

References

REFERENCES

- Adams, MA, 2004. Biomechanics of back pain. *Acupuncture in Medicine: Journal of the British Medical Acupuncture Society* 22(4): 178-188.
- Adams, MA, McNally, DS, Chinn, H, Dolan, P, 1994. Posture and compressive strength of the lumbar spine. *Clinical Biomechanics* 9(1): 5-14.
- Akaike, H, 1974. A new look at the statistical model identification *IEEE Transactions on Automatic Control* 19(6): 716-723.
- Alexopoulos, EC, Stathi, IC, Charizani, F, 2004. Prevalence of musculoskeletal disorders in dentists. *BMC Musculoskeletal Disorders* 5(16).
- Allread, WG, Marras, WS, Burr, DL, 2000. Measuring trunk motions in industry: variability due to task factors, individual differences, and the amount of data collected. *Ergonomics* 43(6): 691-701.
- Anderson, CK, Chaffin, DB, Herrin, GD, Matthews, LS, 1985. A biomechanical model of the lumbosacral joint during lifting activities. *Journal of Biomechanics* 18(8): 571-584.
- Andersson, GB, 1999. Epidemiological features of chronic low-back pain. *Lancet* 354(9178): 581-585.
- Andrews, DM, Holmes, AM, Weiry, PL, Arnold, TA, Callaghan, JP, 2008. Decision times and errors increase when classifying trunk postures near posture bin boundaries. *Theoretical Issues in Ergonomics Science* 9(5): 425-440.
- Ariëns, GA, Bongers, PM, Douwes, M, Miedema, MC, Hoogendoorn, WE, van der Wal, G, Bouter, LM, van Mechelen, W, 2001. Are neck flexion, neck rotation, and sitting at work risk factors for neck pain? Results of a prospective cohort study. *Occupational and Environmental Medicine* 58(3): 200-207.
- Bakker, EW, Verhagen, AP, van Trijffel, E, Lucas, C, Koes, BW, 2009. Spinal mechanical load as a risk factor for low back pain: a systematic review of prospective cohort studies. *Spine* 34(8): E281-293.
- Balogh, I, Orbaek, P, Ohlsson, K, Nordander, C, Unge, J, Winkel, J, Hansson, GA, 2004. Self-assessed and directly measured occupational physical activities -- influence of musculoskeletal complaints, age and gender. *Applied Ergonomics* 35(1): 49-56.
- Balogh, I, Orbaek, P, Winkel, J, Nordander, C, Ohlsson, K, Ektor-Andersen, J, 2001. Questionnaire-based mechanical exposure indices for large population studies -- reliability, internal consistency and predictive validity. *Scandinavian Journal of Work Environment & Health* 27(1): 41-48.
- Bao, S, Howard, N, Spielholz, P, Silverstein, B, Polissar, N, 2009. Interrater reliability of posture observations. *Human Factors* 51(3): 292-309.
- Barrero, LH, Katz, JN, Dennerlein, JT, 2009a. Validity of self-reported mechanical demands for occupational epidemiologic research of musculoskeletal disorders. *Scandinavian Journal of Work Environment & Health* 35(4): 245-260.
- Barrero, LH, Katz, JN, Perry, MJ, Krishnan, R, Ware, JH, Dennerlein, JT, 2009b. Work pattern causes bias in self-reported activity duration: a randomised study of mechanisms and implications for exposure assessment and epidemiology. *Occupational and Environmental Medicine* 66(1): 38-44.
- van der Beek, AJ, Braam, IT, Douwes, M, Bongers, PM, Frings-Dresen, MH, Verbeek, JH, Luyts, S, 1994. Validity of a diary estimating exposure to tasks, activities, and postures of the trunk. *International Archives of Occupational and Environmental Health* 66(3): 173-178.
- van der Beek, AJ, Frings-Dresen, MH, 1998. Assessment of mechanical exposure in ergonomic epidemiology. *Occupational Environmental Medicine* 55(5): 291-299.
- van der Beek, AJ, van Gaalen, LC, Frings-Dresen, MH, 1992. Working postures and activities of lorry drivers: a reliability study of on-site observation and recording on a pocket computer. *Applied Ergonomics* 23(5): 331-336.
- Bonato, P, Ebenbichler, GR, Roy, SH, Lehr, S, Posch, M, Kollmitzer, J, Della Croce, U, 2003. Muscle fatigue and fatigue-related biomechanical changes during a cyclic lifting task. *Spine* 28(16): 1810-1820.
- Bot, SD, van der Waal, JM, Terwee, CB, van der Windt, DA, Schellevis, FG, Bouter, LM, Dekker, J, 2005. Incidence and prevalence of complaints of the neck and upper extremity in general practice. *Annals of the Rheumatic Diseases* 64(1): 118-123.
- Brereton, LC, McGill, SM, 1999. Effects of physical fatigue and cognitive challenges on the potential for low back injury. *Human Movement Science* 18(6): 839-857.
- Brinckmann, P, Biggemann, M, Hilweg, D, 1988. Fatigue fracture of human lumbar vertebrae. *Clinical Biomechanics* 3(Suppl 1): 1-23.
- Brinckmann, P, Biggemann, M, Hilweg, D, 1989. Prediction of the compressive strength of human lumbar vertebrae. *Spine* 14(6): 606-610.
- Burdorf, A, 2010. The role of assessment of biomechanical exposure at the workplace in the prevention of musculoskeletal disorders. *Scandinavian Journal of Work Environment & Health* 36(1): 1-2.

- Burdorf, A, Jansen, JP, 2006. Predicting the long term course of low back pain and its consequences for sickness absence and associated work disability. *Occupational and Environmental Medicine* 63(8): 522-529.
- Burt, S, Punnett, L, 1999. Evaluation of interrater reliability for posture observations in a field study. *Applied Ergonomics* 30(2): 121-135.
- Callaghan, JP, McGill, SM, 2001. Intervertebral disc herniation: studies on a porcine model exposed to highly repetitive flexion/extension motion with compressive force. *Clinical Biomechanics* 16(1): 28-37.
- Callaghan, JP, Salewytch, AJ, Andrews, DM, 2001. An evaluation of predictive methods for estimating cumulative spinal loading. *Ergonomics* 44(9): 825-837.
- Cann, AP, Connolly, M, Ruuska, R, MacNeil, M, Birmingham, TB, Vandervoort, AA, Callaghan, JP, 2008. Inter-rater reliability of output measures for a posture matching assessment approach: a pilot study with food service workers. *Ergonomics* 51(4): 556-572.
- Cappozzo, A, Catani, F, Croce, UD, Leardini, A, 1995. Position and orientation in space of bones during movement: anatomical frame definition and determination. *Clinical Biomechanics* 10(4): 171-178.
- Chaffin, DB, 2009. The evolving role of biomechanics in prevention of overexertion injuries. *Ergonomics* 52(1): 3-14.
- Chang, CC, Hsiang, S, Dempsey, PG, McGorry, RW, 2003. A computerized video coding system for biomechanical analysis of lifting tasks. *International Journal of Industrial Ergonomics* 32(4): 239-250.
- Chang, CC, McGorry, RW, Lin, JH, Xu, X, Hsiang, SM, 2010. Prediction accuracy in estimating joint angle trajectories using a video posture coding method for sagittal lifting tasks. *Ergonomics* 53(8): 1039-1047.
- Chen, JC, Chang, WR, Shih, TS, Chen, CJ, Chang, WP, Dennerlein, JT, Ryan, LM, Christiani, DC, 2004. Using "Exposure Prediction Rules" for Exposure Assessment - An Example on Whole-Body Vibration in Taxi Drivers. *Epidemiology* 15(3): 293-299.
- Chen, SM, Liu, MF, Cook, J, Bass, S, Lo, SK, 2009. Sedentary lifestyle as a risk factor for low back pain: a systematic review. *International Archives of Occupational and Environmental Health* 82(7): 797-806.
- Coenen, P, Kingma, I, Boot, CR, Bongers, PM, van Dieën, JH, 2012. The contribution of load magnitude and number of load cycles to cumulative low-back load estimations: a study based on in-vitro compression data. *Clinical Biomechanics* 27(10): 1083-1086.
- Coenen, P, Kingma, I, Boot, CR, Faber, GS, Xu, X, Bongers, PM, van Dieën, JH, 2011. Estimation of low back moments from video analysis: a validation study. *Journal of Biomechanics* 44(13): 2369-2375.
- Coenen, P, Kingma, I, Boot, CRL, Bongers, PM, van Dieën, JH, 2013a. Inter-rater reliability of a video-analysis method measuring low-back load in a field situation. *Applied Ergonomics* 44(5): 828-834.
- Coenen, P, Kingma, I, Boot, CRL, Twisk, JWR, Bongers, PM, van Dieën, JH, 2013b. Cumulative low back load at work as a risk factor of low back pain: a prospective cohort study. *Journal of Occupational Rehabilitation* 23(1): 11-18.
- Costa-Black, KM, Loisel, P, Anema, JR, Pransky, G, 2010. Back pain and work. *Best Practice & Research, Clinical Rheumatology* 24(2): 227-240.
- Côté, JN, 2012. A critical review on physical factors and functional characteristics that may explain a sex/gender difference in work-related neck/shoulder disorders. *Ergonomics* 55(2): 173-182.
- Côté, P, van der Velde, G, Cassidy, JD, Carroll, LJ, Hogg-Johnson, S, Holm, LW, Carragee, EJ, Haldeman, S, Nordin, M, Hurwitz, EL, Guzman, J, Peloso, PM, 2008. The burden and determinants of neck pain in workers: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* 33(Suppl 4): 60-74.
- da Costa, BR, Vieira, ER, 2010. Risk factors for work-related musculoskeletal disorders: A systematic review of recent longitudinal studies. *American Journal of Industrial Medicine* 53(3): 285-323.
- David, GC, 2005. Ergonomic methods for assessing exposure to risk factors for work-related musculoskeletal disorders. *Occupational Medicine* 55(3): 190-199.
- Davis, KG, Marras, WS, 2000. Assessment of the relationship between box weight and trunk kinematics: does a reduction in box weight necessarily correspond to a decrease in spinal loading? *Human Factors* 42(2): 195-208.
- Davison, AC, Hinkley, DV, 1997. Bootstrap methods and their applications. Cambridge University Press, Cambridge.
- Dempsey, PG, 2007. Effectiveness of ergonomics interventions to prevent musculoskeletal disorders: Beware of what you ask. *International Journal of Industrial Ergonomics* 37(2): 169-173.
- van Dieën, JH, Faber, GS, Loos, RC, Kuijter, PP, Kingma, I, van der Molen, HF, Frings-Dresen, MH, 2010. Validity of estimates of spinal compression forces obtained from worksite measurements. *Ergonomics* 53(6): 792-800.

- van Dieën, JH, Kingma, I, 2005. Effects of antagonistic co-contraction on differences between electromyography based and optimization based estimates of spinal forces. *Ergonomics* 48(4): 411-426.
- van Dieën, JH, van der Burg, P, Raaijmakers, TA, Toussaint, HM, 1998. Effects of repetitive lifting on kinematics: inadequate anticipatory control or adaptive changes? *Journal of Motor Behavior* 30(1): 20-32.
- van Dieën, JH, van der Veen, A, van Royen, BJ, Kingma, I, 2006. Fatigue failure in shear loading of porcine lumbar spine segments. *Spine* 31(15): E494-498.
- van Dieën, JH, Weinans, H, Toussaint, HM, 1999. Fractures of the lumbar vertebral endplate in the etiology of low back pain: a hypothesis on the causative role of spinal compression in aspecific low back pain. *Medical Hypotheses* 53(3): 246-252.
- Dolan, P, Adams, MA, 1998. Repetitive lifting tasks fatigue the back muscles and increase the bending moment acting on the lumbar spine. *Journal of Biomechanics* 31(8): 713-721.
- Dumas, R, Cheze, L, Verriest, JP, 2007. Adjustments to McConville et al. and Young et al. body segment inertial parameters. *Journal of Biomechanics* 40(3): 543-553.
- Dutta, T, 2012. Evaluation of the Kinect sensor for 3-D kinematic measurement in the workplace. *Applied Ergonomics* 43(4): 645-649.
- Eatough, EM, Way, JD, Chang, CH, 2012. Understanding the link between psychosocial work stressors and work-related musculoskeletal complaints. *Applied Ergonomics* 43(3): 554-563.
- Efron, B, Gong, G, 1983. A Leisurely Look at the Bootstrap, the Jackknife, and Cross-Validation. *The American Statistician* 37(1): 36-48.
- Efron, B, Tibshirani, R, 1986. Bootstrap methods for standard errors, confidence intervals, and other measures of statistical accuracy. *Statistical Science* 1(1): 54-77.
- Eriksen, W, Bruusgaard, D, Knardahl, S, 2004. Work factors as predictors of intense or disabling low back pain; a prospective study of nurses' aides. *Occupational Environmental Health* 61(5): 398-404.
- Faber, A, Giver, H, Stroyer, J, Hannerz, H, 2010a. Are low back pain and low physical capacity risk indicators for dropout among recently qualified eldercare workers? A follow-up study. *Scandinavian Journal of Public Health* 38(8): 810-816.
- Faber, GS, Kingma, I, Bruijn, SM, van Dieën, JH, 2009a. Optimal inertial sensor location for ambulatory measurement of trunk inclination. *Journal of Biomechanics* 42(14): 2406-2409.
- Faber, GS, Kingma, I, Kuijer, PPFM, van der Molen, HF, Hoozemans, MJM, Frings-Dresen, MHW, van Dieën, JH, 2009b. Working height, block mass and one- vs. two-handed block handling: the contribution to low back and shoulder loading during masonry work. *Ergonomics* 52(9): 1104-1118.
- Faber, GS, Kingma, I, Martin Schepers, H, Veltink, PH, van Dieën, JH, 2010b. Determination of joint moments with instrumented force shoes in a variety of tasks. *Journal of Biomechanics* 43(14): 2848-2854.
- Faber, GS, Kingma, I, van Dieën, JH, 2007. The effects of ergonomic interventions on low back moments are attenuated by changes in lifting behaviour. *Ergonomics* 50(9): 1377-1391.
- Faber, GS, Kingma, I, van Dieën, JH, 2010c. Bottom-up estimation of joint moments during manual lifting using orientation sensors instead of position sensors. *Journal of Biomechanics* 43(7): 1432-1436.
- Faber, GS, Kingma, I, van Dieën, JH, 2011. Effect of initial horizontal object position on peak L5/S1 moments in manual lifting is dependent on task type and familiarity with alternative lifting strategies. *Ergonomics* 54(1): 72-81.
- Fallentin, N, Viikari-Juntura, E, Waersted, M, Kilbom, Å, 2001. Evaluation of physical workload standards and guidelines from a Nordic perspective. *Scand Journal of Work Environment & Health* 27(Suppl 2): 1-52.
- Fejer, R, Kyvik, KO, Hartvigsen, J, 2006. The prevalence of neck pain in the world population: a systematic critical review of the literature. *European Spine Journal* 15(6): 834-848.
- Ferguson, SA, Gaudes-MacLaren, LL, Marras, WS, Waters, TR, Davis, KG, 2002. Spinal loading when lifting from industrial storage bins. *Ergonomics* 45(6): 399-414.
- Fleiss, JL, 1986. *The Design and Analysis of Clinical Experiments*. John Wiley and sons, Toronto.
- Freitag, S, Ellegast, R, Dulon, M, Nienhaus, A, 2007. Quantitative measurement of stressful trunk postures in nursing professions. *The Annals of Occupational Hygiene* 51(4): 385-395.
- Gallagher, S, Marras, WS, Litsky, AS, Burr, D, Landoll, J, Matkovic, V, 2007. A comparison of fatigue failure responses of old versus middle-aged lumbar motion segments in simulated flexed lifting. *Spine* 32(17): 1832-1839.
- Geuskens, GA, Hazes, JMW, Barendregt, PJ, Burdorf, A, 2008. Predictors of sick leave and reduced productivity at work among persons with early inflammatory joint conditions. *Scandinavian Journal of Work, Environment & Health* 34(6): 420-429.

- Glitsch, U, Ottersbach, HJ, Ellegast, R, Schaub, K, Franz, G, Jager, M, 2007. Physical workload of flight attendants when pushing and pulling trolleys aboard aircraft. *International Journal of Industrial Ergonomics* 37(1-2): 845-854.
- Godin, G, Jobin, J, Bouillon, J, 1986. Assessment of leisure time exercise behavior by self-report: a concurrent validity study. *Canadian Journal of Public Health* 77(5): 359-362.
- Goetzel, RZ, Hawkins, K, Ozminkowski, RJ, Wang, S, 2003. The health and productivity cost burden of the "top 10" physical and mental health conditions affecting six large U.S. employers in 1999. *Journal of Occupational and Environmental Medicine* 45(1): 5-14.
- Goffe, WL, Ferrier, GD, Rogers, J, 1994. Global Optimization of Statistical Functions with Simulated Annealing. *Journal of Econometrics* 60(1-2): 65-100.
- Granata, KP, Gottipati, P, 2008. Fatigue influences the dynamic stability of the torso. *Ergonomics* 51(8): 1258-1271.
- Griffith, LE, Shanon, HS, Wells, RP, Walter, SD, Cole, DC, Côté, P, Frank, J, Hogg-Johnson, S, Langlois, L, 2012. Individual participant data meta-analysis of mechanical workplace risk factors and low back pain. *American Journal of Public Health* 102(2): 309-318.
- Gunning, JL, Callaghan, JP, McGill, SM, 2001. Spinal posture and prior loading history modulate compressive strength and type of failure in the spine: a biomechanical study using a porcine cervical spine model. *Clinical Biomechanics* 16(6): 471-480.
- Hägg, GM, Luttmann, A, Jäger, M, 2000. Methodologies for evaluating electromyographic field data in ergonomics. *Journal of Electromyography and Kinesiology* 10(5): 301-312.
- Hamberg-van Reenen, HH, Ariens, GA, Blatter, BM, van Mechelen, W, Bongers, PM, 2007. A systematic review of the relation between physical capacity and future low back and neck/shoulder pain. *Pain* 130(1-2): 93-107.
- Hansson, GA, Arvidsson, I, Ohlsson, K, Nordander, C, Mathiassen, SE, Skerfving, S, Balogh, I, 2006. Precision of measurements of physical workload during standardised manual handling. Part II: Inclination of head, upper back, neck and upper arms. *Journal of Electromyography and Kinesiology* 16(2): 125-136.
- Hansson, GA, Balogh, I, Bystrom, JU, Ohlsson, K, Nordander, C, Asterland, P, Sjolander, S, Rylander, L, Winkel, J, Skerfving, S, 2001. Questionnaire versus direct technical measurements in assessing postures and movements of the head, upper back, arms and hands. *Scandinavian Journal of Work Environment & Health* 27(1): 30-40.
- Hansson, T, Roos, B, Nachemson, A, 1980. The bone mineral content and ultimate compressive strength of lumbar vertebrae. *Spine* 5(1): 46-55.
- Hansson, TH, Keller, TS, Spengler, DM, 1987. Mechanical behaviour of the human lumbar spine. II. Fatigue strength during dynamic compressive loading. *Journal of Orthopaedic Research* 5(4): 479-487.
- Hartvigsen, J, Bakketeig, LS, Leboeuf-Yde, C, Engberg, M, Lauritzen, T, 2001. The association between physical workload and low back pain clouded by the "healthy worker" effect: population-based cross-sectional and 5-year prospective questionnaire study. *Spine* 26(16): 1788-1792.
- Hartvigsen, J, Lings, S, Leboeuf-Yde, C, Bakketeig, L, 2004. Psychosocial factors at work in relation to low back pain and consequences of low back pain; a systematic, critical review of prospective cohort studies. *Occupational and Environmental Medicine* 61(1): e2.
- Hestbaek, L, Leboeuf-Yde, C, Kyvik, KO, Manniche, C, 2006. The course of low back pain from adolescence to adulthood: eight-year follow-up of 9600 twins. *Spine* 31(4): 468-472.
- van den Heuvel, SG, Ariens, GA, Boshuizen, HC, Hoogendoorn, WE, Bongers, PM, 2004. Prognostic factors related to recurrent low-back pain and sickness absence. *Scandinavian Journal of Work, Environment & Health* 30(6): 459-467.
- van den Heuvel, SG, van der Beek, AJ, Blatter, BM, Hoogendoorn, WE, Bongers, PM, 2005. Psychosocial work characteristics in relation to neck and upper limb symptoms. *Pain* 114(1-2): 47-53.
- Hildebrandt, VH, Douwes, M, 1991. Physical load and work: Questionnaire on musculoskeletal load and health complaints (Lichamelijke belasting en arbeid: vragenlijst bewegingsapparaat). *Voorburg: Ministry of Social Affairs and Employment*.
- Hof, AL, 1992. An explicit expression for the moment in multibody systems. *Journal of Biomechanics* 25(10): 1209-1211.
- Holmstrom, E, Moritz, U, 1991. Low back pain -- correspondence between questionnaire, interview and clinical examination. *Scandinavian Journal of Rehabilitation Medicine* 23(3): 119-125.
- Holmstrom, EB, Lindell, J, Moritz, U, 1992. Low back and neck/shoulder pain in construction workers: occupational workload and psychosocial risk factors. Part 2: Relationship to neck and shoulder pain. *Spine* 17(6): 672-677.
- Hoofman, WE, van Poppel, MN, van der Beek, AJ, Bongers, PM, van Mechelen, W, 2004. Gender differences in the relations between work-related physical and psychosocial risk factors and musculoskeletal complaints. *Scandinavian Journal of Work Environment & Health* 30(4): 261-278.

- Hoogendoorn, WE, Bongers, PM, de Vet, HC, Douwes, M, Koes, BW, Miedema, MC, Ariens, GA, Bouter, LM, 2000a. Flexion and rotation of the trunk and lifting at work are risk factors for low back pain: results of a prospective cohort study. *Spine* 25(23): 3087-3092.
- Hoogendoorn, WE, van Poppel, MN, Bongers, PM, Koes, BW, Bouter, LM, 1999. Physical load during work and leisure time as risk factors for back pain. *Scandinavian Journal of Work Environment & Health* 25(5): 387-403.
- Hoogendoorn, WE, van Poppel, MN, Bongers, PM, Koes, BW, Bouter, LM, 2000b. Systematic review of psychosocial factors at work and private life as risk factors for back pain. *Spine* 25(16): 2114-2125.
- Hoozemans, MJ, Burdorf, A, van der Beek, AJ, Frings-Dresen, MH, Mathiassen, SE, 2001. Group-based measurement strategies in exposure assessment explored by bootstrapping. *Scandinavian Journal of Work Environment & Health* 27(2): 125-132.
- Hoozemans, MJ, Kingma, I, de Vries, WH, van Dieën, JH, 2008. Effect of lifting height and load mass on low back loading. *Ergonomics* 51(7): 1053-1063.
- Howarth, SJ, Callaghan, JP, 2012. Compressive force magnitude and intervertebral joint flexion/extension angle influence shear failure force magnitude in the porcine cervical spine. *Journal of Biomechanics* 45(3): 484-490.
- Hoy, D, Bain, C, Williams, G, March, L, Brooks, P, Blyth, F, Woolf, A, Vos, T, Buchbinder, R, 2012. A systematic review of the global prevalence of low back pain. *Arthritis and Rheumatism* 64(6): 2028-2037.
- Hsiang, SM, Brogmus, GE, Martin, SE, Bezverkhny, IB, 1998. Video based lifting technique coding system. *Ergonomics* 41(3): 239-256.
- ISCO, 1968. International Standard Classification of Occupations (ISCO). International Labour Office, Geneva.
- Jäger, M, Jordan, C, Luttmann, A, Laurig, W, Group, D, 2000. Evaluation and assessment of lumbar load during total shifts for occupational manual materials handling jobs within the Dortmund Lumbar Load Study - DOLLY. *International Journal of Industrial Ergonomics* 25(6): 553-571.
- Jansen, JP, Burdorf, A, 2003. Effects of measurement strategy and statistical analysis on dose-response relations between physical workload and low back pain. *Occupational and Environmental Medicine* 60(12): 942-947.
- Janssens, L, Brumagne, S, Polspoel, K, Troosters, T, McConnell, A, 2010. The effect of inspiratory muscles fatigue on postural control in people with and without recurrent low back pain. *Spine* 35(10): 1088-1094.
- Johanson, E, Brumagne, S, Janssens, L, Pijnenburg, M, Claeys, K, Paasuke, M, 2011. The effect of acute back muscle fatigue on postural control strategy in people with and without recurrent low back pain. *European Spine Journal* 20(12): 2152-2159.
- de Jonge, J, Reuvers, MM, Houtman, IL, Bongers, PM, Kompier, MA, 2000. Linear and nonlinear relations between psychosocial job characteristics, subjective outcomes, and sickness absence: baseline results from SMASH. Study on Musculoskeletal Disorders, Absenteeism, Stress, and Health. *Journal of Occupational Health Psychology* 5(2): 256-268.
- Karasek, R, 1985. Job content instrument user guides: revision 1.1. Los Angeles, CA: Department of Industrial and System Engineering, University of Southern California.
- Kerr, MS, Frank, JW, Shannon, HS, Norman, RW, Wells, RP, Neumann, WP, Bombardier, C, 2001. Biomechanical and psychosocial risk factors for low back pain at work. *American Journal of Public Health* 91(7): 1069-1075.
- Kingma, I, de Looze, MP, Toussaint, HM, Klijnsma, HG, Bruijnen, TBM, 1996. Validation of a full body 3-D dynamic linked segment model. *Human Movement Science* 15(6): 833-860.
- Kingma, I, de Looze, MP, van Dieën, JH, Toussaint, HM, Adams, MA, Baten, CT, 1998. When is a lifting movement too asymmetric to identify low-back loading by 2-D analysis? *Ergonomics* 41(10): 1453-1461.
- Kingma, I, Faber, GS, Bakker, AJ, van Dieën, JH, 2006. Can low back loading during lifting be reduced by placing one leg beside the object to be lifted? *Physical Therapy* 86(8): 1091-1105.
- Kingma, I, Faber, GS, van Dieën, JH, 2010. How to lift a box that is too large to fit between the knees. *Ergonomics* 53(10): 1228-1238.
- Kociolek, AM, Keir, PJ, 2010. Reliability of distal upper extremity posture matching using slow-motion and frame-by-frame video methods. *Human Factors* 52(3): 441-455.
- Koes, BW, van Tulder, MW, Thomas, S, 2006. Diagnosis and treatment of low back pain. *BMJ* 332(7555): 1430-1434.
- Kovacs, FM, Abaira, V, Zamora, J, Fernandez, C, 2005. The transition from acute to subacute and chronic low back pain: a study based on determinants of quality of life and prediction of chronic disability. *Spine* 30(15): 1786-1792.
- Krajcarski, S, Wells, R, 2008. The time variation pattern of mechanical exposure and the reporting of low back pain. *Theoretical Issues in Ergonomics Science* 9(1): 45-71.
- Kromhout, H, Heederik, D, 1995. Occupational epidemiology in the rubber industry: implications of exposure variability. *American Journal of Industrial Medicine* 27(2): 171-185.

- Kromhout, H, Tielemans, E, Preller, L, Heederik, D, 1996. Estimates of individual dose from current measurements of exposure *Occupational Hygiene* 3(1-3): 23-39.
- Kuiper, JI, Burdorf, A, Verbeek, JHAM, Frings-Dresen, MHW, van der Beek, AJ, Viikari-Juntura, ERA, 1999. Epidemiologic evidence on manual material handling as a risk factor for back disorders: a systematic review. *International Journal of Industrial Ergonomics* 24(4): 389-404.
- Kumar, S, 1990. Cumulative load as a risk factor for back pain. *Spine* 15(12): 1311-1316.
- Kuorinka, I, Jonsson, B, Kilbom, A, Vinterberg, H, Biering-Sorensen, F, Andersson, G, Jorgensen, K, 1987. Standardised Nordic questionnaires for the analysis of musculoskeletal symptoms. *Applied Ergonomics* 18(3): 233-237.
- Kwon, BK, Roffey, DM, Bishop, PB, Dagenais, S, Wai, EK, 2011. Systematic review: occupational physical activity and low back pain. *Occupational Medicine* 61(8): 541-548.
- Lambeek, LC, van Tulder, MW, Swinkels, IC, Koppes, LL, Anema, JR, van Mechelen, W, 2011. The trend in total cost of back pain in The Netherlands in the period 2002-2007. *Spine* 36(13): 1050-1058.
- Lariviere, C, Gagnon, D, 1999. The influence of trunk modelling in 3D biomechanical analysis of simple and complex lifting tasks. *Clinical Biomechanics* 14(7): 449-461.
- Leboeuf-Yde, C, 2004. Back pain -- individual and genetic factors. *Journal of Electromyography and Kinesiology* 14(1): 129-133.
- de Leva, P, 1996. Adjustments to Zatsiorsky-Seluyanov's segment inertia parameters. *Journal of Biomechanics* 29(9): 1223-1230.
- Linton, SJ, 2001. Occupational psychological factors increase the risk for back pain: a systematic review. *Journal of Occupational Rehabilitation* 11(1): 53-66.
- Lis, AM, Black, KM, Korn, H, Nordin, M, 2007. Association between sitting and occupational LBP. *European Spine Journal* 16(2): 283-298.
- Liv, P, Mathiassen, SE, Svendsen, SW, 2010. Theoretical and empirical efficiency of sampling strategies for estimating upper arm elevation. *Annals of Occupational Hygiene* 55(4): 436-449.
- Loomis, D, Kromhout, H, 2004. Exposure variability: concepts and applications in occupational epidemiology. *American Journal of Industrial Medicine* 45(1): 113-122.
- de Looze, MP, Kingma, I, Bussmann, JBJ, Toussaint, HM, 1992. Validation of a dynamic linked segment model to calculate joint moments in lifting. *Clinical Biomechanics* 7(3): 161-169.
- de Looze, MP, Kingma, I, Thunnissen, W, van Wijk, MJ, Toussaint, HM, 1994a. The evaluation of a practical biomechanical model estimating lumbar moments in occupational activities. *Ergonomics* 37(9): 1495-1502.
- de Looze, MP, Toussaint, HM, Ensink, J, Mangnus, C, van der Beek, AJ, 1994b. The validity of visual observation to assess posture in a laboratory-simulated, manual material handling task. *Ergonomics* 37(8): 1335-1343.
- de Looze, MP, Visser, B, Houting, I, van Rooy, MA, van Dieën, JH, Toussaint, HM, 1996. Weight and frequency effect on spinal loading in a bricklaying task. *Journal of Biomechanics* 29(11): 1425-1433.
- Lötters, F, Burdorf, A, Kuiper, J, Miedema, H, 2003. Model for the work-relatedness of low-back pain. *Scandinavian Journal of Work Environment & Health* 29(6): 431-440.
- Lowe, BD, 2004. Accuracy and validity of observational estimates of shoulder and elbow posture. *Applied Ergonomics* 35(2): 159-171.
- Macfarlane, GJ, Pallewatte, N, Paudyal, P, Blyth, FM, Coggon, D, Crombez, G, Linton, S, Leino-Arjas, P, Silman, AJ, Smeets, RJ, van der Windt, D, 2009. Evaluation of work-related psychosocial factors and regional musculoskeletal pain: results from a EULAR Task Force. *Annals of the Rheumatic Diseases* 68(6): 885-891.
- Maetzel, A, Li, L, 2002. The economic burden of low back pain: a review of studies published between 1996 and 2001. *Best Practice & Research. Clinical Rheumatology* 16(1): 23-30.
- Manek, NJ, MacGregor, AJ, 2005. Epidemiology of back disorders: prevalence, risk factors, and prognosis. *Current Opinion in Rheumatology* 17(2): 134-140.
- Marras, WS, 2012. The complex spine: the multidimensional system of causal pathways for low-back disorders. *Human Factors* 54(6): 881-889.
- Marras, WS, Ferguson, SA, Burr, D, Davis, KG, Gupta, P, 2004. Spine loading in patients with low back pain during asymmetric lifting exertions. *the Spine Journal* 4(1): 67-75.
- Marras, WS, Ferguson, SA, Burr, D, Schabo, P, Maronitis, A, 2007. Low back pain recurrence in occupational environments. *Spine* 32(21): 2387-2397.
- Marras, WS, Granata, KP, Davis, KG, Allread, WG, Jorgensen, MJ, 1999. Effects of box features on spine loading during warehouse order selecting. *Ergonomics* 42(7): 980-996.
- Marras, WS, Lavender, SA, Ferguson, SA, Splittstoesser, RE, Yang, G, 2010. Quantitative dynamic measures of physical exposure predict low back functional impairment. *Spine* 35(8): 914-923.
- Marras, WS, Lavender, SA, Leurgans, SE, Fathallah, FA, Ferguson, SA, Allread, WG, Rajulu, SL, 1995. Biomechanical risk factors for occupationally related low back disorders. *Ergonomics* 38(2): 377-410.

- Marras, WS, Lavender, SA, Leurgans, SE, Rajulu, SL, Allread, WG, Fathallah, FA, Ferguson, SA, 1993. The role of dynamic three-dimensional trunk motion in occupationally-related low back disorders. The effects of workplace factors, trunk position, and trunk motion characteristics on risk of injury. *Spine* 18(5): 617-628.
- Mathiassen, SE, 2006. Diversity and variation in biomechanical exposure: what is it, and why would we like to know? *Applied Ergonomics* 37(4): 419-427.
- Mathiassen, SE, Bolin, K, 2011. Optimizing cost-efficiency in mean exposure assessment - cost functions reconsidered. *BMC Medical Research Methodology* 11: 76.
- Mathiassen, SE, Burdorf, A, van der Beek, AJ, 2002. Statistical power and measurement allocation in ergonomic intervention studies assessing upper trapezius EMG amplitude. A case study of assembly work. *Journal of Electromyography and Kinesiology* 12(1): 45-57.
- Mathiassen, SE, Burdorf, A, van der Beek, AJ, Hansson, GA, 2003a. Efficient one-day sampling of mechanical job exposure data -- a study based on upper trapezius activity in cleaners and office workers. *American Industrial Hygiene Association Journal* 64(2): 196-211.
- Mathiassen, SE, Moller, T, Forsman, M, 2003b. Variability in mechanical exposure within and between individuals performing a highly constrained industrial work task. *Ergonomics* 46(8): 800-824.
- Mathiassen, SE, Nordander, C, Svendsen, SW, Wellman, HM, Dempsey, PG, 2005. Task-based estimation of mechanical job exposure in occupational groups. *Scandinavian Journal of Work Environment & Health* 31(2): 138-151.
- Mathiassen, SE, Paquet, V, 2010. The ability of limited exposure sampling to detect effects of interventions that reduce the occurrence of pronounced trunk inclination. *Applied Ergonomics* 41(2): 295-304.
- Matsudaira, K, Konishi, H, Miyoshi, K, Isomura, T, Takeshita, K, Hara, N, Yamada, K, Machida, H, 2012. Potential risk factors for new onset of back pain disability in Japanese workers: findings from the Japan epidemiological research of occupation-related back pain study. *Spine* 37(15): 1324-1333.
- McGill, SM, 2009. Evolving ergonomics? *Ergonomics* 52(1): 80-86.
- Moray, N, 2000. Culture, politics and ergonomics. *Ergonomics* 43(7): 858-868.
- Neumann, WP, Wells, RP, Norman, RW, Frank, J, Shannon, H, Kerr, MS, 2001a. A posture and load sampling approach to determining low-back pain risk in occupational settings. *International Journal of Industrial Ergonomics* 27(2): 65-77.
- Neumann, WP, Wells, RP, Norman, RW, Kerr, MS, Frank, J, Shannon, HS, Group, OW, 2001b. Trunk posture: reliability, accuracy, and risk estimates for low back pain from a video based assessment method. *International Journal of Industrial Ergonomics* 28(6): 355-365.
- Nicholson, PH, Alkalay, R, 2007. Quantitative ultrasound predicts bone mineral density and failure load in human lumbar vertebrae. *Clinical Biomechanics* 22(6): 623-629.
- van Nieuwenhuysse, A, Somville, PR, Crombez, G, Burdorf, A, Verbeke, G, Johannik, K, van den Bergh, O, Masschelein, R, Mairiaux, P, Moens, GF, 2006. The role of physical workload and pain related fear in the development of low back pain in young workers: evidence from the BelCoBack Study; results after one year of follow up. *Occupational and Environmental Medicine* 63(1): 45-52.
- Norman, R, Wells, R, Neumann, P, Frank, J, Shannon, H, Kerr, M, 1998. A comparison of peak vs cumulative physical work exposure risk factors for the reporting of low back pain in the automotive industry. *Clinical Biomechanics* 13(8): 561-573.
- van Oostrom, SH, Verschuren, WM, de Vet, HC, Picavet, HS, 2011. Ten year course of low back pain in an adult population-based cohort--the Doetinchem cohort study. *European Journal of Pain* 15(9): 993-998.
- Palmer, KT, Smedley, J, 2007. Work relatedness of chronic neck pain with physical findings -- a systematic review. *Scandinavian Journal of Work Environment & Health* 33(3): 165-191.
- Pan, W, 2001. Akaike's information criterion in generalized estimating equations. *Biometrics* 57(1): 120-125.
- Paquet, V, Punnett, L, Woskie, S, Buchholz, B, 2005. Reliable exposure assessment strategies for physical ergonomics stressors in construction and other non-routinized work. *Ergonomics* 48(9): 1200-1219.
- Parkinson, RJ, Callaghan, JP, 2007. The role of load magnitude as a modifier of the cumulative load tolerance of porcine cervical spinal units: progress towards a force weighting approach. *Theoretical Issues in Ergonomics Science* 8(3): 171-184.
- Paul, JA, Douwes, M, 1993. Two-dimensional photographic posture recording and description: a validity study. *Applied Ergonomics* 24(2): 83-90.
- Picavet, HS, Schouten, JS, 2003. Musculoskeletal pain in the Netherlands: prevalences, consequences and risk groups, the DMC(3)-study. *Pain* 102(1-2): 167-178.
- Plamondon, A, Gagnon, M, Desjardins, P, 1996. Validation of two 3-D segment models to calculate the net reaction forces and moments at the L(5)/S(1) joint in lifting. *Clinical Biomechanics* 11(2): 101-110.

- Potvin, JR, 1997. Use of NIOSH equation input to calculate lumbosacral compression forces. *Ergonomics* 40(7): 691-707.
- Punnett, L, 2004. Work related neck pain: how important is it, and how should we understand its causes? *Occupational and Environmental Medicine* 61(12): 954-955.
- Punnett, L, Fine, LJ, Keyserling, WM, Herrin, GD, Chaffin, DB, 1991. Back disorders and nonneutral trunk postures of automobile assembly workers. *Scandinavian Journal of Work, Environment & Health* 17(5): 337-346.
- Punnett, L, Pruss-Utun, A, Nelson, DI, Fingerhut, MA, Leigh, J, Tak, S, Phillips, S, 2005. Estimating the global burden of low back pain attributable to combined occupational exposures. *American Journal of Industrial Medicine* 48(6): 459-469.
- Punnett, L, Wegman, DH, 2004. Work-related musculoskeletal disorders: the epidemiologic evidence and the debate. *Journal of Electromyography and Kinesiology* 14(1): 13-23.
- Rapillard, L, Charlebois, M, Zysset, PK, 2006. Compressive fatigue behavior of human vertebral trabecular bone. *Journal of Biomechanics* 39(11): 2133-2139.
- Reeves, GK, Cox, DR, Darby, SC, Whitley, E, 1998. Some aspects of measurement error in explanatory variables for continuous and binary regression models. *Statistics in Medicine* 17(19): 2157-2177.
- van Rijn, RM, Huisstede, BM, Koes, BW, Burdorf, A, 2010. Associations between work-related factors and specific disorders of the shoulder -- a systematic review of the literature. *Scandinavian Journal of Work Environment & Health* 36(3): 189-201.
- Roelen, CA, Koopmans, PC, Groothoff, JW, 2010. Subjective health complaints in relation to sickness absence. *Work* 37(1): 15-21.
- Rothman, KJ, Greenland, S, 2005. Causation and causal inference in epidemiology. *American Journal of Public Medicine* 95(Suppl 1): 144-150.
- Seidler, A, Bergmann, A, Jager, M, Ellegast, R, Ditchen, D, Elsner, G, Grifka, J, Haerting, J, Hofmann, F, Linhardt, O, Luttmann, A, Michaelis, M, Petereit-Haack, G, Schumann, B, Bolm-Audorff, U, 2009. Cumulative occupational lumbar load and lumbar disc disease -- results of a German multi-center case-control study (EPILIFT). *BMC Musculoskeletal Disorders* 10: 48.
- Seidler, A, Bolm-Audorff, U, Heiskel, H, Henkel, N, Roth-Kuerver, B, Kaiser, U, Bickeboller, R, Willingstorfer, WJ, Beck, W, Elsner, G, 2001. The role of cumulative physical work load in lumbar spine disease: risk factors for lumbar osteochondrosis and spondylosis associated with chronic complaints. *Occupational and Environmental Medicine* 58(11): 735-746.
- Seidler, A, Bolm-Audorff, U, Siol, T, Henkel, N, Fuchs, C, Schug, H, Leheta, F, Marquardt, G, Schmitt, E, Ulrich, PT, Beck, W, Missalla, A, Elsner, G, 2003. Occupational risk factors for symptomatic lumbar disc herniation; a case-control study. *Occupational and Environmental Medicine* 60(11): 821-830.
- Shrout, PE, Fleiss, JL, 1979. Intraclass correlations: uses in assessing rater reliability. *Psychological Bulletin* 86(2): 420-428.
- Smedley, J, Egger, P, Cooper, C, Coggon, D, 1997. Prospective cohort study of predictors of incident low back pain in nurses. *BMJ* 314(7089): 1225-1228.
- Sparto, PJ, Parnianpour, M, Reinsel, TE, Simon, S, 1997. The effect of fatigue on multijoint kinematics, coordination, and postural stability during a repetitive lifting test. *The Journal of Orthopaedic and Sports Physical Therapy* 25(1): 3-12.
- Spielholz, P, Silverstein, B, Morgan, M, Checkoway, H, Kaufman, J, 2001. Comparison of self-report, video observation and direct measurement methods for upper extremity musculoskeletal disorder physical risk factors. *Ergonomics* 44(6): 588-613.
- Stewart, WF, Ricci, JA, Chee, E, Morganstein, D, Lipton, R, 2003. Lost productive time and cost due to common pain conditions in the US workforce. *Journal of the American Medical Association* 290(18): 2443-2454.
- Sullivan, D, Bryden, P, Callaghan, JP, 2002. Inter- and intra-observer reliability of calculating cumulative lumbar spine loads. *Ergonomics* 45(11): 788-797.
- Sutherland, CA, Albert, WJ, Wrigley, AT, Callaghan, JP, 2008. A validation of a posture matching approach for the determination of 3D cumulative back loads. *Applied Ergonomics* 39(2): 199-208.
- Svensden, SW, Mathiassen, SE, Bonde, JP, 2005. Task based exposure assessment in ergonomic epidemiology: a study of upper arm elevation in the jobs of machinists, car mechanics, and house painters. *Occupational and Environmental Medicine* 62(1): 18-27.
- Svensson, E, 2001. Guidelines to statistical evaluation of data from rating scales and questionnaires. *Journal of Rehabilitation Medicine* 33(1): 47-48.
- Takala, EP, Pehkonen, I, Forsman, M, Hansson, GA, Mathiassen, SE, Neumann, WP, Sjogaard, G, Veiersted, KB, Westgaard, RH, Winkel, J, 2010. Systematic evaluation of observational methods assessing biomechanical exposures at work. *Scandinavian Journal of Work Environment & Health* 36(1): 3-24.
- Tielemans, E, Kupper, LL, Kromhout, H, Heederik, D, Houba, R, 1998. Individual-based and group-based occupational exposure assessment: some equations to evaluate different strategies. *The Annals of Occupational Hygiene* 42(2): 115-119.

- Tiemessen, IJ, Hulshof, CT, Frings-Dresen, MH, 2008. Low back pain in drivers exposed to whole body vibration: analysis of a dose-response pattern. *Occupational Environmental Medicine* 65(10): 667-675.
- Trask, C, Mathiassen, SE, Wahlstrom, J, Heiden, M, Rezagholi, M, 2012. Data collection costs in industrial environments for three occupational posture exposure assessment methods. *BMC Medical Research Methodology* 12: 89.
- Twisk, JWR, 2003. Applied longitudinal data analysis for epidemiology: a practical guide. Cambridge University Press, New York.
- Twisk, JWR, 2006. Applied multilevel analysis. Cambridge University Press, Cambridge, United Kingdom.
- van Tulder, M, Koes, B, Bombardier, C, 2002. Low back pain. *Best Practice & Research, Clinical Rheumatology* 16(5): 761-775.
- van der Veen, AJ, Mullender, M, Smit, TH, Kingma, I, van Dieën, JH, 2005. Flow-related mechanics of the intervertebral disc: the validity of an in vitro model. *Spine* 30(18): E534-539.
- Verbeek, JH, Martimo, KP, Karppinen, J, Kuijper, PP, Viikari-Juntura, E, Takala, EP, 2011. Manual material handling advice and assistive devices for preventing and treating back pain in workers. *Cochrane Database of Systematic Reviews* 18(3): CD005958.
- Wahlstrom, J, Mathiassen, SE, Liv, P, Hedlund, P, Ahlgren, C, Forsman, M, 2010. Upper arm postures and movements in female hairdressers across four full working days. *The Annals of Occupational Hygiene* 54(5): 584-594.
- Wai, EK, Rodriguez, S, Dagenais, S, Hall, H, 2008. Evidence-informed management of chronic low back pain with physical activity, smoking cessation, and weight loss. *the Spine Journal* 8(1): 195-202.
- Wai, EK, Roffey, DM, Bishop, P, Kwon, BK, Dagenais, S, 2010. Causal assessment of occupational lifting and low back pain: results of a systematic review. *the Spine Journal* 10(6): 554-566.
- Wang, Y, Videman, T, Battie, MC, 2012a. ISSLS prize winner: Lumbar vertebral endplate lesions: associations with disc degeneration and back pain history. *Spine* 37(17): 1490-1496.
- Wang, Y, Videman, T, Battie, MC, 2012b. Lumbar vertebral endplate lesions: prevalence, classification, and association with age. *Spine* 37(17): 1432-1439.
- Waters, TR, Putz-Anderson, V, Garg, A, Fine, LJ, 1993. Revised NIOSH equation for the design and evaluation of manual lifting tasks. *Ergonomics* 36(7): 749-776.
- Welch, L, Haile, E, Boden, LI, Hunting, KL, 2009. Musculoskeletal disorders among construction roofers - physical function and disability. *Scandinavian Journal of Work, Environment & Health* 35(1): 56-63.
- Wells, R, van Eerd, D, Hägg, G, 2004. Mechanical exposure concepts using force as the agent. *Scandinavian Journal of Work, Environment & Health* 30(3): 179-190.
- Westgaard, RH, Winkel, J, 1997. Ergonomic intervention research for improved musculoskeletal health: A critical review. *International Journal of Industrial Ergonomics* 20(6): 463-500.
- Winkel, J, Mathiassen, SE, 1994. Assessment of physical work load in epidemiologic studies: concepts, issues and operational considerations. *Ergonomics* 37(6): 979-988.
- van Wyk, PM, Weir, PL, Andrews, DM, Fiedler, KM, Callaghan, JP, 2009. Determining the optimal size for posture categories used in video-based posture assessment methods. *Ergonomics* 52(8): 921-930.
- Xu, X, Chang, CC, Faber, GS, Kingma, I, Dennerlein, JT, 2010a. Comparing polynomial and cubic spline interpolation of segment angles for estimating L5/S1 net moment during symmetric lifting tasks. *Journal of Biomechanics* 43(10): 583-586.
- Xu, X, Chang, CC, Faber, GS, Kingma, I, Dennerlein, JT, 2010b. Interpolation of segment Euler angles can provide a robust estimation of segment angular trajectories during asymmetric lifting tasks. *Journal of Biomechanics* 43(10): 2043-2048.
- Xu, X, Chang, CC, Faber, GS, Kingma, I, Dennerlein, JT, 2011. The validity and inter-rater reliability of video-based posture observation during asymmetric lifting tasks. *Human Factors* 53(4): 371-382.
- Xu, X, Chang, CC, Faber, GS, Kingma, I, Dennerlein, JT, 2012. Estimation of 3-D peak L5/S1 joint moment during asymmetric lifting tasks with cubic spline interpolation of segment Euler angles. *Applied Ergonomics* 43(1): 115-120.
- Zatsiorsky, VM, 2002. Kinetics of Human Motion. Human Kinetics, Champaign, IL.
- Zhang, X, Chaffin, D, 2000. A three-dimensional dynamic posture prediction model for simulating in-vehicle seated reaching movements: development and validation. *Ergonomics* 43(9): 1314-1330.