attenuate the negative effects of sarcopenia and frailty in both early and late stages.	**GOOD** + protocol: PROSPERO ID: CRD42019138253 + rob2/risk of bias: The article includes risk of bias + GRADE: GRADE level is stated + sufficient number of studies (systematic review/meta-analysis): 25 = Enough for real assessment	10.3390/jcm10081630
Carmen de Labra et al.	2015	systematic review of rcts	9	Frail elderly people, defined with a clear operational definition/measurement of frailty;	Of these, six included multi-component exercise interventions (aerobic and resistance training not coexisting in the intervention), one included physical comprehensive training, and two included exercises based on strength training.Three trials focused on the effects of exercise intervention on balance performance, and one demonstrated enhanced balance	All nine of these trials included a control group receiving no treatment, maintaining their habitual lifestyle or using a home-based low level exercise program	Studies examining, as a primary outcome, the effects of the intervention on the domains of frailty and/or physical capacity and/or functional capacity of the sample; and	Four trials investigated functional ability, and two showed positive results after the intervention. Seven trials investigated the effects of exercise intervention on muscle strength, and five of them reported increases; three trials investigated the effects of exercise training on body composition, finding improvements in this parameter in two of them; finally, one trial investigated the effects of exercise on frailty using Fried's criteria and found an improvement in this measurement	Exercise interventions have demonstrated improvement in different outcome measurements in frail older adults, however, there were large differences between studies with regard to effect sizes.	**POOR** - protocol: ingen tydelig protokol - rob2/risk of bias: Artiklen inkluderer ingen tydelig Risk of Bias - GRADE: Der er ikke angivet tydelig GRADE-niveau - Nok studier (systematisk review/**meta-analyse**): 9 = Begrænset evidens: Der kan være nok til kvalitative mønstre.	10.1186/s12877-015-0155-4

Mobilitetsbegrænsning

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Ferry Efendi et al.	2022	Systematic review and meta-analysis	9	Older adults with various conditions were involved in the included studies, including healthy, frailty, cognitive impairment, dementia, and wheelchair user.	Chair-based resistance band exercise (CRBE) effects on physical functioning, sleep quality, and depression among older adults in long-term care facilities (LTCF) Included studies were carried out in various types of long-term care facilities such as nursing homes (n = 6), daycare (n = 1), geriatric centers (n = 1), and centers of health and social support institutions (n = 2).	six trials provided a usual or routine daily activity for participants in the control group, two studies did not administer any exercise, and one study provided a joint mobility routine	CRBE effects on physical functioning, sleep quality, and depression among older adults in long-term care facilities (LTCF).	<u>**3.4. Effects of CRBE on physical functioning**</u> <u>**3.4.1. Activity daily living**</u>: Six studies examined the effects of CRBE on independence in activity daily living measured. **low heterogeneity**. These results suggest that chair-based resistance band exercise statistically significantly improves independence in activity daily living compared with routine care. <u>**3.4.2. Lung capacity**</u>: Three studies examined the effects of chair-based resistance band exercise on lung capacity. **low heterogeneity**. These results suggest that CRBE statistically significant improved lung capacity compared with routine care. <u>**3.4.3. Handgrip strength**</u>: Five studies examined the effects of CRBE on handgrip strength, with **low heterogeneity**. These results suggest that CRBE statistically significant improved handgrip strength compared with routine care. <u>**3.4.4. Upper limb muscle endurance**</u>: Five studies examined the effects of CRBE on upper limb muscle endurance, **considerable heterogeneity**. These results suggest that CRBE statistically significant improved upper limb muscle endurance compared with routine care. <u>**3.4.5. Lower limb muscle endurance**</u>: Four studies examined the effects of CRBE on lower limb muscle endurance, **low heterogeneity**. These results suggest that CRBE statistically significant improved lower limb muscle endurance more than routine care. <u>**3.4.6. Upper body flexibility**</u>: Four studies examined the effects of CRBE on upper body flexibility measured with a back scratch test, **low heterogeneity**. These results suggest that CRBE statistically significant improves upper body flexibility compared with routine care. <u>**3.4.7. Lower body flexibility**</u>: Four studies examined the effects of CRBE on lower body flexibility measured with a chair sit-and-reach test, **moderate heterogeneity**. These results suggest that CRBE statistically significant improves lower body flexibility compared with routine care. <u>**3.4.8. Dynamic balance**</u>: Three studies examined the effects of CRBE on dynamic balance with a Timed Up and Go test, **low heterogeneity**. These results suggest that CRBE statistically significant improves dynamic balance compared with routine care. <u>**3.5. Effects of CRBE on sleep quality**</u> Two studies examined the effects of CRBE on sleep quality measured by the Pittsburgh Sleep Quality, **low heterogeneity**. These results suggest that CRBE significantly statistically significant improved sleep quality compared with routine care. <u>**3.6. Effects of CRBE on depression**</u> Two studies examined the effects of CRBE on depression measured by the Taiwanese Depression Scale (TDS) and the Cornell Scale for Depression in Dementia (CSDD). **moderate heterogeneity**. These results suggest that CRBE statistically significant reduced depression compared with routine care.	The evidence suggests that CRBE improved physical functioning parameters, and sleep quality, and lowers depression among older adults in LTCF. This study could be used to persuade long-term care facilities to allow people with limited mobility to engage in physical activity. // Physical functioning decline, poor sleep quality, and depression are obstacles that hinder older adults with impaired mobility from achieving healthy aging. The cumulative evidence is conclusive that CRBE positively affects all physical functioning parameters, the activity of daily living, sleep quality, and depression among older adults in long-term care. With the evidence from the present study, CRBE may serve as evidence for LTCF to empower residents with impaired mobility to perform physical activity.	**POOR** + protocol: PROSPERO ID: CRD42022320946 - rob2/risk of bias: The article does not include a clear Risk of bias - GRADE: No clear GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 9 = Some evidence, but not robust		<u>10.1016/j.ijnss.2022.12.002</u>	**B stort studie** effect of chair-based resistance band exercise on independence in: (6// N= 510) activity daily living: significant/INT + low disagreement. (5// N= 571) Handgrip strength: significant/INT+ no disagreement. (5// N= 575) Upper limb muscle endurance: significant/INT + high disagreement. (4// N= 437) Lower limb muscle endurance: significant/INT + no disagreement. (4// N= 407) Upper body flexibility: significant/INT + no disagreement. (4// N= 547) Lower body flexibility: significant/INT+ low disagreement. (3// N= 220) Dynamic balance: significant/INT + no disagreement.

Multisygdom: Osteosarkopenisk Overvægt

Ref	År	S-T	Ant	P	I	C	O	H-R	Kon	Kval-V	Noter	DOI	V-E
Hsuan-Wei Liu & Oscar Kuang-Sheng Lee	2024	A meta-analysis	4	P: Participants aged 60+, diagnosed with osteosarcopenic obesity (OSO), and no major comorbidities	**I: diverse resistance training** - resistance exercises using elastic bands three times a week for 12 weeks. In one trial, the osteoporotic group combined weight training and aerobic exercises	**C: comparisons involved controls or placebos** - In a single trial, participants in the control group were assessed at baseline and after 12 weeks, while other studies evaluated both pre- and post-intervention	The OSO T-score and physical function measures like HGS and GS were the secondary objectives, whereas body composition measures like BFP, SMI, and BMD were the primary ones. DXA examined BMD, SMI, and BFP; standard dynamometry measured HGS; a 10-m walk test evaluated gait speed. The study design adhered to randomized controlled trial principles. **outcomes encompassed fat mass, lean mass, BMI, waist circumference, handgrip strength, 6-min walk distance, and chair rise test.** Bone density and body fat percentage showed low-quality evidence, whereas the primary outcome (skeletal muscle mass index) demonstrated high-quality evidence. Secondary outcomes (gait speed, chair rise test, osteosarcopenic obesity T-score) had high-quality evidence. However, due to bias risk and consistent findings, hand grip strength and timed up-and-go test evidence were rated as moderate. **8.2.4. Resistance Training's Effects on Secondary Outcomes:** In terms of handgrip strength (HGS), timed chair rise (TCR), timed up and go (TUG), and gait speed (GS), the two studies presented varying results. It is noteworthy that resistance training with elastic bands significantly increased TCR and had an impact on GS. However, there were some differences in the results for GS and TUG. One study observed an improvement in GS, leading to an increase in TUG, while another study found an increase in GS, also affecting TUG (Fig. 4).	Resistance exercise effectively improves body composition, increasing body fat percentage and the skeletal muscle mass index. age-related osteoporosis (OSO), in older persons Elastic bands improve physical performance securely and efficiently.	Resistance exercise effectively improves body composition, increasing body fat percentage and the skeletal muscle mass index. age-related osteoporosis (OSO), in older persons Elastic bands improve physical performance securely and efficiently.	**ADEQUATE** + protocol: PROSPERO ID: CRD42023448834 + rob2/risk of bias: The article includes rob2 + GRADE: GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 4 = Not enough, more research needed		10.1016/j.jor.2024.03.039	**D** **Functional outcomes:** (3 studies//n=108) Skeletal Muscle Mass Index (SMI): P < 0.001, I2 = 98%, CI: 0.55 (0.31, 0.71) = significant in favor of control + high disagreement handgrip strength (HGS): not seen in forest plot (2//n=73) timed chair rise (TCR): -23.86 (-24.28, -23.44) = significant in favor of intervention. + high disagreement (3// N=136) timed up and go (TUG): -3.41 (-3.56, -3.27) = significant in favor of control + high disagreement (3// N=136) gait speed (GS): 9.86 (9.84, 988) = significant in favor of control. + high disagreement
Jia-Ming Yang et al.	2022	systematic review and meta-analysis	4	People with OSO (participants were required to have a combination of osteopenia, sarcopenia, and obesity and to have no other diseases, such as fractures, heart failure, and diabetes). Participants were required to be elderly (age≥60),	Interventions included resistance training, such as elastic resistance training and progressive resistance training.	control group or placebo.	**Primary outcomes**: body composition (e.g., body fat percentage (BFP), skeletal muscle mass index (SMI), bone mineral density (BMD)); **secondary outcomes**: physical function (e.g., hand grip strength (HGS), gait speed (GS)) and OSO Z score. Among them, BFP, SMI, and BMD were calculated using data obtained from the dual-energy X-ray absorptiometry (DXA). The HGS of the subject's dominant hand was measured using a standard hydraulic hand dynamometer. A 10-m walk test (10 MWT) was measured to obtain the GS of the participants.	**Effects of resistance training on secondary outcomes** Because only one study could extract available data for secondary outcomes, it was not possible to conduct a meta-analysis. As shown in Table 1, two studies explored the OSO Z score, and the results showed that resistance training can effectively improve the Z score [50, 53]. They treated the OSO Z score as a composite Z score derived from the average of the components calculated based on the following formula: Z score = ((muscular strength Z score) + (SMM Z score) + (− 1 × body fat Z score) + (BMD Z score))/4 [50, 53]. Two studies measured HGS, GS, timed up and go (TUG), and 30-s timed chair rise (TCR) repetition and showed that 12 weeks of elastic band resistance training significantly improved TCR but had no effect on GS [51, 53]. However, the two studies	Resistance training is a safe and effective intervention that can improve many parameters in OSO patients, such as BFP and SMM. Resistance training is a good option for elderly individuals who want to improve their physical fitness.	**ADEQUATE** + protocol: PROSPERO ID: CRD42021285205 + rob2/risk of bias: The article includes rob2 + GRADE: GRADE level is stated - sufficient number of studies (systematic review/meta-analysis): 4 = Not enough, more research needed		10.1007/s11657-022-01120-x	**D** **Functional outcomes:** (2//n = 57) Skeletal Muscle Mass Index (SMI): P < 0.001, I2 = 98 %, CI: 0.20 (-0.25, 0.64) = non-significant. + no disagreement (3//n = 79) skeletal muscle mass (SMM): 1.19 (0.50, 1.89) = significant in favor of intervention. + no disagreement (4//n = 182) BMD: not significant, no disagreement (4//n = 182) BFP: significant/INT moderate disagreement

	but there were no restrictions for sex or environment (such as hospitals, communities, or nursing homes).		showed opposite results for HGS and TUG. Banitalebi et al.[53] found that 12 weeks of resistance training increased HGS (P=0.013) but had no effect on TUG (P=0.225). Nevertheless, Lee et al. [51] showed the opposite result: progressive elastic band resistance exercise training could not improve HGS (P=0.413) but could increase TUG (P=0.030).		

Resultatsyntese

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Raske	DOI: 10.1016/j.archger.2024.105731		10.1016/j.archger.2023.105303		10.1016/j.jphys.2023.05.018		
Outcome-kategori	**Hoseinpour et al. 2025: [61]** Styrketræning på inflammatoriske markører, kropssammensætning og funktionel kapacitet	**Evidens styrke**	**Rocha et al. 2024: [91]** Power/Høj-volumen styrketræning (HV-RT) og Lav-volumen styrketræning (LV-RT)	**Evidens styrke**	**Morrison et al. 2023: [81]** Power/Høj-volumen styrketræning (HVPT) på fysisk funktion	**Evidens styrke**	**Samlet vurdering**
Muskelstyrke – underekstremitet (knæstræk, LLMS)	knæstræk: signifikant øget styrke til fordel for RT; høj uenighed	Svag–moderat (C/D)	HV-RT overlegent LV-RT for benstyrke ved både ≤12 og >12 uger; ingen heterogenitet	Stærk (A)	Svag-moderat effekt til fordel for HVPT i SPPB og TUG Der var svage til moderate effekter for ændringen fra baseline-scorer til fordel for HVPT for SPPB- og TUG-resultaterne.	moderat (C)	Moderat-høj evidens for benstyrkeforbedring ved styrketræning (RT); samtidig forbedrer HVPT benstyrke mere ene RT
Muskelstyrke – overekstremitet (HGS/ULMS)	Ikke rappoteret	–	HV-RT bedre end LV-RT for overekstremitetsstyrke ved >12 uger; moderat uenighed	Moderat (B/C)	Ikke rapporteret tydeligt	–	Moderat-høj evidens; begrænset datagrundlag, da det kun er baseret på én undersøgelse (HVRT)
Gangfunktion / aerob kapacitet (6MWT, CRE)	6-minutters gangtest (6MWT): signifikant forbedring af RT; høj uenighed	svag (C)	Funktionel fitness tenderer til fordel for HV-RT, men samlet effekt for funktionel fitness er ikke signifikant; høj uenighed	Svag (D)	Signifikant, men lille effekt med fordel for HVPT. Effektestimaterne var meget usikre for resultaterne af sædvanlig ganghastighed, hurtig ganghastighed, lang gang og trappeopstigning med hensyn til ændring fra baseline eller sammenligning af værdier efter interventionen. Selvom effekten for baglæns gangtest var meget usikker, var der en positiv effekt for HVPT i 400 m gangtesten (MD 11,36 sekunder), selvom det var uklart, om effekten var stor nok til at være klinisk værdifuld.	moderat (C)	Moderat evidens for RT og HVPT kan forbedre gangudholdenhed, men effekterne er generelt små og med uenighed

Funktionel performance (TCR, funktionel fitness/funktion, 30-STS)	Signifikante forbedringer fysisk kapacitet (functional capacity)	moderat (C)	HV-RT viser tendens til bedre funktionel fitness (bl.a. TCR, TUG, GS), men samlet analyse er ikke signifikant og med høj heterogenitet	Svag (D)	Signifikant, men lille effekt med moderat uenighed: 30-STS and static balance til fordel for HVPT.	moderat (C)	Moderat evidens for forbedret funktionel performance, men uensartede mål og heterogenitet begrænser sikkerheden
Balance og faldrelaterede outcomes (statisk/dynamisk balance, fald-tiltro, TUG)	Ikke rapporteret	–	Ikke systematisk rapporteret.	Svag (D)	Signifikant, men lille effekt med moderat uenighed: TUG, 30-STS og statisk balance til fordel for HVPT. Effektestimaterne var meget usikre for resultaterne af 5-STS, statisk balance, dynamisk balance, normal ganghastighed, hurtig ganghastighed, lang gang og trappeopgang med hensyn til ændring fra baseline eller sammenligning af værdier efter interventionen. Undergruppeanalyser viste en positiv effekt for HVPT i TUG, 30-STS og statisk balance ved højere træningsfrekvense CT: balanceeffekter er små og ofte ikke-signifikante, især hos >65-årige	moderat (C)	Svag-moderat evidens for, at RT og HVPT kan forbedre faldrelaterede komponenter; data er begrænsede og uensartede
Træningstype	*Primært styrketræning. Få studier elastikbånd, egen kropsvægt, udholdenshedsstyrketræning og cirkeltræning*	–	*højhastishedsstyrketræning og lavhastishedsstyrketræning (HV-RT og LV-RT)*	–	*højhastishedspowertræning (high-velocity power training HVPT) sammenlignet med traditionel styrketræning (TRT)*	–	*Styrketræning er hovedintervention med variationer HVRT LVRT HVPT og TRT*
Træningsfrekvens	*1–3×/uge i 6-38 uger* *Varigheden af træningsprogrammerne varierede fra 6 uger til 38 uger*	–	*2-3×/uge i 6-24 uger* *(opdelt i ≤12 vs >12)* *Den anbefalede hyppighed er 2 til 3 gange om ugen*	–	*1-3×/uge i 6-48 uger*	–	*Træningsfrekvensen var 1–3 gange/uge, og interventionsvarigheden strakte sig fra 6 til 48 uger.*
Intensitet	*30-85% 1RM + Borg scale.* *Intensiteten af træningsprogrammerne varierede fra 30 % til 85 % af 1RM. To studier målte intensiteten med Borg-skalaen.*	–	*intensitet på 30 til 40 % af maksimalt én gentagelse (1RM). Når man fokuserer på øvelser, der understreger muskelkraft, ligger den anbefalede intensitet inden for intervallet 40 % til 60 % af 1RM.*	–	***TRT**: 40-93% 1RM vs **HVPT**: 40-80%*	–	*Intensiteten varierede bredt (30–93 % af 1RM), et enkelt studie anvender Borg-skalaen. Powertræning (HVPT/HV-RT) udføres med lette belastninger og så hurtig koncentrisk hastighed som muligt, mens traditionel styrketræning (PR/LV-RT/TRT) blev udført med moderat til tung belastning og langsomt til moderat tempo.*
Volume (sets × reps)	*1-5 sæt × 4-25 gentagelser* *Antallet af sæt varierede fra 1 sæt til 5 sæt, mens træningsgentagelserne varierede fra 4 til 25.*	–	*1-3 sæt × 4-15 gentagelser* *volumen bestående af et til tre sæt pr. øvelse. Sammenlignede virkningerne af enkeltsæt og flere sæt motionstræning på funktionel kapacitet, styrke i øvre og nedre lemmer, muskelkvalitet og størrelse*	–	*HPVT: sæt: 2-4, gentagelser: 6-20. TRT: sæt 2-3, gentagelser: 6-15.*	–	*Moderat volumen generelt tilstrækkeligt flere sæt giver bedre styrkerespons: 1-4 sæt og 4-25 reps*

			hos ældre individer (≥ 50 år). Dette studie viste, at flere sæt var en smule bedre end enkelte sæt motionstræning med hensyn til styrke i underekstremitet og muskelkvalitet i denne population.				
Progression	Ikke rapporteret	–	progression er 70 til 85 % af 1RM	–	ikke angivet specifikt, kræver specifik indsigt i studiets forskningsartikler.	–	Progression anvendes eksplicit i ét studie (progression to 70 to 85 % of 1RM for strength-focused training)
Trænede muskelgrupper	Ikke ensartet rapporteret; Hele kroppen, flerled eller enkeltled indgår i nogle, andre har kun skrevet styrketræning	–	Underekstremitet. Udførelse af træning med maksimal koncentrisk hastighed to til tre gange om ugen bør involvere i alt otte til ti flerledsøvelser pr. session.	–	fokus på helkrops bevægelse/fysisk funktion	–	Øvelser og muskelgrupper blev ikke ensartet rapporteret. Nogle studier inkluderede hele kroppen, multi- og single-joint øvelser, mens andre kun angav styrketræning af underekstremiteter.
Styrketests	knæstræk and 6-minute walk distance (6-MWD /6mwt) the intensity of the training programs ranged from 30 % (Ihalainen et al., 2019) to 85 % (Strandberg et al., 2015) of 1RM. Yet, two studies measured the intensity with the Borg scale (Kim et al., 2018; Urzi et al., 2019).	–	bænkpres, preacher curls/isolations-curl på bænk, bicep curls/armbøjninger (med håndvægte/stang), dødløft, knæstræk mm.	–	**Meta: Short Physical Performance Battery (SPPB), Timed Up and Go test (TUG),** ikke-meta: five times sit-to-stand test (5-STS), 30-second sit-to-stand test (30-STS), gait speed tests, static or dynamic balance tests, stair climb tests and walking tests for distance.	–	Styrke og funktion måles med både 1RM nærtests (én med Borg-skala) og funktionelle tests: (SPPB), (TUG), knæstræk, (6-MWD), bænkpres, preacher curls/isolations-curl på bænk, bicep curls/armbøjninger (med håndvægte/stang), dødløft mm.
Samlet evidens	**D – svag evidens: på grund af heterogenitet trods positive effekter og små primærstudier**	**C**	**B – høj evidens: for volumen-effekt på muskelstyrke (især for volume og HVRT), svagere for funktionel fitness**	**B**	**C – moderat evidens: for HVPT på funktion for forbedring af fysisk fuktion**	**C**	**Moderat evidens: RT (især ved høj hastighed eller høj volumen) forbedrer muskelstyrke og funktionel kapacitet hos raske ældre; men faldrelaterede outcomes har svag evidens**
Sarkopeni	10.1016/j.archger.2024.105595		10.1016/j.gerinurse.2024.09.016		10.1002/jcsm.13225		
Outcome-kategori	**Sun et al. 2025: [101]** **RT vs. kontrol**	**Evidens styrke**	**Peng et al. 2024: [87]** **RT (±/med/uden ernæring)**	**Evidens styrke**	**Shen et al. 2023: [96]** **RT og kombinationsformer**	**Evidens styrke**	**Samlet vurdering**
Muskelstyrke – underekstremitet (HGS)	Stor og signifikant forbedring; robust retning, men høj heterogenitet (SMD = 0,83).	Moderat -høj (B/C)	Signifikant forbedring til fordel for RT (med/uden ernæring); stærkere effekt ved ≤6 mdr., lav–moderat uenighed.	høj (B)	RT og RT+bal./aerob+ernæring giver størst, signifikant forbedring, til fordel for intervention; GRADE moderat–høj. Størst effekt: RT alene, RT+ernæring og RT+balance/aerob. Effekten overstiger ofte MID.	Moderat –høj (A/B)	Høj evidens for, at RT-baserede programmer forbedrer HGS hos ældre med sarkopeni
Muskelstyrke – underekstremitet (KES / isometrisk styrke)	KES øges signifikant til fordel for RT. Signifikant forbedring (SMD = 0,90), men høj heterogenitet. Effekt størst ved >70 %1RM.	Moderat -høj (B/C)	Isometrisk styrke forbedres signifikant i subanalyse (SMD = ~0,53), men varierende testmetoder og har deraf moderat–høj uenighed.	moderat (C)	Kombinerede RT-baserede programmer viser generelt positive effekter på knæekstension som surrogat, særligt ved kombinationer;	Moderat (B/C)	Moderat-høj evidens for benstyrkeforbedring, men heterogenitet reducerer sikkerheden

Funktionel styrke – chair stand (30-s CST / 5x CST)	Ingen signifikant samlet effekt, høj heterogenitet.	Svag (D)	rejse-sætte-sig forbedres signifikant til fordel for RT (både med/uden ernæring), især ved kortere forløb; lav uenighed. Mest markant ved intervention ≤6 måneder.	Moderat -høj (B/C)	rejse-sætte-sig forbedres ved RT kombineret med aerob/balance+ernæring; signifikant tidsreduktion til fordel for intervention, men CI krydser ofte MID. Klare forbedringer i kombinationstræning (RT+balance/aerob±ernæring), men ikke altid klinisk relevant. Styrke- og balanceøvelser med eller uden ernæring (MD: 0,16 m/s, moderat) var de mest effektive til at forbedre fysisk funktion målt ved normal ganghastighed (MID: 0,1 m/s).	Moderat (C)	Moderat evidens for, at RT-baserede programmer forbedrer stolerejsning. Bedst effekt ses i kombinationstræning og svagere ved ren RT
Gangfunktion – usual/maximal gait speed	Ikke primært rapporteret; ingen klar effekt på rejse-sætte-sig-relaterede gangmål	–	sædvanlig og max ganghastighed: ingen signifikant effekt af RT (med/uden ernæring); moderat uenighed.	Svag-moderat (C/D)	Små, men signifikante forbedringer (MD ~0,11–0,16 m/s) ved RT+balance og/eller ernæring. RT+balance (± ernæring) forbedrer usual og max gait speed signifikant til fordel for intervention; effekter sandsynligvis klinisk relevante.	Moderat (B)	moderat evidens for forbedret ganghastighed; stærkest når RT kombineres med balance/aerob træning
Mobilitet – (TUG)	Ikke rapporteret	–	Overordnet ingen robust, signifikant TUG-effekt af RT (med/uden ernæring)	Svag (D)	RT+balance reducerer TUG-tid signifikant til fordel for intervention (≈ −1,85 s); øvrige kombinationer mere usikre.	Moderat (C)	Svag–moderat evidens for TUG-forbedring, primært drevet af RT+balance
Samlet fysisk performance (SPPB)	Ikke rapporteret	–	SPPB: ingen signifikant forskel efter RT; moderat uenighed	Svag (D)	Ikke rapporteret	–	Svag evidens for forbedring i samlet performance-score; effekter bedre vurderet via enkelt-tests (HGS, CST, TUG)
Kvalitet af livet (QoL – (ikke PICO-relevant)	Ikke rapporteret	–	Ingen klar signifikant effekt	Svag (D)	RT (alene/med balance/aerob/ernæring) forbedrer QoL signifikant til fordel for intervention	Mod./Høj (A/B)	Understøttende evidens for patientvigtig gevinst- Ikke PICO-relevant, men positiv effekt
Træningstype	***Resistance training (RT)***	–	***RT eller multikomponent træning (RT + aerob/balance), med/uden ernæring***	–	***RT, RT + balance, RT + aerob, m/eller uden ernæring (NMA ranking)***	–	*Størst effekt når RT kombineres med balance/aerob træning*
Træningsfrekvens	***1–3×/uge***	–	***2–3×/uge***	–	*Ikke konsekvent rapporteret*	–	*Konsistent: 1–3×/uge anbefales*
Intensitet	***40–85 % 1RM: bedst effekt ved langsommere muskelkontraktionshastighed på 60-70 % (bedst >70 % for HS/håndgrebsstyrke og KES/knæextensorstyrke)***	–	*Ikke ensartet rapporteret; primært moderat–høj intensitet*	–	*Ikke konsekvent rapporteret*	–	*Moderat–høj intensitet (≥60–70 % 1RM) giver bedst funktionel respons*
Volume (sets × reps)	*Variation, bedst respons ved ≥3 sæt pr øvelse, med 8–12 reps pr. sæt*	–	*Ikke konsekvent rapporteret*	–	*Ikke konsekvent rapporteret*	–	*Minimum ≥2–3 sæt pr. øvelse for målbar styrkefremgang*
Progression	*Ikke konsekvent rapporteret*	–	*Ikke konsekvent rapporteret*	–	*Ikke konsekvent rapporteret*	–	*Mangelfuldt rapporteret i alle tre studier*
Trænede muskelgrupper	*Hele kroppen*	–	*Hele kroppen*	–	*Fokus på funktionelle bevægelser*	–	*underekstremiteter er afgørende for funktionelle effekter*

Styrketests	*Håndgrebsstyrke (HS), knæekstension (KES), chair stand*	*–*	*Håndgrebsstyrke (HGS), rejse-sætte-sig, SPPB*	*–*	*sædvanlig ganghastighed, TUG test og rejse-sætte-sig*	*–*	*Konsistent: HGS + rejse-sætte-sig + ganghastighed = mest anvendt og følsomt*
Samlet evidens	**C – moderat evidens. Klare styrkeeffekter, usikker funktionel overførsel.**	C	**C – moderat evidens for styrke, funktionel effekt mest ved kortere forløb.**	C	**B – stærkest evidens når RT kombineres med balance/aerob træning ± ernæring.**	**A/B**	**Samlet moderat-høj; Høj samlet evidens og robust styrkeforbedring; moderat evidens for funktion, der især forbedres i kombinationsforløb.**
Overvægt & sarkopen fedme (SO)	10.3390/nursrep15030089		10.3389/fnut.2025.1537291		10.3389/fnut.2025.1575580		
Outcome-kategori	**Polo-Ferrero et al. 2025: [89]** sarkopen fedme (SO)	**Evidens styrke**	**Qiu et al. 2025 [90]** sarkopen fedme (SO)	**Evidens styrke**	**Wei et al. 2025 [108]** sarkopen fedme (SO)	**Evidens styrke**	**Samlet vurdering**
Muskelstyrke – håndgreb (HGS)	HGS indgår som del af physical performance; ingen selvstændig signifikant HGS-effekt rapporteret; effektstørrelsen er lille og GRADE lav–meget lav	Svag-moderat (C/D)	RT og MCT forbedrer HGS signifikant versus kontrol; RT rangerer højest i SUCRA; AT og CT uden sikker effekt. Derudover forbedredes håndgrebsstyrken (HGS) signifikant under både MCT (SMD = 0,87, 95% CI: 0,19, 1,5) og RT (SMD = 0,84, 95% CI: 0,43, 1,25).	høj (B)	RT og CE øger HGS signifikant versus kontrol (MD ≈ 2.8–3.4); AR uden effekt; tydelig styrkeforbedring	høj (B)	Moderat evidens for forbedring af HGS hos SO, stærkest for RT (Qiu, Wei) og MCT (Qiu); Polo-Ferrero støtter kun svagt via komposit-score
Muskelstyrke – ben (30-s CST, leg press, knæekstension)	Benstyrke/chair stand indgår i physical performance, men ingen deltest – inkl. chair stand – skiller sig signifikant ud; kun SLS er robust; samlet lille effekt	moderat (C)	rejse-sætte-sig forbedres signifikant ved RT og MCT (MD ~3 repetitioner vs kontrol); CT viser positiv, men ikke sikker effekt; RT rangerer højst for CST	Moderat -høj (B/C)	Knee extension strength viser tendens til forbedring (MD ≈ 2.6; p = 0.08), men ikke signifikant; ingen 30-s CST eller leg-press-udfald rapporteret. RT og CE forbedrede muskelstyrken, hvor RT var bedre (MD = 3,43 vs. 2,64 for CE, begge p < 0,00001).	Svag-moderat (C/D)	Moderat evidens for forbedring af underekstremitetsstyrke, især CST i Qiu; Wei viser kun tendens, og Polo-Ferrero kun indirekte støtte/svag støtte via komposit
Gangfunktion (gait speed)	Ganghastighed/gait speed indgår i physical performance, men subgroup-analysen viser ingen selvstændig signifikant gait-effekt; SLS er eneste test med klar effekt	Svag (D)	Ganghastighed forbedres signifikant ved MCT og CT; MCT er bedst; RT adskiller sig ikke fra kontrol	Moderat (C)	Ganghastighed forbedres markant efter intervention (MD ≈ 0.88); både RT og CE signifikant bedre end kontrol; AR ingen effekt	Moderat -høj (B/C)	Svag–moderat evidens samlet; mest stabil for MCT (Qiu) og for RT/CE i Wei; Polo-Ferrero bidrager kun indirekte via komposit
Mobilitet – TUG/Timed Up and Go	TUG indgår i physical performance, men ingen selvstændig signifikant TUG-effekt; kun samlet lille SMD og SLS signifikant	Svag (D)	Ikke rapporteret	–	TUG-tid forkortes signifikant efter intervention (MD ≈ −1.16 s) i SO; tre studier; tyder på bedre mobilitet. Af de tre studier sammenligner to RT og kontrol og den tredje er fokus "virkningerne af samtidig træning"	Moderat (C)	Moderat evidens for TUG-forbedring, primært drevet af Wei; Polo-Ferrero har kun svag indirekte støtte, Qiu rapporterer ikke TUG
Funktionel performance – SPPB / samlet score	Physical performance (komposit af bl.a. TUG, gait, chair stand, HG, SLS) forbedres samlet (SMD ≈	moderat (C)	SPPB eller samlet funktionel score ikke rapporteret; kun enkelt-tests (HGS, 30-s CST, gait speed), der alle tre forbedres signifikant)	–	Funktionel performance forbedres på tværs af enkelt-tests (HGS, gait, TUG), men ingen SPPB eller sammenlagt score rapporteret	moderat (C)	Lille–moderat samlet funktionel gevinst på tværs af reviews, men effekten er fragmenteret og baseret på forskellige deltests frem for standardiseret SPPB

	0.36; p = 0.003; I^2 = 0 %); GRADE lav–meget lav						
Balance / statisk postural kontrol (SLS)	SLS (etbensstand-test) forbedres signifikant (SMD ≈ 0.88; p = 0.03; n = 29); eneste deltest med tydelig effekt; low–very low GRADE men konsistent retning	Moderat (C)	Ikke rapporteret	–	Ikke rapporteret	–	Moderat evidens for forbedret statisk balance via RT hos SO, men kun dokumenteret i Polo-Ferrero og på lille sample
Kropssammensætning (BF %, BMI, FFM, SMI m.m. - ikke pico-relevant)	RT forbedrer samlet kropssammensætning (SMD ≈ 0.35; p = 0.003; I^2 = 0 %); BF % reduceres signifikant (SMD ≈ 0.52); GRADE moderat for komposition	Moderat -høj (B/C)	MCT, CT og RT reducerer BF % signifikant versus kontrol; MCT bedst og bedre end både RT og CT; BMI og FFM forbedres kun signifikant ved MCT	Moderat -høj (B/C)	BF % reduceres signifikant samlet (CE og RT; CE stærkest); BMI reduceres samlet, men kun CE klart signifikant; ASM/ASMI og total fat mass/totale fedtmasse ændres ikke signifikant	moderat (C)	Moderat samlet evidens for forbedret kropssammensætning hos SO; MCT stærkest (Qiu); RT og CE giver robuste BF %-effekter, men ikke konsistent muskelmasseøgning (Polo-Ferrero, Wei)
Træningstype	*Alle inkluderede interventioner er RT-baserede programmer hos ældre med SO (klassisk styrketræning over 10–12 uger)*	–	*RT, CT (RT+AT), MCT (multikomponent), AT; alle med træningsprogrammer til SO*	–	*Ét studie sammenlignede hypertrofitræning og højhastigheds-kredsløbstræning; to studier undersøgte virkningerne af kombineret træning (CE) og en kontrolgruppe; otte studier sammenlignede styrketræning (RT) og en kontrolgruppe; ét studie sammenlignede virkningerne af RT, CE, aerob træning (AR) og kontrolgrupper; to studier fokuserede på virkningerne af cirkelløbstræning; og ét studie fokuserede på virkningerne af samtidig træning.*	–	*Alle tre reviews undersøger styrketræning; Qiu og Wei inkluderer også CT/MCT/CE; MCT ser ud til at kombinere kompositions- og funktionsgevinster bedst*
Træningsfrekvens	*Overvejende 3×/uge; ét studie med 2×/uge; interventionslængde typisk 12 uger (ét 10-ugers studie)*	–	*2–3×/uge i 8–24 uger afhængigt af studie*	–	*2–3 dage/uge; 6 studier med 2×/uge og 9 studier med 3×/uge; de fleste interventioner ≥12 uger (1 var 8-10 uger)*	–	*Frekvens 2–3×/uge på tværs af alle tre reviews; passer til klassiske kliniske programmer*
Intensitet	*Intensitet ikke specificeret*	–	*Intensitet ikke detaljeret; varierer mellem RT, CT, MCT og AT*	–	*40–85 % af 1-RM eller HRR; RT, ERT og CE spænder fra moderat til høj intensitet afhængigt af studie* *med intensiteter fra 40 til 85 % af den maksimale puls ved én gentagelse (1-RM) eller pulsreserve (HRR). Én undersøgelse anvendte højintensitetstræning, syv undersøgelser anvendte moderat til højintensitetstræning, fem undersøgelser anvendte moderatintensitetstræning, én undersøgelse anvendte lav til moderatintensitetstræning, og to undersøgelser specificerede ikke*	–	*Wei giver konkrete intensitetsdata (40–85 % 1-RM/HRR); de øvrige beskriver primært træningstype, ikke præcis belastning*
Volume (sets × reps / varighed)	*Varighed typisk 10–12 uger med 2–3 sessioner/uge; detaljer om sets × reps er ikke tydeligt rapporteret*	–	*Sessioner 30–60 (op til 75) min; 2–3×/uge; detaljerede sets × reps fremgår ikke tydeligt*	–	*6 studier ≤120 min/uge og 7 studier >120 min/uge; typisk 2–3 sæt × 8–12 reps; interventionslængde 8–32 uger*	–	*Samlet moderat volumen (2–3 sæt, 8–12 reps, 2–3×/uge) i Wei; de andre angiver primært varighed og frekvens*

Progression	*Ikke beskrevet*	–	*Ikke beskrevet; progression må udledes fra primærstudier, ikke NMA-teksten*	–	*Belastning progredieres ikke tydeligt, men kan udledes i angivet data fra nogle primærstudier*	–	*Progression er ikke tydeligt beskrevet i, men kan udledes i nogle ikluderede studier*
Trænede muskelgrupper	*Ikke specificeret i resulter;*	–	*Ikke specificeret i resultatafsnittet; RT/MCT/CT/AT beskrives kun som træningstyper, ikke som konkrete muskelgrupper*	–	*Store muskelgrupper i over- og underekstremitet (benpres, knæ-/hofteøvelser, overkropsøvelser, elastikøvelser mv.) trænes i RT-, ERT-, CE- og circuit-programmerne*	–	*Kun Wei beskriver muskelgrupper tydeligt; de andre rapporterer primært modalitet, ikke muskelvalg*
Styrketests	*the timed up and go test (TUG), rejse-sætte-sig/chair stand test (CS), etbens-stand/single-leg stance (SLS), håndregbsstyrke/hand grip test (HG), anvendes som del af physical performance; kun SLS har klar selvstændig effekt.*	–	*HGS, rejse-sætte-sig og ganghastighed indgår; ingen specifikke knæekstensionstests*	–	*HGS, ganghastighed, TUG og knæekstensionsstyrke (isometrisk) rapporteres; Den samlede effektstørrelse viste, at TUG-tiden var signifikant forkortet efter træning hos SO-patienter (MD=−1,16, 95% CI: [−1,51, -0,80], p<0,00001). Træning viste en tendens til forbedring af knæekstensionsstyrken (MD=2,61, 95% CI: [−0,28, 5,50], p=0,08), hvilket indikerer potentielle forbedringer i daglig aktivitetsfunktion og træningsudholdenhed.*	–	*HGS og 30-s CST er de bedst understøttede styrkenære tests (Qiu, Wei); Polo-Ferrero bidrager primært med SLS og giver kun samlet SMD og en stærk SLS-effekt*
Samlet evidens	**C – moderat evidens: samlet forbedres SPPB med ingen uenighed**	**C**	**B – høj evidens for styrke; funktionelle effekter er ikke signifikante**	**B**	**C – moderat til høj evidens for både styrke og funktionelle effekter**	**C**	**Moderat-høj samlet evidens: gennemgående positiv retning, men heterogenitet og fragmenterede outcomes**
Risiko for fald	10.3390/ijerph20064723		10.3389/fnagi.2021.764826		10.3390/jcm10143184		

Outcome-kategori	**Li et al. 2023: [72]** Lavintensiv modstandstræning med okklusionstræning: BFR + lavintens styrketræning (ST)	**Evidens styrke**	**Kim et al. 2022: [65]** Reaktiv balance	**Evidens styrke**	**Claudino et al. 2021: [46]** styrketræning (ST) & fald	**Evidens styrke**	**Samlet vurdering**
Muskelstyrke (lower limb)	Signifikant styrkeforbedring med LIRT+BFR vs kontrol (SMD 0,51); høj heterogenitet. HIRT er bedre end BFR (SMD −0,27 imod BFR). Lavintensiv modstandstræning med blodgennemstrømningsbegrænsning kan effektivt forbedre muskelstyrken i underekstremiteterne, muskelmassen og gangevnen hos midaldrende og ældre voksne og kan tjene som en vigtig form for faldmodstandstræning for ældre voksne.	moderat (C) (RCTs, men heterogenitet og begrænset blinding)	Ikke rapporteret. Styrke i klassisk forstand er ikke primært outcome; fokus er reaktiv balance. Styrketræningsarme indgår, men styrkeresultater rapporteres ikke som hovedanalytisk fokus.	–	Styrke/power målt som sekundært outcome, men ingen klare mellemgruppeforskelle (ST vs andre aktive interventioner – alle forbedres nogenlunde ens).	lav (D)	Svag-moderat evidens for forbedring af underekstremitetsstyrke ved styrketræning. Li: Lavintensiv BFR-ST kan øge styrke, men effekten er mindre end ved højintensiv ST. Claudino viser, at ST ikke er bedre end andre typer træning til at øge styrke yderligere i disse fald-studier. Reaktiv balance-træning bidrager derved ikke direkte til styrke, og styrketræning alene er ikke overlegen ift. andre aktive interventioner.

Muskelmasse	Signifikant forbedring i muskelmasse (quadriceps CSA MD 1,99 cm²); få studier; substantiel uenighed. Quadriceps CSA: MD = 1,99 cm² (0,77–3,22), I²=0 % – signifikant øgning af muskelmasse med LIRT+BFR vs kontrol. For muskelmasse i underekstremiteterne blev muskeltværsnitsarealet (muscle cross-sectional area: CSA) valgt	moderat (C) (få studier, men konsistente)	Ikke rapporteret. Ikke fokus på hypertrofi	–	Ikke systematisk rapporteret. Hypertrofi ikke et centralt outcome, men er angivet i diskussionen som at det forbedres.	–	Moderat evidens for øget muskelmasse ved lavintensiv BFR-styrketræning. Evidensen understøttes ikke af de øvrige reviews.
Gangfunktion (walking ability, TUG)	Signifikant forbedret TUG/gangtid (SMD −0,89); høj heterogenitet. Samlet SMD = −0,89 (−1,71; −0,06), dvs. hurtigere TUG/gangtid med BFR; I² = 85 % (høj heterogenitet). Subgruppe: TUG alene SMD = −0,88 (−1,61; −0,16) signifikant; 400 m Gangtest ikke signifikant.	Lav (D) (få studier, høj heterogenitet)	Reactive gait (slip/trip under gang): gaitR vs gaitNR SMD = 0,60 (0,33; 0,88) til fordel for reaktiv gangtræning. Det er ikke almindelig ganghastighed, men evnen til at genvinde balancen ved perturbation.	Lav (D)	Gait speed som sekundære outcomes: ingen mellemgruppeforskelle mellem ST og kontrol/andre træningsformer; alle grupper tenderer til forbedring.	lav (D)	Svag evidens. Li: BFR-ST kan forbedre funktionel gang, men datagrundlaget er lille og høj heterogent. Kim: specifik reaktiv gangtræning (gaitR) forbedrer balancerespons under perturbationer/evnen til at håndtere pludselige hændelser, hvilket er vigtigt for faldforebyggelse, men ikke almindelig ganghastighed. Claudino: ST alene ser ikke ud til at give ekstra fordel på ganghastighed frem for andre aktive tiltag.
Balance (statisk/dynamisk)	Ingen signifikante effekt af BFR på statisk balance. SMD = 0,22 (−0,08; 0,52), altså ingen signifikant effekt af BFR på statisk balance (eyes open/closed, functional reach).	Lav (D) (få studier, brede CIs)	Reactive balancetræning er signifikant bedre end kontrol. Hovedfokus er reaktiv balance, men flere protokoller arbejder også med postural kontrol. NMA viser, at SBR (enkelt-balanceøvelse med reaktiv komponent) rangerer højest (SUCRA score = 0.90), efterfulgt af power-træning og gaitR ift. forbedring af reaktiv balanceopgaver. Effekter på "klassisk" balance er ikke systematisk kvantificeret.	Moderat (C)	Styrketræning ikke bedre end andre aktive programmer. Posturale balance-mål: ingen klare forskelle mellem ST og andre programmer (balance, Tai Chi, multimodal) – alle grupper forbedres, men ST ikke overlegent.	–	Svag-moderat evidens for balance-specifik og perturbationsbaseret træning forbedrer balance. Styrketræning – med eller uden BFR – har effekt, men ingen dokumenteret overlegen effekt og ser ikke ud til at forbedre statisk/dynamisk balance robust. Reaktivt balancetrænings-design (Kim) er det, der tydeligst forbedrer opgave-specifik balance.
Reaktiv balance	Ikke rapporteret	–	Klar og konsistent forbedring; SBR bedst rangeret intervention: Klart signifikant; stærkest intervention og konsekvent retning mod intervention. Primært outcome: NMA/netværkmetaanalysen (39 studier) viser SBR som højst rangerende intervention (SUCRA 0,90), dernæst power og gaitR. SBR viste signifikant forbedring vs ingen træning (mean diff. 2,7, 95 % CrI 1,0–4,3). Resultaterne var robuste på tværs af Bayesiansk og frequentist analyse.	Moderat (C) (mange studier, men udbredt risiko for bias)	Ikke rapporteret. Reaktiv balance ikke direkte målt; kun fald og funktionelle tests.	–	Moderat evidens for reactive balance training. Kim tegner et billede af at opgave-specifik, perturbationsbaseret balance- og gangtræning er mest effektivt til at forbedre reaktiv balance. Kim viser også at klassisk ST har mindre, men dokumenteret effekt på reaktiv balance.
Fald (faktiske hændelser)	Ikke rapporteret	–	Ikke rapporteret. Ingen faktiske fald, kun lab-baserede "næsten-fald"/reaktioner.	–	Ingen signifikant effekt/Ingen reduktion i fald (RR 1,00); substantiel heterogenitet. Primært outcome. Pooled RR for ST vs andre/ingen træning = 1,00 (0,77–1,30), I² = 50 %, dvs.	lav (D)	Lav evidens for, at styrketræning reducerer faktiske fald. Ingen af reviews dokumenterer en reduktion i fald ved ST alene sammenlignet med andre aktive

				ingen dokumenteret reduktion i falls med ST sammenlignet med unimodal/multimodal træning eller passiv kontrol. GRADE: meget lav evidens.		eller multimodale interventioner. Claudino viser, at ST er "lige så godt" som andre træningsformer mht. fald, men ikke bedre. Kim peger på, at hvis målet er reaktiv balance (forudsætning for færre fald), er perturbationsbaserede programmer mest lovende.
Træningstype	*Lav-intensiv ST for UE (20–30 %1RM, enkelte 35–45 %1RM) med blodflow-restriktion (BFR), sammenlignet med LIRT, HIRT og balance. Primært benpres, knæekst./-flex., squat, plantar fleksion. Sammenlignet med daglig aktivitet, lav-intensiv ST uden BFR (LIRT), høj-intensiv ST (HIRT) og dynamisk balancetræning - mere signifikant hos personer i alderen 55-64 år*	*–*	*Perturbationsbaseret balance, reaktiv gang, power, styrke m.m.: 17 "træningstyper": perturbations-balance (SBR/MBR), reaktiv gangtræning (gaitR), styrketræning (str), power-træning (pw), multimodale programmer m.m. Outcome = reaktiv balance (slip/trip, platform, push/pull, perturbationer på gangbånd).*	*Klassisk styrketræning vs med anden motion, fx multimodale programmer sammenlignet med ikke aktiv kontrol eller multimodal eller unimodal exercise*		*Samlet peger evidensen på, at styrketræning er relevant for muskelstyrke og -masse, men at balance- og faldrelaterede outcomes kræver specifik reaktiv eller multimodal træning.*
Træningsfrekvens	*2–3 d/uge, varighed 4–16 uger (flest 8–12 uger). Subgruppe: 3×/uge gav størst styrkegevinst.* *Interventionseffekten af lavintensiv modstandstræning med blodgennemstrømningsbegrænsning på muskelstyrken i underekstremiteterne var mere signifikant, når træningscyklussen var 4-8 uger, træningsfrekvensen var 3 gange/uge, træningsintensiteten var 20-30 % af 1RM, og det vaskulære flowblokerende tryk var ≥120 mmHg. Med hensyn til træningscyklusser tog det normalt 10 uger at opnå betydelige fordele for dem med muskelhypertrofi, når der blev udført modstandstræning.*	*–*	*1–5 (en enkelt 7) sessioner/uge, 1 uge til 1 år de fleste 2–3 d/uge i 6–16 uger. Stor variation. 15–90 min/session*	*1-3 d/uge, varighed i 84-365 dage, 50-60 min pr session*		*Træningsfrekvensen på 1–3 gange ugentligt er konsistent på tværs af studier og understøtter praktisk anvendelighed.*
Intensitet	*BFR-grupper: 20–30 %1RM (op til 35–45 %), lav belastning men med cuff-tryk ofte ≥120 mmHg. HIRT-grupper: 70–90 %1RM.*	*–*	*Intensitet afhænger af komponent: styrke/power typisk moderat–høj; balance/reaktiv træning ofte lav–moderat intensitet, fokus på opgavekompleksitet/perturbation frem for %1RM. Ikke systematisk analyseret.*	*Moderat–høj intensitet afhængigt af studie; de fleste er angivet "High and increased using the 7-RM method"*		*Moderat–høj intensitet er nødvendig for maksimal styrkegevinst; lavintensiv BFR kan være et alternativ, men er ikke overlegen. Balanceeffekter er ikke intensitetsafhængige i klassisk forstand.*

Volume (sets × reps)	Høj repetitionsvolumen ved lav intensitet/belastning (klassisk BFR-setup: flere sæt til træthed ved 20–30 %1RM). Detaljer varierer, men benpres/knæext/flex gentages i flere sæt.	–	15–90 min/session; ofte 20–60 min med kombination af balance-, gang- og/eller styrkeøvelser.	Volumen lå typisk på 2–3 sæt × 6–12 gentagelser, med enkelte studier, der anvendte højere repetitionsantal (op til 20–30 gentagelser). 2 sæt med 6-8 gentagelser 2 sæt med 6-8 gentagelser 3 sæt med 8-12 gentagelser hver (2 minutters hvile mellem sættene) 2 sæt med 6-8 gentagelser 3 gentagelser og efter 9. træningssession med 2 sæt med 10-20 gentagelser 1 sæt med 30 gentagelser Volumen varierede fra 1–3 sæt pr. øvelse, med 6–30 gentagelser pr. sæt. De fleste protokoller anvendte 2 sæt med 6–8 gentagelser eller 3 sæt med 8–12 gentagelser, mens enkelte studier benyttede enten høj-repetitionsprotokoller (2 sæt × 10–20 gentagelser eller 1 sæt × 30 gentagelser). Pauser mellem sæt blev sjældent rapporteret, men var i ét studie 2 minutter.		Volumen varierer betydeligt. Høj repetitionsvolumen ved lav intensitet (BFR) kan give styrke- og hypertrofirespons, men der er ingen robust volumen-tærskel for balance eller fald.
Progression	Ikke tydeligt rapporteret. Progression i belastning og/eller cuff-tryk implicit; subgruppeanalyse peger på cycle 4–16 uger og 20–30 %1RM med moderat–højt cuff-tryk som optimal kombination for styrke.	–	Ikke tydeligt rapporteret. Nogle øger gradvist ("4 for 6weeks, 7 for 10 weeks") = rapporteret, men ikke detaljeret. Der skrives i diskusionen: the challenge should be increased by adjusting the parameters of the perturbation, complexity of the context, and cognitive processing demands	Ikke tydeligt rapporteret. Progressiv træning anvendes; detaljer skal findes i de enkelte studier: **Intensity**: High and increased using the 7-RM method High and increased using the 7-RM method 70–80% of 1-RM High and increased using the 7-RM method Progressive intensity Medium and not progressive		Progression anvendes, men rapporteres inkonsistent og detaljer skal findes i studiernes inkluderede studier. Reaktiv balance kræver progression i perturbationskompleksitet snarere end belastning.
Trænede muskelgrupper	Primært underekstremitet (UE): LIRT + BFR, lavintensiv modstandstræning med blodgennemstrømningsbegrænsning; HIRT, højintensiv modstandstræning; LIRT, lavintensiv modstandstræning; LE, knæstrækning; LC, bencurl; LP, benpres; KE, knæekstension; KF, knæfleksion; uge, uge/s; 1/10RM, 1/10-gentagende maksimal styrke; MVC, maksimal frivillig kontraktion; CSA, tværsnitsareal; SPPB, short physical performance battery; 30STS, 30s sit-to-stand-test; TUG timed up and go-test.	–	Helkrops-/akse-stabilitet og UE/LE afhængig af program. SBR/gaitR retter sig mod postural kontrol og reaktive strategier i gang/stå. Styrkegrupper retter sig ofte mod LE.	Primært underekstremitet.		Underekstremiteten er central for både styrke og funktion. Reaktiv balance-træning fokuserer på helkrops- og postural kontrol, hvilket ikke dækkes af klassisk styrketræning alene.

Styrketests	*1RM leg press, knee extension, MVC, isokinetiske tests*	*–*	*Funktionelle tests og power fremfor klassisk 1RM: Leg press 1RM, power tests (W), funktionelle tests (sit-to-stand, gait speed) fremfor klassiske 1RM*		*Funktionelle test mv.* *Der blev ikke observeret forskelle mellem grupperne i ændringer i Barthel-indeksscore, balance, knoglemineraltæthed, kantkontrast, fleksibilitet, ganghastighed, modificeret Rivermead mobilitetsindeks, postural svajning, proprioception, livskvalitet, reaktionstid, short physical performance test (SPPB), styrke og kraft, Stroop-test, timed up to go-test, trail making-test, verbal digit span-test eller helhjernevolumen.*		*Styrketests varierer betydeligt mellem studier – direkte sammenligning begrænset, men alle måler UE-styrke.*
Samlet evidens	**C – moderat evidens. BFR + lavintensiv ST hos midaldrende/ældre forbedrer UE-styrke og muskelmasse, og der er tegn på forbedret funktionel gang (TUG/gangtid). Der er derimod ingen sikker effekt på statisk balance ud over kontrolgrupper, og BFR er ikke bedre end traditionel HIRT til styrke.**	**C**	**C – moderat evidens (strong for reactive balance). Reaktivt balancetræning (især SBR og gaitR) har den stærkeste evidens for at forbedre reaktiv balance, som er tæt knyttet til risiko for fald. Powertræning alene har effektive modalitet til reaktiv balance og det beskrives som "power training can be considered as a secondary training exercise"**	**C**	**C – moderat evidens. Klassiske Styrketræningsprogrammer hos ældre reducerer ikke dokumenterbart fald mere end andre aktive eller multimodale programmer. Evidensen på fald er meget usikker, men peger på, at styrketræing er "ikke være, ikke bedre" end andre tiltag.**	**C**	**Moderat evidens: (lovende funktionelle effekter; begrænset falddata). Styrketræning (med eller uden BFR) forbedrer underekstremitetsstyrke og i nogen grad muskelmasse, men ikke tilstrækkeligt dokumenteret som selvstændig faldforebyggelse. For fald/reaktiv balance ser perturbationsbaseret balance-/gangtræning ud til at være mest relevant. En klinisk anbefaling bør derfor kombinere styrketræning med reaktiv balance- og gangtræning, hvis målet er faldforebyggelse, bevare funktion og funktionel robusthed.**
Skrøbelige	10.1093/gerona/glac230		10.1093/ageing/afad004		10.1016/j.arr.2023.102079		
Outcome-kategori	**Lopez et al. 2023: [74]** HVRT vs TRE	**Evidens styrke**	**Sun et al. 2023: [102]** ikke-farmakologiske interventioner til behandling af skrøbelighed	**Evidens styrke**	**Nagata et al. 2023: [82]** Dosis-respons-forhold i RT til forbedring af funktionel præstation	**Evidens styrke**	**Samlet vurdering**
Gangfunktion / mobilitet (ganghastighed, TUG, STS, 6MWT)	Fast walking speed: TUG, 5xSTS, 30-s STS: Overvejende signifikante forbedringer i fast ganghastighed til fordel for RT-grupper (særligt high-velocity RT og hos raske/mixede grupper); høj uenighed. Effekt er ikke signifikant hos skrøbelige. **6-minutters gangtest (6MWT)**: forbedres signifikant til fordel for både high-velocity og traditionel RT vs kontrol, hos raske og samlet; effekten usikker/ikke signifikant hos mest skrøbelige. **TUG-tid**: reduceres (hurtigere = bedre) signifikant til fordel for RT (både HVRE og TRE) vs kontrol, hos raske og samlet i begge interventioner samt hos fysisk begrænsede i TRE; moderat heterogenitet.	Svag-moderat (C/D)	Ingen direkte meta-analyse på ganghastighed/TUG; effekter beskrives via frailty/ADL og PA/mixed training; evidens primært very low–low: fysisk aktivitet (PA) og især mixed physical training og multikomponent-interventioner reducerer frailty (SMD ca. 0.4–0.5) og forbedrer ADL i forhold til usual care.	Svag (D)	RT forbedrer STS signifikant med moderat uenighed; habitual walking speed og TUG er ikke signifikante samlet og med høj uenighed (TUG kun i subgruppe institutionaliserede); **SPPB** forbedres signifikant til fordel for RT, men med høj uenighed og ikke robust i høj-kvalitetsstudier.	moderat (C)	Samlet moderat evidens: Mest robust forbedring ses for STS. Ganghastighed og TUG er overordnet mere usikre/inkonsistente:Nagata: ikke signifikant samlet, og Sun bidrager ikke med direkte gait/TUG-syntese.

	(5xSTS): Klar, signifikant forbedring (kortere tid) til fordel for både high-velocity og traditionel RT vs kontrol; moderat uenighed. **(30s STS)**: Signifikant forbedring (flere gentagelser) til fordel for RT vs kontrol; lav–moderat uenighed; effekter på tværs af helbredstilstand. Både high-velocity RT (HVRE) og traditionel RT (TRE) forbedrer ganghastighed, TUG-tid, sit-to-stand og 6MWT vs. kontrol. Ingen signifikant forskel mellem HVRE og TRE på fysisk funktion. GRADE: low for TUG, 30-s STS, 6MWT og very low for fast walking speed og 5xSTS pga. høj risiko for bias, heterogenitet og imprecision.						
Muskelstyrke / muskelpower	HVRT og TRE øger 1RM leg press markant vs kontrol (men GRADE very low for 1RM); HVRT giver større forbedringer i power end TRE; GRADE moderate for power. Ikke signifikant effekt hos skrøbelige: "physically healthy (SMD = 0.61 to 0.99) and mixed physically healthy and physically impaired participants (SMD = 0.78 to 1.03), but not for those physically impaired" Leg press power og 1RM: både TRAD RT og HVRE giver store gevinster i 1RM leg press (SMD ~1.1–1.2) vs. kontrol. HVRE giver større forbedringer i benmuskelpower (SMD 0.55 vs. TRE) og tydelige gevinster vs. kontrol (SMD ~0.9). GRADE: moderate for power, very low for 1RM (styrke) pga. bias/imprecision.	moderat (C)	Styrke/power ikke syntetiseret som selvstændigt outcome; RT omtales som effektiv komponent i frailty-reduktion, men uden systematisk styrke-evidens. Primært rettet mod frailty-score og funktion.	–	Fokus er funktionelle tests; muskelstyrke ikke primært metaanalyseret, men styrkeelementer indgår i RT-protokollerne.	–	Evidens peger på, at benmuskelpower og 1RM styrke øges tydeligt med RT, især HVRE, men dette er primært vist i Lopez-analysen; de øvrige to arbejder mere med frailty/funktion end rene styrketests.
Frailty (FP, frailty-score, skrøbelighedstilstand)	Ikke primært outcome; omtales dog kontekstuelt med fokus på at forebygge; størstedelen af deltagerne er fysisk raske, med enkelte undergrupper med bl.a. frailty/skrøbelighed. Ældre voksne med en højere risiko for fysiske begrænsninger, såsom personer med skrøbelighed eller mobilitetsbegrænsninger, er sårbare over for stressfaktorer og negative konsekvenser. I betragtning af reduktioner i den fysiske reservekapacitet er interventioner rettet mod basale daglige opgaver såsom gang, retningsskift, balance og at rejse sig fra	–	RT og flere PA-typer reducerer frailty vs usual care; evidens angivet som very low for RT/multikomponent og low for visse andre; SUCRA favoriserer RT og mind–body, hvor RT er den interention, der har størst sandsylighed for at reducerer frailty.	Svag-moderat (C/D)	Ikke tydeligt rapporteret. Fokus er på funktion: Deltagere er typisk frail/pre-frail, men frailty som score ændres ikke metaanalyseret/outcome er funktionstest. Minimum to ugentlige træningssessioner er nødvendige for at fremkalde signifikante forbedringer i SPPB-scorer, med en optimal tærskel identificeret ved tre ugentlige sessioner. Det er værd at bemærke, at en **højere træningsvolumen pr. øvelse og pr. session synes at dæmpe forbedringerne i SPPB-præstation, hvilket understreger behovet for forsigtighed ved bestemmelse af RT-volumen for denne population.** Selvom der blev	–	Kun Sun et al. leverer direkte syntese af frailty (men stadig lav-kvalitets) evidens for, at fysisk aktivitet og RT reducerer frailty-grad hos ældre.

	en stol afgørende for disse personer. Derfor kan ældre voksne med fysiske handicap især drage fordel af målrettet højhastigheds modstandstræning. Dette kan give en større sikkerhedsmargin, før tærsklen for fysisk begræsning nås, og bidrage til at reducere risikoen for fald og hospitalsindlæggelser. Efterfølgende kan mål som forbedring af muskeludholdenhed prioriteres ved at introducere traditionelle modstandsøvelser eller endda forskellige træningskomponenter såsom aerobe og balanceøvelser inden for et multimodalt træningsprogram.				observeret sammenhænge mellem forskellige træningsvariabler og SPPB-ændringer, afdækkede vores analyse ingen signifikante sammenhænge mellem forskellige doser, parametre eller karakteristika for RT og forbedringer i sit-to-stand-tiden. (...) resultater indikerede også, at RT alene udøver en positiv indflydelse på TUG-præstationen blandt ældre voksne i lokalsamfundet klassificeret som skrøbelige eller præ-skrøbelige, men ikke hos institutionsindlagte ældre personer. (...) RT alene ikke gav forbedringer i ganghastighed sammenlignet med ikke-aktive skrøbelige kontrolgrupper.		
ADL / funktion i dagligdagen	ADL ikke meta-analyseret; beskrives overordnet. Det forbedres, men der rapporteres ingen tydelig forskel mellem HVRT og TRE på fysisk funktion. Forbedres, men ingen signifikant forskel mellem TRE og HVRT; Ikke rapporteret som meta-analyseret outcome, **men** beskrives som et overordnet mål ved at sikre forbedringer i studiets outcomes: "Mens styrketræning med høj hastighed fremmede større forbedringer i fysiske funktionstest med en tidskomponent, var traditionel styrketræning den mest effektive intervention til at forbedre præstationen, hvor deltagerne skulle arbejde længere (...) derfor kan både styrketræning med høj hastighed og traditionel styrketræning være nødvendig for at forbedre flere områder af fysisk funktion" (oversat)	–	Mixed physical training forbedrer ADL vs usual care (SMD 0.29) med very low certainty. Effekt af RT alene beskrives ikke tydeligt.	Svag (D)	ADL måles ved baseline, men ikke som primært ændrings-outcome; funktionel forbedring omtales via STS/SPPB. RT alene kan dog forbedre sit-to-stand-tiden og SPPB-scorer hos skrøbelige og præ-skrøbelige ældre voksne.	–	Der er usikker evidens for ADL-forbedring (Sun: very low for mixed training). Øvrige reviews giver ikke direkte ADL-effekt i det angivne materiale.
Kvalitet af livet (QoL)	Ikke rapporteret	–	comprehensive geriatric assessment og mixed physical training forbedrer QoL vs usual care; evidens graded low certainty. Effekt af RT alene beskrives ikke tydeligt.	Moderat (C)	Ikke rapporteret	–	Kun Sun et al. rapporterer QoL med lav sikkerhed, og disse er mere tydelige i multikomponente geriatriske forløb end i isoleret RT; QoL er ikke konsistent dækket på tværs af de tre.
Træningstype	*HVRT vs TRE; High-velocity RT (≈31) vs. traditionel RT (≈70). Primært maskin-baserede benøvelser (leg press m.m.), fokus på benstyrke/power og funktionstests*	*–*	*Bred palet af ikke-farmakologiske interventioner (PA: aerob/RT/mind-body/mixed; multikomponent; nutrition; CGA, kognitiv træning, telemonitorering m.m.). . RT ofte integreret i bredere forløb (mixed PA/multikomponent).*	*–*	*Ren RT i 10 RCT'er (elastik/ankelvægte/egen vægt/maskiner) målrettet benmuskulatur.*	*–*	*Alle tre understøtter RT som central komponent, hvor benfokuseret RT – ofte kombineret med anden PA – er central intervention ved frailty; Lopez fokuserer på hastighed (HVRT vs TRE), Sun på brede interventionstyper, Nagata på RT-dosering i skrøbelige/præ-skrøbelige.*

Træningsfrekvens	HVRT: 12–14 uger og 24–36 sessioner (mediant: 12 uger), ca. 36 sessioner IQR: 24–36 sessions). Typisk 2–3 gange/uge. TRE: 12–16 uger (median 12 uger), 36 sessioner (IQR: 24–38 sessions).	–	Stor variation (6–156 uger), men ofte 2–3/uge; mange studier <24 uger.	–	Gns.: 2.4 ±0.7 (range 1–3) sessions pr uge (1–3/uge); varighed 13,2 ± 5.8 uger (8–24).	–	På tværs af reviews ligger omkring 2–3 gange/uge i 8–24 uger.
Intensitet	HVRE: median 70 % 1RM (IQR 50–75 %). Fokus på høj relativ intensitet og eksplosiv udførelse i HVRE; TRE: 75 % 1RM (IQR 70–80 %).	–	Ikke tydeligt rapporteret; nævner "low to moderate intensity, for at least 6 weeks" som anbefaling i diskussion.	–	Varierer 40–80% 1RM (ankelvægte, maskiner, elastikker). Nogle programmer lav-intens (40 % 1RM), andre 60–80 % 1RM.	–	Lopez giver mest konkret intensitet (≈60–80% 1RM), med eksplosive varianter til power. Sun/Nagata har mere generelle eller varierede intensitetsangivelser i de givne data.
Volume (sets × reps / pr. uge)	HVRE: median 42 sæt/uge (IQR 32–61 sæt/uge);. TRE: 50 sæt/uge (IQR 36–72 sæt/uge).	–	Ikke tydeligt rapporteret.	–	Gns.: 2,5 ± 1.1 (1–4) sæt/øvelse; 11.6 ± 3.2 (8–15) reps, sessioner ca. 47,5 min (30–60).	–	Samlet peger data på moderat volumen (flere benøvelser, 2–3 sæt, 8–15 reps); meget høj volumen fremhæves ikke som nødvendigt i de angivne data.
Progression	Ikke detaljeret i hovedresultaterne (implicit via intensitetsangivelse/1RM-intensitet).	–	Progression inkonsistent rapporteret; anbefales i diskussion: "studies recommended that older adults should follow the principles of individualisation, periodisation and progression, and perform training 2–3 days per week"	–	7/10 studier rapporterer progression. Nogle kun volumen, andre kun intensitet, enkelte begge.	–	Progression omtales som vigtig, særligt for STS-forbedring, men er rapporteret uens på tværs af reviews/studier.
Trænede muskelgrupper	Primært underekstremitet (leg press m.m.).	–	RT anbefales for store muskelgrupper; i mixed/multikomponent ofte underekstremitet (UE) + helkrop (ofte med balance og styrke kombineret): For resistance training prescriptions, studies recommended that older adults should follow the principles of individualisation, periodisation and progression, and perform training 2–3 days per week using **the major muscles** with low to moderate intensity, for at least 6 weeks	–	Fokus på knæ- og hofteextensorer/flexorer, ankel plantar/dorsalflexorer; enkelte protokoller inkl. hofteabduktorer	–	UE/benmuskulatur er gennemgående centralt – konsistent med funktionelle outcomes (gang, STS, SPPB).
Styrketests	Direkte styrke/power: leg press power (W) og leg press 1RM; mange funktionstests (TUG, STS, 6MWT m.fl.). Hurtig ganghastighed, n = 12; timed up and go, n = 40; 5-gange rejse-sætte-sig-test, n = 18; 30-sekunders rejse-sætte-sig-test, n = 24; 6-minutters gangtest, n =	–	Ingen systematisk styrkemeta-analyse; styrke indgår mere indirekte via frailtykomponenter og funktionstests.	–	Ingen specifik styrketest metaanalyseret; funktionelle tests (HWS, TUG, SPPB, STS) fungerer som styrke-nære endpoints.	–	Kun Lopez giver direkte kvantitativ evidens for styrke/power-tests, men funktionelle tests i Sun/Nagata understøtter samme retning.

	15; muskelkraft i benpres [udtrykt i W], n = 10; muskelkraft i benpres [udtrykt i W.kg−1], n = 4; muskelkraft i trappeopgang, n = 3; muskelkraft i rejse-sætte-sig-test, n = 3; muskelkraft i modgående spring, n = 3; og muskelstyrke i benpres, n = 24						
Samlet evidens	**C – moderat evidens for, at RT forbedrer styrke, men svag evidens for forbedriger af funktionelle tests hos ældre, inkl. en mindre andel skrøbelige.**	**C**	**C – moderat evidens (frailty/ADL; QoL), men positiv retning for frailty-reduktion.**	**C**	**C – modetal evidens: positive effekter på STS (modetal sikkerhed) og SPPB (ikke robust i høj-kvalitetsstudier), uenighed og ikke-signifikante gang/TUG-effekter.**	**C**	**Moderat evidens for, at RT kan forbedre især STS og visse sammensatte funktionstests hos skrøbelige/præ-skrøbelige ældre, mens ganghastighed/TUG er mere usikre. Evidensen er begrænset af heterogenitet og generelt lav/very low GRADE i flere outcomes. Effekt er i flere tests ikke signifikant for skrøbelige.**
Hjertesyge og sygdomme i kredsløbet	10.3389/fphys.2018.01564		10.1016/j.jesf.2016.08.001				
Outcome-kategori	**Slimani et al. 2018: [97]** Multikomponent fysisk træning ved hjertesvigt	**Evidens styrke**	**Zhang et al. 2016: [115]** Kortvarig træningsintervention (aerob, kombineret og styrkebaseret træning) ved kronisk hjertesvigt	**Evidens styrke**			**Samlet vurdering**
Gangfunktion / Aerob kapacitet (6MWT, VO_2, distance)	aerob kapacitet måles på gangfuktion: Størst (og stor) effekt ved **RT** (ES = 1.71; 95% CI = 1.03 to 2.39; p < 0.001), moderat til høj heterogenitet; små forbedringer ved **aerob** (ES = 0.51; 95% CI = 0.30 to 0.72; p < 0.001) og ikke tydelig effekt ved kombineret træning (ES = 0.15; 95% CI = −0.24 to 0.53; p = 0.458). Moderat–høj heterogenitet og ingen tydelig dosis–respons. Små til moderate signifikante forbedringer i aerob kapacitet (6-MWT, VO_2, gangdistance) på tværs af træningsformer.	Moderat (B)	Signifikant forbedring i VO_2max ved aerob og kombineret træning; ingen signifikant effekt ved styrketræning alene. <u>**Effektstørrelse**</u> **aftager med stigende alder.** Heterogenitet var høj, derfor subgruppeanalyse, hvor det varierer afhængigt af subgruppe (**50–55 år**: (WMD), −3.57; 95% CI, −4.86 to −2.29; **I2 = 50.5%**, p = 0.089 // **60–65 år**: WMD, −2.35; 95% CI, −2.66 to −2.04; **I2 = 0.0%**, p = 0.469 // **69–75**: WMD, −1.11; 95% CI, −1.88 to −0.34; **I2 = 38.5%**, p = 0.165). <u>**Træningstype**</u>: **aerobic exercise** (SMD, −2.69; 95% CI, −3.45 to −1.92; I2 = 37.7%, p = 0.117)	Moderat (C)			Moderat-høj evidens for forbedring af aerob kapacitet ved fysisk træning hos patienter med hjertesvigt, stærkest dokumenteret for aerob og kombineret træning. Evidensen for styrketræning alene er mere usikker.

			aerobic kombineret med styrketræing (SMD, −2.20; 95% CI, −4.41 to −0.26; I2 = 76.6%, p = 0.005) **styrketræning** ingen signifikant effekt (SMD, −1.79; 95% CI, −3.91 to 0.32; I2 = 82.1%, p = 0.000).		
Kvalitet af livet (QoL – MLHFQ)	Lille, men signifikant forbedring i QoL (MLHFQ) (ES = −0.69; 95% CI = −1.00 to −0.38; p < 0.001). Effekten er samlet set lille–moderat med meget høj heterogenitet (I² 91.45%; p < 0.001). **Subgruppeanalyse**: moderat forbedring hos kvinder (ES = −1.13; 95% CI = −2.01 to −0.24; p = 0.013) lille forbedring hos mænd (ES = −0.55; 95% CI = −1.29 to 0.19; p = 0.148) lille forbedring hos kønnene kombineret (ES = −0.69; 95% CI −1.02 to −0.36; p < 0.001), uden signifikant forskel mellem dem (Q = 1.05; p = 0.592). Aerob viser effekt (moderate ES = −1.04; 95% CI = −1.67 to −0.41; p = 0.001) kombineret træning viser effekt (small ES = −0.42; 95% CI −0.71 to −0.13; p = 0.005) RT alene viser ikke tydelig og ikke-signifikant effekt (ES = −0.17; 95% CI = −0.80 to 0.47; p = 0.610) Dog ingen signifikant forskel mellem træningsmodes (Q = 4.20; p = 0.123)	moderat (C)	Signifikant forbedring i QoL efter kortvarige træningsforløb med lav heterogenitet (I² = 17 %) (MLHFQ: n = 299, I2 = 17%; 95% CI, 3.19 to 9.70; p < 0.00001.	Høj (B)	Moderat-høj evidens for, at fysisk træning kan forbedre livskvalitet hos patienter med hjertesvigt. Evidensen er mest robust for aerob og kombineret træning; effekten af styrketræning alene er usikker.

Muskelstyrke	Ikke rapporteret som selvstændigt outcome; ingen systematiske styrketests indgår.	–	Ikke rapporteret som klart outcome; styrketræning indgår, men uden direkte styrkemålinger.	–		Der foreligger ikke tilstrækkelig evidens til at vurdere effekten af træning på muskelstyrke hos patienter med hjertesvigt i disse reviews.
Kardiovaskulære funktioner (ikke PICO-relevant)	Moderate forbedringer i kardiale parametre (fx LVEF) rapporteres (moderate ES = 0.91; 95% CI = 0.37 to 1.45; p = 0.001), især ved aerob træning (moderate ES = 1.17; 95% CI = 0.45 to 1.89; p = 0.001) og kombineret aerobic og RT (small ES = 0.30; 95% CI = −0.49 to 1.10; p = 0.450), uden signifikant forskel mellem træningsmodes (Q = 2.49; p < 0.115)	moderat (C)	Kortvarig træningsintervention kan forbedre cardiac output (CO)	Svag-moderat (C/D)		Der er indikationer på forbedret hjertefunktion ved træning, men evidensen er heterogen.
Træningstype	*Aerob, styrketræning og kombineret træning; få rene styrketræningsprotokoller.*	*–*	*Aerob træning, kombineret aerob+RT og RT alene sammenlignes.*	*–*		*Begge reviews inkluderer flere træningstyper; aerob og kombineret træning er bedst dokumenteret for funktionelle forbedringer. Begrænset isoleret styrketræning.*
Træningsfrekvens	*1–5×/uge over 4–54 uger; QoL-effekter størst ved 12 uger og 3–4 sessioner/uge.*	*–*	*Typisk 3×/uge, variation 2–5×/uge. 8-24 uger* *Nnogle studier går ned til 4 uger, men inklusionskriterierne er min. 8* *Nogle træner ned til 2 gange om ugen, men inklusionskriterierne er min. 3*	*–*		*Træningsfrekvens på ca. 3 gange/uge er mest konsistent anvendt og forbundet med positive effekter.*
Intensitet	*Ikke tydeligt rapporteret; generelle anbefalinger i diskusionen om moderat aerob intensitet: "30–60 min a day of aerobic activity of moderate-intensity for several months to promote and maintain health, and reduce the risk of chronic disease, premature mortality, functional limitations, and disability"*	*–*	*Aerob intensitet 40–80 % VO_2-reserve; styrkeintensitet ikke standardiseret.*	*–*		*Intensitet er utilstrækkeligt rapporteret til klare konklusioner, især for styrketræning.*
Volume (sets × reps)	*Ikke tydeligt rapporteret*	*–*	*Ikke systematisk rapporteret.*	*–*		*Ingen dosis-anbefaling mulig: Der foreligger utilstrækkelige data til at vurdere volumen-effekter.*
Progression	*Ikke tydeligt rapporteret*	*–*	*Nævnt overordnet, men ikke detaljeret eller systematisk.*	*–*		*Progression forekommer, men er ikke tilstrækkeligt beskrevet til evidensbaserede anbefalinger.*
Trænede muskelgrupper	*Ikke specificeret.*	*–*	*Ikke specifikt angivet.*	*–*		*Uklar – muskelgrupper er ikke systematisk rapporteret i nogen af reviewene.*

Styrketests (funktionelle mål)	6-MWT/gangtest (mest rapporteret) – forbedring: lille til moderat effekt. Kvalitet af livet forbedret. Ingen konsistente styrketests.	–	VO_2max anvendes som centralt funktionelt mål og forbedres (signifikant i flere subgrupper); ingen ensartede styrketests.	–	Funktionelle mål dominerer; direkte styrketests mangler: Funktionelle tests tyder på forbedring af aerob kapacitet og mobilitet, men ikke dokumenteret styrkeforbedring.
Samlet evidens	**B – moderat–høj evidens for, at fysisk træning forbedrer aerob kapacitet og livskvalitet hos patienter med hjertesvigt; heterogenitet og manglende standardisering begrænser sikkerheden**	**Svag–moderat (C)**	**C – moderat evidens for forbedring af aerob kapacitet og QoL ved aerob og kombineret træning; evidensen for styrketræning alene er svag.**	**Svag–moderat (C)**	**Moderat-høj evidens for positive effekter af fysisk træning på aerob kapacitet og livskvalitet hos patienter med hjertesvigt, mens evidensen for styrketræning alene og for muskelstyrke er begrænset — lav specifik evidens for styrketræning.**
Demens og Mild Cognitive Impairment (MCI)	10.1016/j.gerinurse.2025.01.006		10.3390/ijerph17249216		
Outcome-kategori	**Yuan et al. 2025: [112]** kognitiv skrøbelighed: træningsinterventioner på kognition, fysisk funktion og livskvalitet	**Evidens styrke**	**Lee 2020: [71]** MCI: Aerobe og styrketræning på kognitive og fysiologiske tilpasninger	**Evidens styrke**	**Samlet vurdering**
Gangfunktion (walking ability, gait speed)	gangfunktion: signifikant, ingen heterogenitet (I2=0%). Gait speed: signifikant (MD=0.21), men høj heterogenitet (I2=90%).	Moderat (C)	Ikke rapporteret som pooled outcome	–	Moderat evidens for forbedring af gangrelaterede outcomes i CF, men blandet robusthed: walking ability (TUG) er konsistent, mens gait speed er præget af høj heterogenitet; ingen pooled dokumentation fra Lee.
Muskelstyrke (håndgrebsstyrk, Styrke i underekstremitet erne/lower limb strength)	Styrke i underekstremiteterne (rejse-sætte-sig): signifikant med substantiel uenighed (I2=54%). håndgrebsstyrke: signifikant (I2=72%), men med høj heterogenitet.	Moderat (C)	håndgrebsstyrke: signifikant moderat effekt (d≈0,62); bedst effekt af styrketræning vs aerob (herunder er higt speed bedst, derefter almindelig RT og til sidst low speed). Begrænses af 4 studier (n = 73) + moderat uenighed	Lav (D)	Lav-moderat evidens for styrkeforbedring samlet: Positiv retning. Yuan viser signifikante effekter, men med heterogenitet (især grip). Lee viser signifikant HGS med moderat effektstørrelse.
Mobilitet / funktionel performance (TUG, SPPB, frailty score)	**Physical frailty**: signifikant forbedring, men høj heterogenitet (I2=95%). **SPPB** (Short Physical Performance Battery): ingen signifikant effekt (P=0.32; I2=70%). **TUG** (gangfunktion): signifikant (I2=0%). **FAB** (Frontal function): signifikant (I2=61%).	Svag (D)	Ikke entydigt rapporteret.	–	Svag evidens for samlet funktionel performance: tydelig forbedring i frailty og TUG i Yuan, men meget høj heterogenitet og ingen effekt på SPPB; Lee bidrager ikke med entydige funktionelle outcomes.
Kognition (ikke PICO-relevant)	MoCA/MMSE: signifikant forbedring (SMD=0.98) med høj heterogenitet (I2=82%); subgroup peger på større effekt ved ≤12 uger, ≤45 min, ≥3x/uge; mind-body > resistance.	Moderat (C)	Signifikant forbedring i kognitive funktioner; bedst effekt af styrketræning vs aerob (herunder er higt speed bedst, derefter almindelig RT og til sidst low speed).	Moderat (C)	Moderat evidens for kognitiv forbedring, men heterogenitet er høj i Yuan; Lee beskriver signifikant kognitiv gevinst og angiver rammer for dose/frekvens.

Træningstype	*Højhastigheds styrketræning, elastiktræning, flerkomponentsøvelser, otago-træning, mindfulness TaiChi, baduanjin-øvelser, kognitiv træning, HIIT (cykling)*	*–*	*Aerob træning eller styrketræning.*	*–*	Bred interventionspalette i Yuan; Lee opsummerer som aerob eller styrke - ikke muligt at rangordne træningstyper.
Træningsfrekvens	*2–3×/uge; 30–60 min; 8–48 uger.*	*–*	*Typisk 3×/uge (interval 1–5×/uge); gennemsnit 24.6 uger (6–48)*	*–*	Frekvens/varighed er rapporteret i begge; Yuan mere snæver (2–3×/uge), Lee angiver bredere spænd (1–5×/uge) og et minimumsforslag.
Intensitet	*Rapporteres ikke tydeligt, men i diskussionen beskrives det at mens højintensiv træning er nødvendig for fysisk forbedring, synes moderat intensitetstræning at være mere effektiv til kognitiv forbedring blandt ældre. Mange ældre voksne med CF kan dog have svært ved at gennemføre middelhøj intensitet under længerevarende træningsprogrammer på grund af deres fysiske skrøbelighed.. Enkelte studier med progressiv modstand (elastikker).*	*–*	*Moderat–høj (gennemsnitlig 1 times motion): 55–90 % HRmax/HRR; styrke 75% RM, 7 RM, maximal (RM) eller RPE 14–15.*	*–*	Intensitet mere konkret i Lee end i Yuan. (Moderat–høj)
Volume (sets × reps)	*Ikke tydeligt rapporteret.*	*–*	*Typisk 2–3 sæt × 6–15 reps; eksempler: 2 sæt × 6–8 reps af 7RM; 2 sæt × 15 reps med 6 s isometrisk; 2–3 sæt × 12–15 reps; 2–3 sæt × 8–10 reps.*	*–*	Sæt/reps fremgår kun i Lee (Typisk 2–3 sæt × 6–15 reps)
Progression	*Ikke tydeligt rapporteret.*	*–*	*Ikke eksplicit rapporteret (intensitet styret via RPE)*	*–*	Progression ikke tydeligt dokumenteret
Trænede muskelgrupper	*Hele kroppen.*	*–*	*Hele kroppen; biceps, triceps, ryg (seated row, lat pulldown), ben (leg press, hamstrings, lægge); også UE/LE/truncus i funktionelle bevægelser.*	*–*	Begge angiver helkropsfokus; Lee har konkrete muskelgrupper/øvelser nævnt.
Styrketests	*rejse-sætte-sig (FTSST/Five Times Sit to Stand Test), håndgrebsstyrke, ganghastighed (4.4 m and 6 m tests), gangfunktion, TUG (Timed Up-and-Go), physical fitness SPPB (Short Physical Performance Battery)*	*–*	*håndgrebsstyrke; 1RM-tests i enkelte studier; SPPB; Timed Up-and-Go; rejse-sætte-sig; funktionel rækkevidde/functional reach; VO2peak.*	*–*	Tydelige testbatterier i begge; Yuan har konkrete CF-funktionstests og styrketest via FTSST/håndgrebsstyrke; Lee nævner bredere fysiologiske og funktionelle tests.
Samlet evidens	**C – moderat evidens: signifikante forbedringer i flere funktionelle domæner (skrøbelighed, TUG, ganghastighed, håndgrebsstyrke, FTSST), men høj heterogenitet og manglende effekt på SPPB svækker sikkerheden.**	**C**	**D – svag evidens: signifikante kognitive og åndgrebsstyrke-effekter er nævnt, men flere centrale samlede funktionelle outcomes er ikke entydigt, hvilket begrænser samlet evidensstyrke.**	**D**	**Moderat evidens for træningsinterventioners effekt på funktion hos CF/MCI, men med stor heterogenitet (Yuan) og begrænset pooled funktion (Lee); bedst dokumenteret for grebsstyrke.**
Mobilitetsbegrænsede	10.1016/j.ijnss.2022.12.002				

Outcome-kategori	**Efendi et al. 2022: [54]** Stolebaseret styrketræning med elastik (CRBE) hos mobilitetsbegrænsede ældre i plejesektoren	**Evidens styrke**	**Samlet vurdering**
ADL (selvhjulpenhed)	Signifikant forbedring i ADL; (SMD ≈ 0,30; 95% CI: 0,11–0,48; P=0,001) med lav heterogenitet (I2 ≈10%).	Høj (B)	Høj evidens for forbedret ADL ved CRBE, signifikant effekt og lav heterogenitet.
Håndgrebsstyrke	Håndgrebsstyrke forbedres signifikant (MD ≈ +2,17 kg; 95% CI: 1,22–3,11; P<0,001) med lav heterogenitet (I2=0%).	Høj (B)	Høj evidens for forbedret håndgrebsstyrke ved CRBE (robust retning og meget lav heterogenitet).
Muskelstyrke – overekstremitet (arm curl)	Øvre ekstremitets udholdenhed (arm curl) forbedres signifikant (MD ≈ +2,23; 95% CI: 0,49–3,97; P=0,012), men med høj heterogenitet (I2 ≈80,9%).	Moderat (C)	Moderat evidens for forbedring i overekstremitetsudholdenhed pga. meget høj heterogenitet trods signifikant effekt.
Muskelstyrke – underekstremitet (chair-stand)	CChair-stand forbedres signifikant (MD ≈ +1,32; 95% CI: 0,69–1,96; P<0,001) med lav heterogenitet (I2=0%).	Høj (B)	Høj evidens for forbedret underekstremitetsudholdenhed/ styrkenær funktion (chair-stand) ved CRBE med konsistente resultater.
Fleksibilitet (øvre/nedre krop)	Upper body (back scratch): signifikant (MD ≈ +3,06; P=0,022) med lav heterogenitet (I2=0%). Lower body (chair sit-and-reach): signifikant (MD ≈ +5,34; P<0,001) med moderat heterogenitet (I2 ≈42,1%).	Høj (B)	Høj evidens for forbedret fleksibilitet: robust for øvre krop (lav heterogenitet) og mindre robust for nedre krop (moderat heterogenitet).
Dynamisk balance (TUG / 8-foot up-and-go)	Signifikant forbedring (MD ≈ −0,35 sek; 95% CI: −0,61 til −0,08; P=0,011) med lav heterogenitet (I2=0%).	Høj (B)	Høj evidens for forbedret dynamisk balance/mobilitet ved CRBE (signifikant og konsistent).
Lungekapacitet (ikke PICO-relevant)	Peak flow forbedres signifikant (MD ≈ +40,35 l/min; P<0,001) med lav heterogenitet (I2=0%).	Høj (B)	Høj evidens for forbedret peak flow i CRBE-studierne (ikke PICO-relevant, men et velrapporteret outcome).
Søvnkvalitet og depression (ikke PICO-relevant)	Søvn (PSQI): signifikant forbedring (MD ≈ −1,71; P<0,001) med lav heterogenitet (I2=0%).	Moderat (C)	Moderat evidens: søvn har mere robust evidens (lav heterogenitet), mens depression er mere usikker (få studier og moderat heterogenitet).

	Depression: lille men signifikant reduktion (SMD ≈ −0,33; P=0,035) med moderat heterogenitet (I2 ≈55,4%) og få studier.		
Træningstype	*(CRBE): siddende træning med elastiske bånd, typisk i tre faser (opvarmning, elastikbaseret styrke, cool-down).*	*–*	*Træningen er beskrevet som stolebaseret elastiktræning; detaljeniveauet er tilstrækkeligt til implementering, men ikke til dosering i %1RM.*
Træningsfrekvens	*2–3×/uge; i genemsnit 24 uger (12–60 uger i intervention); sessioner 40–46 min.*	*–*	*Frekvens og varighed er tydeligt rapporteret og relativt konsistent.*
Intensitet	*Styres via RPE (4–8/10) og elastikmodstand; ét studie ca. 45–50 % HRmax; ikke angivet i %1RM. Deltagerne arbejder til moderat–moderat høj anstrengelse uden udmattelse.*	*–*	*Intensitet er operationelt beskrevet via RPE/elastik og enkelte HRmax-tal, men ikke standardiseret som %1RM.*
Volume (sets × reps)	*Ikke tydeligt rapporteret. Flere studier øger gradvist repetitionsantalet pr. sæt over ugerne; nævnt: "10 submaximal repetitions" ved RPE 6–8; reps pr. sæt øges ugentligt; ingen hvile mellem sæt nævnt.*	*–*	*Volumen er utilstrækkeligt standardiseret/rapporteret til præcis sammenligning (sæt er ikke angivet konsekvent).*
Progression	*Progression beskrives som: 1) flere repetitioner (fx gradvist øget reps pr. øvelse), 2) hårdeste elastikfarve over tid, 3) overgang fra "basic" til "advanced" program (flere/teknisk sværere øvelser). Ingen fælles kvantitativ %1RM-model.*	*–*	*Progression er beskrevet kvalitativt og på flere måder, men uden fælles kvantificering.*
Trænede muskelgrupper	*Helkropsorienteret (siddende): arme/skuldre (biceps curl, triceps extension, overhead press), øvre ryg/bryst (row/press), samt hofte/knæ/ankel via stolebaserede benøvelser.*	*–*	*Muskelgrupper/øvelser er rimeligt konkret angivet som helkropspræget stoletræning.*
Styrketests	*Funktionelle styrke- og kapacitetstests: håndbrebsstyrke, dynamometri, arm curl test, rejse-sætte-sig, plus TUG (mobilitet/balance). Der anvendes ikke systematisk 1RM til belastningsstyring i reviewets samlede rapportering.*	*–*	*Testbatteriet er funktionelt og konsekvent rapporteret; belastningsstyring via 1RM fremgår ikke.*
Samlet evidens	**B – høj evidens for funktionelle gevinster (ADL, HGS, chair-stand, TUG) med overvejende lav heterogenitet; svagere evidens for arm curl pga. meget høj heterogenitet; dosering (sets×reps) er**	**B**	**CRBE har samlet set høj evidens for forbedring i centrale funktionelle outcomes hos mobilitetsbegrænsede plejesektorbeboere, men begrænset rapportering af volumen/dosering, heterogenitet i enkelte outcomes og især omfang af inkluderede studier i**

	utilstrækkeligt rapporteret.		**funktionelle mål reducerer sikkerheden.**
Diabetes	10.1016/j.diabres.2025.112079		
Outcome-kategori	**Feng et al. 2025: [55]** Type 2-diabetes / metabolisk dysregulation hos ældre og styrketræning (RET) (glykæmisk kontrol, lipidprofiler, kropssammensætning, muskelstyrke og blodtryk)	**Evidens styrke**	**Samlet vurdering**
Muskelstyrke – overkrop	samlet effekt i forest plot ikke signifikant, dog er de lige akkurat signifikante på P-værdi (P = 0.05). Derfor: Signifikant forbedring (MD: 1,60, 95 % CI 0,09 til 3,11; P = 0,05; I2 = 95 %), men vurderes ikke klinisk relevant Når der blev detekteret signifikant heterogenitet ved alle analyser, blev der udført metaanalyser ved hjælp af en tilfældig effektmodel og inverse variansmetoder for at evaluere den gennemsnitlige forskel (MD) og 95 % konfidensinterval (CI).	Svag (D)	Signifikant, men ekstrem heterogenitet (I2=95%) og grænse-signifikans (P=0,05) giver lav sikkerhed.
Muskelstyrke – benstyrke	Signifikant forbedring (MD: 2,72, 95 % CI 0,59 til 4,85; P = 0,01; I = 96,0 %)	Svag (D)	Signifikant, men ekstrem heterogenitet (I2=96%) reducerer sikkerheden markant.
Kropssammensætning (ikke PICO-relevant)	**Mager kropsmasse:** Ret øgede sigifikant mager kropsmasse (MD: 0,29, 95 % CI 0,04 til 0,55; P = 0,03; I2 = 25,0 %). **Taljeomkreds:** RET mindskede signifikant taljeomkredsen (MD: 4,49, 95 % CI 7,73 til 1,26; P = 0,006; I2 = 85,0 %). **Fedtmasse**: Der blev ikke observeret signifikante ændringer i fedtmasse. **Kropsvægt**: Samlet analyse viste en ikke-signifikant forbedring i kropsvægt med RET. **Fedt%**: Samlet analyse viste, at RET ikke havde en signifikant indflydelse på fedt%. **Body mass index:** RET havde ikke en signifikant indflydelse på body mass index.	moderat (C)	Blandet: mager masse har lav heterogenitet (I2=25%) og er signifikant, men talje har høj heterogenitet (I2=85%), og flere centrale mål (fedtmasse, vægt, fedt%, BMI) er ikke signifikante.

Glykæmisk kontrol og lipids (ikke PICO-relevant)	**Hæmoglobin A1c**: Reducerede signifikant (MD = 0,51, 95 % CI: 0,76 til 0,26; P < 0,0001; I2 = 89,0 %). Effekt af interventioner på 12 uger eller mindre, interventioner på mere end 12 uger og med 1-2 eller 3 sessioner om ugen. **Fastende blodglukose**: Signifikant fald i fastende blodglukose (MD = 1,43 mg/dl, 95 % CI: 2,78 til 0,08; P = 0,04; I2 = 69,0 %). Undergruppeanalyser viste en signifikant reduktion i fastende blodglukose med ≥ 4 sessioner om ugen. **Insulin**: Der blev ikke observeret signifikante ændringer i insulinniveauer. **Lipider Triglycerid**: signifikant reduktion af triglyceridniveauer (MD = 0,32, 95 % CI 0,62 til 0,03: P = 0,03; I2 = 47,0 %). Undergruppeanalyser viste signifikante reduktioner i triglycerider med både træningsvarigheder på over 12 uger og træningsvarigheder på 12 uger eller mindre, samt interventioner med 3 sessioner om ugen. **Total kolesterol**: Signifikant reduktion i total kolesterol (MD = 7,08, 95 % CI 12,07 til 2,09; P = 0,005; I2 = 80,0 %). Undergruppeanalyser viste signifikante reduktioner i total kolesterol med interventioner, der oversteg 12 uger, og med 1-2 sessioner pr. uge. **Low-density lipoprotein**: Signifikant reduktion af low-density lipoprotein-niveauer (MD = 1,91, 95 % CI 3,79 til 0,03; P = 0,05; I2 = 78,0 %). Undergruppeanalyser viste signifikante reduktioner i low-density lipoprotein med 1-2 sessioner pr. uge. **High-density lipoprotein**: Der blev ikke observeret signifikante ændringer i high-density lipoprotein. Metaregressionsanalyser viste, at ingen af de betragtede variabler – stikprøvestørrelse, gennemsnitsalder eller BMI – signifikant påvirkede effekten af RET på hæmoglobin A1C, fastende blodglukose eller triglycerider. *Gennemsnitsalder blev identificeret som en*	Svag (D)	Samlet lav sikkerhed: Der er flere signifikante metaboliske effekter, men heterogeniteten er høj for flere nøgleoutcomes (HbA1c I2=89%, FBG I2=69%, TC I2=80%, LDL I2=78%), og nogle outcomes er ikke signifikante (insulin, HDL).

	signifikant kilde til heterogenitet i det samlede kolesteroltal (Q = 6,09, p = 0,01), mens stikprøvestørrelse (Q = 0,03, p = 0,86) og BMI (Q = 0,53, p = 0,47) ikke var det. For lavdensitetslipoprotein bidrog ingen af variablerne signifikant til heterogenitet eller påvirkede behandlingseffekten (gennemsnitsalder: Q = 1,99, p = 0,16; BMI: Q = 0,00, p = 0,97; stikprøvestørrelse: Q = 0,03, p = 0,86). *En moderat træningsfrekvens (1-3 sessioner/uge) var effektiv, hvilket kan indikere en tærskeleffekt i den træningsvolumen, der er nødvendig for glykæmiske forbedringer.*		
Træningstype	*Ren modstandstræning (Resistance Exercise Training, RET), primært med vægtmaskiner og frie vægte; i 2 studier elastiske bånd.*	–	*Modaliteten (RET) er klar, men variation i udstyr (maskiner/frie vægte vs elastik) og protokoller kan bidrage til heterogenitet.*
Træningsfrekvens	*Varierede meget: 1–7 sessioner/uge; varighed 12 uger–12 måneder.* ***Fordeling**:* *1×/uge (1 studie)* *1–2×/uge (1 studie)* *2×/uge (2 studie)* *5×/uge (13 studie)* *7×/uge (2 studie)* ***Kategorier**: lav 1–2,* *moderat 3, høj ≥4/uge.*	–	*Meget stor spredning i frekvens (1–7/uge) og ujævn fordeling (mange ved 5/uge) gør det svært at udlede stabil dosis/frekvens-implikation.*
Intensitet	*Overvejende moderat–høj intensitet: 40–90%; typisk 60–80 % 1RM, enkelte 85–90 %; nogle start 40–50 % med progression; enkelte Borg 15–18.*	–	*Intensitet er relativt konkret (1RM/Borg),men spændet er bredt og ikke ensartet operationaliseret, hvilket understøtter moderat-lav sikkerhed.*
Volume (sets × reps)	*Antal øvelser pr. træningspas: 3-12; 2-4 sæt; 8–20 reps*	–	*Volumen er angivet som interval (3–12 øvelser, 2–4 sæt, 8–20 reps), uden fælles protokol, hvilket begrænser sammenlignelighed.*

Progression	Progression nævnes i mange, men ikke alle inkluderede data fra studier, baseret på fx tidspunkt i interventionen eller når styrke er øget mv.	–			Lav sikkerhed: Progression er inkonsistent rapporteret og uden standardiserede kriterier.
Trænede muskelgrupper	Helkrops-RET med fokus på store muskelgrupper: **Underekstremitet**: benpres, knæekstension/-fleksion, hofteekstension/-abduktion, læg/calf raise. **Overekstremitet**: brystpres, roning, lateral pulldown, skulderpres, biceps curl, triceps extension.	–			Øvelses-/muskelgruppeangivelsen er relativt konkret (store muskelgrupper, både UE og OE), men bredt formuleret på tværs af studier.
Styrketests	Typisk 1RM- eller fler-RM; OE/UE styrke rapporteres som kg; funktionelle styrkemål i nogle studier; ingen fælles standard, men styrkeudfald er relativt godt repræsenteret.	–			Den relative manglende standardisering i styrketests og rapportering begrænser sikkerheden og sammenligneligheden på tværs.
Samlet funktionel evidens	**D – svag evidens. Funktionelle outcomes (som gang/TUG/SPPB) er ikke systematisk rapporteret, men indgår i de inskluderede studier; de funktion-nære resultater her er OE/UE muskelstyrke, som begge er signifikante, men har ekstrem heterogenitet (I2 95–96%).**	**Svag (D)**			**Samlet svag evidens for funktion-nær forbedring via styrke, primært pga. ekstrem heterogenitet og mangel på standardiserede funktionelle outcomes i de oplysninger, du har sendt.**
Multisyge	10.1016/j.jor.2024.03.039		10.1007/s11657-022-01120-x		
Outcome-kategori	**Liu & Lee 2024: [75]** Osteosarkopenisk overvægt (OSO) og elastikbaseret styrketræning	**Evidens styrke**	**Yang et al. 2022: [111]** Osteosarkopenisk overvægt (OSO) og elastikbaseret styrketræning	**Evidens styrke**	**Samlet vurdering**
Gangfunktion (GS)	Ganghastighed (GS) ikke signifikant; meget høj heterogenitet (P < 0.001, I2 = 100 %, CI: 9.84–9.88)	Svag (D)	Ingen signifikant effekt (ikke meta-analyseret)	Svag (D)	Svag evidens. Der er ikke dokumenteret konsistent effekt af elastikbaseret styrketræning på ganghastighed hos ældre med OSO. Ét studie viser ingen effekt med meget høj heterogenitet, og det andet finder ingen signifikant effekt.
Mobilitet (TUG)	Resultaterne for tidsbestemt op-og-gå-test (TUG) var ufyldestgørende på grund af inkonsistente fund og begrænsede data til metaanalyse.	Svag (D)	Ét studie viser forbedring, et andet ingen effekt (modsatrettede fund) (ikke meta-analyseret)	Svag (D)	Svag/modstridende evidens. Evidensen for forbedring i mobilitet (TUG) er modstridende og utilstrækkelig. Studierne viser inkonsistente resultater uden pooled effekt.
Funktionel styrke (TCR)	Signifikant forbedring, men esktrem høj heterogenitet (P < 0.001, I2 = 100 %, CI: −24.28–23.44)	Svag (D)	Signifikant forbedring (ikke meta-analyseret)	Moderat (C)	moderat evidens. Positiv retning, dog høj uenighed. Timed Chair Rise forbedres i begge studier, men den meget høje heterogenitet i meta-analysen og manglende pooled data i det andet studie reducerer den samlede evidensstyrke.

Muskelstyrke (HGS)	Resultaterne for håndgrebsstyrke (HGS) var ufyldestgørende på grund af inkonsistente fund og begrænsede data til metaanalyse.	Svag (D)	Ét studie finder forbedring, et andet ingen effekt (ikke meta-analyseret)	Svag (D)	Svag/modstridende evidens. Håndgrebsstyrke viser ikke konsistent respons på elastikbaseret styrketræning ved OSO, og evidensen er præget af modsatrettede resultater.
Sygdomsspecifikke outcomes (BMD, SMM og SMI - ikke PICO-relevant)	Bone mineral density (BMD): signifikant forbedret, med høj uenighed (P < 0.001, I2 = 98 %, CI: 0.39–0.71) Skeletal muscle mass index (SMI): beskrives som signifikant, med høj uenighed (P < 0.001, I2 = 98 %, CI: 0.31–0.71) i resultater, OBS: men beskrives som ikke signifikant i diskusionen. Skeletal muscle mass (SMM): beskrives som signifikant forbedret i diskusionen, men enighed fremgår ikke.	Svag (D)	Bone mineral density (BMD): ikke signifikant (men beskrives som forbedres), med lav uenighed (MD = 0.01 g/cm2, 95% CI: 0.001, 0.02, P = 0.03, I2 = 0%) Skeletal muscle mass index (SMI): Ikke signifikant effekt med lav uenighed (MD = 0.20 kg/m2, 95% CI: − 0.25, 0.64, P = 0.38, I2 = 0%) Skeletal muscle mass (SMM): signifikant forbedring med lav uenighed (MD = 1.19 kg, 95% CI: 0.50, 1.89, P = 0.0007, I2 = 0%)	Svag–moderat (C/D)	Inkonsistent evidens. Sygdomsspecifikke kropssammensætningsmål viser forbedringer i enkelte studier, men resultaterne er inkonsistente og præget af høj heterogenitet. BMD: positiv reting, men ikke nok evidens til anbefaling SMI: positiv reting, men ikke nok evidens til anbefaling SMM: signifikant effekt og lav uenighed i ét studie.
Fedtprocent (BFP - ikke PICO-relevant)	Body Fat Percentage (BFP): Signifikant forbedret, men med ekstrem uenighed (CI: −262.55–260.11, P < 0.001, I2 = 100 %)	Svag (D)	Signifikanf forberig i BFP med moderat uenighed (MD = − 1.61%, 95% CI: − 2.94, − 0.28, P = 0.02, I2 = 50%)	Moderat (C)	Signifikant effekt med moderat til høj uenighed. Reduktion i fedtprocent ses, men meget stor variation mellem studierne begrænser evidensens styrke.
Træningstype	*Elastisk modstandstræning (elastiske bånd). Ét studie inkluderede også aerob træning som kombinationsintervention.*	*–*	*Styrketræning (resistance training) – primært med elastiske bånd i 3 studier. Ét studie: kombineret aerob træning + styrketræning i OSO-gruppen. Ét studie delte RT i 1-sæt- vs 3-sæt-gruppe (10–15 RM).*	*–*	*Interventionerne er elastikbaserede.*
Træningsfrekvens	*3×/uge i alle studier. Varighed fast: 12 uger.*	*–*	*3×/uge i 12 uger i alle studier*	*–*	*Frekvens og varighed er ens på tværs af studierne.*
Intensitet	*Ikke systematisk rapporteret. Ingen fælles angivelse i %1RM eller reps-til-udmattelse.*	*–*	*Ikke entydigt angivet. Angivet som 10–15 reps i ét studie (1 vs 3 sæt af 10–15 reps). Ét studie beskriver "progressive elastikøvelser", men uden systematisk angivelse i %1RM eller RM-niveau.*	*–*	*Manglende standardisering af intensitet svækker sammenlignelighed.*
Volume (sets × reps)	*Ikke konsekvent rapporteret. Angives kun som "elastikøvelser". Ingen fælles protokol.*	*–*	*Kun tydeligt i ét studie: 1 eller 3 sæt × 10–15 reps pr. øvelse.*	*–*	*Utilstrækkelig rapportering af træningsvolume.*
Progression	*Ikke rapporteret*	*–*	*Kun kvalitativt beskrevet i ét studie. Beskrevet som progressiv modstand i ét studie; ingen talbaseret eller ensartet progression rapporteret på tværs af studierne.*	*–*	*Manglende ensartet og kvantificerbar progression.*

Trænede muskelgrupper	*Primært store muskelgrupper i over- og underekstremitet; funktionelle tests* *TUG/Timed Up and Go: Helkrop (funktionel), primært underekstremitet* *Time to Chair Rise (TCR): (funktionel), primært underekstremitet* *HGS/Handgrip Strength: Overekstremitet* *GS/Gait Speed: Primært underekstremitet (funktionel)*	–	*Primært større muskelgrupper i over- og underekstremitet.* *TUG/timed up and go test: Helkrop (funktionel), primært underekstremitet* *TCR/timed chair rise test: (funktionel), primært underekstremitet* *HGS/hand grip strength: Overekstremitet* *GS/gait speed: Primært underekstremitet (funktionel)*	–	*Træningen er helkropsorienteret, med fokus på fuktionelle mål*
Styrketests	*Håndgrebsstyrke (HGS), Time to Chair Rise (TCR), Timed Up and Go (TUG), ganghastighed (GS). Ingen systematisk anvendelse af 1RM eller objektiv styrkemåling for belastningsstyring.*	–	*Funktionelle/relaterede tests: HGS, TUG, TCR og GS. Ingen standardiseret brug af 1RM eller dynamometrisk maksimalstyrketest til belastningsstyring på tværs af studier.*	–	*Funktionelle tests anvendes frem for klassiske maksimalstyrketests.*
Samlet evidens	**D – svag evidens: signifikante forbedringer ses i funktionel styrke (TCR) og flere sygdomsspecifikke mål (BMD, SMM, BFP), men centrale funktionelle outcomes (GS, TUG, HGS) er enten ikke signifikante eller præget af meget høj heterogenitet, hvilket svækker den samlede evidenssikkerhed.**	**D**	**D – svag evidens: enkelte forbedringer i funktionel styrke (TCR) og kropssammensætning ses, men manglende eller modstridende effekter på gangfunktion, mobilitet og muskelstyrke samt fravær af pooled analyser begrænser den samlede evidensstyrke.**	**D**	**Svag evidens for styrketræningsinterventioner s effekt på funktion hos ældre med osteosarkopenisk overvægt; effekten er bedst dokumenteret for funktionel styrke (TCR), mens gangfunktion, mobilitet og grebsstyrke er inkonsistente eller uden sikker effekt.**
Kronisk nyresygdom	10.1186/s12882-024-03547-5				
	Chen et al. 2024: [42]				
Outcome-kategori	Kronisk nyresygdom og modstandstræning (funktion, inflammation og metaboliske markører)	**Evidens styrke**			**Samlet vurdering**
Gangfunktion (6-min walk)	Signifikant forbedring i 6-minutters gangtest; men med stor effektstørrelse og substantiel heterogenitet (WMD 89.93; 95% CI 50.12 til 129.74; P = 0.000; I2 = 55.0%).	Moderat (C)			Der ses klinisk relevant forbedring i gangkapacitet, men heterogenitet og få studier reducerer sikkerheden.
Muskelstyrke (grip strength)	Signifikant forbedring i håndgrebsstyrke; substantiel heterogenitet (WMD 3.97; 95% CI 1.89 til 6.05; P = 0.000; I2 = 56.5%).	Moderat (C)			Forbedring i grebsstyrke ses, men inkonsistens og heterogenitet svækker evidensstyrken.

Sygdomsspecifikke outcomes (ikke PICO-relevant)	GFR: ingen signifikant effekt (I2 = 71.8%). CRP: signifikant reduktion (WMD −2.46; P = 0.006; I2 = 75.9%). Serum creatinine: ingen signifikante ændringer (WMD −0.01; P = 0.849; I2 = 42.7%) Hæmoglobin: ingen signifikante ændringer (WMD −0.07; P = 0.787; I2 = 24.1%) HbA1c: signifikant reduktion (WMD −0.46; P = 0.000; I2 = 56.6%). HDL: ingen effekt (I2 = 71.0%). LDL: rapporteret som øget, men p-værdi ikke signifikant (WMD 1.72; P = 0.512; I2 = 0.0%).	Svag (D)	Outcomes er overvejende metaboliske/inflammatoriske; resultaterne er blandede og præget af høj heterogenitet.
Kropssammensætning (ikke PICO-relevant)	Fat-free mass: signifikant forbedring (WMD 6.53; P = 0.018; I2 = 83.6%). BMI: ingen effekt (WMD 0.09; P = 0.776; I2 = 2.4%) fat mass: ingen signifikant effekt (WMD −5.38; P = 0.183; I2 = 85.8%)	Svag (D)	Kun fat-free mass forbedres, men høj heterogenitet og få studier begrænser fortolkningen.
Træningstype	*Modstandstræning (resistance exercise) hos voksne med CKD. De præcise modaliteter (maskiner, frie vægte, elastikker osv.) er ikke beskrevet.*	–	Interventionen er overordnet defineret, men mangler detaljer til klinisk reproducerbarhed.
Træningsfrekvens	*Ikke systematisk rapporteret. Interventionslængder varierer fra 8 uger til 12 måneder, men antal ugentlige sessioner fremgår ikke konsistent.*	–	Manglende rapportering af ugentlig frekvens begrænser anvendelighed.
Intensitet	*Ikke systematisk rapporteret. Kun omtalt generelt som resistance exercise; ingen samlet angivelse af %1RM, RM-områder eller belastningsniveauer*	–	Belastningsniveau kan ikke vurderes.
Volume (sets × reps)	*Ikke systematisk rapporteret. Sæt og reps beskrives ikke som fælles standard. De enkelte RCT-protokoller må konsulteres, hvis man vil bruge*	–	Utilstrækkelig beskrivelse af træningsdosis.

	specifikke serier/gentagelser.		
Progression	*Ikke systematisk rapporteret. Det står ikke eksplicit at der er tale om progressiv styrketræning og der er ingen fælles model for progression (fx %1RM-øgning pr. uge) rapporteret.*	–	Det er uklart, om interventionerne følger principper for progressiv styrketræning.
Trænede muskelgrupper	*Ikke systematisk rapporteret. Outcomes indikerer involvering af både over- og underekstremiteter (grebsstyrke, 6MWT).*	–	Muskelgruppespecifik effekt kan ikke vurderes.
Styrketests	*Håndgrebsstyrke (grip strength) er den eneste styrketest, der eksplicit fremgår som kvantitativt outcome (kgf). Ingen fælles rapportering af 1RM-tests eller andre dynamometriske styrketests i resultatafsnittet – andre styrkemålinger vil kun fremgå af de enkelte primærstudier.*	–	Funktionel styrke er kun delvist belyst.
Samlet funktionel evidens	**C – moderat evidens: signifikante forbedringer ses i gangkapacitet (6MWT) og grebsstyrke, men høj heterogenitet, begrænset rapportering af træningsparametre og manglende konsistens på tværs af funktionelle outcomes reducerer den samlede evidensstyrke.**	**C**	**Moderat evidens for modstandstrænings effekt på funktion hos personer med kronisk nyresygdom; effekten er kun dokumenteret for gangkapacitet og grebsstyrke, men metodiske og rapporteringsmæssige begrænsninger svækker sikkerheden.**
Osteoporose	10.1186/s13018-025-05890-1		
	Zhao et al. 2025: [116]		
Outcome-kategori	Styrketræning til forebyggelse af knogletab hos postmenopausale kvinder	**Evidens styrke**	**Samlet vurdering**
Knogletæthed – Lumbal columna (LS - ikke PICO-relevant)	Signifikant forbedring (SMD = 0.88; P = 0.01), men meget høj heterogenitet (I^2 = 91%).	Moderat (C)	Moderat evidens for forbedring i LS-BMD, men meget høj heterogenitet reducerer sikkerheden betydeligt. Effekten er inkonsistent på tværs af studier, hvilket begrænser den kliniske tolkning.
Knogletæthed – Femoral neck (FN - ikke PICO-relevant)	Signifikant forbedring (SMD = 0.89; P = 0.0004) med meget høj heterogenitet (I^2 = 87%).	Moderat (C)	Moderat evides for at FN-BMD forbedres signifikant, men den meget høje heterogenitet indikerer stor variation i effektstørrelser, hvilket svækker den samlede evidens og robustheden af fundet.
Knogletæthed – Total hip (TH - ikke PICO-relevant)	Signifikant forbedring (SMD = 0.30; P = 0.003) med lav heterogenitet (I^2 = 25%).	Høj-moderat (B/C)	Høj-moderat evidens for at TH-BMD forbedres. Der ses en konsistent og statistisk signifikant forbedring med lav heterogenitet, hvilket gør dette outcome til det mest robuste og metodisk sikre blandt de rapporterede knoglemål.

Knogletæthed – Trochanter (Troch - ikke PICO-relevant)	Ingen signifikant effekt (P = 0.06), lav heterogenitet (I² = 19%).	Moderat (C)	Moderat evidens for at der ikke ses effekt. Der ses ingen statistisk signifikant effekt på Troch-BMD, men resultaterne er konsistente. Manglende signifikans begrænser evidensstyrken.
Funktionelle outcomes	Ikke rapporteret: DXA-målt knogletæthed (LS, FN, TH, Troch) — ingen funktionelle outcomes.	–	Fravær af funktionelle outcomes (fx balance, gang eller fald) betyder, at klinisk relevans i forhold til funktion ikke kan vurderes.
Træningstype	*Udelukkende modstandstræning (resistance training)*	–	*Interventionen er klart afgrænset til modstandstræning, hvilket styrker intern validitet, men siger intet om funktionelle effekter.*
Træningsfrekvens	*≥3×/uge gav de mest konsistente forbedringer i BMD (LS, FN, TH og Troch); længere interventioner gav bedre effekt: <48 uger: effekt på LS og FN. ≥48 uger: effekt på FN og TH*	–	*Der ses et dosis–respons-mønster, hvor højere frekvens og længere varighed er forbundet med bedre knogleeffekter,*
Intensitet	*Overvejende moderat–høj (50–85 % 1RM / 6–25 RM); høj intensitet gav størst effekt.* *Klassificeret efter 1RM eller antal gentagelser: Høj (≥70 % 1RM eller <6 reps). Moderat (51–69 % 1RM eller 8–15 reps). Lav (≤50 % 1RM eller >15 reps). Primært baseret på 50–85% af 1RM eller repetitionsgrænser (6–25 RM). Høj intensitet gav størst knogleadaptation, især i FN og TH.* *Træningsvarighed pr. session: ≥40 min pr. træningspas var forbundet med bedre effekter (specifikt LS).*	–	*Resultaterne peger på, at moderat–høj (især høj) intensitet er nødvendig for knogleadaptation*
Volume (sets × reps)	*Ikke systematisk rapporteret. Varierede mellem studierne, men i de fleste tilfælde flere sæt med progressiv modstand. Varierede fra lav (<50 % 1RM), moderat (50–69 % 1RM) og høj (≥70 % 1RM).*	–	*Manglende standardiseret rapportering af volume begrænser reproducerbarhed og klinisk implementering.*

	Høj intensitet havde størst effekt.				
Progression	*Ikke systematisk rapporteret. Beskrives som progressiv belastningsstigning, der blev øget i de fleste studier, men uden fælles model.*	*–*			*Progression nævnes, men manglende ensartet beskrivelse svækker evidensens praktiske anvendelighed.*
Trænede muskelgrupper	*Ikke tydeligt rapporteret.*	*–*			*Manglende angivelse af trænede muskelgrupper begrænser forståelsen af mekanismer og målretning af træningen.*
Styrketests	*1RM anvendt til intensitetsjustering; DXA som outcome.*	*–*			*Brug af 1RM til intensitetsstyring styrker metodisk kvalitet, men styrke som outcome er ikke rapporteret.*
Samlet evidens	**C – moderat evidens: Moderat evidens for, at modstandstræning kan forbedre knogletæthed hos postmenopausale kvinder, især i femoral neck og total hip. Effekten understøttes af signifikante pooled resultater, men høj heterogenitet i LS og FN samt manglende funktionelle outcomes begrænser den samlede evidensstyrke til at drage anbefalinger. Effekten fremstår mest robust for total hip, hvor heterogeniteten er lav.**	**C**			**Moderat evidens for, at modstandstræning forbedrer knogletæthed hos postmenopausale kvinder. Effekten er mest konsistent for total hip, mens høj heterogenitet og fravær af funktionelle outcomes begrænser den overordnede evidensstyrke.**
Artrose	10.1016/j.ocarto.2022.100242		10.1002/art.38290		
	Smedslund et al. 2022: [99]		**Juhl et al. 2014: [63]**		
Outcome-kategori	Skuldersmerter / rotator cuff rehabilitering hos voksne/ældre	**Evidens styrke**	Knieartrose og styrketræning (knæartrose/ quadricepsfokus)	**Evidens styrke**	**Samlet vurdering**
Smerte (ikke PICO-relevant)	Små–moderate, konsistente effekter vs. kontrol (SMD ca. −0,38 i netværk, −0,45 direkte, −0,31 indirekte) – dvs. en klinisk relevant, men ikke stor smertereduktion	Høj (B)	Poosamlet effekt i forest plot ikke signifikant, dog er de signifikante på P-værdi for styrketræning og kombinationstræning/ ikke-signifikant for aerobic og performance exercise. Den gennemsnitslige effekt er lavest for kombinationstræning. **Resultat**: Overordnet smertereduktion (pooled SMD ~0.50; I² = 62%)/(Resistance exercise SMD ~0.62; aerob SMD ~0.67). Effekten svarer til 8.5 mm på smerte og 8.3 mm for disability, på en 0–100 mm VAS. Quadriceps-specifik træning mest effektiv; høj heterogenitet	Moderat (C)	Moderat evidens for, at træningsinterventioner reducerer smerte. Effekten er konsistent ved skuldersmerter og gennemsnitligt signifikant ved knæartrose, men høj heterogenitet ved OA reducerer sikkerheden.

			samlet effekt i forest plot ikke signifikant for andet end kombinationstræning, dog er de signifikante på P-værdi for styrketræning og aerobic / ikke-signifikant for kombinationstræning og performance exercise. Den gennemsnitslige effekt er lavest for kombinationstræning.		
Funktion (disability)	Ikke rapporteret.	–	**Resultat**: Signifikant forbedring parallelt med smertereduktion (SMD ~0.49; I² = 68.8%). Single-type træning (ren styrke, ren aerob eller ren performance) giver større effekt (SMD ~0,6) end programmer, der blander flere træningstyper (SMD ~0,16–0,22); ≥3 træningssessioner/uge bedst.	Moderat (C)	Moderat evidens for forbedring af funktion ved knæartrose. Manglende funktionelle data ved skuldersmerter begrænser samlet evidensstyrke.
Specifik styrketræning	Styrketræning indgår i brede kategorier, men ikke isoleret analyseret	–	Quadriceps-specifik styrketræning giver større smertereduktion end generel træning og er mere effektiv end generel underekstremitetsstyrketræning for både smerte og funktion (større SMD for quad-only vs. general lower-limb), men høj heterogenitet. (men er ikke statistisk signifikant)	Moderat (B/C)	Moderat evidens for, at målrettet quadriceps-træning giver større klinisk effekt end generel underekstremitetstræning ved knæartrose. Overførbarhed til skuldersmerter kan ikke vurderes.
Træningstype	*Bred "exercise"-kategori inkl. styrke og multikomponent:* *Træningsrelaterede kategorier: EXERCISE (aquatic exercise, exercise, exercise therapy + booster, land-based exercise, strength training, strength + agility + aerobic exercise). Styrketræning indgår både som selvstændig kategori og i multikomponenttræning.* *Andre kategorier med styrkeelementer: Combined treatments: fx "whole body vibration + strength training". Nogle passive/behandlingskategorier (fx whole body vibration) kan indirekte indeholde styrkeelementer, men klassificeres ikke som ren R*	*–*	*Landbaseret exercise: rene styrketræningsprogrammer (isokinetisk/isometrisk/dynamisk), quadriceps-specifik træning, general lower-limb strength, samt kombinationsprogrammer (styrke + aerob + performance).*	*–*	*Moderat evidens for, at rene træningstyper (én hovedkomponent) er mere effektive end multikomponentprogrammer, primært dokumenteret ved knæartrose.*
Træningsfrekvens	*Ikke systematisk rapporteret. Parametre varierer på tværs af de inkluderede primærstudier og må hentes i de underliggende reviews*	*–*	*≥3×/uge og ≥12 superviserede sessioner associeret med bedre effekt end færre træninger for både smerte og*	*–*	*Moderat evidens, men positiv retning for, at højere superviseret træningsfrekvens (≥3×/uge) er forbundet med*

			disability og skal være i mindst 12 supervised sessions. *Interventionslængder fra 4 uger til 18 måneder; enkelte langvarige (fx 9 måneder, 18 måneder).* *Ingen klar sammenhæng mellem intensitet og effekt i i styrkegruppen, meta-regression.*		*større effekt, dokumenteret ved knæartrose.*
Intensitet	*Ikke systematisk rapporteret. ingen angivelse af belastning i %1RM.*	–	*Varierer betydeligt mellem studier; nogle programmer beskriver progressiv styrketræning, nogle baseret på 1RM (fx høj-resistens af 1RM vs. lav-resistens), men intensitet samles ikke i én fælles dosis. Meta-regression beskriver at der ikke er en klar sammenhæng mellem intensitet og effekt i styrkegruppen.*	–	*Moderat evidens for, at træningsintensitet i sig selv ikke er afgørende for effekt på smerte og funktion.*
Volume (sets × reps)	*Ikke systematisk rapporteret.*	–	*Ikke standardiseret rapporteret på tværs af studier*	–	*Utilstrækkelig evidens til at vurdere betydningen af træningsvolumen.*
Progression	*Ikke systematisk rapporteret.*	–	*Ikke tydeligt rapporteret.*	–	*Utilstrækkelig evidens for effekt af progression.*
Trænede muskelgrupper	*Ikke systematisk rapporteret, men fokus er på knee OA, hip OA, og hand OA*	–	*Fokus på underekstremitet, især quadriceps som central målmuskel. Nogle interventioner inkluderede også hamstring og hofter (abduktorer/adduktorer), særligt i funktionelle styrkeprogrammer. Nogle enkelte studier har også fokus på overekstremitet*	–	*Målmuskel (quadriceps) er central i Juhl et al. for at måle effekt ved knæartrose, moderat evidens; utilstrækkelige data ved skuldersmerter.*
Styrketests	*Ikke systematisk rapporteret.*	–	*Ikke i et samlet tal, kun som effektmål (SMD). Styrke blev primært vurderet via quadriceps-specifikke styrkemålinger såsom 1RM eller isokinetiske knæekstensionstests.*	–	*Utilstrækkelig evidens for sammenhæng mellem styrketests og funktion.*
Samlet evidens	B – høj evidens: træning giver små–moderate og konsistente effekter på smerte (SMD ca. −0,31 til −0,45) på tværs af netværk/direkte/indirekte analyser; funktionsoutcome ikke rapporteret.	**B**	**C – moderat evidens: træning reducerer smerte og disability (overordnet SMD ~0,50), men med substantiel heterogenitet (I² ~62–69%) og prediction intervals der inkluderer ingen effekt; quadriceps-specifik træning har større effekt end generel underekstremitetstræning.**	**C**	**Moderat evidens: Moderat-høj evidens for smertereduktion ved skulder- og knæartrose, men sikkerheden for funktionsforbedring og effekternes stabilitet er mere usikker ved knæartrose pga. høj heterogenitet, mens skulderdata fremstår mere konsistente (smerte).** **moderat evidens for funktionel forbedring/disability ved træningsinterventioner, med målrettet quadriceps-træning ved knæartrose.**

Kronisk Obstruktiv Lungesygdom (KOL)	10.1177/17534666231170813		
	Karagiannis et al. 2023: [64]		
Outcome-kategori	Styrketræning ved KOL – fokus på overekstremitet og funktionsevne	**Evidens styrke**	**Samlet vurdering**
Muskelstyrke – overekstremitet (pectoralis, albuefleksion, samlet styrke)	Signifikante forbedringer i albuefleksorer, pectoralis major og samlet overekstremitetsstyrke. Effekter både short- og long-term (SMD ~0.72–1.51). Lav–moderat heterogenitet; moderat-høj evidens.	Høj (B)	Høj evidens for, at overekstremitets-styrketræning forbedrer muskelstyrke hos personer med KOL, med konsistente effekter på tværs af muskelgrupper og opfølgningsperioder, men begrænset af lav–moderat evidenskvalitet.
Muskelstyrke – elastic band vs maskiner	Ingen signifikante forskelle mellem elastisk modstand og maskinbaseret styrketræning; meget lav evidens for forskel. ingen uenighed.	Svag (D)	Svag evidens for, at træningsmodalitet (elastik vs. maskiner) påvirker styrkeudbyttet; konklusionen er usikker pga. meget lav evidenskvalitet.
Sammenligning mod ingen træning / sham	ULET signifikant bedre end ingen træning eller sham, især short-term (SMD ~0.50–1.51); effekten persisterer delvist long-term. Høj metodologisk variation. Moderat-høj evidens.	Høj (B)	Høj evidens for, at overekstremitets-styrketræning giver større styrkeforbedringer end ingen træning hos personer med KOL, trods heterogenitet og varierende studiedesign.
Træningstype	*Modstandstræning med maskiner, frie vægte og/eller elastiske bånd. I de fleste studier: både over- og underekstremiteter, men fokus er overekstremiteter*	*–*	*Forskellige former for overekstremitets-styrketræning er effektive, uden klar overlegenhed af én modalitet.*
Træningsfrekvens	*2–7×/uge over 6–16 uger; mest konsistent 2–3×/uge ≥6 uger.*	*–*	*Regelmæssig træning ≥3×/uge over mindst 6 uger er forbundet med styrkeforbedringer.*
Intensitet	*50–85 % 1RM eller 6–25RM (baseret på 1RM-test eller fatigue-test)*	*–*	*Moderat–høj intensitet anvendes effektivt, men uden klar dosis–respons-relation.*
Volumen (sets × reps)	*Vægte: 1–4 sæt × 8–12 reps; elastik: 2–7 sæt × 6–25 reps.*	*–*	*Varierende volumen vairerer ud fra tyden af styrketræning; ingen optimal dosis identificeret.*
Progression	*Progressiv belastningsøgning efter få sessioner.*	*–*	*Progression indgår som princip, men uden standardiseret model.*
Trænede muskelgrupper	*Primært overekstremitet: albuefleksorer, skulderfleksorer/-abduktorer, latissimus dorsi, pectoralis major (hyppigst vurderede muskler); flertallet af studier inkluderede også underekstremitet.*	*–*	*Målrettet træning af overekstremitetsmuskulatur forbedrer styrke ved KOL.*

Styrketests	*1RM, isometrisk og isokinetisk styrke samt håndgrebsstyrke.*	*–*	*Flere valide tests anvendes.*
Samlet evidens	**B – høj evidens: overordnet signifikante forbedringer i overekstremitetsstyrke (fx albuefleksorer, chest press/pectoralis og samlet overkropsstyrke). Samtidigt meget lav evidens for ingen forskel mellem elastik og maskiner, og stor variation i tests/muskler/protokoller begrænser sikkerheden.**	**B**	**Høj evidens for, at overekstremitets-styrketræning forbedrer muskelstyrke hos personer med KOL; effekterne er konsistente, men den samlede evidens begrænses af heterogene protokoller og høj risiko for bias.**

Bilag 2: Metode

Valg og vurdering af litteratur

Kvalitetsvurdering

Studier får ét point for hver af følgende:

1. **Har studiet en publiceret protokol:** Studiet skal henvise til en protokol, der skal kunne findes online.
2. **Er der foretaget risk of bias / ROB2**: Disse to er de metodiske kvalitetsvurderinger, der er fokuseret på [12, 24]. Andre vurderingsværktøjer vurderes lavere i metodisk kvalitet, hvorfor studier med andre værktøjer er blevet nedgraderet.

- **Grading of Recommendations Assessment, Development and Evaluation (GRADE)**: Studiet skal tydeligt have lavet en GRADE. GRADE er en systematisk metode til at vurdere evidensens sikkerhed og styrken af kliniske anbefalinger i sundhedsfaglige retningslinjer. Metoden har til formål at skabe gennemsigtighed, konsistens og metodisk stringens i vurderingen af evidens og i beslutningsprocesser om behandling og interventioner. I GRADE vurderes evidensen ved hjælp af en struktureret tilgang, hvor den samlede sikkerhed i evidensen klassificeres som høj, moderat, lav eller meget lav. Vurderingen baseres på flere faktorer, herunder studiedesign, risiko for bias, inkonsistens mellem studier, indirekte evidens, upræcision og publikationsbias [22].
- **Er der nok studier i til at man kan drage en reel konklusion**: Skal indeholde ≥10 studier.
    - 0–4: Ikke nok til at drage stabile konklusioner, mere forskning nødvendig.
    - 5–9: Noget evidens, men ikke robust. Der kan være nok til kvalitative mønstre, men konklusionerne er svage og påvirkelige af enkelte studier.
    - ≥10: Nok til reel konklusion. Herunder vurderes studier: konsistens + styrke af evidens + gentagne fund på tværs af metoder = Nok til at give 1 point i kvalitetsmodellen.

Herudfra scores studiet på:

- 4 point: **GOOD**
- 3 point: **ADEQUATE**
- <2 point: **POOR** (Se kvalitetsvurdering jf. bilag 1: Dataekstraktion & logføring).

Vurdering af evidens

Antal studier ("body of evidence"):

- ≥ 10 studier i metaanalysen: Godt (A)
- 5–9 studier: Acceptabelt (B)
- <5 studier: Svagt/skal nedgraderes (C)*

Enighed i studierne (konsistens / heterogenitet):

- **Signifikant = ingen nedgradering**: Hvis den samlede effekt ikke rører nullinjen (dvs. 95% CI ligger helt på én side i et **forest plot**, der er standardmetoden til grafisk visning af resultaterne af en metaanalyse)
- **Ikke statistisk signifikant effekt = nedgrader**: Hvis whiskers (95% CI) rører nullinjen eller krydser
- **Inkonsistens = nedgrader**: Hvis studierne peger i helt forskellige retninger

<u>Heraf vil studiernes evidens afspejles på følgende måde</u>:

Vurderingen følger en fremgangsmåde, hvor en metaanalyse eller et systematisk review som udgangspunkt betragtes som A-kvalitet. Er alle kriterier for at opnå A-kvalitet opnået, forbliver studiet i denne kvalitetsklasse.

A – Meget høj kvalitet: Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man ikke forventer at ny forskning vil finde anden effekt. Alle kriterier skal opfyldes.

- ≥10 studier
- Ensretning i studierne
- Effekt er signifikant (ingen kryds over nullinje)

Bliver alle kriterie for A-klassen ikke opfyldt, skal studiet nedgraderet. Herefter skal det vurderet, om det kriterie, der ikke opfylder A-klassen, opfylder det tilsvarende kriterie i B-klassen. Ved hver nedgradering, skal studies gennemgås ud fra den nedgraderede klasses kriterier, for at vurdere om det skal nedgraderes yderligere eller ej.

***B – Høj kvalitet**: Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man forventer at ny forskning kan have en lille, men ikke betydelig effekt. Bliver det kriterie, der ikke er opfyldt for at opnå en A-klasse vurdering opfyldt i B-klasse kriterier, bliver studiet vurderet til at have B-kvalitet. Let heterogenitet må ikke overstiges. 1-3 kriterier skal opfyldes.

- 5–9 studier
- Let heterogenitet
- CI er tæt på at rører nullinjen, men uden helt at ramme

Hvis heterogenitet er større end let eller andre kriterie for B-klassen ikke opfyldes, nedgraderes studiet til C-kvalitet og studiet skal derefter genvurderes i denne klasse.

***C – Moderat kvalitet**: Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man forventer at ny forskning kan have en moderat betydning for den præcise effekt, hvor heterogenitet i studier eller om der findes signifikant effekt kan variere. Hvis substantiel heterogenitet overstiges, er det et afgørende kriterie, at der er signifikant effekt. Afhængigt af kombinationen skal 1-2 kriterier skal opfyldes. Hvis 2 kriterier skal sameksistere, er kombinationsmulighederne følgende: 1) <5 studier + moderat/substantiel heterogenitet eller 2) moderat eller substantiel heterogenitet + ikke statistisk signifikant. Andre kombinationer nedgraderes til D-kvalitet (se kombinationer, der nedgraderes nedenfor).

- <5 studier
- Moderat/substantiel heterogenitet eller høj heterogenitet, men med signifikant effekt
- Effekten er ikke statistisk signifikant

***D – Modsigende/lav kvalitet**: Ved denne vurdering betragtes effekt pålidelig i sådan et omfang, at man forventer at ny forskning kan have en væsentlig betydning for den præcise effekt, hvor heterogenitet i studier eller om der findes signifikant effekt kan ændres. Hvis ét kriterie opfyldes, vurderes studiet til D-kvalitet.

- <5 studier kombineret med 1) høj heterogenitet, uafhængigt af signifikant effekt eller 2) Ikke statistisk signifikant effekt
- Høj heterogenitet kombineret med 1) <5 studier eller 2) ikke statistisk signifikant effekt.
- Effekten er ikke statistisk signifikant kombineret med 1) <5 studier eller 2) høj heterogenitet (Bilag 1: Dataekstraktion og logføring)

Note: I tilfælde hvor metaanalyser indeholder færre end 10 studier, men hvor de relevante analyser i forest plot samlet inkluderer **≥100 deltagere**, er evidens- og kvalitetsvurderingen opjusteret. Denne opjustering er begrundet i, at et højt deltagerantal kan øge præcisionen af effektestimatet og dermed reducere usikkerheden, selv ved et begrænset antal studier [4-5, 20].

Samlet vurdering: 14 geriatriske tilstande

Raske

Samlet vurdering: ADEQUATE /ADEQUATE/ADEQUATE (Kvalitetsvurdering) / Moderat evidens (C)

Kvalitetsvurdering: Tilstrækkelig metodisk kvalitet; ADEQUATE [61, 81, 91].

Vurdering af evidens (funktionelle outcomes): C – moderat evidens. Der er konsistent evidens for forbedring af muskelstyrke ved styrketræning hos raske ældre, særligt ved power-orienterede styrketræningsprotokoller [89]. Funktionelle forbedringer (Short Physical Performance Battery, Timed Up and Go, Rejse-sætte-sig-test, gangtests) ses, men effekterne er generelt små og præget af heterogenitet [61, 81]. Evidensen for effekt på balance- og faldrelaterede er svag og utilstrækkelig til sikre konklusioner [81].

Sarkopeni

Samlet vurdering: ADEQUATE/ADEQUATE/GOOD (Kvalitetsvurdering) / Moderat-høj evidens (B)

Kvalitetsvurdering: Tilstrækkelig til høj metodisk kvalitet; ADEQUATE [87, 101], GOOD [96].
Vurdering af evidens (funktionelle outcomes): B – moderat-høj evidens. Funktionelle outcomes (rejse-sætte-sig-test, ganghastighed, Timed Up and Go) viser overordnet bedst og mest konsistent forbedring, når **styrketræning kombineres med balance eller aerob træning (effekt ses både med og uden tilføjelse af ernæring)**, mens ren styrketræning har mere **variabel effekt** på funktion. Styrkerelaterede outcomes (håndgrebsstyrke/knæekstensionsstyrke) forbedres derimod konsistent og med moderat til høj evidens på tværs [87, 96, 101].

Overvægt og sarkopen fedme

Samlet vurdering: GOOD/ADEQUATE/ADEQUATE (Kvalitetsvurdering) / Moderat-høj evidens (C)

Kvalitetsvurdering: Tilstrækkelig metodisk kvalitet; GOOD [89], ADEQUATE [90, 108].
Vurdering af evidens (funktionelle outcomes): C – moderat-høj evidens. Der er overordnet positiv retning for funktionelle outcomes (håndgrebsstyrke, rejse-sætte-sig-test, ganghastighed og Timed Up and Go i én metaanalyse), men **der bruges forskellige mål** (ikke samme tests på tværs af metaanalyserne), og én metaanalyse [89] viser primært effekt via komposit-score (Short Physical Performance Battery, der samler flere test i én - se hvilke jf. Definitioner), hvor deltestene i denne ikke viser selvstændige effekter, med en enkelt undtagelse i én deltest af balance (etbensstand-test). De mest robuste og direkte funktionelle outcomes i ses for **håndgrebsstyrke** [90, 108] og **rejse-sætte-sig-test** [89], mens Timed Up and Go primært understøttes af to studier [89, 108], der ikke viser selvstændige signifikante effekter i hverken gangtest, Timed Up and Go, rejse-sætte-sig-test eller håndgrebsstyrke [89-90, 108].

Hjertesygdomme og sygdomme i kredsløbet

Samlet vurdering: POOR/POOR (Kvalitetsvurdering) / Moderat–høj evidens (C)
Kvalitetsvurdering: Lav metodisk kvalitet; POOR [97, 115].
Vurdering af evidens (funktionelle outcomes): C – moderat–høj evidens. Begge metaanalyser viser forbedringer i aerob kapacitet/gangrelaterede mål og livskvalitet ved træning, men der er heterogenitet og effekt på aerob kapacitet målet med forskellige tests (en gangtest og VO_2max), hvor der opstår uenighed om effekt for isoleret styrketræning, aerob træning og kombineret aerob- og styrketræning. Yderligere er der mangelfuld rapportering af styrketræningsdosis (antal sæt og gentagelser af øvelser, progression, muskelgrupper) [97, 115].

Demens og mild kognitiv svækkelse (MCI)

Samlet vurdering: ADEQUATE/POOR (Kvalitetsvurdering) / moderat evidens (C)
Kvalitetsvurdering: Lav-tilstrækkelig metodisk kvalitet; ADEQUATE [112], POOR [71].
Vurdering af evidens (funktionelle outcomes): C – moderat evidens. Den ene metaanalyse viser signifikante forbedringer i flere funktionelle outcomes (Timed Up and Go, ganghastighed, håndgrebsstyrke, rejse-sætte-sig-test), men heterogeniteten er høj for flere nøglemål og Short Physical Performance Battery er ikke statistisk signifikant [112]. Det andet bidrager med signifikant forbedring i håndgrebsstyrke, men flere centrale funktionelle outcomes er ikke rapporteret som entydige, samlede resultater i metaanalysen, og der er få personer i de studier, der målet effekt på hångrebsstyrke (4 studier med total n = 73 personer), hvilket samlet reducerer sikkerheden [71].

Diabetes

<u>Samlet vurdering</u>: POOR (Kvalitetsvurdering) / Svag evidens (D)
<u>Kvalitetsvurdering</u>: Lav metodisk kvalitet; POOR [55].
<u>Vurdering af evidens (funktionelle outcomes)</u>: D – svag evidens. Muskelstyrke forbedres signifikant og er klinisk relevant for underekstremitet, men ikke for overekstremitet. Dog begrænser den ekstremt høje heterogenitet og manglende funktionelle outcomes sikkerheden, og den kliniske generaliserbarhed af resultaterne [55].

Kroniske nyresygdomme

<u>Samlet vurdering</u>: POOR (Kvalitetsvurdering) / Moderat evidens (C)
<u>Kvalitetsvurdering</u>: Lav metodisk kvalitet; POOR [42].
<u>Vurdering af evidens (funktionelle outcomes)</u>: C – moderat evidens. Der ses signifikante forbedringer i ganghastighed og håndgrebsstyrke, men evidensen svækkes af få studier, substantiel heterogenitet og mangelfuld rapportering af træningsfrekvens, intensitet, volumen og progression. Evidensgrundlaget tillader derfor ikke præcise eller sikre anbefalinger om styrketræningsdosering ved kronisk nyresygdom [42].

Osteoporose

<u>Samlet vurdering</u>: POOR (Kvalitetsvurdering) / Moderat evidens (C)
K**<u>valitetsvurdering</u>: Lav metodisk kvalitet;** POOR [116].
<u>Vurdering af evidens (funktionelle outcomes)</u>: C – moderat evidens. Der er signifikante forbedringer i knogletæthed, særligt for hele hoften, men høj heterogenitet for øvrige knoglemål (lænderyggen og lårbenshalsen) og fravær af funktionelle outcomes reducerer den samlede sikkerhed og kliniske overførbarhed [116].

Artrose

<u>Samlet vurdering</u>: GOOD/POOR (Kvalitetsvurdering) / Moderat-høj evidens (C)
<u>Kvalitetsvurdering</u>: Tilstrækkelig metodisk kvalitet; GOOD [99]; POOR [63].
<u>Vurdering af evidens (funktionelle outcomes)</u>: C – moderat-høj evidens. Der er konsistent evidens for smertereduktion ved skuldersmerter, mens smerter og funktionelle forbedringer (patientrapporteret funktionsnedsættelse) ved knæartrose er dokumenteret, men præget af høj heterogenitet og lav effekt. Funktionelle data mangler for skuldersmerter, hvilket begrænser den samlede vurdering af funktion på tværs af artroseområder [63, 99].

Kronisk obstruktiv lungesygdom (KOL)

<u>Samlet vurdering</u>: GOOD (Kvalitetsvurdering) / Høj evidens (B)
<u>Kvalitetsvurdering</u>: Høj metodisk kvalitet; GOOD [64].
<u>Vurdering af evidens (funktionelle outcomes)</u>: B – høj evidens. Der er konsistent evidens for forbedring af muskelstyrke i overekstremiteterne, men ingen dokumentation for funktionelle outcomes, og det samlede evidensgrundlag begrænses af relativt få studier pr. outcome og heterogene træningsprotokoller [64].

Risiko for fald

Samlet vurdering: ADEQUATE/ADEQUATE /ADEQUATE (Kvalitetsvurdering) / Moderat evidens (C)

Kvalitetsvurdering: Tilstrækkelig metodisk kvalitet; ADEQUATE [72, 65, 46]

Vurdering af evidens (funktionelle outcomes): C – moderat evidens. Der er tegn på funktionelle forbedringer (Timed Up and Go og ganghastighed) ved **okklusionstræning+lavintens styrketræning**, men med høj heterogenitet. Reaktiv balancetræning viser mere konsistente, opgave-specifikke forbedringer i reaktiv balance (lav–moderat evidens) end gangtræning uden mekaniske posturale forstyrrelser, mens evidensen for reduktion i **faktiske fald** ved styrketræning alene er meget lav og uden signifikant effekt [72, 65, 46].

Skrøbelighed

Samlet vurdering: ADEQUATE/GOOD/GOOD (Kvalitetsvurdering) / Moderat evidens (C)
Kvalitetsvurdering: Moderat-høj metodisk kvalitet; ADEQUATE [74], GOOD [82, 102].
Vurdering af evidens (funktionelle outcomes): C – moderat evidens. Der ses mest konsistente forbedringer i Rejse-sætte-sig-test, mens ganghastighed og Timed Up and Go er mere variable og ofte ikke statistisk signifikante i samlede analyser [74, 82]. Multikomponent træning (kombination af to eller flere af følgende: aerob træning, balancetræning, fleksibilitetstræning, mind-body træning (pilates, yoga mv.), styrketræning, udstræk (statisk eller isometrisk) kan reducere skrøbelighed og i enkelte analyser forbedre selvhjulpenhed og livskvalitet, men evidensen er overvejende lav [102].

Mobilitetsbegrænsning

Samlet vurdering: POOR (Kvalitetsvurdering) / Høj evidens (B)
Kvalitetsvurdering: Lav metodisk kvalitet; POOR [54].
Vurdering af evidens (funktionelle outcomes): B – høj evidens. Flere funktionelle outcomes (selvhjulpenhed, håndgrebsstyrke, rejse-sætte-sig-test og Timed Up and Go) viser signifikante forbedringer med lav heterogenitet, men evidensen er begrænset af få (men store) studier, lav kvalitet og utilstrækkelig rapportering af træningsdosis. Samlet reduceres sikkerheden for kliniske konklusioner [54].

Multisygdom: Osteosarkopenisk overvægt

Samlet vurdering: ADEQUATE/ADEQUATE (Kvalitetsvurdering) / Svag evidens (D)
Kvalitetsvurdering: Tilstrækkelig metodisk kvalitet; ADEQUATE [75, 111].
Vurdering af evidens (funktionelle outcomes): D – svag evidens. Enkeltstående forbedringer i funktionel styrke (rejse-sætte-sig-test) ses, men med høj heterogenitet og centrale funktionelle outcomes (ganghastighed, Timed Up and Go, håndgrebsstyrke) er inkonsistente, og mangelfuld rapportering af intensitet, volumen og progression begrænser sikkerheden og den kliniske generaliserbarhed [75, 111].

Bilag 3: Protokol

Protokol

1. Titel

Fysioterapeutisk anbefaling til styrketræning som behandling af udvalgte geriatriske tilstande

2. Baggrund og formål

Baggrund: Den demografiske udvikling betyder, at andelen af personer over 80 år forventes at mere end fordobles frem mod 2053 [6]. Dette øger risikoen for sygdomsbyrde, tab af funktionsevne og større pres på sundheds- og plejesektoren [13-15]. Aldringsprocessen medfører fysiologiske ændringer såsom tab af muskelmasse og styrke, hvilket øger sårbarhed, risiko for fald og tab af selvhjulpenhed. Forskning har dog vist, at styrketræning kan have en markant positiv effekt på ældre menneskers funktion, mobilitet og livskvalitet [8, 22]. Fragala et al. udarbejdede i 2019 et omfattende position statement om styrketræning for ældre [8], men der mangler nyere, retningsgivende anbefalinger målrettet fysioterapeuter, særligt i en dansk kontekst [17].

Formål: Systematiske reviews og metaanalyser blev gennemgået med formål at samle og vurdere evidens om styrketræning til ældre med og uden geriatriske sygdomme. Resultaterne skal danne grundlag for en fysioterapeutisk anbefaling, der giver konkrete værktøjer og retningslinjer for praksis.

PICO:

- **Population:** Ældre ≥60 år, inkl. grupper med og uden forskellige geriatriske sygdomme.
- **Intervention:** Styrketræning alene eller kombineret med andre træningsformer.
- **Comparator:** Sammenligningsgrundlaget holdes åbent. Det afgørende er, at effekt at styrketræning kan vurderes; herunder sammenlignes bl.a. styrketræning med andre eller samtidige interventioner, kontrolgrupper af vanlig livsførsel, passive eller almindelig pleje eller sammenligning mellem forskellige typer af styrketræning/intensitet mv.
- **Outcomes:** Funktionstab hos ældre mennesker behandles. Outcomes måles i: muskelstyrke, funktionsevne, fysisk funktion, mobilitet, fald, livskvalitet og sygdomsspecifikke, funktionelle outcomes.

3. Forskningsspørgsmål

1. Hvilken evidens findes i systematiske reviews og metaanalyser for effekten af styrketræning på funktionsevne, fysisk funktion, mobilitet, fald livskvalitet og sygdomsspecifikke, funktionelle outcomes hos ældre med udvalgte geriatriske sygdomme?
2. Hvordan kan denne viden omsættes til fysioterapeutiske anbefalinger, herunder i forhold til individualisering og sygdomsspecifik tilpasning?

4. Inklusions- og eksklusionskriterier

Inklusionskriterier

- Studietype: Systematiske reviews og metaanalyser
- Population: Ældre (≥60 år), både raske og med geriatriske tilstande (fx raske, sarkopeni, overvægt og sarkopen fedme, hjertesygdomme og sygdomme i kredsløbet, demens og mild kognitiv svækkelse (MCI), diabetes, kroniske nyresygdomme, osteoporose, artrose, kronisk obstruktiv lungesygdom (KOL), risiko for fald, skrøbelighed, mobilitetsbegrænsning og multisygdom: osteosarkopenisk overvægt)
- Intervention: Styrketræning, alene eller kombineret med anden træning
- Outcomes: Muskelstyrke, funktionsevne, mobilitet, fald, livskvalitet, sygdomsspecifikke outcomes
- Sprog: Engelsk og skandinaviske sprog
- Tidsramme: 2015 – 2025 (søgning foretaget i oktober 2025)

Eksklusionskriterier

- Narrative oversigter eller ikke-systematiske reviews
- Studier med yngre populationer (<60 år), medmindre data er rapporteret særskilt for ældre
- Interventioner uden styrketræningselement
- Effekt af styrketræning kan ikke vurderes som enten enkeltstående intervention eller i kombination af anden intervention
- Outcomes måles på biomarkører eller anden måleenhed, der ikke kan anvendes i praksis, i den gængse fysioterapeutiske klinik

5. Informationssøgning / søgestrategi

- Databaser: PubMed, Cochrane Library, PEDro
- Supplerende søgning i reference- og citationslister
- Søgestreng vil kombinere MeSH-termer og fritekstsøgning: *"resistance training" OR "strength training" AND "older adults" OR "elderly" AND "systematic review" OR "meta-analysis" (se fuld søgning jf. bilag 1: Søgestrenge)*

6. Udvælgelsesproces

- Screening i to faser (titel/abstract, derefter fuldtekst) udført af to uafhængige reviewere
- Uenigheder løses ved diskussion eller, i sidste ende, en af metodevejledernes vurdering
- Dokumentation af udvælgelsesprocessen kan ses i PRISMA-flowdiagram (jf. Metode) samt i bilag (jf. bilag 1).

7. Dataekstraktion

Standardiseret skema (Excel): Reference; År; Studietype; Antal inkluderede primærstudier; Population; Intervention; Comparator; Outcomes; Hovedresultater; Konklusion; Kvalitetsvurdering; Kommentarer/Noter; DOI; Vurdering af evidens

8. Kvalitetsvurdering

Kvaliteten og troværdigheden af de inkluderede studier vurderes ud fra en pragmatisk screening. Studier får ét point for hver af følgende:

Har studiet en publiceret protokol: Studiet skal henvise til en protokol, der skal kunne findes online.

Er der foretaget risk of bias / ROB2: Disse to er de metodiske kvalitetsvurderinger, der er fokuseret på. Andre vurderingsværktøjer vurderes lavere i metodisk kvalitet, hvorfor studier med andre værktøjer er blevet nedgraderet.

GRADE: Studiet skal tydeligt have lavet en GRADE.

Tilstrækkeligt antal studier i til at drage en reel konklusion: Skal indeholde ≥10 studier.

9. Dataanalyse og syntese

Resultaterne, opdelt efter en række udvalgte geriatriske tilstande og outcomes.

Sammenligning af evidensstyrke og konsistens på tværs af systematiske reviews og metaanalyser.

10. Etiske overvejelser

Ingen etisk godkendelse påkrævet, da dette er sekundærforskning. Alle inkluderede kilder vil blive korrekt citeret.

11. Tidsplan

August 2025 – marts 2026.

12. Formidling og publikation

Resultaterne vil blive publiceret som en faglig anbefaling fra Dansk Selskab for Fysioterapi i Gerontologi og Geriatri samt i et peer-reviewet tidsskrift.

13. Referencer

[2] *Berlingske (2019). Berlingske nuancerer: Hvor stor er ældrebyrden – og hvor tung er den egentlig?: https://www.berlingske.dk/danmark/berlingske-nuancerer-hvor-stor-er-aeldrebyrden-og-hvor-tung-er-den*

[6] *DST (2018). Markant flere ældre i fremtiden. Danmarks Statistik: https://www.dst.dk/da/Statistik/nyheder-analyser-publ/nyt/NytHtml?cid=26827*

[8] *Fragala, Cadore, Dorgo, Izquierdo, Kraemer, Peterson & Ryan (2019). Resistance Training for Older Adults: Position Statement From the National Strength and Conditioning Association). Journal of Strength and Conditioning Research 33(8):p 2019-2052, August 2019. | DOI: 10.1519/JSC.0000000000003230.*

[13] *ISM (2020). REDEGØRELSE OM ÆLDREOMRÅDET 2020. Sundheds- og Ældreministeriet: https://www.ism.dk/Media/5/A/8503_SUM_Aeldreomraadet_TILG.pdf*

[15] *KL (2023). ALDERSFORDELTE SUNDHEDS- OG PLEJEUDGIFTER PÅ TVÆRS AF SEKTORER. Kommunernes Landsforening: https://www.kl.dk/media/l0fdnzqf/aldersfordelte-sundhedsudgifter.pdf*

[17] Madsen, Madsen & Andersen (2023). Fysioterapeuter mangler fokus på intensitet i styrketræning til ældre. Bachelorprisen2023: fysio.dk/bachelorprisen2023

[22] *Peterson, Rhea, Sen & Gordon (2010). Resistance exercise for muscular strength in older adults: A meta-analysis. Ageing Research Reviews, 9(3), 226–237.* https://doi.org/10.1016/j.arr.2010.03.004