

SDC 1 Table. Physical activity to prevent and treat hypertension: A summary of the qualifying meta-analyses and systematic reviews by physical activity type

Author, Year	Coverage Dates	Publication Type	Total Included Studies (N)	Total Participants in Study Sample (N)	Exercise Type (Mode)	Methodological Study Quality (AMSTAR_{EX})	The Blood Pressure (SBP/DBP/MAP) Change (mm Hg) Following Exercise vs Control by BP Group or the Relationship of Physical Activity to Incident Hypertension or Cardiovascular Disease Progression and Other Relevant Outcomes
Conceicao, 2016 (1)	Up to February 2016	Meta-Analysis of RCTs	4	216	Aerobic (Dance) Training	Moderate	H -12.0 (95% CI -16.1 to -7.9) / -3.4 (95% CI -4.8 to -1.9)
Cornelissen, 2013b (2)	Up to February 2012	Meta-Analysis of RCTs	93	5223	Aerobic Training	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 BP reductions occurred among men 2x the magnitude vs women; ≤24 wk vs >24 wk; ≤210 min/wk vs >210 min/wk; <30 min/session and ≥30 min/ session vs; moderate to vigorous vs low intensity; greater weight loss vs less weight loss
Dickinson, 2006 (3)	1998 to May 2003	Meta-Analysis of RCTs	105	6805	Aerobic Training	Moderate	H -4.6 (95% CI -7.1 to -2.0) / -2.4 (95% CI -4.0 to -0.7)
Fagard, 2007 (4)	Up to December 2003	Meta-Analysis of RCTs	72	3836	Aerobic Training	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 (5)	September 2004 to September 2012	Meta-Analysis of RCTs	68	1,275	Aerobic Training	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•kg•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
Wen, 2017 (6)	1985 to May 2015	Meta-Analysis of RCTs	13	802	Aerobic Training	Moderate	H -7.0 (SMD 95% CI -1.29 to -0.28) / -3.0 (SMD 95% CI -1.14 to -0.12)
Casonatto, 2016 (7)	1999 to March 2015	Meta-Analysis of RCTs	30	646	Acute 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 BP reductions occurred among H vs N; using larger than smaller muscle groups; recovering in supine vs seated position
Cornelissen, 2011 (8)	1987 to June 2010	Meta-Analysis of RCTs	28	1012	Dynamic Resistance Training	Moderate	<p>H -1.7 (95% CI -5.5 to 2.0) / -3.2 (95% CI -4.7 to -1.7) /</p> <p>PH -4.7 (95% CI -7.8 to -1.6) / -3.2 (95% CI -5.0 to -1.4) /</p> <p>N -1.2 (95% CI -3.5 to 1.0) / -3.2 (95% CI -5.47 to -0.9)</p>
MacDonald, 2016 (9)	1987 to 2013	Meta-Analysis of RCTs	64	2344	Dynamic Resistance Training	High	<p>H -5.7 (95% CI -9.0 to -2.7) / -5.2 95% CI -8.4, -1.9)</p> <p>PR -3.0 (95% CI -5.1 to -1.0) / -3.3 (95% CI -5.3 to -1.4)</p> <p>N 0.0 (95% CI -2.5 to 2.5) / -0.9 (95% CI -2.1 to 2.2)</p> <p>Subgroup Analyses: Greater BP reductions occurred among Nonwhite samples with H -14.4 /-10.3; by BP 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</p>
Corso, 2016 (10)	Up to January 2015	Meta-Analysis of RCTs	68	4110	Concurrent Training	High	<p>H -5.3 (95% CI -6.4 to -4.2) / 5.6 (95% CI -6.9 to -3.8)</p> <p>PH -2.9 (95% CI -3.9 to -1.9) / -3.6 (95% CI -5.0 to -0.2)</p> <p>N 0.9 (95% CI 0.2 to 1.6) / -1.5 (95% CI -2.5 to -0.4)</p> <p>Subgroup Analyses: Greatest potential BP reductions occurred among H in higher quality trials and when BP was measured as the primary outcome -9.2/-7.7</p>

Carlson, 2014 (11)	January 1966 to July 2013	Meta-Analysis of RCTs & Cross Over Studies	9	233	Isometric Resistance Training	Moderate	H -4.3 (95% CI -6.4 to -2.2) / -5.5 (95% CI -7.9 to -3.0) / -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)
Park, 2017 (12)	1946 to 2014	Meta-Analysis of RCTs	6	394	Yoga	Moderate	H -11.4 (95% CI -14.6 to -8.2) / -2.4 (95% CI -4.3 to -0.4) These findings were noted in a subsample of study participations ≥ 60 years
Xiong, 2015 (13)	1978 to November 2014	Meta-Analysis of RCTs	8	572	Baduanjin	Moderate	H -13.0 (95% CI -21.2 to -4.8) / -6.1 (95% CI -11.2 to -1.1) Subgroup Analyses: Greater BP reductions occurred with Baduanjin + meds vs meds only -7.5 (95% CI -11.4 to -3.6)/ -3.6 (95% CI -5.2 to -1.8)
Xiong, 2015 (14)	1959 to April 2014	Meta-Analysis of RCTs	20	2349	Qigong	Moderate	H -17.4 (95% CI -21.1 to -13.7) / -10.6 (95% CI -14.0 to -6.3) Subgroup Analyses: Greater BP reductions occurred with exercise vs Qigong -6.5 (95% CI -2.8 to -10.2)/+ or -?0.7 (95% CI -1.4 to 2.7); Qigong vs antihypertensive meds -7.9 (95% CI -16.8 to 1.0)/ -6.1 (95% CI -9.6 to -2.6); Qigong + antihypertensive meds vs antihypertensive meds -12.0 (95% CI -15.6 to -8.5)/-5.3 (95% CI -8.1 to -2.4)
Wang, 2013 (15)	1959 to April 2013	Meta-Analysis of RCTs	18	1371	Tai Chi	Moderate	H -12.4 (95% CI -12.6 to -12.2) / -6.0 (95% CI -6.2 to -5.9) Subgroup Analyses: Greater BP reductions occurred with Tai Chi vs antihypertensive meds -14.3 (95% CI -14.31 to -14.29)/-6.0 (95% CI -6.01 to -5.99); Tai Chi + antihypertensive meds vs meds -9.3 (95% CI -10.9 to -7.8)/-7.2 (95% CI -7.7 to -6.6); and Tai Chi vs routine care -12.4 (95% CI -12.6 to -12.2) /-6.0 (95% CI -6.2 to -5.9)

Huai, 2013 (16)	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 H at baseline 15,607 adults developed H (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 H 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% decreased risk of H 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 H.
Liu, 2017 (17)	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 N, after 2 to 20 years of follow up, 67,698 incident cases of H occurred (20.5% of the sample). The risk of H was reduced by 6% (RR=0.94 [95% CI: 0.92-0.96]) at 10 MET hours per week of leisure-time light, moderate, and vigorous physical activity among adults with normal blood pressure. The protective effect increased by about 6% for each further each increase of 10 MET hours per week. For adults with 20 MET hours per week of leisure-time light, moderate, and vigorous physical activity, the risk of H was reduced by 12% (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 H was reduced by 33% (RR=0.67 [95% CI: 0.58-0.78]). The relationship between leisure-time physical and incident H 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 adjustment.
Rossi, 2012 (18)	January 1985 to January 2012	Systematic Review of Prospective Cohort Studies	6	96,073	Habitual Physical Activity (Mostly General, Leisure)	High	Hu and colleagues [2007] investigated the associations among occupational, daily commuting, and leisure-time physical activity and CVD mortality among 26,643 overweight, Finnish men and women with H 25 to 64 years of age that were followed for 20 years. The multivariate-adjusted hazard ratios of CVD mortality associated with low (almost completely inactive), moderate (some physical activity more than 4 hours per week \approx 12 MET hours per week or more), and high (vigorous physical activity more than 3 hours per week \approx 18 MET hours per week or more) leisure-time physical activity were 1.00, 0.84 (95% CI: 0.77-0.92), and 0.73 (95% CI: 0.62-0.86) among men, respectively; and 1.00, 0.78 (95% CI: 0.70-0.87) and 0.76 (95% CI: 0.60-0.97) among women, respectively. Vatten [2006] found that among men with a resting SBP between 140-159 mmHg, those who were highly physically active [RR 1.21 (95% CI: 0.97-1.52)] reduced their risk of CVD mortality by 30% compared to those who were physically inactive [RR 1.73 (95% CI:

							1.37-2.19)]. Among men with a resting SBP >160 mmHg, those who were highly physically active [RR 1.82 (95% CI: 1.46-2.28)] reduced their risk of CVD mortality by 19% compared to those who were physically inactive [RR 2.24 (95% CI: 1.78-2.83)]. In addition, among women with a resting SBP between 140-159 mmHg, those who were highly physically active [RR 1.47 (95% CI: 1.04-2.09)] reduced their risk of CVD mortality by 24% compared to those who were physically inactive [RR 1.93 (95% CI: 1.39-2.69)]. Among women with a resting SBP >160 mmHg, those who were highly physically active [RR 1.77 (95% CI: 1.26-2.54)] reduced their risk of CVD mortality by 27% compared to those who were physically inactive [RR 2.41 (95% CI: 1.76-3.30)]. Therefore, as SBP increases within hypertensive ranges, the risk of CVD mortality increases. However, the increased risk is attenuated with higher levels of physical activity.
Summary	1946 to 2016	17 Meta-Analyses & 1 Systematic Review	4 to 93	594,129	Aerobic (k=6), Dynamic Resistance (k=3), 1 Concurrent (k=1), Isometric Resistance (k=1), CAM (k=4), Habitual Physical Activity (k=3)	Poor (k=1); Moderate (k=14); High (k=3) 83.3% Poor to Moderate; 16.7% High	Aerobic H -8.3 /-5.2; PH -4.3/-1.7; N -1.4/-1.3 Dynamic Resistance H -5.7/-5.2; PH -2.9/-3.6; N -0.9/0.0 Concurrent H -5.3/-5.6; PH -2.9/-3.6; N +0.9/-1.5 CAM H -13.6 /-8.5 Leisure-time moderate physical activity equating to ≈ 12 MET hours per week or more reduced CVD mortality by 16% among men and 22% among women, while higher amounts of leisure time vigorous physical activity equating to ≈18 MET hours per week or more reduced CVD mortality by 27% among men and 24% among women, indicating an inverse, dose-response relationship between leisure-time physical activity and CVD mortality among adults with H.

AMSTARE_xBP=Assessment of multiple systematic reviews adapted for exercise and BP; BP=blood pressure; CAM=Complementary and alternative types (modes); CI=Confidence interval; CVD=cardiovascular disease; DBP=Diastolic blood pressure; H=Hypertension; NA=Not applicable; MAP=Mean arterial blood pressure; METS=Metabolic energy equivalents; N=Normal blood pressure; P=Prehypertension; RCT=Randomized controlled trial; SMD=Standardized mean difference; RR=Relative risk; SBP=Systolic blood pressure; MPA=moderate physical activity; VPA=vigorous physical activity.

SDC 1 Table REFERENCES

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