Title: The Effects of Sprint Interval Training on Physical Performance: A Systematic Review and Meta-Analysis

Supplementary Material

Electronic Supplementary Material Appendix S1: Database search results

Source	Search	Hits
MEDLINE	1. ("sprint interval training" or "high intensity interval training" or "high intensity intermittent training" or "HIIT" or "interval exercise" or "high intensity training" or "high intensity exercise" or "high intensity aerobic interval training" or "aerobic interval training").mp.	1. 6,118
	2. Limit 1 to (english language and humans and yr="2000 - 2020")	2. 3,545
Web of Science	1. ("sprint interval training" or "high intensity interval training" or "high intensity intermittent training" or "HIIT" or "interval exercise" or "high intensity training" or "high intensity exercise" or "high intensity aerobic interval training" or "aerobic interval training").mp.	1. 7,218
	2. Limit 1 to (english language and Sport Science and yr="2000 - 2020")	2. 3,135
SportDiscuss	1. ("sprint interval training" or "high intensity interval training" or "high intensity intermittent training" or "HIIT" or "interval exercise" or "high intensity training" or "high intensity exercise" or "high intensity aerobic interval training" or "aerobic interval training").mp.	1. 3,282
	2. Limit 1 to (english language and Academic Journals and yr="2000 - 2020")	2. 2,195

Electronic Supplementary Material Appendix 2 Studies excluded at full-text screening and reasons for exclusion

0: Reason for exclusion; 1: Meets the inclusion criteria.

	Population Based			Intervention Based				
Reference	**Non-Diseased**	**Non-overweight / obese recruitment**	**Mean age 18-45**	**'All out' cycling, ≤30s duration**	**≥2 Week Duration**	**Pre-Post Outcome Measures**	**Non-Supplementation Training Group**	**Total Score**
Androulakis-Korakakis P, Langdown L, Lewis A, Fisher JP, Gentil P, Paoli A, et al. Effects of Exercise Modality During Additional "High-Intensity Interval Training" on Aerobic Fitness and Strength in Powerlifting and Strongman Athletes. Journal of Strength & Conditioning Research. 2018; 32(2):450-457.	1	1	1	0	1	1	1	6
Astorino TA, Edmunds RM, Clark A, King L, Gallant RA, Namm S, et al. High-intensity interval training increases cardiac output and VO2max. Med Sci Sports Exerc. 2017;49(2):265-73.	1	1	1	0	1	1	1	6
Astorino TA, Vella CA. Predictors of change in affect in response to high intensity interval exercise (HIIE) and sprint interval exercise (SIE). Physiol Behav. 2018;196:211-7.	1	1	1	0	0	0	1	4
Astorino TA, Edmunds RM, Clark A, Gallant R, King L, Ordille GM, et al. Change in maximal fat oxidation in response to different regimes of periodized high-intensity interval training (HIIT). Eur J Appl Physiol. 2017 Apr;117(4):745-55.	1	1	1	0	1	1	1	6
Astorino TA, deRevere J, Anderson T, Kellogg E, Holstrom P, Ring S, et al. Change in VO 2max and time trial performance in response to high-intensity interval training prescribed using ventilatory threshold. Eur J Appl Physiol. 2018;118(9):1811-20.	1	1	1	0	1	1	1	6
Bentley RF, Jones JH, Hirai DM, Zelt JT, Giles MD, Raleigh JP, et al. Submaximal exercise cardiac output is increased by 4 weeks of sprint interval training in young healthy males with low initial Q-V O2: Importance of cardiac response phenotype. Plos one. 2019;14(1):e0195458.	1	1	1	0	1	1	1	6
Boer P. Sprint interval training vs. high intensity interval training in untrained university students. South African Journal for Research in Sport, Physical Education and Recreation. 2019;41(3):17-30.	1	1	1	0	1	1	1	6

Bogdanis GC, Stavrinou P, Fatouros IG, Philippou A, Chatzinikolaou A, Draganidis D, et al. Short-term high-intensity interval exercise training attenuates oxidative stress responses and improves antioxidant status in healthy humans. Food & Chemical Toxicology. 2013; 61:171-177.	1	1	1	0	1	1	1	6
Bonafiglia JT, Edgett BA, Baechler BL, Nelms MW, Simpson CA, Quadrilatero J, et al. Acute upregulation of PGC-1α mRNA correlates with training-induced increases in SDH activity in human skeletal muscle. Applied Physiology, Nutrition & Metabolism. 2017 06;42(6):656-66.	1	1	1	0	1	1	1	6
Burn N, Niven A. Why do they do (h) it? using self-determination theory to understand why people start and continue to do high-intensity interval training group exercise classes. International Journal of Sport and Exercise Psychology. 2019;17(5):537-51.	1	1	1	0	0	0	1	4
Byrd BR, Keith J, Keeling SM, Weatherwax RM, Nolan PB, Ramos JS, et al. Personalized moderate-intensity exercise training combined with high-intensity interval training enhances training responsiveness. International journal of environmental research and public health. 2019;16(12):2088.	1	1	1	0	1	1	1	6
Capostagno B, Lambert MI, Lamberts RP. Standardized versus customized high-intensity training: effects on cycling performance. International journal of sports physiology & performance. 2014; 9(2):292-301.	1	1	1	0	0	1	1	5
Cavar M, Marsic T, Corluka M, Culjak Z, Zovko IC, Müller A, et al. Effects of 6 weeks of different high-intensity interval and moderate continuous training on aerobic and anaerobic performance. The Journal of Strength & Conditioning Research. 2019;33(1):44-56.	1	1	1	0	1	1	1	6
Clark B, Costa VP, O'Brien BJ, Guglielmo LG, Paton CD. Effects of a seven day overload-period of high-intensity training on performance and physiology of competitive cyclists. PLoS ONE [Electronic Resource]. 2014; 9(12):e115308.	1	1	1	1	0	1	1	6
Cochran AJR, Percival ME, Tricarico S, Little JP, Cermak N, Gillen JB, et al. Intermittent and continuous high-intensity exercise training induce similar acute but different chronic muscle adaptations. Experimental physiology. 2014; 99(5):782-791.	1	1	1	0	1	0	1	5
Connolly LJ, Bailey SJ, Krustrup P, Fulford J, Smietanka C, Jones AM. Effects of self-paced interval and continuous training on health markers in	1	1	1	0	1	1	1	6

women. European journal of applied physiology. 2017; 117(11):2281-2293.								
Da Silva CR, Santana PV, Mendes PC, Saraiva B, Da SL, Leite RD, et al. Metabolic and cardiorespiratory acute responses to fasting versus feeding during high-intensity interval training. Sport Sciences for Health. 2018; 14(2):347-355.	1	1	1	1	0	0	1	5
Da Silva Machado, Daniel G, Costa EC, Ray H, Beale L, Chatzisarantis NL, de Farias-Junior LF, et al. Short-term psychological and physiological effects of varying the volume of high-intensity interval training in healthy men. Percept Mot Skills. 2019;126(1):119-42.	1	1	1	0	1	1	1	6
Denham J, Gray A, Scott-Hamilton J, Hagstrom AD. Sprint Interval Training Decreases Circulating MicroRNAs Important for Muscle Development. International Journal of Sports Medicine. 2018; 39(1):67-72.	1	1	1	1	1	0	1	6
Edge J, Bishop D, Hill-Haas S, Dawson B, Goodman C. Comparison of muscle buffer capacity and repeated-sprint ability of untrained, endurance-trained and team-sport athletes. European journal of applied physiology. 2006; 96(3):225-234.	1	1	1	1	0	1	1	6
Edge J, Eynon N, McKenna MJ, Goodman CA, Harris RC, Bishop DJ. Altering the rest interval during high-intensity interval training does not affect muscle or performance adaptations. Experimental physiology. 2013; 98(2):481-490.	1	1	1	0	1	1	1	6
Edgett BA, Bonafiglia JT, Baechler BL, Quadrilatero J, Gurd BJ. The effect of acute and chronic sprint-interval training on LRP130, SIRT3, and PGC-1alpha expression in human skeletal muscle. Physiological Reports. 2016; 4(17):09.	1	1	1	0	1	1	1	6
Eskelinen J, Heinonen I, Löyttyniemi E, Saunavaara V, Kirjavainen A, Virtanen KA, et al. Muscle-specific glucose and free fatty acid uptake after sprint interval and moderate-intensity training in healthy middle-aged men. Journal of applied physiology. 2015; 118(9):1172-1180.	1	0	0	1	1	1	1	5
Etxebarria N, Anson JM, Pyne DB, Ferguson RA. High-intensity cycle interval training improves cycling and running performance in triathletes. European Journal of Sport Science EJSS : Official Journal of the European College of Sport Science. 2014; 14(6):521-529.	1	1	1	0	1	1	1	6
Forbes SC, Sletten N, Durrer C, Myette-Côté É, Candow D, Little JP. Creatine Monohydrate Supplementation Does Not Augment Fitness,	1	1	1	1	1	1	0	6

Performance, or Body Composition Adaptations in Response to Four Weeks of High-Intensity Interval Training in Young Females. International Journal of Sport Nutrition & Exercise Metabolism. 2017; 27(3):185-192.								
Vinuela Garcia M, Vera Ibanez A, Colomer Poveda D, Marquez Sanchez G, Romero Arenas S. Effect of 12 sessions of high-intensity interval training on body composition in young adults. NUTRICION HOSPITALARIA. 2016;33(3):637-43.	0	0	0	0	0	0	0	0
Gatterer H, Menz V, Salazar-Martinez E, Sumbalova Z, Garcia-Souza L, Velika B, et al. Exercise Performance, Muscle Oxygen Extraction and Blood Cell Mitochondrial Respiration after Repeated-Sprint and Sprint Interval Training in Hypoxia: A Pilot Study. Journal of Sports Science & Medicine. 2018; 17(3):339-347.	1	1	1	0	1	1	1	6
Gibala MJ, McGee SL, Garnham AP, Howlett KF, Snow RJ, Hargreaves M. Brief intense interval exercise activates AMPK and p38 MAPK signaling and increases the expression of PGC-1α in human skeletal muscle. Journal of Applied Physiology. 2009; 106(3):929-934.	1	1	1	1	0	0	1	5
Gibala MJ, Bostad W, McCarthy DG. Physiological adaptations to interval training to promote endurance. Current Opinion in Physiology. 2019;10:180-4.	0	0	0	0	0	0	0	0
Gray SR, Aird TP, Farquharson AJ, Horgan GW, Fisher E, Wilson J, et al. Inter-individual responses to sprint interval training, a pilot study investigating interactions with the sirtuin system. Applied Physiology, Nutrition, & Metabolism = Physiologie Appliquee, Nutrition et Metabolisme. 2018; 43(1):84-93.	1	1	1	1	1	0	1	6
Gunnarsson TP, Brandt N, Fiorenza M, Hostrup M, Pilegaard H, Bangsbo J. Inclusion of sprints in moderate intensity continuous training leads to muscle oxidative adaptations in trained individuals. Physiological reports. 2019;7(4):e13976.	1	1	1	0	1	1	1	6
Gurd BJ, Giles MD, Bonafiglia JT, Raleigh JP, Boyd JC, Ma JK, et al. Incidence of nonresponse and individual patterns of response following sprint interval training. Applied Physiology, Nutrition, & Metabolism = Physiologie Appliquee, Nutrition et Metabolisme. 2016; 41(3):229-234.	1	1	1	0	1	0	1	5
Hajizadeh Maleki B, Tartibian B, Chehrazi M. The effects of three different exercise modalities on markers of male reproduction in healthy subjects: a	1	1	1	0	1	1	1	6

randomized controlled trial. Reproduction. 2017; 153(2):157-174.								
Hatle H, Stobakk PK, Molmen HE, Bronstad E, Tjonna AE, Steinshamn S, et al. Effect of 24 sessions of high-intensity aerobic interval training carried out at either high or moderate frequency, a randomized trial. PLoS ONE [Electronic Resource]. 2014; 9(2):e88375.	1	1	1	0	1	1	1	6
Hebisz P, Hebisz R, Murawska-Ciałowicz E, Zatoń M. Changes in exercise capacity and serum BDNF following long-term sprint interval training in well-trained cyclists. Applied Physiology, Nutrition, and Metabolism. 2019;44(5):499-506.	1	1	1	0	1	1	1	6
Heiskanen MA, Leskinen T, Heinonen IHA, Loyttyniemi E, Eskelinen J, Virtanen K, et al. Right ventricular metabolic adaptations to high-intensity interval and moderate-intensity continuous training in healthy middle-aged men. American Journal of Physiology - Heart & Circulatory Physiology. 2016; 311(3):H667-75.	1	1	0	1	1	1	1	6
Hill MW, Higgins MF, Price MJ. The effect of high-intensity cycling training on postural sway during standing under rested and fatigued conditions in healthy young adults. European journal of applied physiology. 2016; 116(10):1965-1974.	1	1	1	0	1	1	1	6
Hostrup M, Gunnarsson TP, Fiorenza M, Mørch K, Onslev J, Pedersen KM, et al. In-season adaptations to intense intermittent training and sprint interval training in sub-elite football players. Scand J Med Sci Sports. 2019;29(5):669-77.	1	1	1	0	1	1	1	6
Huffman LS, Wadsworth DD, McDonald JR, Foote SJ, Hyatt H, Pascoe DD. Effects of a Sprint Interval and Resistance Concurrent Exercise Training Program on Aerobic Capacity of Inactive Adult Women. The Journal of Strength & Conditioning Research. 2019; 33(6):1640-1647.	1	1	1	0	1	1	1	6
Inoue A, Impellizzeri FM, Pires FO, Pompeu FAMS, Deslandes AC, Santos TM. Effects of Sprint versus High-Intensity Aerobic Interval Training on Cross-Country Mountain Biking Performance: A Randomized Controlled Trial. PLoS ONE [Electronic Resource]. 2016; 11(1):e0145298.	1	1	1	0	1	1	1	6
Islam H, Townsend LK, Hazell TJ. Modified sprint interval training protocols. Part I. Physiological responses. Applied Physiology, Nutrition, & Metabolism = Physiologie Appliquee, Nutrition et Metabolisme. 2017; 42(4):339-346.	1	1	1	0	0	0	1	4

Jabbour G, Iancu H, Mauriege P, Joanisse DR, Martin LJ. High-intensity interval training improves performance in young and older individuals by increasing mechanical efficiency. Physiological Reports. 2017; 5(7).	1	0	1	1	1	1	1	6
Kellogg E, Cantacessi C, McNamer O, Holmes H, von Bargen R, Ramirez R, et al. Comparison of Psychological and Physiological Responses to Imposed vs. Self-selected High-Intensity Interval Training. Journal of strength and conditioning research. 2019; 33(11):2945-2952.	1	1	1	0	1	1	1	6
Kim J, Lee N, Trilk J, Kim E, Kim S, Lee M, et al. Effects of sprint interval training on elite Judoists. International Journal of Sports Medicine. 2011; 32(12):929-934.	1	1	1	0	1	1	1	6
Kiviniemi AM, Tulppo MP, Eskelinen JJ, Savolainen AM, Kapanen J, Heinonen IHA, et al. Cardiac autonomic function and high-intensity interval training in middle-age men. Medicine & Science in Sports & Exercise. 2014; 46(10):1960-1967.	1	1	0	1	1	1	1	6
Kiviniemi AM, Tulppo MP, Eskelinen JJ, Savolainen AM, Kapanen J, Heinonen IHA, et al. Autonomic Function Predicts Fitness Response to Short-Term High-Intensity Interval Training. International Journal of Sports Medicine. 2015; 36(11):915-921.	1	1	0	1	1	1	1	6
Kliszczewicz B, McKenzie M, Nickerson B. Physiological adaptation following four-weeks of high-intensity functional training. Vojnosanitetski pregled. 2019; 76(3):272-277.	1	1	1	0	1	1	1	6
Kristoffersen M, Sandbakk Ø, Rønnestad BR, Gundersen H. Comparison of short-sprint and heavy strength training on cycling performance. Frontiers in physiology. 2019; 10:1132.	1	1	1	0	1	1	1	6
Lamberts RP, Swart J, Noakes TD, Lambert MI. Changes in heart rate recovery after high-intensity training in well-trained cyclists. European journal of applied physiology. 2009; 105(5):705-713.	1	1	1	0	1	1	1	6
Lira F, Antunes B, Figueiredo C, Campos E, Panissa V, St-Pierre D, et al. Impact of 5-week high-intensity interval training on indices of cardio metabolic health in men. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2019; 13(2):1359-1364.	1	1	1	0	1	1	1	6
Lopes WA, Hortmann K, de Oliveira GH, Okawa RTP. Does 6 weeks of HIIT alter structural and functional cardiac and arterial stiffness in young adults? Eur J Appl Physiol. 2019;119(4):1041-2.	0	0	0	0	0	0	1	1
Ma JK, Scribbans TD, Edgett BA, Boyd JC, Simpson CA, Little JP, et al. Extremely low-volume, high-	1	1	1	0	1	1	1	6

intensity interval training improves exercise capacity and increases mitochondrial protein content in human skeletal muscle. Open Journal of Molecular and Integrative Physiology. 2013; 3(04):202.								
Mallol M, Bentley DJ, Norton L, Norton K, Mejuto G, Yanci J. Comparison of Reduced-Volume High-Intensity Interval Training and High-Volume Training on Endurance Performance in Triathletes. International Journal of Sports Physiology & Performance. 2019; 14(2):239-245.	1	1	1	0	1	1	1	6
Marles A, Legrand R, Blondel N, Mucci P, Betbeder D, Prieur F. Effect of high-intensity interval training and detraining on extra VO2 and on the VO2 slow component. European journal of applied physiology. 2007; 99(6):633-640.	1	1	1	0	1	1	1	6
Martin LJ, Anderson SH, Schmale MS, Hallworth JR, Hazell TJ. A group-enhanced sprint interval training program for amateur athletes. Applied Physiology, Nutrition & Metabolism. 2016; 41(8):809-815.	1	1	1	0	1	1	1	6
May RW, Seibert GS, Sanchez-Gonzalez MA, Fincham FD. Self-regulatory biofeedback training: An intervention to reduce school burnout and improve cardiac functioning in college students. Stress. 2019;22(1):1-8.	1	1	1	0	1	1	1	6
McGinley C, Bishop DJ. Rest interval duration does not influence adaptations in acid/base transport proteins following 10 wk of sprint-interval training in active women. American Journal of Physiology - Regulatory Integrative & Comparative Physiology. 2017; 312(5):R702-R717.	1	1	1	0	1	1	1	6
McKie GL, Islam H, Townsend LK, Robertson-Wilson J, Eys M, Hazell TJ. Modified sprint interval training protocols: physiological and psychological responses to 4 weeks of training. Applied Physiology, Nutrition & Metabolism. 2018; 43(6):595-601.	1	1	1	0	1	1	1	6
Naves JPA, Viana RB, Rebelo ACS, de Lira, Claudio Andre B, Pimentel GD, Lobo PCB, et al. Effects of high-intensity interval training vs. sprint interval training on anthropometric measures and cardiorespiratory fitness in healthy young women. Frontiers in physiology. 2018; 9:1738.	1	1	1	0	1	1	1	6
O'Connor D, Malone JK. The Dose Response for Sprint Interval Training Interventions May Affect the Time Course of Aerobic Training Adaptations. Sports. 2019; 7(4):85.	1	1	1	0	1	1	1	6
Olney N, Wertz T, LaPorta Z, Mora A, Serbas J, Astorino TA. Comparison of acute physiological and psychological responses between moderate-intensity	1	1	1	1	0	0	1	5

continuous exercise and three regimes of high-intensity interval training. Journal of Strength & Conditioning Research. 2018; 32(8):2130-2138.								
Puype J, Van Proeyen K, Raymackers J, Deldicque L, Hespel P. Sprint Interval Training in Hypoxia Stimulates Glycolytic Enzyme Activity. Medicine & Science in Sports & Exercise. 2013; 45(11):2166-2174.	1	1	1	0	1	1	1	6
Raleigh JP, Giles MD, Scribbans TD, Edgett BA, Sawula LJ, Bonafiglia JT, et al. The impact of work-matched interval training on VO2peak and VO2 kinetics: diminishing returns with increasing intensity. Applied Physiology, Nutrition, & Metabolism = Physiologie Appliquee, Nutrition et Metabolisme. 2016; 41(7):706-713.	1	1	1	0	1	1	1	6
Raleigh JP, Giles MD, Islam H, Nelms M, Bentley RF, Jones JH, et al. Contribution of central and peripheral adaptations to changes in maximal oxygen uptake following 4 weeks of sprint interval training. Applied Physiology, Nutrition & Metabolism. 2018; 43(10):1059-1068.	1	1	1	0	1	1	1	6
Richards JC, Johnson TK, Kuzma JN, Lonac MC, Schweder MM, Voyles WF, et al. Short-term sprint interval training increases insulin sensitivity in healthy adults but does not affect the thermogenic response to beta-adrenergic stimulation. Journal of Physiology. 2010; 588(Pt 15):2961-2972.	1	1	1	1	1	0	1	6
Riffe JJ, Stout JR, Fukuda DH, Robinson EH, Miramonti AA, Beyer KS, et al. The Dmax method is a valid procedure to estimate physical working capacity at fatigue threshold. Muscle & nerve. 2017; 55(3):344-349.	1	1	1	0	1	1	1	6
Saanijoki T, Nummenmaa L, Eskelinen J, Savolainen AM, Vahlberg T, Kalliokoski KK, et al. Affective Responses to Repeated Sessions of High-Intensity Interval Training. Medicine & Science in Sports & Exercise. 2015; 47(12):2604-2611.	1	0	0	1	1	1	1	5
Sandvei M, Jeppesen PB, Støen L, Litleskare S, Johansen E, Stensrud T, et al. Sprint interval running increases insulin sensitivity in young healthy subjects. Archives of Physiology and Biochemistry. 2012; 118(3):139-147.	1	1	1	0	1	1	1	6
Schaer CE, Wuthrich TU, Beltrami FG, Spengler CM. Effects of Sprint-Interval and Endurance Respiratory Muscle Training Regimens. Medicine and science in sports and exercise. 2019; 51(2):361-371.	1	1	1	0	1	1	1	6

Schaun GZ, Vecchio FBD. High-Intensity Interval Exercises' Acute Impact on Heart Rate Variability: Comparison between Whole-Body and Cycle Ergometer Protocols. Journal of Strength & Conditioning Research (Lippincott Williams & Wilkins). 2018; 32(1):223-229.	1	1	1	0	0	1	0	4
Schaun GZ, Pinto SS, Brasil B, Nunes GN, Alberton CL. Neuromuscular adaptations to sixteen weeks of whole-body high-intensity interval training compared to ergometer-based interval and continuous training. Journal of sports sciences. 2019; 37(14):1561-1569.	1	1	1	0	1	1	1	6
Scribbans TD, Ma JK, Edgett BA, Vorobej KA, Mitchell AS, Zelt JGE, et al. Resveratrol supplementation does not augment performance adaptations or fibre-type-specific responses to high-intensity interval training in humans. Applied Physiology, Nutrition & Metabolism. 2014; 39(11):1305-1313.	1	1	1	0	1	1	0	5
Siahkouhian M, Khodadadi D, Shahmoradi K. Effects of high-intensity interval training on aerobic and anaerobic indices: comparison of physically active and inactive men. Science & Sports. 2013; 28(5):e119-e125.	1	1	1	0	1	1	1	6
Silva JR. Concurrent aerobic and strength training for performance in soccer. In: Concurrent Aerobic and Strength Training. Springer; 2019. p. 397-416.	0	0	0	0	0	0	0	0
Stork MJ, Martin Ginis K,A., Gibala MJ. Psychological and Behavioral Responses to Interval and Continuous Exercise. Medicine & Science in Sports & Exercise. 2018; 50(10):2110-2121.	1	1	1	1	0	0	1	5
Suzuki Y, Ito O, Takahashi H, Takamatsu K. The effect of sprint training on skeletal muscle carnosine in humans. International Journal of Sport and Health Science. 2004; 2:105-110.	1	1	1	1	1	1	0	6
Thom G, Kavaliauskas M, Babraj J. Changes in lactate kinetics underpin soccer performance adaptations to cycling-based sprint interval training. European journal of sport science. 2020;20(4):486-94.	1	1	0	1	1	1	1	6
Tsuchiya Y, Ijichi T, Goto K. Effect of sprint training on resting serum irisin concentration - Sprint training once daily vs. twice every other day. Metabolism: Clinical & Experimental. 2016; 65(4):492-495.	1	1	1	1	1	0	1	6
Turnes T, de Aguiar RA, de Oliveira Cruz RS, Lisboa FD, Pereira KL, Caputo F. Short-term interval training at both lower and higher intensities in the severe exercise domain result in improvements in	1	1	1	0	1	1	1	6

VO2 on-kinetics. European journal of applied physiology. 2016; 116(10):1975-1984								
Viana RB, de Lira C,Andre Barbosa, Naves JPA, Coswig VS, Del Vecchio FB, Ramirez-Campillo R, et al. Can We Draw General Conclusions from Interval Training Studies? Sports Medicine. 2018; 48(9):2001-2009.	1	1	1	0	1	1	1	6
Wang R, Fukuda DH, Hoffman JR, La Monica MB, Starling TM, Stout JR, et al. Distinct effects of repeated-sprint training in normobaric hypoxia and β-alanine supplementation. J Am Coll Nutr. 2019;38(2):149-61.	1	1	1	0	1	1	1	6
Weber CL, Schneider DA. Increases in maximal accumulated oxygen deficit after high-intensity interval training are not gender dependent. Journal of applied physiology. 2002; 92(5):1795-1801.	1	1	1	0	1	1	1	6
Wood KM, Olive B, LaValle K, Thompson H, Greer K, Astorino TA. Dissimilar Physiological and Perceptual Responses Between Sprint Interval Training and High-Intensity Interval Training. Journal of Strength & Conditioning Research. 2016; 30(1):244-250.	1	1	1	0	0	0	1	4
Zinner C, Sperlich B, Born D, Michels G. Effects of combined high intensity arm and leg training on performance and cardio-respiratory measures. Journal of Sports Medicine & Physical Fitness. 2017; 57(7-8):969-975.	1	1	1	0	1	1	1	6

Electronic Supplementary Material Appendix S3: Modified Downs and Black checklists

Control trials checklist:

1. Is the hypothesis/aim/objective of the study clearly described?

YES	1
NO	0

2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
    a. If the main outcomes are first mentioned in the Results section, the question should be answered no.

YES	1
NO	0

3. Are the characteristics of the participants included in the study clearly described?
    a. In cohort studies and trials, inclusion and/or exclusion criteria should be given. In case-control studies, a case-definition and the source for controls should be given.

YES	1
NO	0

4. Are the interventions of interest clearly described?
    a. Treatments and placebo (where relevant) that are to be compared should be clearly described.

YES	1
NO	0

5. Are the distributions of principal confounders in each group of participants to be compared clearly described?
    a. A list of principal confounders is provided.

YES	2
PARTIALLY	1
NO	0

6. Are the main findings of the study clearly described?
    a. Simple outcome data (including denominators and numerators) should be reported for all major findings so that the reader can check the major analyses and conclusions. (This question does not cover statistical tests which are considered below).

YES	1
NO	0

7. Does the study provide estimates of the random variability in the data for the main outcomes?
    a. In non-normally distributed data the inter-quartile range of results should be reported. In normally distributed data the standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered yes.

YES	1
NO	0

8. Have the characteristics of participants lost to follow-up been described?
    a. This should be answered yes where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by their inclusion. This should be answered no, where a study does not report the number of participant lost to follow-up.

YES	1
NO	0

9. Have actual probability values been reported (e.g.0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?

YES	1
NO	0

10. Was an attempt made to blind those measuring the main outcomes of the intervention?

YES	1
NO	0
UNABLE TO DETERMINE	0

11. Were the statistical tests used to assess the main outcomes appropriate?
    a. The statistical techniques used must be appropriate to the data. For example nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered yes. If the distribution of the data (normal or not) is not described it must be assumed that the estimates used were appropriate and the question should be answered yes.

YES	1
NO	0
UNABLE TO DETERMINE	0

12. Was compliance with the intervention/s reliable?
    a. Where there was noncompliance with the allocated treatment or where there was contamination of one group, the question should be answered no. For studies where the effect of any misclassification was likely to bias any association to the null, the question should be answered yes.

YES	1
NO	0
UNABLE TO DETERMINE	0

13. Were the main outcome measures used accurate (valid and reliable)?
    a. For studies where the outcome measures are clearly described, the question should be answered yes. For studies which refer to other work or that demonstrates the outcome measures are accurate, the question should be answered as yes.

YES	1
NO	0
UNABLE TO DETERMINE	0

14. Were the participants in different intervention groups (trials and cohort studies) or were the cases and controls (case-control studies) recruited from the same population?
    a. For example, participants for all comparison groups should be selected from the same hospital. The question should be answered unable to determine for cohort and case control studies where there is no information concerning the source of participants included in the study.

YES	1
NO	0
UNABLE TO DETERMINE	0

15. Were study subjects randomised to intervention groups?
    a. Studies which state that subjects were randomised should be answered yes except where method of randomisation would not ensure random allocation. For example alternate allocation would score no because it is predictable.

YES	1
NO	0
UNABLE TO DETERMINE	0

16. Was there adequate adjustment for confounding in the analyses from which the main findings were drawn?
    a. This question should be answered no for trials if: the main conclusions of the study were based on analyses of treatment rather than intention to treat; the distribution of known confounders in the different treatment groups was not described; or the distribution of known confounders differed between the treatment groups but was not taken into account in the analyses. In nonrandomised studies if the effect of the main confounders was not investigated or confounding was demonstrated but no adjustment was made in the final analyses the question should be answered as no.

YES	1
N/A Reported no base line differences and therefore no requirement	1
NO – was a difference and didn't adjust	0
UNABLE TO DETERMINE any baseline differences	0

17. Were losses of participants to follow-up taken into account?
    a. If the numbers of participants lost to follow-up are not reported, the question should be answered as unable to determine. If the proportion lost to follow-up was too small to affect the main findings, the question should be answered yes.

YES	1
N/A if there was a statement that all recruited made it to post	1
NO	0
UNABLE TO DETERMINE	0

18. Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%? (WAS THE POWER CALCULATION DONE)
    a. Sample sizes have been calculated to detect a difference of x% and y%.

YES	1
NO	0

19. If a power calculation was done, was this adjusted to take into account multiple outcome variables (if multiple variables were collected)? ADD TO POWER DOMAIN

YES (N/A only 1 variable)	1
NO	0

20. Were familiarisation sessions of training completed? ADDED TO INTERNAL VALIDITY - BIAS

YES	1
NO	0

21. Were familiarisation sessions of testing completed? ADDED TO INTERNAL VALIDITY - BIAS

YES	1
NO	0

22. Was number of sessions attended reported? ADDED TO REPORTING DOMAIN

YES	1
NO	0

23. Was a minimum number of sessions for inclusion reported? ADDED TO REPORTING DOMAIN

YES	1
NO	0

Non-Control trials checklist:

1. Is the hypothesis/aim/objective of the study clearly described?

YES	1
NO	0

2. Are the main outcomes to be measured clearly described in the Introduction or Methods section?
    a. If the main outcomes are first mentioned in the Results section, the question should be answered no.

YES	1
NO	0

3. Are the characteristics of the participants included in the study clearly described?
    a. In cohort studies and trials, inclusion and/or exclusion criteria should be given. In case-control studies, a case-definition and the source for controls should be given.

YES	1
NO	0

4. Are the interventions of interest clearly described?
    a. Treatments and placebo (where relevant) that are to be compared should be clearly described.

YES	1
NO	0

5. Are the main findings of the study clearly described?
    a. Simple outcome data (including denominators and numerators) should be reported for all major findings so that the reader can check the major analyses and conclusions. (This question does not cover statistical tests which are considered below).

YES	1
NO	0

6. Does the study provide estimates of the random variability in the data for the main outcomes?
    a. In non-normally distributed data the inter-quartile range of results should be reported. In normally distributed data the standard error, standard deviation or confidence intervals should be reported. If the distribution of the data is not described, it must be assumed that the estimates used were appropriate and the question should be answered yes.

YES	1
NO	0

7. Have the characteristics of participants lost to follow-up been described?
    a. This should be answered yes where there were no losses to follow-up or where losses to follow-up were so small that findings would be unaffected by their inclusion. This should be answered no, where a study does not report the number of participant lost to follow-up.

YES	1
NO	0

8. Have actual probability values been reported (e.g.0.035 rather than <0.05) for the main outcomes except where the probability value is less than 0.001?

YES	1
NO	0

9. Was an attempt made to blind those measuring the main outcomes of the intervention?

YES	1
NO	0
UNABLE TO DETERMINE	0

10. Were the statistical tests used to assess the main outcomes appropriate?
    a. The statistical techniques used must be appropriate to the data. For example nonparametric methods should be used for small sample sizes. Where little statistical analysis has been undertaken but where there is no evidence of bias, the question should be answered yes. If the distribution of the data (normal or not) is not described it must be assumed that the estimates used were appropriate and the question should be answered yes.

YES	1
NO	0
UNABLE TO DETERMINE	0

11. Was compliance with the intervention/s reliable?
    a. Where there was noncompliance with the allocated treatment or where there was contamination of one group, the question should be answered no. For studies where the effect of any misclassification was likely to bias any association to the null, the question should be answered yes.

YES	1
NO	0
UNABLE TO DETERMINE	0

12. Were the main outcome measures used accurate (valid and reliable)?
    a. For studies where the outcome measures are clearly described, the question should be answered yes. For studies which refer to other work or that demonstrates the outcome measures are accurate, the question should be answered as yes.

YES	1
NO	0
UNABLE TO DETERMINE	0

13. Were losses of participants to follow-up taken into account?
    a. If the numbers of participants lost to follow-up are not reported, the question should be answered as unable to determine. If the proportion lost to follow-up was too small to affect the main findings, the question should be answered yes.

YES	1
N/A if there was a statement that all recruited made it to post	1
NO	0
UNABLE TO DETERMINE	0

14. Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%? (WAS THE POWER CALCULATION DONE)
    a. Sample sizes have been calculated to detect a difference of x% and y%.

YES	1
NO	0

15. If a power calculation was done, was this adjusted to take into account multiple outcome variables (if multiple variables were collected)? ADD TO POWER DOMAIN

YES (N/A only 1 variable)	1
NO	0

16. Were familiarisation sessions of training completed? ADDED TO INTERNAL VALIDITY - BIAS

YES	1
NO	0

17. Were familiarisation sessions of testing completed? ADDED TO INTERNAL VALIDITY - BIAS

YES	1
NO	0

18. Was number of sessions attended reported? ADDED TO REPORTING DOMAIN

YES	1
NO	0

19. Was a minimum number of sessions for inclusion reported? ADDED TO REPORTING DOMAIN

YES	1
NO	0

Electronic Supplementary Material Appendix S4: Example brms code

Variables:

1) Standardised mean difference effect sizes: SprintES
2) Within study effect size variance calculated form 0.7 correlation : SprintSE0.7
3) Study identifier: StudyId
4) Outcome identifier: OucomeId
5) Regression variable: Var1

Example basic model:

```
mod1.prior = get_prior(SprintES | se(SprintSE,sigma=TRUE) ~ 1 + (1| StudyId/OucomeId), family = gaussian(), data=Data)

mod1.prior$prior[7] = "student_t(3, 0, 1.5)"

set.seed(123)

mod1 = brm(SprintES | se(SprintSE,sigma=TRUE) ~ 1 + (1| StudyId/OucomeId), family = gaussian(),

    data = Data, prior = mod1.prior, chains = 4, iter = 20000, warmup = 10000)

mod1Posterior = posterior_samples(mod1)

# Pooled Effect Size

quantile(mod1Posterior[,1],c(0.025,0.5,0.975))

# Between study variation

quantile(mod1Posterior[,2],c(0.125,0.5,0.875))
```

Example regression model:

```
mod2.prior = get_prior(SprintES | se(SprintSE,sigma=TRUE) ~ Var1 + (1| StudyId/OucomeId), family = gaussian(), data=Data)

mod2.prior$prior[9] = "student_t(3, 0, 1.5)"

set.seed(123)

mod2 = brm(SprintES | se(SprintSE,sigma=TRUE) ~ Var1 + (1| StudyId/OucomeId), family = gaussian(),

    data = Data, prior = mod2.prior, chains = 4, iter = 20000, warmup = 10000)

mod2Posterior = posterior_samples(mod2)

# Intercept effect size

quantile(mod2Posterior[,1],c(0.025,0.5,0.975))

# Comparison of intercept to level 2 of Var1

quantile(mod2Posterior[,2],c(0.025,0.5,0.975))

# Between study variation

quantile(mod2Posterior[,3],c(0.125,0.5,0.875))
```