

laxity at 200N in males. Beighton score together with the laximetry gives us additional diagnostic information in the assessment of the patients with the ACL trauma.

References:

1. Boguszewski D V, Cheung EC, Joshi NB, Markolf KL, McAllister DR. Male-Female Differences in Knee Laxity and Stiffness: A Cadaveric Study . *Am J Sport Med* . 2015;43(12):2982–2987. doi:10.1177/0363546515608478 .
2. Clinch J, Deere K, Sayers A, et al. Epidemiology of generalized joint laxity (hypermobility) in fourteen-year-old children from the UK: a population-based evaluation. *Arthritis Rheum*. 2011;63(9):2819–27. doi:10.1002/art.30435.
3. Hakim A, R G. A simple questionnaire to detect hypermobility: an adjunct to the assessment of patients with diffuse musculoskeletal pain. *Int J Clin Pract*. 2003;57(3):163.

**IF EVERY THING IS CHANGING ALL THE TIME
REPETITION IN THERAPY HAS TO BE QUESTIONED**

Wolfgang I. Schöllhorn, Fabian Horst
Johannes Gutenberg University of Mainz

Traditionally, rehabilitation as well as athlete's training is oriented on ideal prototypes that are mainly independent from the individual and the situation. This typically results in numerous repetitions and corrective instructions by the therapist's during the intervention. Despite Bernstein's (1967) famous statement about the impossibility of identical movements by "repeating without repetition" only marginal changes in training and therapy have been observed yet. First striking support for the individuality of movement patterns has been provided by the analysis of high performance athletes (Bauer & Schöllhorn 1997, Schöllhorn & Bauer 1998) as well as by the analysis of gait patterns (Schöllhorn et al. 2002). By just analyzing biomechanically measured movement patterns

during 200ms an individual person could be identified. Evidence for an even finer differentiation of movement repetitions within an individual were shown by assigning emotions (Janssen et al. 2008) to individual expressions of gait. Similarly, the identification of the grade of fatigue within the biomechanical gait patterns of an individual (Jäger et al. 2003, Janssen et al. 2011) provided first evidence for the dependence of gait patterns on situations. More recently, even stronger evidence for continuous changes of individual gait patterns could be shown. Within a single day (Horst et al. 2014) as well as on consecutive days (Horst et al. 2015) high rates of separation even without any intervention were possible. If health and rehabilitation is also understood as preparation for future events and coping with disturbances repeating despite the impossible repetitive based training seems to be suboptimal. In order to prepare patients and athletes for future events that will include new elements for granted more variable approaches are more promising. By increasing the variability during the learning process and relying on the human's ability to interpolate a much better preparation for new elements is achieved. Furthermore, higher variability not only prepares for unknown situations in future but also supports a self organizing process in order to find someone's self. Analyses of brain activities by means of EEG after different learning schedules support these consequences (Henz et al. 2015, Maus et al. 2015).

References:

1. Bauer HU, Schöllhorn WI. Self-Organizing Maps for the Analysis of Complex Movement Patterns. *Neural Processing Letters*. 1997; 5: 193-199.
2. Bernstein MA. The Coordination and Regulation of Movements. Oxford (NY): Pergamon Press; 1967.
3. Henz D, Kenville R, Simon M, Leinberger O, Schöllhorn WI. EEG brain activity in differential, contextual interference, and classical repetition oriented badminton serve training. In: Radmann A, Hedenborg S, Tsolakidis E. Book of

Abstract of the 20th Annual Congress of the European College of Sport Science. Malmö: Malmö University Electronic Publishing: 2015. pp. 502-503.

4. Horst F, Eekhoff A, Schöllhorn WI. Individual gait patterns are changing much more by itself. In: De Haan A, De Ruiter CJ, Tsolakidis E. Book of Abstract of the 19th Annual Congress of the European College of Sport Science. Utrecht: Digital Printing Partners. 2014. p. 42.

5. Horst F, Kramer F, Schäfer B, Eekhoff A, Hegen P, Schöllhorn WI. Daily changes of individual gait patterns. In: Radmann A, Hedenborg S, Tsolakidis E. Book of Abstract of the 20th Annual Congress of the European College of Sport Science. Malmö: Malmö University Electronic Publishing: 2015. p. 53.

6. Jäger J, Alichmann M, Schöllhorn WI. Erkennung von Ermüdungszuständen anhand von Bodenreaktionskräften mittels neuronaler Netze. In: Brüggemann GP, Morey-Klapsing G. Biologische Systeme - Mechanische Eigenschaften und ihre Adaptation bei körperlicher Belastung. Hamburg: Czwalina: 2003. pp. 179-183.

7. Janssen D, Schöllhorn WI, Lubienetzki J, Fölling K, Kokenge H, Davids K. Recognition of Emotions in Gait Patterns by Means of Artificial Neural Nets. *J Nonverb Behav*. 2008; 32: 79-92.

8. Janssen D, Schöllhorn WI, Newell KM, Jäger JM, Rost F, Vehof K. Diagnosing fatigue in gait patterns by support vector machines and self-organizing maps. *Hum Mov Sci*. 2011; 30(5): 966-975.

9. Maus J, Henz D, Eekhoff A, Schöllhorn WI. Influence of different grounds during walking on cortical activity. In: Radmann A, Hedenborg S, Tsolakidis E. Book of Abstract of the 20th Annual Congress of the European College of Sport Science. Malmö: Malmö University Electronic Publishing: 2015. p. 509.

10. Schöllhorn WI, Bauer HU. Identifying individual movement styles in high performance sports by means of self-

organizing Kohonen maps. In: Riehle H, Vieten M. XVI. International Symposium on Biomechanics in Sports. Konstanz: Universitätsverlag; 1998. pp. 574-577.

FINNISH HEALTH PHYSICAL ACTIVITY RECOMMENDATIONS

Pirkko Mäntykivi, Marjut Koivisto

School of Health Care and Social Work Seinäjoki University of Applied Sciences

Increasing physical activity and decreasing sedentary lifestyle are the main objectives in the prevention and treatment of lifestyle-related diseases.

The UKK Institute is a private research institute, owned by the Urho Kekkonen Fitness Institute Foundation in Finland. One of its aims is to promote physical activity and health.

The UKK Institute's Physical Activity Pie has been updated 2009 to meet the guidelines for health-enhancing physical activity for adults (aged 18—64).

The new version of this graphic aid to health-enhancing physical activity puts more emphasis on the significance of muscular fitness to health. Physical activity that improves endurance has been given a total weekly duration that is based on the degree of strain needed to perform the activity.

The revision of the recommendation for health-enhancing physical activity is based on a broad review of the scientific literature, which continually provides more and more scientific evidence of the effect of physical activity on health.