Supplementary Files

HIIT is not superior to MICT in changing blood lipids: A systematic review and meta-analyses.

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G.N. Wood is supported by an Australian Government Research Training Program (RTP) Scholarship. This work received no other financial support and has no relationship to industry.

The authors report no relationships that could be construed as a conflict of interest. The authors take responsibility for all aspects of the reliability and freedom from bias of the data presented and their discussed interpretation.

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Table [1] Study and PICO (full)

Study (alphabetical order)	**Participants (number, gender, age, health status, dropout)**	**Exercise Protocols (frequency, intensity, time, type, volume, progression, study duration, exercise equipment, session supervision, physiological monitoring; work or energy matching)**	**Pre- and Post Lipid Outcomes**
(Ciolac, et al. 2010)	Recruited (R) 44♀; Analysed (A) HIIT: 11, MICT: 11, CON: 12; HIIT: 24.4 ± 3.8 years MICT: 26.6 ± 4.9 years CON: 25.3 ± 3.7 years; Status: healthy; HIIT dropout: 5 (1 non compliant) MICT dropout: 5 (2 non compliant) CON dropout: 0 Completion compliance minimum: 70%	Treadmill walking or running; 3 sessions per week; 16 weeks duration; Weight-bearing; 5 min warm-up (intensity unspecified); 15 min calisthenics cool down (intensity unspecified); HIIT: (2 min walking 50–60% of VO_{2MAX} + 1 min walking/running at 80–90% of VO_{2MAX}) x 13; MICT: 40 min walking 60–70% VO_{2MAX}; Cardiovascular workload matched; Exercise time matched; Supervised; HR monitoring device; VO_{2MAX} established at baseline; treadmill incline adjusted throughout duration of study for training adaptations;	Measurements taken during follicular phase of subject's cycle, pre-post intervention; 12-hour fasted state, seated position; mg dL^{-1} Lipid fractions similar between groups at baseline and follow-up; Lipid changes: TC: ↓HIIT>↓MICT; TRG: ↓HIIT>↑MICT; HDL-C: ↑MICT>↑HIIT; LDL-C: ↓HIIT>↓MICT; not statistically significant;
(Connolly, et al. 2017)	R 48♀; A HIIT: 15, MICT: 15, CON: 15 HIIT: 44 ± 7 years MICT: 43 ± 7 years CON: 45 ± 7 years; Status: healthy; HIIT dropout: 1 MICT dropout: 1 CON dropout: 1	Ergocycle; 3 sessions per week; 12 weeks duration; Non weight-bearing; 5 min warm-up 50W; 5 min cool-down 50W; HIIT: (30-20-10 sec) ie: 30 sec LI (~30% of max effort) + 20 sec MI (~50–60% of max effort) + 10 sec HI (>90% max effort) x 5 + 2 min passive recovery) x 5; MICT: 50 min 70-85% HR_{peak}; Not work/energy matched; Supervised; HR monitoring device, RPE 10 point scale; self-selection of intensity (pedal cadence or flywheel resistance increase) and self-adjustment for training adaptation;	Time of measurement pre intervention not indicated; post not < 96 hours after final exercise session; Overnight fasted state, seated position; mmol/L Lipid fractions similar between groups at baseline and follow-up; Lipid changes: TC: ↓MICT>↑HIIT; TRG: ↑MICT=↑HIIT; HDL-C: ↓HIIT<↓MICT; LDL-C: ↓MICT>↑HIIT; TC/HDL-C: ↑MICT<↑HIIT; not statistically significant;
(Cuddy, Ramos and Dalleck 2019)	R: 16♀, 16♂ A HIIT: 12, MICT: 15, HIIT: 40.8 ± 10.8 years MICT: 42.2 ± 9.7 years Status: Ov, Ob HIIT dropout: 4 MICT dropout: 1	Ergocycle HIIT: 2-3-4 sessions per week; MICT: 3-4-5 sessions per week 8 weeks duration; Non-weight bearing; HIIT: 3 min warm-up, 3 min cool-down MICT: unspecified (included in 30 mins)	Measurements taken pre-post training (48-72 hours after last training session); Fasted state; Seated position; mg dL^{-1} Lipid fractions similar between groups at baseline; Lipid changes: TRG:↓HIIT>↓MICT;

		HIIT: Wk 1-2: 20 sec sprint + 3 min slow recovery + 20 secs sprint ≈ 4 mins of HIIT protocol per session 2 days Wk 3-4: as above 3 days Wk 5-8: as above 4 days MICT (unspecified aerobic exercise): Wk 1: 40-50% HRR 3 days 25min Wk 2: 50-55% HRR 4 days 30 min Wk 3-4: 55-60% HRR 4 days 30 min Wk 5-6: 55-60% HRR 5 days 30 min Wk 7-8: 60-65% HRR 5 days 30 min HRR; Exercise energy expenditure unmatched; Supervised; MHR and VO_{2MAX} estimated at baseline; HIIT intensity adjusted, MICT not stated; HIIT: HR monitoring device, MICT not stated;	HDL-C: ↑HIIT>↑MICT; Statisitically significant within group from baseline for HIIT and MICT but not between groups;
(Fisher, et al. 2015)	R 28♂; A HIIT: 13, MICT: 10; 20 ± 1.5 years; Status: Ov, Ob; HIIT dropout: 2 MICT dropout: 3;	Ergocycle; HIIT: 3 sessions per week; MICT: 5 sessions per week; 6 weeks duration; Non weight-bearing; Warm-up/cool-down not indicated; HIIT: (((4 min 15% Max-AP + 30 sec 85% Max-AP) x 4) + 2 min 15% Max-AP) x 2; MICT: 45-60 min 55-65% VO_{2peak}; Exercise energy expenditure match not indicated; Supervised; HR monitoring device; Maximum Anaerobic Power (Max A-P) and VO_{2peak} established at baseline; adjustment of effort during sessions not indicated;	Measurements taken 24-72 hours after last day of training; Overnight fasted state; Seated position; mg dL^{-1} Lipid fractions similar between groups at baseline; Lipid changes: TC*: ↓MICT>↓HIIT; TRG*: ↓MICT>↓HIIT; *Statistically significant for test of change over time within groups; HDL-C: ↓HIIT<↓MICT; LDL-C: ↓MICT>↓HIIT Not statistically significant
(Hwang, et al. 2016)	R 51; A HIIT: 15(5♂), MICT: 14(7♂), CON: 14(5♂); HIIT: 64.8 ± 1.4 years MICT: 65.6 ± 1.8 years CON: 63.8 ± 1.6 years; Aged; Status: Ov; HIIT dropout: 2(1♂) MICT dropout: 4(2♂) CON dropout: 2(1♂);	All-extremity ergometer; 4 sessions per week; 8 weeks duration; Non weight-bearing; 10 min warm-up 70% HR_{peak}; 2-min cool-down 70% HR_{peak}; HIIT: (4 min 90% HR_{peak} + 3 min 70% HR_{peak}) x 4; MICT: 32 min 70% HR_{peak} Exercise energy expenditure closely matched; Supervised; HR monitoring device;	Measurements taken pre intervention. Post intervention blood samples obtained 31.8 ± 6.1 and 24.7 ± 3.9 hours following last exercise training session for HIIT and MICT; Fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline and followup; Lipid changes: TC: ↓HIIT>↓MICT; TRG: ↓HIIT>↑MICT; HDL-C: ↓MICT>~~Δ~~HIIT;

		HR_{peak} established at baseline, individuals self-adjusted to reach target HR;	LDL-C: ↓HIIT>↓MICT; Not statistically significant
(Keating, et al. 2014)	R 38 (7♂); A HIIT: 11(3♂), MICT: 11(2♂), CON: 11(2♂); HIIT: 41.8 ± 9.7 years MICT: 44.1 ± 6.9 years CON: 42.9 ± 9.4 years Status: Ov HIIT dropout: 2(0♂) MICT dropout: 2(0♂) CON dropout: 1(0♂)	Ergocycle; 3 ssessions per week 12 weeks duration; Non-weight bearing; HIIT: 6 min total warm-up/cool-down (intensity unspecified) HIIT: Wks 1-4 (120% VO_{2peak} + <40% VO_{2peak}) x 4 ≈ 12.5-16.5mins per session (work:recovery ratio = 16.7-37.5), Wks 5-12 (120% VO_{2peak} + <40% VO_{2peak}) x 6 ≈ 18mins per session (work:recovery ratio 50%); MICT: 3-6 min total warm-up/cool down (intensity unspecified) MICT: Wks 1-2 50-60% VO_{2peak} 30-40 mins, Wks 3-12 65% VO_{2peak} 45 mins Energy expenditure/workload unmatched; Supervised; HR monitoring device, RPE 6-20 point scale; VO_{2peak} estimated at baseline; effort increased to maintain intensity targets;	Measurements taken pre-post invention; 10-hour overnight fasted state; Position not indicated; mmol/L Lipid fraction dis/similarites between groups at baseline not stated; Lipid changes: TC*: ↑MICT >~~Δ~~HIIT; TRG: ↓MICT >~~Δ~~HIIT; HDL-C: ~~Δ~~MICT = ~~Δ~~HIIT; LDL-C*: ↑MICT >~~Δ~~HIIT; Not statistically significant *Statistically significant group x time interaction (P < 0.05).
(Kemmler, et al. 2014)	R 81♂; A HIIT: 33, MICT: 32, CON: 41; HIIT: 43.9 ± 5.0 years MICT: 42.9 ± 5.1 years CON: 42.5 ± 5.6 years; Status: Ov, MetS; HIIT dropout: 7 MICT dropout: 9 CON dropout: 0;	Running; 2 sessions per week at baseline, 3-4 sessions per week from week 8; 16 weeks duration; Weight-bearing; No warm-up/cool-down specified; HIIT: (90 sec -12 mins 95-110% IAT-HR + 1-3 mins 70-75% IAT-HR) ≈ 30-40 min per session and 25-45 min 95% IAT-HR; MICT: 35-90 min 70–82.5% IAT-HR; Exercise energy expenditure closely matched; 50% sessions per week supervised with HR training device and RPE, individual monthly training log; IAT-HR: HR at individual aerobic threshold IAT (minimum lactate 2.0 mmol/L) established at baseline and adjusted at 8 weeks;	Measurements taken pre-post intervention; 12-hour overnight fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline; Lipid changes: TRG: ↓HIIT*>↓MICT; HDL-C**: ↑HIIT*>↑MICT* *Significant changes within groups; **Significant changes between groups.
(Kong, et al. 2016)	R 31♀; A HIIT: 13, A MICT: 13; HIIT: 21.5 ± 4 years MICT: 20.5 ± 1.9 years Status: Ob; HIIT dropout: 2 MICT dropout: 3	Ergocycle; 4 sessions per week 5 weeks duration; Non weight-bearing; 3 min warm up 50 W; 3 min cool-down 50W; HIIT: (8 sec maximum VO_{2peak} + 12 sec passive recovery) x 60, average workload ≈ 80 ± 7% VO_{2peak}; MICT: 40 min 60% VO_{2peak} first 2 weeks, thereafter 40 min 80% VO_{2peak}; Not work/energy matched;	Measurements taken 96-144 hours pre-intervention during follicular or late luteal phases of subject's cycle, post-intervention 72-120 hours after last training session; 12-hour fasted state, Position not indicated; mmol/L Lipid fractions similar between groups at baseline and follow-up; Lipid changes: TC: ↓HIIT>↑MICT; TRG: ↓HIIT>↑MICT;

		Supervised; HR monitoring device, RPE 6-20 point scale; VO_{2peak} established at baseline; resistance increased after 2 successfully completed sessions at a given resistance by 0.5kg;	HDL-C: ↑HIIT>~~≙~~MICT; LDL-C: ↓HIIT>↑MICT; Not statistically significant
(Lee, Hsu and Cheng 2016, a)	R 21♂; (entire study) Comparison a: MICT group split A HIIT: 13, A MICT: 7; HIIT: 21 ± 1 years MICT: 21 ± 3 years Status: healthy; HIIT dropout: 1 MICT dropout: 0	Ergocycle; 3 sessions per week 4 weeks duration; Non weight-bearing; 5 min warm-up 30% VO_{2MAX} 3 min cool-down 30% VO_{2MAX}; HIIT: 2 weeks (60 sec 85% VO_{2MAX} + 120 sec 30% VO_{2MAX}) x 8, 2 weeks (60 sec 90% VO_{2MAX} + 120 sec 30% VO_{2MAX}) x 8; MICT: usual activity with no HIIT component ≈ 6 hours per week; Not work/energy matched; HIIT supervised, MICT unsupervised; HR monitoring not specified, VO_{2MAX} established at baseline;	Measurements taken pre-post intervention; 12-hour fasted state, Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline and follow-up; Lipid changes: TC: ↓MICT>↑HIIT; TRG: ↑HIIT>↑MICT; HDL-C: ↑HIIT>↓MICT; LDL-C: ↓MICT>↓HIIT; Not statistically significant
(Lee, Hsu and Cheng 2016, b)	R 21♂; (entire study) Comparison b: MICT group split A HIIT: 12, A MICT: 6; HIIT: 21 ± 1 years MICT: 21 ± 3 years; Status: healthy; HIIT dropout: 2 MICT dropout: 1	Ergocycle; 3 sessions per week 4 weeks duration; Non weight-bearing; 5 min warm-up 30% VO_{2MAX} 3 min cool-down 30% VO_{2MAX}; HIIT: 2 weeks (10 sec 85% VO_{2MAX} + 20 sec 30% VO_{2MAX}) x 48, 2 weeks (10 sec 90% VO_{2MAX} + 20 sec 30% VO_{2MAX}) x 48; MICT: usual activity with no HIIT component ≈ 6 hours per week; Not work/energy matched; HIIT supervised, MICT unsupervised; HR monitoring not specified, VO_{2MAX} established at baseline;	Measurements taken pre-post intervention; 12-hour fasted state, Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline and follow-up; Lipid changes: TC: ↓MICT>↑HIIT; TRG: ↑HIIT>↑MICT; HDL-C: ↑HIIT>↓MICT; LDL-C: ↓MICT>↓HIIT; Not statistically significant
(Lira, et al. 2019)	R 20♂; A HIIT: 10, A MICT: 10 HIIT: 26.9 ± 4.7 years MICT: 24.6 ± 3.7 years Status: healthy HIIT dropout: 0 MICT dropout: 0	Treadmill running; 3 sessions per week; 5 weeks duration; Weight-bearing; 5 min warm up 50% sVO_{2PEAK} ≈ maximal aerobic speed 5 min cool down 50% sVO_{2PEAK} HIIT: (1 min 100% sVO_{2PEAK} + 1 min passive recovery) x 10-20 (to equal 5km) MICT: 20-30 mins (to equal 5km) 70% sVO_{2PEAK} Not energy work/matched; Supervised; HR monitoring, VO_{2PEAK} established at baseline, effort increased to maintain intensity targets;	Measurements taken pre-post intervention; 12-hour overnight fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline and follow-up; Lipid changes: TC: ↓MICT>↑HIIT; TRG: ↓HIIT=↑MICT; HDL-C: ↓MICT >↑HIIT; Not statistically significant

(Maillard, et al. 2016)	R 17♀; A HIIT: 8, A MICT: 8; Age matched HIIT and MICT, 61-80 years, postmenopausal; Status: T2D, Ov, Ob; Aged; HIIT dropout: 0 MICT dropout: 1;	Ergocycle; 2 sessions per week; 16 weeks duration; Non weight-bearing; 5 min warm-up (intensity unspecified) 5 min cool-down (intensity unspecified); HIIT: (8 sec 80% max HR + 12sec 20-30rpm) x 60 MICT: 40 min 55-60% target HR of estimated HRR: Exercise energy expenditure closely matched; Supervised; Mean HR monitored weeks 2, 8, 16, estimated maximum HR (208 - 0.7 x age) and target HR [(est max HR – HR at rest) x target % + HR at rest] calculated at baseline and after 2 months;	Measurements taken one week before first and 5-7 days after last training session; Overnight fasted state; Position not indicated; mmol/L Lipid fractions similar between groups at baseline; at follow-up HIIT TRG higher; Lipid changes: TC: ↓MICT>↓HIIT; TRG*: ↓MICT>↑HIIT; HDL-C: ↑MICT=↑HIIT; LDL-C: ↓MICT>↑HIIT; TC/HDL-C**: ↓HIIT>↓MICT Not statistically significant, *Group effect (HIIT) significant ANOVA p=0.03, **Time effect signficant ANOVA p=0.03;
(Matsuo, et al. 2015)	R 26♂; A HIIT: 13, A MICT: 13; HIIT: 47.5 ± 7 years MICT: 47.4 ± 7.5 years; Status: MetS risk factors, Ov HIIT dropout: 0 MICT dropout: 0;	Ergocycle; 3 sessions per week; 8 weeks duration; Non weight-bearing; 2 min warm-up 30W 3 min cool-down 30W (MICT only); HIIT: (3 min 85% VO_{2peak} + 2 min 50% VO_{2peak}) x 3; MICT: 40 min 60-65% VO_{2peak} Not work/energy matched; Supervised; HR monitoring not specified, MHR and VO_{2peak} established at baseline and measured at week 4, exercise intensity adjusted at week 4;	Measurements taken pre-post intervention; 12-hour fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline; Lipid changes: TC: ↑MICT>↑HIIT TRG: ↓HIIT>↓MICT HDL-C*: ↑MICT=↑HIIT LDL-C: ↑HIIT>~~Δ~~MICT TC/HDL-C: ↓HIIT*>↓MICT *Statisically significant;
(Mohr, et al. 2014)	R 62♀; A HIIT: 21, MICT: 21, CON: 20; HIIT: 44 ± 2 years MICT: 46 ± 2 years CON: 45 ± 2 years Status: H, Ov; HIIT dropout: 0 MICT dropout: 0 CON dropout: 0	Free-style swimming; 3 sessions per week 15 weeks duration; Non weight-bearing; HIIT: (30 sec max effort (≈85-95% MHR) + 2 min passive recovery) x 6-10 ≈ 15-25 mins; MICT: 60 min aiming for max distance ≈ 72-79% MHR; Not work/energy matched; Supervised; HR monitored week 1 and week 15, swimming distances recorded each session, MHR established at baseline, intervals increased at 6 and 12 weeks for HIIT participants, and MICT participants were encouraged to swim further at each session if possible;	Measurements taken pre-post intervention without reference to menstrual cycle; Overnight fasted state; Resting position; mmol/L Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TC: ↓MICT*>↓HIIT; HDL-C: ↑MICT>~~Δ~~HIIT; LDL-C: ↓MICT=↓HIIT; Not statistically signficant, *statistically significant for sub-group with baseline TC >= 5.5 mmol/L;

Morales-Palermo, et al. 2019 a	R: 132 (entire study) Comparison a: MICT, CON groups split A HIIT: 32 (35%♀), MICT: 18 (37%♀), CON: 11 (36%♀); HIIT: 55 ± 8 years MICT: 57 ± 7 years Status: MetS HIIT dropout: 3 MICT dropout: 4 CON dropout: 0 Compliance set at 90% of sessions	Ergocycle 3 sessions per week; 16 weeks duration; Non weight-bearing; HIIT 10 min 70% MHR warm-up/5 min 70% cool-down MICT warm-up/cool down included in session HIIT: (4 min 90% MHR + 3 min 70% MHR) x 4 MICT: 50 min 70% MHR Not work/energy matched; Supervised; HR monitoring, MHR established at baseline, effort increased to maintain intensity targets;	Measurements taken pre- and 48 hours post intervention; Overnight fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline; Lipid changes: TC: ↑MICT>↑HIIT TRG: ↓MICT>↓HIIT HDL-C: ↓MICT>↑HIIT LDL-C: ↓MICT>↓HIIT
Morales-Palermo, et al. 2019 b	R: 132 (entire study) A HIIT: 32 (34%♀), MICT: 18 (37%♀), CON: 11 (36%♀); HIIT: 58 ± 8 years MICT: 57 ± 7 years Status: MetS HIIT dropout: 4 MICT dropout: 4 CON dropout: 0 Compliance set at 90% of sessions	Ergocycle 3 sessions per week; 16 weeks duration; Non weight-bearing; HIIT 5 min 70-75% MHR warm-up/5 min 70% cool-down MICT warm-up/cool down included in session HIIT : (1 min 100%MHR + 1.5 min 65%MHR) x 10 MICT: 50 min 70% MHR Not work/energy matched; Supervised; HR monitoring, MHR established at baseline, effort increased to maintain intensity targets;	Measurements taken pre- and 48 hours post intervention; Overnight fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline; Lipid changes: TC: ↑MICT>↓HIIT TRG: ↓MICT>↓HIIT HDL-C: ↑HIIT=↓MICT LDL-C: ↑HIIT>↓MICT
(Moreira, et al. 2008)	R: 30 (gender unspecified); A 22 (8♂) HIIT: 8, MICT: 8, CON: 6; Status: Ob Age: 40 ± 8 years Total dropout (gender, group unspecified): 7 stated in tables, 8 stated in text;	Ergocycle 3 sessions per week; 12 weeks duration; Non-weight bearing; Warm-up/cool down unspecified; HIIT: (2 mins [Anaerobic Threshold+(AT x 20%)] + 1 min passive recovery) x 20* MICT: 60* mins [AT-(AT x 10%)] Exercise time matched; HR monitoring device; Anaerobic Threshold (AT) established at baseline, training target intensity maintained; *Commencing in week 1 with 20 mins per session and incrementally adjusting time until week 6 with 60 mins per session.	Measurements pre-post intervention within 7 day period; 10-hour fasted state; Position not indicated; mg dL^{-1} Lipid fractions similar between groups at baseline. Lipid changes‡: TC: ↓MICT 182 ± 29 – 155 ± 15*>~~Δ~~HIIT 163 ± 11 - 163 ± 22 TG: ↓MICT 204 ± 80 - 197 ± 84>↓HIIT 207 ± 130 - 206 ± 90 *Statistically significant pre/post MICT values. ‡measurements determined from graphic
(Nybo, et al. 2010)	R 36♂; A HIIT: 8; MICT: 9; Strength (STR): 8; CON: 11; HIIT: 37 ± 3 years MICT: 31 ± 2 years STR: 36 ± 2 years	Running; 3 sessions per week; 12 weeks duration; Weight-bearing; HIIT: 5 min warm-up 65% HRR + [(2 min finishing at 90-95% MHR (85% VO_{2MAX}) + 1 min recovery (effort unspecified)] x 5	Measurements taken pre-post intervention; Overnight fasted state; Resting position; mmol/L Lipid fractions similar between groups at baseline; Lipid changes:

	CON: 30 ± 2 years; Status: Healthy HIIT dropout: 0 MICT dropout: 0 STR dropout: 0 CON dropout: 0	MICT: 60 mins 80% MHR (65% VO_{2MAX}) Not work/energy matched; Supervision not indicated; Monitoring not indicated; MHR and VO_{2MAX} established at baseline, training target intensity maintained;	TC: ↓MICT>↓HIIT; HDL-C: ↑MICT>~~Δ~~HIIT; LDL-C: ↓MICT=↓HIIT; TC/HDL-C ratio: ↓MICT*>~~Δ~~HIIT Not statistically significant *Statistically significant pre-post intervention
(Ramos, et al. 2016)	R 43 (♂ and ♀ as percentage); A HIIT: 22(55%♂), MICT: 10(71%♂) HIIT: 56 ± 10 years MICT: 57 ± 9 years Status: H, MetS, T2D; HIIT dropout: 7 (gender unspecified) MICT dropout: 4 (gender unspecified)	Ergocycle or treadmill per supervised sessions, unsupervised sessions e.g. running, swimming, walking, rowing; HIIT: 3 sessions per week; MICT: 5 sessions per week; 16 weeks duration; Weight- and non weight-bearing HIIT: (4 min 85-95% HR_{peak} + 3 min 50-70% HR_{peak}) x 4; 10 min warm-up 60-70% HR_{peak} MICT: 30 min 60-70% HR_{peak} including warm-up and cool-down 60-70% HR_{peak} Not work/energy matched; Two sessions per week supervised; HR monitoring device, Borg 6-20 ratings measured, training log; VO_{2MAX} established at baseline using either ergocycle or treadmill, training target intensity maintained;	Measurements were taken pre-post intervention 12-hour fasted state; mmol/L Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TRG: ↓HIIT>↓MICT HDL-C: ↑MICT=↑HIIT Not statistically significant
(Ruffino, et al. 2017)	R: 21♂ A: 8 HIIT; 8 MICT 55 ± 5 years; Status: T2D, Ob, Ov HIIT dropout: 2 MICT dropout: 3 Compliance requirement: miss >20% of the total training sessions or 3 consecutive sessions, or the final session before post-intervention testing for either HIIT or MICT;	HIIT: Ergocycle; MICT: walking HIIT: 3 sessions per week; MICT: 5 sessions per week 8 weeks duration HIIT: (3 mins warm up 25W, 10-20 secs sprint 86±6%-88±6% MHR, 3 minutes recovery 25W, 10-20 secs sprint 86±6%-88±6% MHR, 3 minutes cool down 25W) x 1. Sprints 10 secs in sessions 1–4, 15 secs in sessions 5–12, and 20 secs in last 12 sessions. MICT: 30-min walking at 40% HHR Wk 1-2, 50% HRR Wk 3-4, 55% HRR Wk 5–8 HIIT: non-weight bearing; MICT: weight-bearing; HIIT: all sessions supervised; MICT: 3 sessions supervised; HR monitoring device, RPE (6-20 Borg scale) recorded each final session every week;	Measurements taken pre intervention and 3 days post intervention; Overnight fasted state; Seated position; mmol/L Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TRG: ↓MICT=↓HIIT HDL-C: ↑HIIT>~~Δ~~MICT LDL-C: ↑HIIT>↓MICT Not statistically significant
(Sawyer, et al. 2016)	R 22; A HIIT: 9(5♂); MICT: 9(4♂) HICT: 35.6 ± 8.9 years MICT: 34.8 ±7.7 years Status: Ob HIIT dropout: 2 (gender unspecified) MICT dropout: 2 (gender unspecified)	Ergocycle; 3 sessions per week; 8 weeks duration; Non weight-bearing; HIIT and MICT: 5 min warm-up 50-60% MHR HIIT: 4 min cool-down 50-60% MHR MICT: 5 min cool-down 50-60% MHR HIIT: (1 min 90-95% MHR + 1 min active recovery 25-50 Watts) x 10	Measurements taken 72 hours pre/post first/last exercise session 10-hour fasted state; Position not indicated; mg dL^{-1} Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TC: ↑HIIT>↑MICT TRG: ↑MICT>↓HIIT

		MICT: 30 min 70–75% MHR Not work/energy matched; Supervised; HR monitoring device; VO_{2MAX} established at baseline and measured at end of Weeks 4 and 8, training target intensity maintained;	HDL-C: ↑HIIT>↓MICT LDL-C: ↑HIIT>↑MICT Not statistically significant
(Shepherd, et al. 2015)	R 90; A HIIT: 42(12♂, 30♀) MICT: 36(14♂, 22♀) HIIT: 42 ± 11 years MICT: 43 ± 11 years Status: Ov HIIT dropout: 4 (3♂) MICT dropout: 8 (1♂)	Ergocycle; HIIT: 3 sessions per week MICT: 5 sessions per week 10 weeks duration; Non weight-bearing; HIIT 5 min warm-up and cool-down MICT warm up and cool-down included in session; HIIT: 15-60 sec >90% MHR + 45-120 sec passive recovery ≈ 22 min session MICT: 30-45 min progression over 10 weeks 70% MHR; Not work/energy matched; 3 instructor-led sessions per week; HR monitoring device, participants self-monitored HR and adjusted effort levels, individual training log; VO_{2MAX} established at baseline;	Measurements taken pre and 48-120 hours after last training session post intervention 10-hour fasted state; Resting position; mmol/L Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TC: ↓MICT>↓HIIT TRG: ↓HIIT>↓MICT HDL-C: ↑MICT>↑HIIT LDL-C: ↓HIIT=↓MICT LDL-C/HDL-C: ↓MICT>↓HIIT Not statistically significant
(Thomas, et al. 1985, a)	R 48♂ (entire study); A 36 (entire study) Comparison a (MICT, CON groups split): HIIT: 8 ; MICT 6; CON: 4; HIIT: 23.1 ± 1.9 years MICT: 23 ± 1.2 years CON: 21.9 ± 1 years Status: healthy Dropout: 6 Compliance minimum: 90%	Running; 3 sessions per week; 11 weeks duration; Weight-bearing; Warm up cool down not indicated; HIIT: (4 min 90-100% MHR + 4 min < 50% MHR) x 6 MICT: 60 mins 75-85% MHR Work matched; Supervised; HR monitoring with radial artery palpation; VO_{2MAX} established at baseline, MICT progressed to and maintained 12km/h speed (approximating 85% MHR).	Measurements taken pre-, mid-, and post-intervention, 12-hour fasted state; Position not stated; mg dL^{-1} Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TC: ↑MICT=↓HIIT HDL-C: ↓MICT>~~Δ~~HIIT Not statistically significant
(Thomas, et al. 1985, b)	R 48♂(entire study) A 36 Comparison b (MICT, CON groups split): HIIT: 9; MICT 5; CON: 4 HIIT: 22.8 ± 1.1 years MICT: 23 ±1.2 years CON: 21.9 ± 1 years Status: healthy	Running; 3 sessions per week; 11 weeks duration; Weight-bearing; Warm up cool down not indicated; HIIT: (2 min 90-100% MHR + 3 min <50% MHR) x 8 MICT: 60 mins 75-85% MHR Work matched;	Measurements taken pre-, mid-, and post-intervention, 12-hour fasted state; Position not stated; mg dL^{-1} Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TC: =↓HIIT >↑MICT HDL-C: ↓MICT>↓HIIT

	Dropout: 6 Compliance minimum: 90%	Supervised; HR monitoring with radial artery palpation; VO_{2MAX} established at baseline, MICT progressed to and maintained 12km/h speed (approximating 85% MHR).	Not statistically significant
(Tjønna, et al. 2008)	R 32; A HIIT: 11(4♂); MICT: 8(4♂); CON: 9(5♂) HIIT: 55.3 ± 13.2 years MICT: 52 ± 10.6 years CON: 49.6 ± 9 years Status: MetS HIIT dropout: 1 (gender unspecified) MICT dropout: 2 (gender unspecified) CON dropout: 1 (gender unspecified)	Inclined treadmill walking/running 3 sessions per week; 8 weeks duration; Weight-bearing; HIIT 10 min warm-up, 2 min cool down MICT warm- up and cool-down included in session; HIIT: (4 min 90% MHR + 3 min active recovery 70% MHR) x 4 MICT: 47 min 70% MHR; Exercise energy matched; Supervision not indicated; HR monitoring device; VO_{2MAX} established at baseline, training target intensity maintained;	Measurements taken pre-post intervention Fasted state; Position not stated; mmol/L Lipid fractions were similar between groups at baseline and TRG at follow-up; Lipid changes: TRG: ↑MICT>↑HIIT HDL-C: ↑HIIT*>↑MICT Not statistically significant, *Statistically significant from baseline and between groups.
(Vella, Taylor and Drummer 2017)	R 19; A HIIT: 8(2♂); MICT 9(5♂); HIIT: 23.1 ± 6.6 years MICT: 28.9 ± 8.1 years Status: Ov, Ob; HIIT dropout: 1 MICT dropout: 1	Treadmill, ergocycle, elliptical; 4 sessions per week; 8 weeks duration; Weight- and non weight-bearing; 5 min warm-up 35-40% HRR; 5 min cool-down 35-40% HRR; HIIT: (1 min 75-80% HRR + 1 min active recovery 35-40% HRR) x 10 MICT: 20min 55-59% HRR; Exercise energy matched; First 3 weeks, per week 3 sessions 1-1 supervised, 4th session unsupervised. Last 5 weeks all sessions unsupervised; HR monitoring device, individual training log; VO_{2PEAK} established at baseline, progressive workload adjustment;	Measurements taken pre and >48 hours after last exercise session post intervention, 12-hour fasted state; Position not stated; mmol/L Lipid fractions were similar between groups at baseline; Lipid changes: TC: ↓HIIT>↓MICT TRG: ↑HIIT=↑MICT HDL-C: ↑MICT >↓HIIT* LDL-C: ↓HIIT*>≙MICT Not statistically significant, *Signficantly significant from baseline and between groups
(Winding, et al. 2018)	R 35; A HIIT: 13(7♂); MICT: 12(7♂); CON: 7(5♂); HIIT: 54 ± 6 years MICT: 58 ± 8 years CON: 57 ± 7 years; Status: T2D, Ov; HIIT dropout: 2 (gender unspecified) MICT dropout: 0 (gender unspecified) CON dropout: 1 (gender unspecified)	Ergocycle; 3 sessions per week; 11 weeks duration; Non weight-bearing; 5 min warm-up 40% peak workload (W_{peak}) no cool-down specified; HIIT: (1 min 95% W_{peak} + 1 min active recovery 20% W_{peak}) x 20 MICT: 40 min 50% W_{peak}; Not work/energy matched; Supervision not indicated; HR monitoring device;	Measurements taken pre-post intervention 24-72 hours prior to first and 24-120 hours after last training session 10-hour fasted state; Position not stated; mmol/L Lipid fractions were similar between groups at baseline; Lipid changes: TC: ↓HIIT>↓MICT TRG: ↓HIIT>↑MICT HDL-C: ↓MICT>≙HIIT LDL-C: ↓MICT=↓HIIT

		VO_{2PEAK} established at baseline, measured during weeks 4 and 8, training target intensity maintained;	Not statistically significant
(Winn, et al. 2018)	R 23; (gender assumed mixed) A 21; HIIT: 8; MICT: 8; CON: 5 HIIT: 41 ± 14 years MICT: 46 ± 9 years CON: 51 ± 13 years Status: Ob HIIT dropout: 1 MICT dropout: 1 CON dropout: 0	Treadmill 4 sessions per week; 4 weeks duration; Weight-bearing; Warm-up/cool-down not stated; HIIT: 4 min 80% VO2peak + 3 min 50% VO2peak approx 60min MICT: 60 mins 55% VO2peak approx 60 min Exercise energy expenditure matched; Supervised; HR monitoring device; VO_{2PEAK} established at baseline, measured every 4th session, training target intensity maintained;	Measurements taken pre and 36-48 hours after last training session post intervention, 10-hour fasted state; Position not stated; mg dL^{-1} Lipid fractions were similar between groups at baseline and follow-up; Lipid changes: TC: ↓HIIT>↓MICT TRG: ↓HIIT>↓MICT HDL-C: ↑HIIT >↓MICT LDL-C: ↓HIIT>↓MICT Not statistically significant
(Zhang, et al. 2015)	R 43♀; A 35: HIIT: 12, MICT: 12, CON: 11; HIIT: 21.0±1.0 years MICT: 20.6±1.2 years CON: 20.9±1.0 years Status: Ob HIIT dropout: 2 MICT dropout: 3 CON dropout: 3	Treadmill running; 4 sessions per week 12 weeks Weight-bearing 10-minute warm-up and 5-minute cool down 50–60% of HR_{peak} HIIT: (4 min 85–95% HR_{peak} + 3 min 50–60% HR_{peak} + 7 min passive recovery) x 4. Week 1-2 85%, week 3-4 90%, week 5+, 95% HR_{peak} MICT: 33 mins 60–70% HR_{peak}. Week 1-2 60% HR_{peak}, Week 3-4 65%, Week 5+ 70% HR_{peak}; Oxygen cost matched; Supervised; HR monitoring device; VO_{2MAX} established at baseline, running speed maintained after week 5;	Measurements taken one week pre-intervention and 3 days post intervention; Overnight fasted state; Resting position; mmol/L Lipid fractions were similar between groups at baseline; Lipid changes: TC*: ↓MICT>↓HIIT TRG: ↓HIIT>↑MICT *Statistically significant from baseline. Not statistically significant.

Table [2] Sub-analyses

Studies	Number of studies	Participant totals	Effect Estimate MD [IV, RE, 95% CI)*	P value	I^2
1.1 Total Cholesterol	24	653	0.10 [-0.03, 0.22]	0.12	0%
1.2 TC Sub-analyses	24	653			
1.2.1 Age > 55	5	169	0.11 [-0.20, 0.42]	0.5	0%
1.2.2 Age 35 to 55	9	281	0.10 [-0.07, 0.28]	0.24	0%
1.2.3 Age < 35	10	203	0.08 [-0.12, 0.29]	0.43	0%
1.2.4 Females only	6	160	0.07 [-0.16, 0.31]	0.54	0%
1.2.5 Males only	8	157	0.12 [-0.13, 0.36]	0.34	0%
1.2.6 MetS or MetS factors/risk	16	498	0.08 [-0.06, 0.22]	0.28	0%
1.2.7 Testex Score >=10	16	478	0.09 [-0.06, 0.24]	0.22	0%
1.2.8 Testex Score <10	8	175	0.11 [-0.11, 0.33]	0.34	0%
1.2.9 Weight-bearing	8	144	0.01 [-0.21, 0.23]	0.94	0%
Test for subgroup differences: Chi² = 0.67, df = 3 (P = 1.00), I^2 = 0%					
1.3 Triglycerides	25	736	-0.05 [-0.11, 0.01]	0.1	0%
1.4 TRG Sub-analyses	25	736			
1.4.1 Age > 55	6	212	0.00 [-0.21, 0.22]	0.97	0%
1.4.2 Age 35 to 55	12	366	-0.10 [-0.19, 0.01]	0.03	0%
1.4.2 Age 35 to 55 (K-1**)	11	301	-0.06 [-0.17, 0.05]	0.27	
1.4.3 Age < 35	7	158	-0.01 [-0.10, 0.08]	0.84	0%
1.4.4 Females only	5	118	-0.08 [-0.21, 0.05]	0.24	0%
1.4.5 Males only	7	193	-0.03 [-0.14, 0.09]	0.64	26%
1.4.6 MetS or MetS factors/risk	20	626	-0.10 [-0.18, 0.02]	0.01	0%
1.4.6 MetS or MetS factors/risk (K-1)**	19	561	-0.07 [-0.17, 0.02]	0.13	
1.4.7 Testex Score >=10	20	621	-0.04 [-0.11, 0.03]	0.28	0%
1.4.8 Testex Score <10	5	115	-0.11 [-0.24, 0.03]	0.13	0%
1.4.9 Weight-bearing	8	226	-0.11 [-0.21, 0.00]	0.04	0%
1.4.9 Weight-bearing (K-1)**	7	161	-0.05 [-0.19, 0.09]	0.45	
Test for subgroup differences: Chi² = 3.37, df = 8 (P = 0.91), I^2 = 0%					
1.5 HDL-Cholesterol	26	739	0.07 [0.04, 0.11]	0.001	0%
1.6 HDL-C Sub-analyses	27	739			
1.6.1 Age > 55	6	176	0.02 [-0.09, 0.14]	0.67	0%
1.6.2 Age 35 to 55	12	405	0.06 [-0.00, 0.12]	0.06	42%
1.6.3 Age < 35	9	178	0.10 [-0.01, 0.20]	0.07	49%
1.6.4 Females only	5	136	0.03 [-0.08, 0.14]	0.6	0%
1.6.5 Males only	10	250	0.11 [0.03, 0.19]	0.007	52%
1.6.5 Males only (K-1)**	9	185	0.09 [-0.01, 0.19]	0.07	54%
1.6.6 MetS or MetS factors/risk	19	605	0.06 [0.02, 0.11]	0.002	14%
1.6.6 MetS or MetS factors/risk (K-1)**	18	540	0.04 [-0.00, 0.08]	0.08	0%
1.6.7 Testex Score >=10	20	598	0.08 [0.03, 0.14]	0.003	40%
1.6.8 Testex Score <10	7	161	0.02 [-0.05, 0.10]	0.52	0%
1.6.9 Weight-bearing	10	234	0.13 [0.06, 0.21]	0.0006	37%
1.6.9 Weight-bearing (K-1)**	9	169	0.11 [0.00, 0.21]	0.05	43%
Test for subgroup differences: Chi² = 7.00, df = 8 (P = 0.54), I^2 = 0%					
1.7 LDL-Cholesterol	20	580	0.05 [-0.06, 0.17]	0.37	0%
1.8 LDL-C Sub-analyses	20	580			
1.8.1 Age > 55	5	168	0.21 [-0.05, 0.47]	0.11	0%
1.8.2 Age 35 to 55	9	281	-0.02 [-0.18, 0.15]	0.84	0%
1.8.3 Age < 35	6	131	0.06 [-0.14, 0.26]	0.58	0%
1.8.4 Females only	5	136	0.03 [-0.22, 0.29]	0.81	0%
1.8.5 Males only	6	125	0.14 [-0.08, 0.35]	0.21	0%
1.8.6 MetS or MetS factors/risk	15	473	0.03 [-0.10, 0.17]	0.61	0%
1.8.7 Testex Score >=10	16	473	0.08 [-0.05, 0.20]	0.23	0%
1.8.8 Testex Score <10	4	107	-0.08 [-0.38, 0.22]	0.59	0%
1.8.9 Weight-bearing	4	72	-0.20 [-0.48, 0.08]	0.17	0%
Test for subgroup differences: Chi² = 6.64, df = 8 (P = 0.58), I^2 = 0%					

*MD = Mean Difference, IV = Inverse Variance, RE = Random Effects, CI = Confidence Interval

**Kemmler 2014

Table [3] TESTEX Assessment of Study Quality

STUDY	Eligibility criteria specified	Randomisation specified	Allocation concealment	Groups similar at baseline	Blinding of assessor[a]	Outcome measures assessed in ≥85% patients[b]	Intention-to-treat analysis	Between-group statistical comparisons[c]	Point measures and measures of variability for all reported outcome measures	Activity monitoring in control groups[d]	Relative exercise intensity remained[e]	Exercise volume and energy expenditure[f]	Overall TESTEX (/15)
Ciolac 2010	1	0	0	1	1	1	0	2	1	1	0	1	9
Connolly 2017	0	0	1	0	1	2	0	2	1	1	1	1	10
Cuddy 2019	1	0	0	1	1	1	0	2	1	1	1	0	9
Fisher 2015	1	1	1	1	1	0	1	2	1	1	0	1	11
Hwang 2016	1	1	1	1	1	2	0	1	1	1	1	1	12
Keating 2014	1	1	0	0	1	3	1	2	1	1	1	1	13
Kemmler 2014	0	1	1	1	1	2	0	1	1	1	1	0	10
Kong 2016	1	0	1	0	1	0	0	2	1	1	0	1	8
Lee CL 2016	1	0	1	1	1	1	0	2	1	1	1	1	11
Lira 2019	1	0	0	1	1	2	1	1	1	1	1	0	10
Maillard 2016	1	0	0	1	1	2	0	2	1	1	1	1	11
Matsuo 2015	1	1	1	1	1	2	1	2	1	1	1	1	14
Mohr 2014	0	0	0	0	1	2	1	1	1	1	0	0	7
Morales-Palermo 2019	1	1	0	1	1	3	0	2	1	1	1	1	13
Moreira 2008	1	0	0	1	1	0	0	2	1	1	1	1	9
Nybo 2010	0	0	0	0	1	3	1	1	1	1	1	0	9
Ramos 2016	1	1	1	1	1	2	0	1	1	1	1	1	12
Ruffino 2016	1	1	0	1	1	2	0	2	1	1	1	0	11
Sawyer 2016	1	0	1	1	1	1	0	2	1	1	1	1	11
Shepherd 2015	1	0	1	1	1	1	1	2	1	1	1	0	11
Thomas 1985	1	0	0	1	1	1	0	1	1	1	1	1	8
Tjønna 2008	1	0	1	0	1	2	0	2	1	1	1	1	11
Vella 2017	0	0	1	1	1	3	0	2	1	1	1	1	12
Winding 2018	1	1	1	0	1	2	0	2	1	1	1	1	12
Winn 2018	1	0	1	1	1	3	0	2	1	1	1	1	13
Zhang 2015	0	0	0	1	1	1	0	2	1	1	1	1	9

Key: total out of 15 points.
Legend: [a]Blood lipid measurements is automated so all studies were awarded 1. [b]Three points possible—one point if adherence >85%, one point if adverse events reported, one point if exercise attendance is reported. [c]Two points possible—one point if primary outcome is reported, one point if all other outcomes reported. [d]MICT is treated as the control for this meta-analysis, so all studies were awarded 1 because activity monitoring was done.

Table [4] Study Lipid Assessment Reporting

Study	Lipid Assessment Methodology
(Ciolac, et al. 2010)	Total cholesterol, fractions, and triglycerides: standard methods analysis using a Dimension RXL Max automatic analyser (Dade Behring, Newark, DE, USA).
(Connolly, et al. 2017)	Samples were analysed using an automatic analyser (Roche Modular P-module, Roche Diagnostics, Indianapolis, IN) for HDL-C (coefficient of variation (CV) 2.1%), total cholesterol (CV 2.3%) and triglycerides (CV 2.4%). LDL-C was derived using the Friedewald formula (Friedewald et al. 1972),
(Cuddy, Ramos and Dalleck 2019)	Samples were analysed via a Cholestech LDX System according to strict standardized operating procedures. The LDX Cholestech measured the total cholesterol, high density lipoprotein (HDL) cholesterol, low density lipoprotein (LDL) cholesterol, triglycerides, and blood glucose in the fingerstick blood. A daily optics check was performed on the LDX Cholestech analyzer used for the study.
(Fisher, et al. 2015)	Total cholesterol, HDL-C, and triglycerides were measured using a SIRRUS analyzer (Stanbio Laboratory, Boerne, TX); LDL-C was calculated using the method of Friedewald et al. 1972.
(Hwang, et al. 2016)	Blood lipids were assessed using spectrophotometry.
(Keating, et al. 2014)	The whole blood sample was stored at 4°C for 2-3h prior to analysis by an accredited commercial laboratory (Douglass Hanly Moir Pty Ltd., Sydney, Australia). Analysis was performed on the same day as that of collection of lipids including triglycerides (TRG), total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), and low density lipoprotein cholesterol (LDL-C)).
(Kemmler, et al. 2014)	Total cholesterol, LDL-cholesterol, HDL-cholesterol, triglycerides, (Olympus Diagnostica GmbH, Hamburg, Germany) were determined.
(Kong, et al. 2016)	Serum lipids, including high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), total cholesterol (TC) and total triglyceride (TG), were measured by using an automatic biochemical analyzer (Olympus AU400, Japan). The intra-assay coefficients of variation (CV) for blood lipid assays were all within 5%.
(Lee, Hsu and Cheng 2016)	Serum was analyzed for TG, TC, HDL-C, and LDL-C; the inter-assay CV values were 1.8%, 1.8%, 2.0%, and 2.1%, respectively.
Lira, et al. 2019)	The concentrations of TRG, TC, and HDL-c were determined by a colorimetric method according to specific kits (Labtest, Brazil). In addition, the non-HDL cholesterol (nHDL-c) was calculated by subtracting total cholesterol to HDL-c concentrations. All results were adjusted for individual changes in plasma volume.
(Maillard, et al. 2016)	Plasma concentrations of total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C) and triglycerides (TG) were measured (Synchron Clinical System UniCel DxC analyzer, Beckman Coulter, Brea, CA, USA), with a cholesterol oxidase method for TC (CHOL reagent), a direct homogeneous method for HDL-C (HDLD reagent) and a lipase/glycerol kinase method for TG (GPO reagent). The low-density lipoprotein (LDL) fraction was indirectly quantified using the equation described by Friedewald et al. 1972.
(Matsuo, et al. 2015)	Automated laboratory methods were used to measure serum lipids. LDL cholesterol was calculated according to Friedewald's formula. The inter- and intra-assay CV were <5% for all blood parameters.
(Mohr, et al. 2014)	Serum analyzed by an automatic analyzer (Cobas Fara, Roche, France) using enzymatic kits (Roche Diagnostics, Germany) for determination of total cholesterol, LDL-cholesterol, HDL-cholesterol, and triglyceride levels.
(Morales-Palomo, et al. 2019)	High-density lipoprotein cholesterol (HDL-c) using accelerator selective detergent method (iCV, 1.7%-2.9%). Blood TG with glycerol-3-phosphate oxidize method (iCV, 0.8%-1.7%). Total serum cholesterol by an enzymatic method with a single aqueous reagent (iCV, 1.1%-1.4%). Low-density lipoprotein-cholesterol (LDL-c) was calculated as proposed by Friedewald. All of the above analyses were run in an automated Mindray BS 400 Chemistry Analyzer (Mindray Medical Instrumentation, Shenzhen, China).
(Moreira, et al. 2008)	Total cholesterol and triglyceride were measured by 50-µL blood samples drawn from the earlobe in heparinized capillary tubes and the blood deposited in specific reagent strips for each determination performed in the Accutrend GCT portable instrument (Roche).
(Nybo, et al. 2010)	Plasma fatty acid, HDL cholesterol, and plasma triacylglycerol concentrations were measured by commercial kits (Wako Chemicals, Neuss, Germany) on a Hitachi autoanalyzer (Roche Diagnostic, Basel, Switzerland). The analytical variations (CV) for these measures were reported to be less than 1.5%. LDL cholesterol was calculated in accordance with the Friedewald–Levy–Fredrickson equation as total cholesterol minus HDL cholesterol and one-fifth of total plasma triacylglycerol.
(Ramos, et al. 2016)	The fasting lipid profile (triglyceride, total cholesterol (TC), HDL cholesterol (HDL-C), and LDL cholesterol (LDL-C)) levels were measured via a finger-prick blood sample analyzed using a Cholestech LDX system.
(Ruffino, et al. 2017)	Baseline plasma samples were analysed for triglycerides, low-density

	lipoprotein, and high-density lipoprotein (Randox RX Daytona Co.).
(Sawyer, et al. 2016)	Total cholesterol, high-density lipoprotein cholesterol (HDL-c), low-density lipoprotein cholesterol (LDL-c), triglycerides, and glucose were measured in plasma with an automated chemistry analyzer (Cobas C111; Roche Diagnostics, Indianapolis, IN) using colorimetric enzymatic reagents. Measured intra-assay coefficient of variation (CV) values were 1.4% for total cholesterol, 0.9% for HDL-C, 1.1% for LDL-C, and 1.6% for triglycerides.
(Shepherd, et al. 2015)	An lLab-600 semi-automatic spectrophotometric analyser was used to determine fasting serum non-esterified fatty acid (NEFA), triglyceride (TG), total cholesterol (TC), LDL-cholesterol (LDL-C) and HDL- cholesterol (HDL-C) concentrations, in combination with the appropriate assay kit (all obtained from Instrumentation Laboratory Ltd UK, Warrington, UK, except for the NEFA assay, which was obtained from Randox, London, UK).
(Thomas, et al. 1985)	HDL-C and TC were analyzed immediately according to the microprocedure of Bonzert and Brewer (1977). This technique requires separation of HDL using phosphotungstate MgCl, ultracentrifugation with a Beckman Airfuge, and an enzymic analysis of TC using a Beckman Cholesterol Analyzer with oxygen electrode. Within assay reliability was assessed y calculating the mean coefficient of variation from duplicate or triplicate samples run during the study. The mean within coefficient of variation for TC = 2.1% and HDL-C = 1.5%. Between assay reliability was assessed by analyzing standards from a stored plasma pool (-70°C) on separate days. The coefficient of variation for TC = 3.6% and HDL-C = 2.5%.
(Tjønna, et al. 2008)	All blood analyses were performed with standard local procedures.
(Vella, Taylor and Drummer 2017)	High-density lipoprotein (HDL), low-density lipoprotein (LDL), total cholesterol, and triglycerides were measured using a Dimension RxL Max Integrated Chemistry System (Siemens, Erlangen, Germany) HDL cholesterol was assessed using the polyethylene glycol direct method with a minimum sensitivity of 0.3 mmol/L and an intra-assay CV of 0.9%. LDL cholesterol was measured using the direct method with a minimum sensitivity of 0.13 mmol/L and an intra-assay CV of 1.4%. Total cholesterol was measured via cholesterol oxidase, esterase, and peroxidase, and had a minimum sensitivity of 0.39 mmol/L and an intra-assay CV of 1.1%. Triglycerides were measured using the enzymatic endpoint method and had a minimum sensitivity of 0.6 mmol/L and an intra-assay CV of 1.2%.
(Winding, et al. 2018)	Baseline blood samples were collected for determination of plasma lipids.
(Winn, et al. 2018)	Serum lipids and aminotransferases (e.g. cholesterol, TG, HDL-C, and LDL-C) were determined by a commercial laboratory (Boyce and Bynum Pathology Laboratories, Columbia, MO, USA).
(Zhang, et al. 2015)	Commercially available kits (Shanghai Kehua Bio-engineering, China) were used with an automatic chemistry analyser (7180, HITACHI, Japan) to determine triglycerides (TG) and total cholesterol (TC). The inter- and intra-coefficients of variance for the measures were as follows: TG (5%, 6%) and TC (4%, 3%).

Funnel Plots:

Figure [2] Total Cholesterol

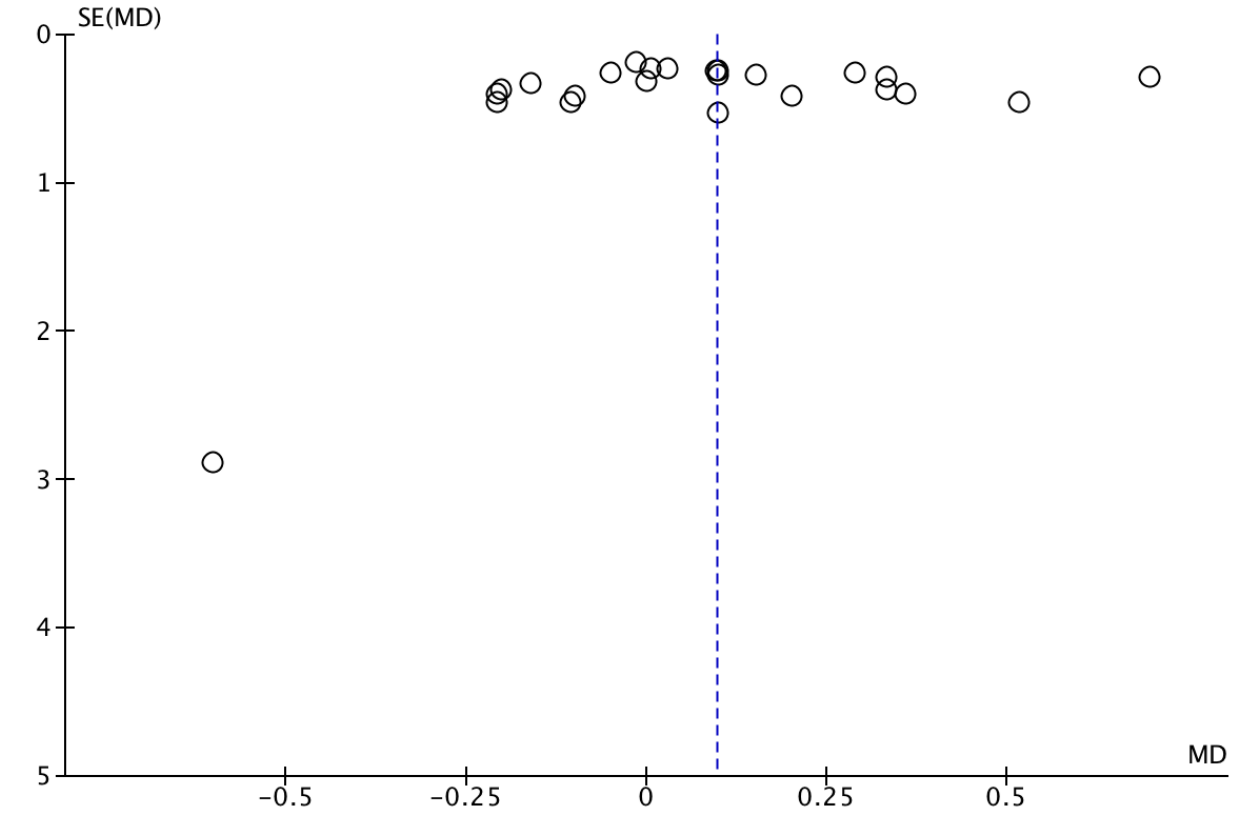

Figure [3] Triglycerides

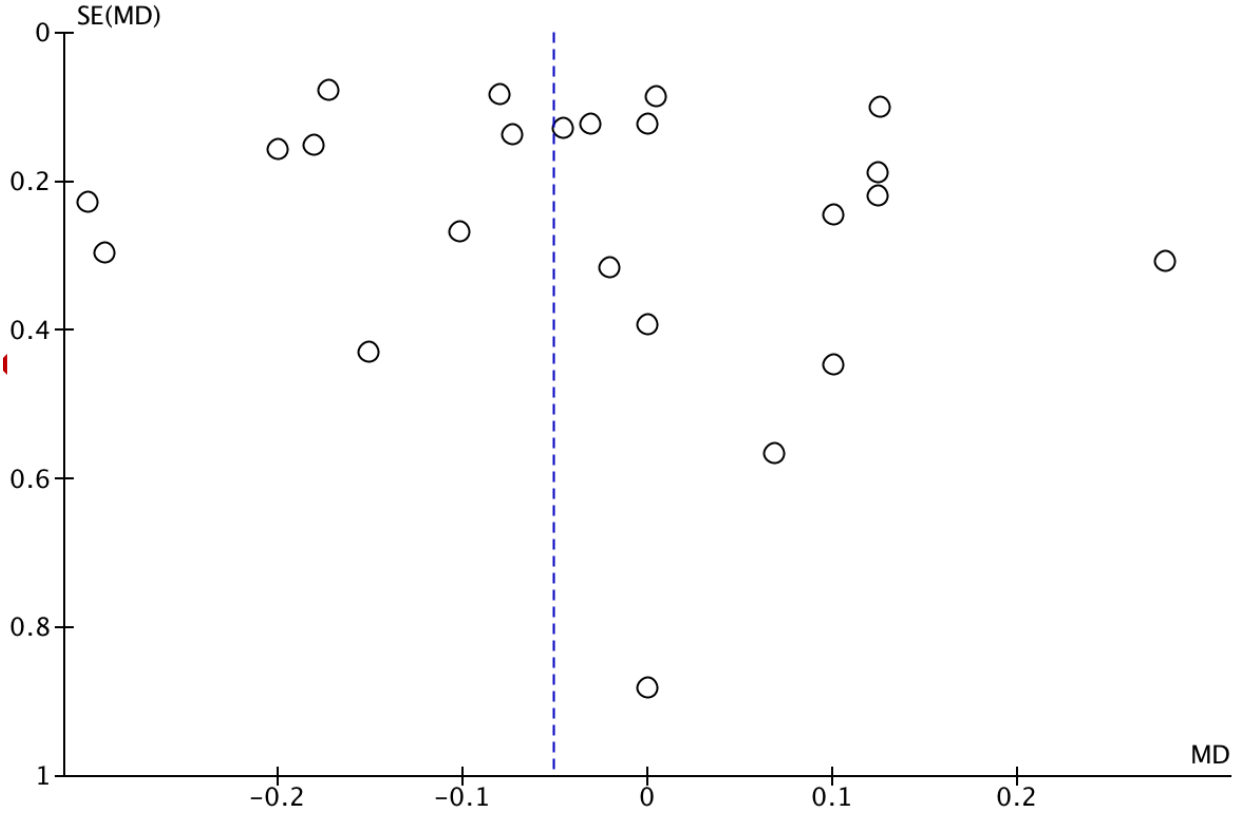

Figure [4] High-density Lipoprotein Cholesterol

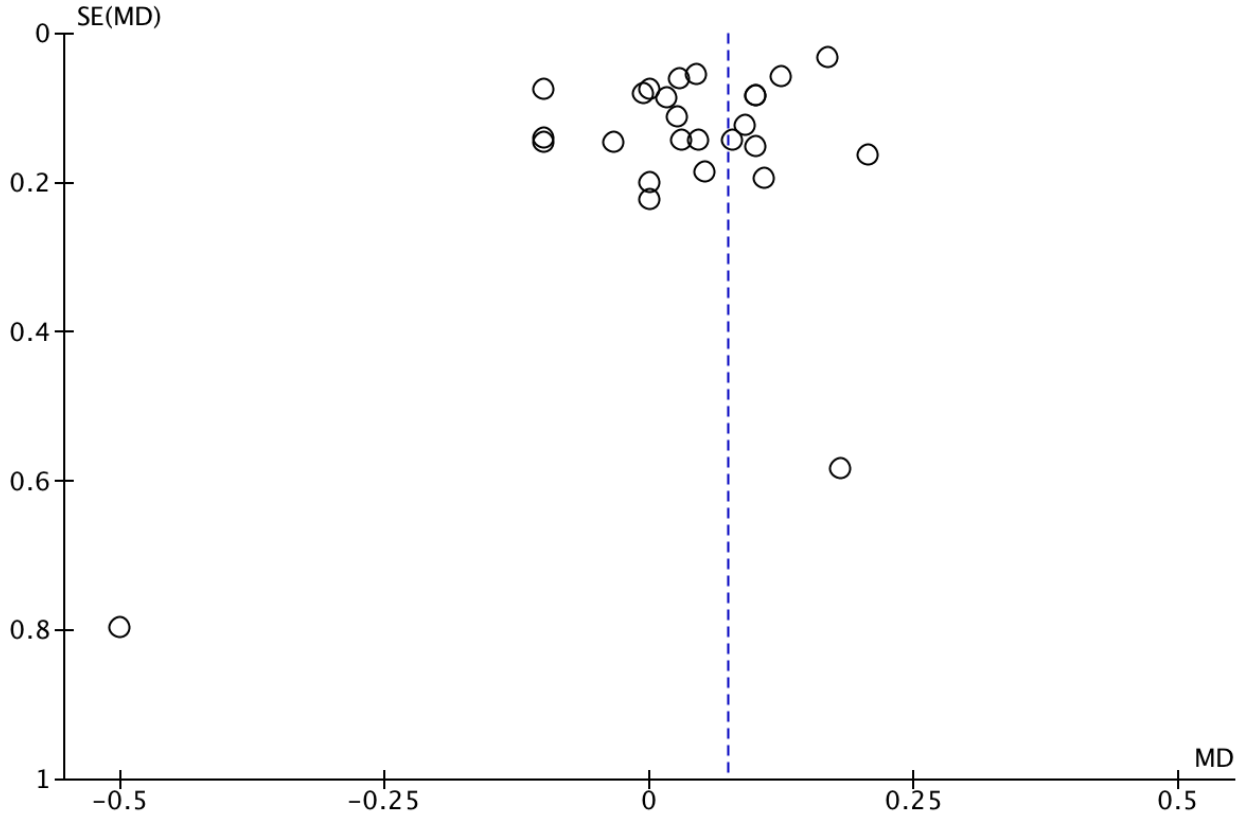

Figure [5] Low-density Lipoprotein Cholesterol

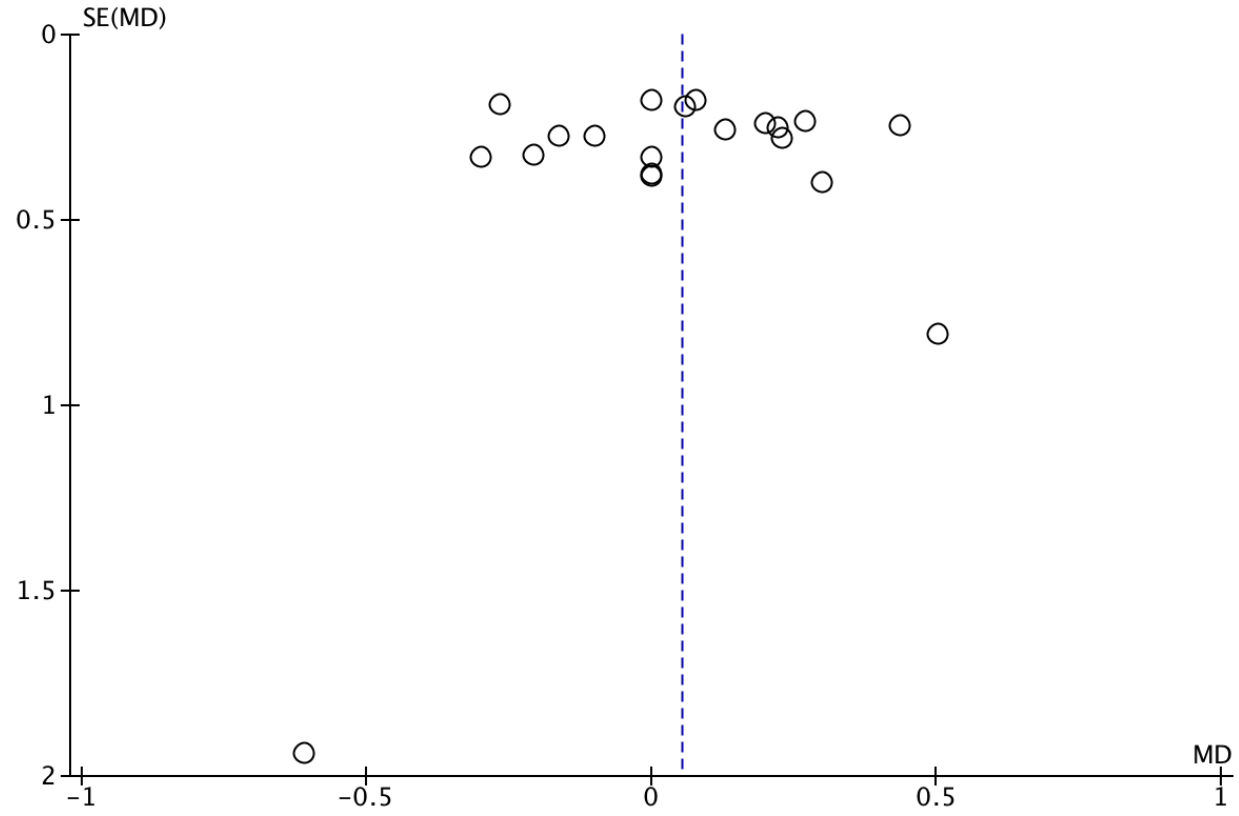

Figure [6] TC/HDL Ratio