Supplementary Table S-F5-2. Blood Pressure Summary of the Qualifying Systematic Review and Meta-Analyses

Author, Year	Coverage Dates	Publication Type	Total Included Studies (N)	Total Participants in Study Sample (N)	Exercise Type (Mode)	Methodological Study Quality ($AMSTAR_{EX}$)	Blood Pressure Change Exercise vs Control by BP Group (mm Hg) [SBP/ DBP [Hypertension (H); Prehypertension (PH); Normal (N)] & Other Relevant Outcomes
Cornelissen, 2013b	Up to February 2012	Meta-Analysis of RCTs	93	5,223	Aerobic	Moderate	H -8.3 (95% CI -10.7 to -6.0) / -5.2 (95% CI -6.9 to -3.4); PH -4.3 (95% CI -7.7 to -0.9) / -1.7 (95% CI -2.7 to 0.7); N -1.7 (95% CI -2.2 to 0.7) / -1.1 (95% CI -2.2 to -0.1) Subgroup Analyses: Greater blood pressure reductions occurred among men 2x the magnitude vs women; ≤24 wk vs >24 wk; ≤210 min/wk vs >210 min/wk; ≥30 min/ session vs <30 min/session; moderate to vigorous vs low intensity; tendency for greater weight loss vs less weight loss
Fagard, 2007	Up to December 2003	Meta-Analysis of RCTs	72	3,836	Aerobic	Poor	H -9.1 (95% CI -9.1 to -4.6) / -4.9 (95% CI -6.5 to -3.3); N -2.0 (95% CI -3.0 to -0.9) / -1.6 (95% CI -2.3 to -1.0)
Murtagh, 2015	September 2004 to September 2012 [included an earlier search by Murphy et al. (2007)]	Meta-Analysis of RCTs	68	1,275	Aerobic	Moderate	PH -3.6 (95% CI -7.7 to -0.9) / -1.5 (95% CI -2.7 to -1.7) Other Findings: Maximal oxygen consumption increased 3.0 $ml \bullet kg \bullet min^{-1}$; Body mass index decreased -0.53 kg/m^2; waist circumference decreased -1.5 cm; body weight was reduced 1.4 kg with women having a greater effect than men; body fat was reduced 1.2%; and no changes in lipids-lipoproteins; all of which were not examined in the context of BP outcomes
MacDonald, 2016	1987 to 2013	Meta-Analysis of RCTs	64	2,344	Dynamic Resistance	High	H -5.7 (95% CI -9.0 to -2.7) / -5.2 (95% CI -8.4, -1.9); PH -3.0 (95% CI -5.1 to -1.0)/ -3.3 (95% CI -5.3 to -1.4);

							N 0.0 (95% CI -2.5 to 2.5)/ -0.9 (95% CI -2.1 to 2.2) Subgroup Analyses: Greater blood pressure reductions occurred among Nonwhite samples with hypertension -14.4 /-10.3; by blood pressure classification; white vs nonwhite; not taking meds vs taking meds; ≥8 exercises vs < 8 exercises; ≥ 3 days vs < 3 days, lower quality vs moderate vs high
Cornelissen, 2011	1987 to June 2010	Meta-Analysis of RCTs	28	1,012	Dynamic Resistance	Moderate	H -1.7 (95% CI -5.5 to 2.0) / -3.2 (95% CI -4.7 to -1.7) / PH -4.7 (95% CI -7.8 to –1.6) / -3.2 (95% CI -5.0 to -1.4) / N -1.2 (95% CI -3.5 to 1.0) / -3.2 (95% CI -5.47 to -0.9)
Casonatto, 2016*	1999 to March 2015	Meta-Analysis of RCTs	30	646	Dynamic Resistance	Moderate	H -9.0 (95% CI -11.3 to -6.8) / -5.4 (95% CI -7.1 to -3.8) N -3.2 (95% CI -4.0 to -2.3) / -2.7 (95% CI -3.4 to -2.1) Subgroup Analyses: Greater blood pressure reductions occurred among hypertensive vs normotensive; using larger than smaller muscle groups; recovering in supine vs seated position
Corso, 2016	Up to January 2015	Meta-Analysis of RCTs	68	4,110	Concurrent	High	H -5.3 (95% CI -6.4 to -4.2) / 5.6 (95% CI -6.9 to -3.8) PH -2.9 (95% CI -3.9 to -1.9) / -3.6 (95% CI -5.0 to -0.2) N 0.9 (95% CI 0.2 to 1.6) / -1.5 (95% CI -2.5 to -0.4) Subgroup Analyses: Greatest potential blood pressure reductions occurred among hypertensives in higher quality trials and when blood pressure was measured as the primary outcome -9.2/-7.7
Carlson, 2014	January 1966 to July 2013	Meta-Analysis of RCTs &	9	233	Isometric Resistance	Moderate	H -4.3 (95% CI -6.4 to -2.2) / -5.5 (95% CI - -7.9 to -3.0) /

		Cross Over Studies					-6.1 (95% CI -8.0 to -4.0) N -7.8 (95% CI -9.2 to -6.4) / -3.1 (95% CI -3.9 to -2.3) / -3.6 (95% CI -4.4 to -2.7)
Liu, 2017	Up to November 2016	Meta-Analysis of Prospective Cohort Studies	24	330,222	Habitual Physical Activity (Leisure Time and Total)	Moderate	Among 330,222 adults with normal blood pressure, after 2 to 20 years of follow up, 67,698 incident cases of hypertension occurred (20.5 percent of the sample). The risk of hypertension was reduced by 6 percent (RR=0.94 [95% CI: 0.92-0.96]) at 10 MET hours per week of leisure-time light, moderate, and vigorous physical activity (LMVPA) among adults with normal blood pressure. The protective effect increased by about 6 percent for each further each increase of 10 MET hours per week. For adults with 20 MET hours per week of leisure-time LMVPA, the risk of hypertension was reduced by 12 percent (RR=0.88 [95% CI: 0.83-0.92]); and for those for 60 MET hours per week of leisure-time LMVPA, the risk of hypertension was reduced by 33 percent (RR=0.67 [95% CI: 0.58-0.78]). The relationship between leisure-time physical and incident hypertension was linear, with no cutoff of benefit, and slightly weaker with (RR=0.94 [95% CI; 0.92-0.96]) than without (RR=0.91 [95% CI: 0.89-0.93]) body mass index (BMI) adjustment.
Huai, 2013	Up to November 2012	Meta-Analysis of Prospective Cohort Studies	13	136,846	Habitual Physical Activity (Recreational, Occupational, Commuting)	Moderate	Among 136,846 adults initially free of hypertension at baseline 15,607 adults developed hypertension (11.4% of the sample) after an average of 10 years (2-45 years) of follow up. High amounts of leisure-time physical activity (i.e., volume and/or intensity) were associated with a 19 percent decreased risk of hypertension compared to the referent group engaging in low amounts of leisure-time physical activity (RR=0.81 [95% CI: 0.76-0.85]). Moderate amounts of leisure-time physical activity were associated with an 11 percent decreased risk of hypertension compared to the referent group engaging in low amounts of leisure-time physical activity (RR=0.89 [95% CI: 0.85-0.94]). However, Huai et al. (2013) found no significant associations with occupational and commuting physical activity and incident hypertension.
Summary	Up to November 2016	10 Meta-Analyses	6 to 93	485,747	3 Aerobic, 3 Dynamic Resistance,	Poor to High	Aerobic H -8.7 / -5.0; PH -4.3/-1.7; N -1.4/-1.4 Dynamic Resistance H -3.8/-4.1; PH -3.9/-3.1; N -0.6/-2.1 Concurrent H -5.3/-5.6; PH -2.9/-3.6; N +0.9/-1.5

					1 Concurrent, 1 Isometric Resistance, 2 Habitual Physical Activity		Incident Hypertension: The risk of hypertension was reduced 6% [RR=0.94 (95% CI: 0.92-0.96)] for each 10 Met hours per week increase of leisure- time LMVPA with the protective effect increasing with greater levels of physical activity. For adults with 20 MET hours per week of leisure-time physical activity, the risk of hypertension was reduced 12% [RR=0.88 (95% CI: 0.83-0.92)]; and for those for 60 MET hours per week of leisure-time physical activity, the risk of hypertension was reduced 33% [RR=0.67 (95% CI: 0.58-0.78)]. These same dose response trends were seen for total physical activity such that for each 50 MET hours per week increase in total physical activity, the risk of hypertension was reduced 7% [RR=0.93 (95% CI: 0.88-0.98)]; and for 64.5 MET hours per week, the risk of hypertension was reduced 10%.

Legend: *=Acute, all else are chronic (i.e, training) meta-analyses, $AMSTAR_{EX}$=Assessment of multiple systematic reviews adapted for exercise, BP=blood pressure, CAM=Complementary and alternative types (modes), CI=Confidence interval, DBP=Diastolic blood pressure, H=Hypertension, PH=Prehypertension, N=Normal blood pressure, SMD=Standardized mean difference, RR=Relative risk, SBP=Systolic blood pressure, LMVPA=Light, moderate, and vigorous physical activity.

REFERENCES

Carlson DJ, Dieberg G, Hess NC, Millar PJ, Smart NA. Isometric exercise training for blood pressure management: a systematic review and meta-analysis. *Mayo Clin Proc.* 2014;89(3):327-334. doi:10.1016/j.mayocp.2013.10.030.

Casonatto J, Goessler KF, Cornelissen VA, Cardoso JR, Polito MD. The blood pressure-lowering effect of a single bout of resistance exercise: a systematic review and meta-analysis of randomised controlled trials. *Eur J Prev Cardiol.* 2016;23(16):1700-1714.

Cornelissen VA, Fagard RH, Coeckelberghs E, Vanhees L. Impact of resistance training on blood pressure and other cardiovascular risk factors: a meta-analysis of randomized, controlled trials. *Hypertension*. 2011;58(5):950-958. doi:10.1161/HYPERTENSIONAHA.111.177071.

Cornelissen VA, Smart NA. Exercise training for blood pressure: a systematic review and meta-analysis. *J Am Heart Assoc.* 2013;2(1):e004473. doi:10.1161/JAHA.112.004473.

Corso LM, Macdonald HV, Johnson BT, et al. Is concurrent training efficacious antihypertensive therapy? A meta-analysis. *Med Sci Sports Exerc.* 2016;48(12):2398-2406.

Fagard RH, Cornelissen VA. Effect of exercise on blood pressure control in hypertensive patients. *Eur J Cardiovasc Prev Rehabil.* 2007;14(1):12-17.

Huai P, Xun H, Reilly KH, Wang Y, Ma W, Xi B. Physical activity and risk of hypertension: a meta-analysis of prospective cohort studies. *Hypertension*. 2013;62(6):1021-1026. doi:10.1161/HYPERTENSIONAHA.113.01965.

Liu X, Zhang D, Liu Y, et al. Dose-response association between physical activity and incident hypertension: a systematic review and meta-analysis of cohort studies. *Hypertension*. 2017;69(5):813-820. doi:10.1161/HYPERTENSIONAHA.116.08994.

MacDonald HV, Johnson BT, Huedo-Medina TB, et al. Dynamic resistance training as stand-alone antihypertensive lifestyle therapy: a meta-analysis. *J Am Heart Assoc*. 2016;5(10): e003231. doi:10.1161/JAHA.116.003231.

Murtagh EM, Nichols L, Mohammed MA, et al. The effect of walking on risk factors for cardiovascular disease: an updated systematic review and meta-analysis of randomised control trials. *Prev Med.* 2015;72:34-43. doi:10.1016/j.ypmed.2014.12.041.