

PHILLIP B. WATTS, Ph.D. FACSM

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CURRENT EMPLOYER

School of Health and Human Performance
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EDUCATIONAL BACKGROUND

- 1975-80 **University of Maryland Graduate School, College Park, Maryland.**
Major: Exercise Physiology
Minor: Human Anatomy and Physiology
Ph.D. degree awarded, 1980
- 1976 **American College of Sports Medicine - Aspen Exercise Leadership Workshop**
Aspen, Colorado. ACSM Certified Exercise Specialist.
- 1973-74 **East Carolina University Graduate School, Greenville, N.C.**
Major: Physical Education
M.A. degree awarded, 1974
- 1969-73 **East Carolina University, Greenville, North Carolina.**
Major: Health and Physical Education
B.S. degree and teaching certificate awarded, 1973.

MEMBERSHIPS

American College of Sports Medicine – Fellow
The Midwest Regional Chapter ACSM
American Alpine Club
Sigma Xi - Scientific Research Society

PROFESSIONAL EXPERIENCE

Northern Michigan University, Marquette, Michigan; 1978-Present.

Tenured Professor

- ❖ GETFIT! Exercise Program; Coordinator 1978-85.
- ❖ Cardiac Rehabilitation Exercise Program; program developer/coordinator, 1978-85.
- ❖ Consultant to the U.S. Olympic Education Center.
- ❖ Master of Science Degree Program in Exercise Science; program developer, 1981.
- ❖ Bachelor of Science Degree Program in Sport Science; program developer, 1996.
- ❖ President of NMU Sigma Xi, 1991/1992
- ❖ Appointed to the University Priorities Committee, 1992.
- ❖ Chair, Faculty Grants Committee, 1997-1999.
- ❖ Chair, *Science In Winter Sports* interest group, American College of Sports Medicine, 2001-2003
- ❖ Coordinator of Sports Science program (1996-2010) and Exercise Science program (1981-2014)

Courses:	HP 258A Rock Climbing	1 credit*
	HP 258B Intermediate Rock Climbing	1 credit*
	RE 358 Teaching of Rock Climbing	2 credits*
	HL 470 Electrocardiography (through 1999)	1 credit *
	ES 315 Physiology of Exercise	4 credits
	PE 316 Kinesiology (Through 1989)	3 credits
	ES 421 Physiology of Training for Sport	3 credits*
	PE 471 Exercise Specialization (Through 1987)	2 credits*
	PE 472 Health and Exer. Leadership Skills (through 1987)	2 credits*
	ES 501 Communications in Exercise Science	1 credit *
	ES 521 Adv. Exercise Physiology	3 credits*
	ES 531 Adv. Seminar in Exercise Physiology	3 credits*
	ES 540 Adv. Mechanical Kinesiology (Through 1989)	3 credits*
	ES 571 Laboratory Procedures in Exercise Science (3 modules)	1 credit each*
	ES 572 Internship in Adult Fit./Cardiac Rehab.(Through 1990)	2 credits*

*Indicates course developed by P.B. Watts.

University of Maryland, College Park, MD; August 1975 to December 1977.

Research Assistant; Sports Medicine and Physical Fitness Center.

- ❖ Univ. of Maryland Adult Fitness Program; coordinator, 1975-77.
- ❖ National Fire Protection and Control Administration Grant for development of a job-related testing program for urban firefighters; Research Assistant.
- ❖ U.S. Department of Justice Occupational Health and Physical Fitness Program; Exercise Stress Test Technician.

AWARDS AND GRANTS

NMU College of Professional Studies Professional Development Grant (wt Scott Drum, PhD; \$5000) Geometric Entropy, Anthropometry, and Psychophysiological Assessment during Lead Rock Climbing Ascents; 2015.

NMU College of Professional Studies Professional Development Grant (\$4844) Geometric Entropy for Lead vs Top-Rope Rock Climbing Ascent Styles; 2013.

NMU Faculty Research Grant (\$7000) Changes in metabolic cost and economy with long-term repeated performance in rock climbing; 2009.

NMU Faculty Research Grant (\$7000) to study physiological responses and energy expenditure in children during rock climbing activity; 2006.

NMU Excellence in Professional Development Award – 2005.

NMU College of Professional Studies Grant (\$1972) to author a course-specific laboratory manual for undergraduate physiology of exercise; 2003-2004.

NMU College of Professional Studies Research Grant (\$1585) to study anthropometry, exercise habits and eating attitudes in physical active youth ages 10-19 years; 1999-2000.

NMU Peter White Scholar for 1999-2000 - \$10,000 award.

Michigan Association of Governing Boards (MAGB) Distinguished Faculty Award, 1999.

Eight-time recipient of Northern Michigan University Faculty Merit Award.

NMU Faculty Research Grant (\$6094) to study acute physiological and metabolic responses during difficult sport rock climbing in expert rock climbers, 1996.

NMU Faculty Research Grant (\$5,888) to develop and test a physiological model for X-C ski racing, 1993.

NMU Distinguished Faculty Award, 1992.

Elected to Fellowship status - American College of Sports Medicine, 1990.

Recipient of a Brewer's Ledge Inc. Treadwall (rock climbing treadmill) to use for research on the metabolic costs of rock climbing (valued at \$10,000), 1991.

NMU Faculty Research Grant (\$2500) to study acute effects of sport climbing on handgrip strength, handgrip endurance, and blood lactate in elite rock climbers, 1991.

Recreational Equipment Incorporated (REI) Climbing Research Grant (\$1500), 1989.

Peter White Research Equipment Award (\$5000), 1989.

NMU Faculty Research Grant (\$2950) to study prediction of high-altitude mountaineering performance from anthropometric and physiologic profiles, 1989.

NMU Faculty Research Grant (\$3000) to study exertional intensities and energy costs of technical mountaineering at moderate altitudes, 1987.

Peter White Research Equipment Award (\$1375), 1986.

NMU Faculty Research Grant (\$3143) to study physiological adaptations in extended technical mountaineering, 1985.

NMU Faculty Research Grant (\$2195) to study the effects of relative training intensity upon acute hemolysis in distance runners, 1984.

NMU Faculty Research Grant (\$2014) to study effects of a glycogen depletion-loading regimen upon the metabolic responses to graded exertion, 1980.

Advisor for eleven student recipients of NMU Spooner Student Research Grants (\$500 each.)

RESEARCH PRESENTATIONS AND PUBLICATIONS

Draper, N, D Giles, V Schoffl, F Fuss, PB Watts, et al. Comparative grading scales, statistical analyses, climber descriptors and ability grouping: International Rock Climbing Research Association position statement. *Sports Tech*. 2016. [dx.doi.org/10.1080/19346182.2015.1107081](https://doi.org/10.1080/19346182.2015.1107081).

Watts, PB. Economy in Difficult Rock Climbing. Chapter 3 in Science of Climbing and Mountaineering, Wolf, P, L Seifert, A Schweizer, Editors. In Review, 2015.

Watts, PB, SN Drum, MA Kilgas, KC Phillips. Geometric Entropy for Lead vs Top-Rope Rock Climbing. *Int J Exerc Sci*. Accepted for publication in 2016.

Watts, PB, V España-Romero, ML Ostrowski, RL Jensen. Change in Geometric Entropy and Energy Expenditure with Repeated Ascents in Rock Climbing. *J Appl Biomechanics*. In Review, 2015.

Watts, PB, S Drum, M Kilgas, K Phillips. Geometric Entropy During Rock Climbing – Lead vs Top-Rope Ascents. Presented at the *2nd International Rock Climbing Research Congress*, Pontresina, Switzerland, September, 2014.

Kilgas, MA, KC Phillips, PB Watts. Static Stretching does not impair sport specific measures of upper-limb force and power in rock climbing. Presented at the *2nd International Rock Climbing Research Congress*, Pontresina, Switzerland, September, 2014.

Durocher, BE, MH Harwood, SN Drum, PB Watts, MT Moore. The acute cardiovascular and inflammatory responses to ultramarathon and marathon. Presented at the *2014 Annual Meeting of the American College of Sports Medicine*, Orlando, FL, June, 2014.

Watts, PB and ML Ostrowski. Oxygen Uptake and Energy Expenditure for Children During Rock Climbing Activity. *Ped Ex Sci*. 26:46-55, 2014.

Watts, PB, V España-Romero, ML Ostrowski, RL Jensen. Change in geometric entropy and energy expenditure with repeated ascents in rock climbing. Presented at the *2013 Annual Meeting of the American College of Sports Medicine*, Indianapolis, IN, June, 2013.

Watts, PB. Up The Walls – Climbing and Children. Keynote presentation delivered at the 2013 Conference of the *Rocky Mountain Chapter of the American College of Sports Medicine*. Denver, April, 2013.

Kane DA, SJ MacKenzie, RL Jensen and PB Watts. Effects of stroke resistance on rowing economy in club rowers post-season. *Int J Sports Med*. 34(2):131-137, 2013.

Watts, PB, ME Burger and JD Dalgord. Effect of High-Intensity Interval Training on Stride Distance During Treadmill Double-Pole Roller-Skiing. Presented at the *Annual Meeting of the American College of Sports Medicine*, San Francisco, June, 2012.

España-Romero, V and PB Watts FACSM. Strength:volume ratio for the forearm in climbers and non-climbers. Presented at the *Annual Meeting of the American College of Sports Medicine*, San Francisco, June, 2012.

Petushek, E, C Richter, D Donovan, WP Ebben, PB Watts, RL Jensen. Comparison of 2D video and electrogoniometry measurements of knee flexion angle during a countermovement jump and landing task. *Sports Eng*. 15(3): 159-166, 2012.

Leissring, SK, RL Jensen, JL Tervo and PB Watts. Onset and Offset of Rectus Femoris Activation During Double Poling Ergometry in Two Positions: Standing vs. Sitting. *Portuguese Journal of Sport Sciences*. 11 (Suppl. 2):747-750, 2011.

España-Romero, V., R.L. Jensen, X. Sanchez, M.L. Ostrowski, J.E. Szekely, P.B. Watts. Physiological responses in rock climbing with repeated ascents over a 10-week period. *Eur J Appl Physiol*, 112(3), 821-828, 2012. Electronic, 2011 DOI 10.1007/s00421-011-2022-0

Watts, P.B., R. L. Jensen, M. L. Ostrowski, X. Sanchez, J. E. Szekely, V. España-Romero. Effect of Route Repetition on Energy Expenditure in Rock Climbing. *Med Sci Sports Exerc*, 43(5):S657-658,

2011. Presented at the *Annual Meeting of the American College of Sports Medicine*, Denver, 2011.

M.L. Ostrowski, V. España-Romero, R.L. Jensen, X. Sanchez, J.E. Szekely, P.B. Watts. Effects of Rock Climbing Route Ascent and Route Familiarity on Handgrip and Finger-Curl Force. *Med Sci Sports Exerc*, 43(5):S657, 2011. Presented at the *Annual Meeting of the American College of Sports Medicine*, Denver, 2011.

Tervo, J.L. and P.B. Watts. Physiological responses of double pole ergometry: standing vs. sitting. Presented at the *5th International Congress on Science and Skiing*, St. Christoph, Austria, 2010.

Jensen, R.L. S.K. Leissring, J.L. Tervo, P.B. Watts. Joint ROM during standing and seated double pole ergometry. Presented at the *5th International Congress on Science and Skiing*, St. Christoph, Austria, 2010.

Tervo, J.L., P.B. Watts, and R.L. Jensen. Electromyographical analysis of double pole ergometry: Standing vs. sitting. In *Proceedings of the 28th Conference of the International Society of Biomechanics in Sports*, 136-139, 2009.

Kaliyamoorthy, M. P.B. Watts, R.L. Jensen and J.A. LaChapelle. Effect of fatigue on dynamic balance after maximum intensity cross country skiing. In: *Proceedings of the XXVII Congress of the International Society of Biomechanics in Sports*, 350, 2009.

Watts, P.B., M.L. Ostrowski. Energy expenditure in children during rock climbing activity. Presented at the *Annual Meeting of the American College of Sports Medicine*. Seattle, May, 2009.

Bowen, R.S., R.L. Jensen, J.M. Ryan, P.B. Watts. Modeling oxygen uptake during V1 treadmill roller skiing. *Int. J. Exerc. Sci.*, 2(1): 48-59, 2009.

Abe, S., R.L. Jensen, P.L. Malin, P.B. Watts. Joint angle changes with varied foot positioning in rock climbing. In: *Proceedings of the XXVI Congress of the International Society of Biomechanics in Sports*, 390-392, 2008

McCutcheon, M.J., R.L. Jensen, R.A. Marlors, P.B. Watts. Energy economy: effect of lateral pedal width variations relative to Q-angle in avid cyclists. In: *Proceedings of the XXVI Congress of the International Society of Biomechanics in Sports*, 316-319, 2008.

Malin, P.L., S. Abe, R.L. Jensen, P.B. Watts. Reliability of joint angle movements during rock climbing. In: *Proceedings of the North American Congress on Biomechanics* <http://www.xcdtech.com/nacob/Abstracts/359.pdf>, 2008.

Watts, P.B., R.L. Jensen, S.M. Agena, J.A. Majchrzak, R.A. Schellinger, C. S. Wubbels. Changes in EMG and finger force with repeated hangs from the hands in rock climbers. *Int. J. Exerc. Sci.* 1(2):62-70, 2008. (<http://digitalcommons.wku.edu/ijes/vol1/iss2/3/>)

Watts, P.B., R.L. Jensen, E. Gannon, R. Kobeinia, J. Maynard, J. Sansom. Forearm EMG during rock climbing differs from EMG during handgrip dynamometry. *Int. J. Exerc. Sci.* 1(1):4-13, 2008. (<http://digitalcommons.wku.edu/ijes/vol1/iss1/2/>)

Kane, D.A., R.L. Jensen, S.E. Williams, P.B. Watts. Effects of drag factor on physiological aspects of rowing. *Int. J. Sports Med.* 29(5):390-4, 2008.

Watts, P.B., V. Asmus-Newbury. Economy responses to stride frequency variations during diagonal stride treadmill roller-skiing. Presented at the *4th International Congress on Science and Skiing*, St. Christoph am Arlberg, Austria, December, 2007.

Jensen, R.L., S. Fjeldheim, J. Ryan, P.B. Watts. Recovery heart rate during graded stage testing. Presented at the 4th International Congress on Science and Skiing, St. Christoph am Arlberg, Austria, December, 2007.

Marlor, D.M., P.B. Watts, R.L. Jensen. Creating an individualized nutrition plan for novel ultradistance events in a cold environment: case study of the La Grande Odyssee Dog Sled Race. Presented at the 4th Annual International Society of Sports Nutrition Conference, June, 2007.

Bowen, R.S., J.M. Ryan, R.L. Jensen, P.B. Watts. Linear regression analysis for prediction of VO₂ during treadmill roller skiing using the V1 technique. (Abst.) *Med. Sci. Sports Exerc.* 39(5):S345, 2007.

Watts, P.B., J.M. Ryan, R.L. Jensen. (2006) Changes in technique-specific VO₂max and competitive performance over a season in collegiate cross-country skiers. Presented at the International Congress on Science and Nordic Skiing. Voukatti, Finland. June, 2006.

Jensen, R.L., R.S. Bowen, S.J. Fjeldheim, M.L. Halloran, S.K. Peck, J.M. Ryan, P.B. Watts. (2006) Comparison of the lactate-heart rate relationship during treadmill roller-skiing and on-snow cross country skiing. Presented at the International Congress on Science and Nordic Skiing. Voukatti, Finland. June, 2006.

Bowen, R.S., R.L. Jensen, P.B. Watts. (2006) Relationship between ankle dorsiflexion and kinematic variables during treadmill roller skiing. Presented at the International Congress on Science and Nordic Skiing. Voukatti, Finland. June, 2006.

Jensen, B.T., R.L. Jensen, P.B. Watts, D. Jensen. (2006) Effects of surface on oxygen uptake, power output, and heart rate during uphill cycling. In *Proceedings of the XXIV International Symposium of Biomechanics in Sports; Salzburg* (H. Schwameder, G. Strutzenberger, V. Fastenberger, S. Lindinger, E. Müller, editors), 1-4.

Cole, K., P.B. Watts, R.L. Jensen, C.E. Teeters. (2006) The effects of backpack loading styles on energy expenditure and movement in the sagittal plane during treadmill walking. In *Proceedings of the XXIV International Symposium of Biomechanics in Sports; Salzburg* (H. Schwameder, G. Strutzenberger, V. Fastenberger, S. Lindinger, E. Müller, editors) 633-666.

Jensen, B.T., R.L. Jensen, P. B. Watts, D.L. Jensen (2006) Effects of added weight on oxygen uptake power output, and heart rate during uphill cycling: treadmill versus over-ground. In *Proceedings of the XXIV International Symposium of Biomechanics in Sports; Salzburg* (H. Schwameder, G. Strutzenberger, V. Fastenberger, S. Lindinger, E. Müller, editors) 646-649.

Watts, P.B., R.L. Jensen, et al. (2005) Vertical hand force and forearm EMG during a rock climbing move with and without added mass. (Abst) *Med. Sci. Sports Exerc.* 37(5):S122.

Bowen, R.S., R.L. Jensen, P.B. Watts (2005) Effects of dorsiflexion on energy expenditure during cross-country skiing using the V1 skate technique. In *Proceedings of the XXIII International Symposium of Biomechanics in Sports* (Qing Wang, editor) 349.

Jensen, R.L., P.B. Watts, J.E. Lawrence, D.M. Moss, J.M. Wagonsomer (2005) Vertical hand force and forearm EMG during a *High-step Rock-on* climbing move with and without added mass. In *Proceedings of the XXIII International Symposium of Biomechanics in Sports* (Qing Wang, editor) 466-469.

Watts, P.B., R.L. Jensen, et al. (2004) Changes in EMG and Finger Force With Repeated Hangs from the Hands in Rock Climbers. (Abst) *Med. Sci. Sports Exerc.* 36(5):S167.

Watts, P.B. (2004) Physiology of difficult rock climbing: a review. *Eur. J. Appl. Physiol.* 91:361-372.

Fischer, S. P.B. Watts, R.L. Jensen, J. Nelson. (2004) Energy expenditure, heart rate response and metabolic equivalents (METs) of adults taking part in children's games. *J Sports Med. Phys. Fitness.* 44:398-403.

Watts, P.B. and R.L. Jensen. (2003) Reliability of peak forces during a finger curl motion common in rock climbing. *Meas. Physical Ed. Exer. Sci.* 7(4):263-267.

Watts, P.B. et al. (2003) Anthropometry of young competitive sport rock climbers. *British J. Sports Med.* 37:420-424.

C.J. Biwer, R.L Jensen, W.D. Schmidt, P.B. Watts. (2003) The effect of creatine on treadmill running with high intensity intervals. *J. Strength Cond. Res.* 17(3):439-445.

Watts, P.B. Physiology of Rock Climbing – An Update. (2002) Opening Keynote Address at the 2nd International Conference on Science and Technology in Climbing and Mountaineering; Leeds, England.

Watts, P.B. (2001) Physiological Aspects of Sport Rock Climbing. Tutorial Lecture (90-min session), 48th Annual Meeting of the American College of Sports Medicine, Baltimore, Maryland.

Watts, P.B. et al. (2000) Metabolic responses during sport rock climbing and the effects of active versus passive recovery. *Int. J. Sports Med.* 21:185-190.

Watts, P.B. (2000) Chapter 1 – Physiological Aspects of Difficult Rock Climbing. In, *The Science of Climbing and Mountaineering*. Messenger, N. W. Patterson, D. Brook, Eds. Human Kinetics Software.

Gannon, E.K., R.L. Jensen, P.B. Watts. (2000) Relationship of abdominal accessory muscle strength and endurance to pulmonary function in older adults. (Abst) *Med. Sci. Sports Exerc.* 32(5):S146.

Watts, P.B., L.M. Joubert. (2000) Relationships between anthropometry and performance in junior sport rock climbers. (Abst.) *Med. Sci. Sports Exerc.* 32(5):S180.

Joubert, L.M. , P.B. Watts. (2000) Effect of hypohydration on the blood lactate response to submaximal graded exercise in females. (Abst.) *Med. Sci. Sports Exerc.* 32(5):S357.

Watts, P.B. (2000) What about climbing? A decade of research at NMU. Presentation at the 2000 Winter Meeting of the Michigan Group of the American College of Sports Medicine.

Watts, P.B., et al. (1999) EMG responses in rock climbing using six hand positions (Abst.). *Med. Sci. Sports Exerc.* 31(5S):S169.

Watts, P.B. Physiological Aspects of Sport Rock Climbing. (1999) Opening Keynote Address at the 1st International Conference on Science and Technology in Climbing and Mountaineering, Leeds, England.

Watts, P.B., B. Coleman, C. Clure, et al. (1999) Metabolic and cardiovascular responses during work on a high ropes course. *J. Sports Med. Phys. Fit.* 39:37-41.

Watts, P.B., K.M. Drobish. (1998) Physiological responses to simulated rock climbing at different angles. *Med. Sci. Sports Exerc.* 30(7):1118-1122.

Ebben, W.P. and P.B. Watts. (1998) A review of combined weight training and plyometric training modes: complex training. *Strength and Conditioning.* 20(5):18-27.

Gannon, E., R. Jensen, R. Harney, R. Kobienia, P.B. Watts. (1998) VO_2 vs work rate slope is affected by stage duration during intermittent incremental exercise. (Abst.) *Med. Sci. Sports Exerc.* 30(5):S55.

Watts, P.B., R.L. Jensen, E. Gannon, et al. (1998) Protocol stage duration effect on lactate threshold during intermittent cycle ergometry. (Abst.) *Med. Sci. Sports Exerc.* 30(5):S327.

Gallagher, P.M., M. Daggett, R.L. Jensen, P.B. Watts. (1998) Physiological comparison of arm vs leg vs combined arm and leg exercise during modified rowing. (Abst.) *Med. Sci. Sports Exerc.* 30(5):S78.

Jensen, R.L., W. Ebben, E. Gannon, R. Harney, R. Kobienia, J. Maynard, P.B. Watts. (1998) Effect of added weight on heart rate and VO_2 during uphill bicycling overground versus on a treadmill. (Abst.) *Med. Sci. Sports Exerc.* 30(5):S58.

Watts, P.B., V.S. Newbury, J.E. Sulentic (1996) Acute changes in handgrip strength, endurance, and blood lactate with sustained sport rock climbing. *J. Sports Med. Phys. Fit.* 36:255-260.

Watts, P.B., C. Clure, R.Hill (1996) Applied prediction of cross country skiing performance from physiological test data (Abst.). *Med. Sci. Sports Exerc.* 28(5):S133.

Wilkins, B.W., P.B. Watts, A. Wilcox (1996) Metabolic response during rock climbing in expert rock climbers (Abst.). *Med. Sci. Sports Exerc.* 28(5):S159.

Hoffman, M.D., P.S. Clifford, P.B. Watts, et al. (1995) Delta efficiency of uphill roller skiing with the double pole and diagonal stride techniques. *Can. J. Appl. Physiol.* 20(4):465-479.

Mittelstadt, S.W., M.D. Hoffman, P.B. Watts, et al. (1995) Lactate responses to roller skiing with the double pole and diagonal stride techniques. *Med. Sci. Sports Exerc.* 27(11):1563-1568.

Watts, P.B., C.A. Clure, M.R. Hill, et al. (1995) Energy costs of rock climbing at different paces (Abst.). *Med. Sci. Sports Exerc.* 27(5):S17.

Lish, A.K., P.B. Watts (1995) Effect of route rehearsal on the energy cost of rock climbing (Abst.). *Med. Sci. Sports Exerc.* 27(5):S209.

Clure, C.A., P.B. Watts, P. Gallagher, et al. (1994) Accuracy of the TEEM 100 metabolic analyzer during maximum oxygen uptake testing of nordic skiers (Abst.). *Med. Sci. Sports Exerc.* 27(5):S86.

Hoffman, M.D., P.S. Clifford, P.B. Watts, et al. (1994) Physiological comparison of uphill roller skiing: diagonal stride versus double pole. *Med. Sci. Sports Exerc.* 26(10):1248-1289.

Watts, P.B., S. Airoidi, C. Clure, et al. (1994) Physiological responses to sport rock climbing during simulated top-rope and simulated lead conditions (Abst.) *Med. Sci. Sports Exerc.* 26(5):S65.

Nicklas, E.C., L.M. Larsen, P.B. Watts (1994) Ventilatory threshold reliability for four assessments over an eight day period (Abst.) *Med. Sci. Sports Exerc.* 26(5):S2.

Hoffman, M.D., S.W. Mittelstadt, P.B. Watts, et al. (1994) Does pole striding simulate the cardiorespiratory demands of diagonal striding on roller skis? (Abst.) *Med. Sci. Sports Exerc.* 26(5):S113.

Watts, P.B., B.C. Silta, J. Stray-Gundersen (1993) Physiological effects of a 3000-mile tandem bicycle trek for a subject with Down syndrome - a case study. Presented at the Midwest Region Chapter ACSM Winter Meeting, Boyne Mtn., Michigan.

Watts, P.B., M.D. Hoffman, J.E. Sulentic, et al. (1993) Physiological responses to specific maximum

exercise tests for cross country skiing. *Canadian J. Appl. Physiol.* 18(4):359-365.

Watts, P.B., K.M. Drobish, K.L. Deur, et al. (1993) Physiological comparison between simulated rock climbing and treadmill running at the same heart rate (Abst). *Med. Sci. Sports Exerc.* 25(5):S81.

Watts, P.B., (1993) Fatigue and recovery of handgrip strength and endurance in elite rock climbers (Abst). *Med. Sci. Sports Exerc.* 25(5):S189.

Gibbons, T.P., P.B. Watts (1993) Heart rate and blood lactate concentration during on-snow training in college cross country skiers (Abst). *Med. Sci. Sports Exerc.* 25(5):S132.

Sulentic, J.E., J.F. Frea, P.B. Watts (1993) Effects of low and high intensity prolonged exercise on lactate threshold and peak responses to maximal work (Abst). *Med. Sci. Sports Exerc.* 25(5):S176.

December, K., F.M. Liao, P.B. Watts (1993) A kinematic analysis of the slapshot as executed by intermediate-level female ice hockey players (Abst). *Med. Sci. Sports Exerc.* 25(5):S196.

Watts, P.B. (1993) Physiological Aspects of Sport Rock Climbing. An invited 2-hour colloquium delivered at the 1993 Annual Meeting of ACSM, Seattle, WA.

Watts, P.B., D.T. Martin, S. Durtschi (1993) Anthropometric profiles of elite male and female sport rock climbers. *J. Sports Sciences*, 11:113-117.

Mittelstadt, S., M.D. Hoffman, P.B. Watts, et al. (1992) Lactate response to roller skiing with the double pole and diagonal stride techniques (Abst). *Med. Sci. Sports Exerc.* 24(5):S105.

Gibbons, T., K. Drobish, P. Watts, et al. (1992) The effects of two different pole lengths on the physiological responses during double pole roller skiing (Abst). *Med. Sci. Sports Exerc.* 24(5):S162.

O'Hagan, K., S. Mittelstadt, P. Watts, et al. (1992) Entrainment with the double pole nordic skiing technique (Abst). *Med. Sci. Sports Exerc.* 24(5):S162.

Martin, D.T., P.B. Watts, V.S. Newbury (1992) The effect of alpine mountaineering on acute erythrocyte hemolysis. *Int. J. Sports Med.* 13(1):31-35.

Watts, P.B., V.S. Newbury, J.E. Sulentic (1991) Fatigue and recovery of handgrip strength and endurance in rock climbing (Abst). *Med. Sci. Sports Exerc.* 23(4):S56.

Watts, P.B., J.E. Sulentic, V.S. Newbury (1991) Methodology for analysis of lactate in field blood samples. 1991 Midwest Regional Meeting of ACSM.

Watts P.B., D.T. Martin, M.H. Schmeling, et al. (1990) Exertional intensities and energy requirements of technical mountaineering at moderate altitude. *J Sports Med Phys Fit.* 30(4):365-376, 1990.

Watts, P.B. (1990) Sports Science at Snowbird. *Rock & Ice.* Number 38 (July/August): 13-15.

Martin, D.T., P.B. Watts, S.D. Zimmerman, et al. (1990) Factors associated with injuries in elite rock climbers. 1990 Annual Meeting of ACSM, Salt lake City, UT.

Watts, P.B., D.T. Martin, D. Baumgarten (1989) Factors related to performance on the Metolius Simulator. 1989 International Olympic Committee World Congress on Sport Sciences, Colorado Springs, Co.

Martin D.T., P.B. Watts, J.E. Sulentic (1989) The acute effects of prolonged submaximal cycling on the

ventilatory threshold. Presented by Martin at the Winter Meeting of the Rocky Mountain Region ACSM.

Egan L.M., P.B. Watts, B.C. Silta (1987) Changes in serum haptoglobin as an acute response to a marathon road race. *J Sports Sci.* 5:55-60.

Watts P.B., C.M. Farmer, M.H. Schmeling, B.C. Silta (1986) Physiological characteristics of elite high altitude mountaineers. *Proc Int Union Physiol Sci.* (abst) 16:p163.05. *XXX Congress of the International Union of Physiological Sciences*, Vancouver, B.C. Canada, 1986.

Watts P.B., A.G. Watts (1985) Physiological adaptations in technical mountaineering at moderate altitude. *1985 Annual Conference of the Association for Experiential Education*, Estes Park, Colorado, 1985. Resulted in development and implementation of pre-course physical fitness self-tests and recommendations for National Outdoor Leadership School (NOLS) students.

Watts P.B. (1982) Effects of a glycogen depletion-loading regimen upon metabolic responses to progressive graded exertion. Presented at the 1982 Annual Meeting of ACSM.

Watts P.B. (1982) Metabolic responses to progressive graded exertion following glucose ingestion. *J Sports Med Phys Fit.* 22:300-313.

Watts P.B. (1980) Evaluating the human metabolic response to graded exertion. *J Cardiovas Pul Tech (CVP).* 8:45-50.

OTHER PUBLICATIONS

Articles:

The Truth About VO₂max – An Update. *Master Skier* (a national cross-country ski magazine), Fall 2008.

A three article series for *The Master Skier*, Winter 2001/2002. (“The Truth About VO₂max”, “This Thing Called Threshold”, “The Cost of Speed”)

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EXTRACURRICULAR INTERESTS

I have an active interest in cross country ski racing, mountain bicycling, and trail running. Some of my best times have involved alpine mountaineering and rock climbing with friends. The mountain environment facilitates my creative interests in photography and writing and I have had several mountaineering photographs and articles published. For several years my wife, Annette, and I directed Christian Wilderness Challenge, an ecumenical Christian outdoor adventure program for university students. I also enjoy the old-time music and arts of the Southern Appalachian region. My family and I have performed old-time music at churches, benefit events, coffee houses and traditional music festivals. We established the annual Hiawatha Music Co-op Youth Scholarship Award in 2007.