Bilateral Pole Walking Effects Evidence Table - Middle-Aged Adults

Author/Year Title Journal/Country	Study Design & Purpose	Participants	Intervention	Measures	Results	Conclusions	Relevance/ Comments
Hagen et al (2011) *Lower & Upper Extremity Loading in Nordic Walking in Comparison with Walking & Running* (Germany)	**Cross-Sectiona**l Examine jt loading parameters and risk of injury w/ NW @ various speeds compared w/ W & running	n=24 38±13 yrs 12 M, 12 F NW instructors	Randomized W & NW trails by ea participant @ 5, 7, 8, & 8.5 kph	Movement speed, GRF,pronation(electrogoniometer), wrist accelometry measure of shock wave transmission	•NW had significantly longer contact times than W w/ ↑LE loading force in 4/12 parameters • NW had SS↓in peak vertical force & loading rate compared w/running, • In NW, SS ↑force to wrist w/↑in speed	•Based on type of NW technique practiced, LE loading forces not reduced in NW compared w/ W. • Repetitive wrist shocks↑ wrist injury risk. Pole handling, grip force, and shock absorption, & prevention ex may ↓risks	* Participants instructed & practiced a particular NW technique of Western German Skiing Assoc, w/ longer stride • Wrist safeguard considerations
Hansen et al (2009) *Energy Expenditure & Comfort During nordic Walking with Different Pole Lengths* (Norway)	**Cross-Sectional** Examine NW effects of different pole lengths	n=12 50.6±2.4 yrs 1 M, 11 F healthy, NW practictioners	treadmill trials on level, 12° uphill & downhill grades w/ different pole lengths	Self-rated comfort Max O2 uptake lactate analysis, HR	• Self selected pole length=67.7±0.5% body ht • Uphill pole length =63.3±0.6% body ht • No difference btw level & downhill NW * 67% ↑energy expend-iture in level NW than W	• Shorter poles ↑uphill NW energy expenditure • Self-selected pole length corresponded to comfort	•Participants practiced a particular NW technique w/ ↑stride length • Pole adj.individualized for comfort, shorter for uphill climbs
Knobloch et al (2006) *Nordic Pole Walking Injuries - Nordic Walking Thumb as Novel Injury Entity* (Germany)	**Review** Obtain data the injury and overload rates of NW	n=137 53.5± 12 yrs 74% F NW practitioners	Questionnaires btw May-September 2005	Calculation of means, standard deviations awa the calculation of the ind & total exposure time in hours	Per 1000 hrs: Total NW injuries=0.926 UE (0.549)>LE(0.344) inj. Most freq inj=distortion of unlar collateral ligament of thumb (0.206)> fall • all resumed NW by 4wks	•NW considered a safe sport. •NW thumb inj may happen w/ fall w/ pole handle forcing thumb into abd & ext.•Prevention efforts-grip constructio/ modifications/education/ technique changes	• Assessment of grip during PW and determination if/how strap is used for injury prevention
Fritschi et al (2012)*The effects of pole walking oh health in adults: A systematic review* (Australia)	**Systematic Review** Summarize effects of PW programs on physical & psychosocial health via quality studies	N=14 articles from 13 studies, 531 articles were identified, winnowed to 14 papers (11 RCTs, 3 CTs) meeting all eligibility criteria.	Process involved 2 ind reviewers reading abstracts w/ consensus for eli-gibility. Final articles inde reviewed & assessed by 2 authors.	Quality assmt of studies - modified Delphi quality score ((yes-no scoring, all criteria equally weighted , >50% rating defined as high quality).	• Quality scores of 14 PW articles ranged from 29% - 86%, with the majority (11) scoring >50% (considered high quality).	• Evidence supports PW has pos effects on phys act & psychosocial outcomes, is well-tolerated & appears to be a safe ex for a wide variety of individual & pt populations. All studies found at least one pos effect, particularly w/ cardioresp, phys activity, & QoL outcomes.	• PW effects on pain, anthropometry, muscle strength & flexibility, fatigue, gait parameters, & blood glucose levels are unclear, more & better quality research needed.

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Kukkonen-Harjula et al (2007) *Self-guided brisk walking training with or without poles: a randomized-controlled trial in middle-aged women* (Finland)	**RCT*** Study health related fitness effects of NW & W w/ sedentary middle-aged women	n=115, into 2 groups: PW=57, W=58 54±3 yrs, female sedentary	40 min 4x/wk for 13 wks, warm-up ex, subjective "walk briskly"protocol & cool-down	HR (monitor), RPE, Pain report Pre/Post: 1-leg balance, walking bkwds, neck shoulder mobility, UE extension, one-leg squat	9 drop-outs (3NW, 6W), 4 training-related LE non-severe injuries from both groups. so post test groups NW=54, W=52) No significant btw group differences except W improved more in 1 legged squat test.	Both W & NW groups demonstrated significant improvements in health-related fitness, and both W & NW appear to be safe & feasible fitness interventions.	Dynamic UE mm test was based on repetitions w/o wts.- UE strength meas may have provided more btw group comparative data
Sprod et al (2005) *The Effects of Walking Poles on Shoulder Function in Breast Cancer Survivors (USA)*	**RCT*** For breast cx survivors, would PW ex program ↑shoulder ROM & UE mm endurance?	n=12, into 2 groups: PW=6, W=6 breast cx survivors, women 50.3±2.7 yrs	Both groups: 20 min, 2x/wk for 8 wks, to PW or W intensity of 40-50% HR reserve, followed by 30 min RET	Pre & post: shoulder ROM & mm endurance: bench press, should press & LD pull down	PW showed SS ($p<0.05$) on bench press & LD pull-down ex; W group showed no within-group improvement in UE muscular endurance.	PW may be easy to use, provide increased stability, may enable increased walking intensity, and increase opportunities to target shoulder mm activity and promote function	Intriguing study, no comments on wearing compression sleeve during activity, which may be important for lymphedema mgmt
Mannerkopi et al (2010) *Does Moderate-to-high intensity Nordic walking improve functional capacity and pain in fibromyalgia? A prospective randomized controlled trial (Sweden)*	**Prospective RCT*** Study NW program effects w/ population w/ fibromyalgia in ↑body fx and ↓pain sx	n=67 into 2 groups: NW=34, W=33 women, fibromyalgia dx 49±7.7 yrs	Both groups: 40-45 min, 2x/wk for 15 wks, (20 min w/ actual W or NW) NW:mod-to-high intensity, W:low intensity workout	•6MWT • FIQ Pain scale, FIQ Physical &, FIQ total scores • EX HR in bicycle ergometer bicycle test • 6 mo followoup	58 completed (9 dropout) •SS↑6MWT($p=0.009$) ,FIQ Physical ($p=0.027$), & SS↓in ex HR ($p=0.020$) in NW compared w/ W group • no btw group differences for FIQ pain • mod outcome effect size	• tailored NW program btw low & mod to high intensity may be effective for pts w/ FM to ↑phys fitness & fx &↓activity limitations. No change demonstrated in pain severity - did not ↓pain but also did not appear to contribute to flare-ups.	Given effective adjustments of NW ex program to match ex capacity, NW may be effective ex & fitness intervention for some pts w/ FM
Hartvigsen et al (2010) *Supervised and non-supervised Nordic walking in the treatment of chronic low lack pain: a single blind randomized clinical trial* (Denmark)	**RCT*** Study unsuper-vised & super-vised NW program effects in pts w/ chronic LBP	n=136 into 3 groups: sup NW=45, unsup NW=46, advice=45 68-77% F, 34-23%M LBP dx > 8wks	•sup NW group-45 min, 2x/wk for 8 wks • unsup NW -1x NW instruction & at home practice 8 wks • Advice group- ed info only	•LBP rating scale,PSFS, EQ-5D (HrQoL scale), •Medication use, • accelorometer meas.for NW groups	No SS improvements found between groups, sup NW group faired better than other groups. At 8 wks, sup NW group used ↓pain meds,and ↓care visits • No reported neg effects	Although no SS findings, mean improvements favored sup NW group program. For selected pts w/ LBP, NW may be effect intervention.	Given wide variability of sx in pop w/ LBP, PW modifications and adjustments may contribute to success of PW intervention.

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Kocur et al (2009) *Effects of NW training on exercise capacity & fitness in men partici-pating in early, short-term inpatient cardiac rehabilitation afater and acute coronary syndrome a controlled trial* (Poland)	**CT*** Determine if adding NW to standard cardiac rehab improve pt fitness outcomes.	n=80 into 3 groups: NW=40, W=20, C =20 male acute coronary syndrome dx 2-3 wks prior w/ good ex tol 51-54±9.4 yrs	All groups part of in-pt cardiac rehab program 5x/wk for 3 wk starting w/ ex. & cycle ergo-meter trng. NW group had additional NW session, W group had add'l W session.	*Fullerton Functional Fitness Test *Ex capacity - sx-limited treadmill ex w/ modified Bruce protocol * HR, Borg RPE	•Btw W & NW groups, NW had SS↑in chair stand and Up & go subtests of FFFT • NW ex cap SS↑over both groups • W & NW showed SS↑in FFFT over C group.	NW may be effective adjunct intervention for pts w/ acute coronary syndrome w/ good ex tolerance in early (2-3 wks post) rehab jprograms.	NW program intensity monitored by PT w/ length of outdoor course =2.5 km; 5 min break halfway.
Figard-Fabre et al (2010) *Efficacy of Nordic Walking in Obesity Management* (Italy)	**CT*** Compare NW w/ W interval program to improve ex capcity of obese middle-aged women	n=23 , into 2 groups: NW=12, W=11 middle-aged female obese BMI 85-86±15	45 min 3x/wk for 12 wks training program, subjects in NW pogram had add'l trng instruction. 1 session/wk supervised, 2/wk individual	Anthropometric measures, HRR measures for ex intensity determiniation, Borg RPE, ex adherence, HR monitor, metabolic system monitor	• NW mean adherence rate significantly higher than W program, although both program adherence in W program also good • Both NW & W programs showed SS improvements in BMI, ↓in %body fat and diastolic BP measures. • Positive resonse to NW by participants	NW may be effective intervention for fitness activity for individuals w/ obesity, authors suggest to start by walking @ preferred walking speed & gradually adjust to perceived "maximal speed".	NW adjustments in use and intensity may help to increase reg ex activity and adherence for sedentary ind w/ obestity.