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Physiotherapie

Abstracts 2015

Masterarbeiten Master of Science in Physiotherapie (MScPT) Studiengang 2012

Editorial

Sehr geehrte Leserin, sehr geehrter Leser

Wir freuen uns, Ihnen den dritten Abstractband der Masterarbeiten des Studiengangs Master of Science in Physiotherapie (MScPT) zu präsentieren.

Nach sechs intensiven Semestern schliessen die Studierenden ihr Studium mit einer Masterarbeit ab. Die Zusammenstellung der diesjährigen Masterarbeiten zeigt die Vielfalt der Forschungsthemen und die Resultate der spannenden Fragestellungen auf. Das Spektrum der Probandinnen und Probanden geht von Kindern mit Zerebralparese bis zu älteren pflegebedürftigen Menschen. Untersucht wurden körperliche Beschwerden oder physiotherapeutische Massnahmen von Kopf bis Fuss. Die unterschiedlich gewählten Methoden von retrospektiven Analysen über systematische Reviews und randomisierten Doppelblind-Studien zeigen die breiten methodischen Kenntnisse, die sich die Studierenden angeeignet haben.

Namhafte Co-Autorinnen und -Autoren sowie Kolleginnen und Kollegen aus der Physiotherapie haben die Studierenden unterstützt und zum Entstehen der Masterarbeiten beigetragen. Ihnen sei an dieser Stelle ganz herzlich für ihre Arbeit gedankt!
Die Studierenden konnten teilweise ihre Masterarbeiten bereits an Kongressen präsentieren, andere streben die Publikation in englisch- oder deutschsprachigen Fachzeitschriften an. Die Resultate aus den Masterarbeiten finden hoffentlich auch den Weg in die Praxis und werden von klinisch tätigen Physiotherapeutinnen und -therapeuten aufgenommen.

Wir gratulieren den frisch diplomierten MSc Physiotherapeutinnen und -therapeuten zu ihrem erfolgreichen Abschluss!

Ihnen wünschen wir eine spannende und inspirierende Lektüre.

Prof. Dr. Karin Niedermann
Leiterin Studiengang
MSc in Physiotherapie (ZHAW)

Prof. Dr. Amir Tal
Leiter Studiengang
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Upper Limb Movements during Gait in Children with Leg Length Discrepancy – a Kinematic Analysis

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The influence of a leg length discrepancy on the lower limbs and on the trunk during gait has been widely analyzed. However, no study has analyzed its impact on the upper limb movement pattern. The aim of the present study was to quantitatively evaluate the upper limb movements during gait in children and adolescents with a leg length discrepancy compared to a group of matched healthy controls. We used a full-body marker set to acquire kinematic data of the shoulder (frontal and sagittal plane), elbow (sagittal plane) and thorax (frontal, sagittal and transversal plane). The data were analyzed using the Vicon Workstation, Nexus and the Polygon software (Oxford Metrics, London, UK). All statistical analyses were performed using SPSS version 22.0.0.0 (SPSS Inc., Chicago, IL, USA). The results of median angle values in patients with a leg length discrepancy showed significant differences in the shoulder extension, shoulder abduction and elbow flexion when compared to healthy participants. Additionally, the patients with a leg length discrepancy demonstrated significantly larger thorax tilt and thorax lateroflexion movements. These results suggest passive physical effects and active secondary compensatory mechanisms during gait in patients with a leg length discrepancy, most probably in order to maintain gait direction and balance. These findings may help physiotherapists for the planning of a physical therapy treatment in children and adolescents with a leg length discrepancy.

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Erkennen von Warnsignalen in der Physiotherapie – Entwicklung und Qualitätsüberprüfung einer Red-Flag-spezifischen Schulung für Physiotherapeuten

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Hintergrund: Der Direktzugang zur Physiotherapie in der Schweiz bietet die Chancen prognostizierte, gesundheitliche Engpässe abzuschwächen. Falls zukünftig Leistungserbringungen ohne ärztliche Anordnung erlaubt würden, wären Physiotherapeuten als medizinische Erstkontaktperson verpflichtet, ihre Kompetenzen im Erkennen von medizinischen Warnsignalen (Red Flags) zu festigen.
Ziel: Es gilt zu klären, ob eine halbtätige Red-Flag-spezifische Schulung eine verlässliche Methode zu derer Wissensvertiefung ist.
Methode: Entwicklung einer Schulung für diplomierte Physiotherapeuten sowie zweier Fragebögen. Diese dienten als Messinstrument zur Qualitätsüberprüfung der Schulung. Die 29 Teilnehmer füllten vor und nach der Schulung einen Bogen aus.
Ergebnisse: Die Auswertung der Testleistung der Fragebögen ($p=0.055$), sowie Subanalysen zeigten keine statistisch messbare Verbesserung auf. 69% der Teilnehmer zeigten nach der Schulung eine verbesserte- und 28% eine verschlechterte Testleistung. Physiotherapeuten, die sich in ihrer Leistung verschlechterten, hätten jeweils den Patienten unnötigerweise zu häufig zum Arzt überwiesen.
Schlussfolgerung: Die Mehrheit erhielt durch die Schulung eine Vertiefung ihres Wissens. Die Tatsache, dass die Therapeuten den Patienten öfter zum Arzt überwiesen als nötig, spricht für eine gewährte Patientensicherheit. Zukünftig sollten Studien mehr Teilnehmer und langfristiges Wissen erfassen.

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Navicular Rise: a possibility to describe dynamic foot function during stance? A descriptive, cross-sectional laboratory study

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Background: Adult acquired flatfoot is a frequent problem with a 19% prevalence. Quantifying the navicular drop (ND) with three-dimensional motion capturing systems during walking is an established laboratory method. The aims of this descriptive, cross-sectional laboratory study were to investigate the reliability of a new parameter, the navicular rise (NR), and its relationship with the ND during level walking and stair descent.
Methods: To assess the navicular bone motion during stance, 20 healthy subjects (mean age 30.4±7.8 years) had to walk on even ground and to go downstairs. The Vicon® system and force plates recorded data of ten trials per task at two measurement days. The NR was extracted from the mean curves and defined as the difference between the minimum navicular height during stance and the navicular height at toe off. To test intra- and interday reliability, Bland-Altman plots were drawn, Intraclass Correlation Coefficients ($ICC_{2.1}$) and repeatability (RP) were calculated. Furthermore, the relationship between the NR and the ND was examined by calculating Pearson (r), Spearman (r_s) correlations and regression coefficients (b), and illustrated with scatterplots.
Results: Included subjects showed a mean NR of (12.22±3.80) mm for level walking, (14.80±3.43) mm for stair descent respectively. The $ICC_{2.1}$ for the NR were 0.98 (intraday), and 0.91 (interday) for level walking. For stair descent, the $ICC_{2.1}$ values obtained were 0.97 (intraday), 0.94 (interday) respectively. The RP for interday-comparisons was 3.23 mm for level walking and 2.69 mm for stair descent. The correlation coefficients for comparison of the NR with the ND were r=0.31, b=0.5 (p=0.049) during level walking, and rs=0.88, b=1.08 (p=0.000) respectively for stair descent.
Conclusion: The NR is highly reliable for intra- and interday measurements. For level walking, the NR may rather not be an independent measure for late stance dynamics. For stair climbing, the NR resembles the ND and therefore, gives no additional information. As only healthy subjects had been measured, the results cannot be transferred to patients. Future research should include larger sample sizes or focus on patient groups.

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Start vibrating and dancing – stop falling Effects of whole-body vibration combined with virtual dance training on functional and cognitive performance in elderly

Background: Fall prevention programmes focus mainly on functional performance. However, to prevent falls it is assumed to be more beneficial when improving physical and cognitive performances. This study examined the effects of a combined intervention consisting of stochastic resonance whole-body vibration (SR-WBV) and virtual dance training (VDT) on physical and cognitive performance in elderly in need of care.
Methods: Seventeen elderly in need of care (10 women, 7 men, age: 79-98) were randomly assigned to the intervention (IG, n=9) or the sham group (SG, n=8). The IG performed five sets of one-minute SR-WBV with one-minute rest in between, three times a week for the first four weeks (baseline frequency: 3Hz, Noise 4). From week five to eight the VDT was conducted after the vibration sessions. The SG performed a SR-WBV training with the same terms applied (fixed frequency: 1Hz, Noise 1). From week five to eight a passive trampoline-programme of five minutes was applied following the vibrations. Primary outcome was the Short Physical Performance Battery (SPPB). Secondary outcomes were the Trail Making Test A and B (TMT A & B) and the Falls Efficacy Scale–International (FES-I) measured at baseline, after four and eight weeks and at follow-up. The non-parametric rank-order test of Puri and Sen was applied, followed by an ANOVA for repeated measures to analyse main and interaction effects and the Mann-Whitney U-Test to determine the differences between groups. Significance level was set at $p < 0.0125$ after Bonferroni correction. Effect sizes were calculated.
Results: The post-hoc analysis showed significant effects on the SPPB total score with large effect sizes from baseline to eight weeks (+72%, $p=0.005$, $\eta 2=0.423$). The TMT part B displayed significant differences with large effect sizes from baseline to eight weeks (+17.5%, $p=0.002$, $\eta 2=0.779$) and to follow-up (+21%, $p=0.001$, $\eta 2=0.827$).
Conclusion: The innovative eight-week training programme consisting of a combination of SRWBV and VDT showed beneficial effects on physical and cognitive performance in elderly in need of care. When conducted three times a week, the programme is suitable and effective.

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Effectiveness of Physiotherapy Interventions on Gait in Children with Cerebral Palsy
A Systematic Review and Network Meta-Analysis

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Aim: To synthesize the effects of physiotherapy interventions on gait and gross motor function of children with cerebral palsy and to compare and rank the interventions by effects.
Methods: This study was a systematic review and network meta-analysis of randomized controlled trials. MEDLINE Advanced, CINHAL, Cochrane Library, and PEDro databases were searched. Two reviewers independently screened abstracts and full texts for inclusion according to the following criteria: (1) children with CP attending any (2) active PT intervention targeting (4) walking speed or gross motor function. Two reviewers independently assessed risk of bias. Data for population, interventions, outcomes measures and results were extracted. Bayesian network meta-analysis was conducted to estimate the standard mean difference of the interventions on walking speed, Gross Motor Function Measure (GMFM), GMFM Dimension D and E.
Results: 65 RCTs were included in systematic review and 62 in network meta-analysis. High clinical heterogeneity was observed across trials. Bayesian network meta-analysis showed sparse networks for all outcome measures.
Interpretation: Whole-body-vibration treatment plus conventional physiotherapy showed consistent effect on the four outcome measures. High clinical heterogeneity and sparse network does not allow further interpretations of the data. New studies are needed.

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Reflex activity in hypermobile and normomobile women during stair climbing
An exploratory study

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Introduction: Joint hypermobility is a widespread problem in rheumatology especially in young women. Complex symptoms like joint dislocations, chronic pain and early osteoarthritis affect daily tasks such as stair climbing. Previous studies report that hypermobile women might present an altered neuromuscular behavior in level walking and stair climbing in order to stabilize their knee joint. However, some results are contradictory and a more direct focus on neuromuscular reflex activity is needed. The purpose of this study was to detect potential differences in thigh muscle reflex activity comparing 67 normomobile and 128 hypermobile women during stair climbing.
Methods: A retrospective analysis of a cross-sectional study was conducted using surface electromyography (EMG) of three thigh muscles during stair climbing. Average muscle activity was compared between the hypermobile and normomobile groups during a 30 ms pre-activity phase and during the reflex phase of 30 to 150 ms. These phases are associated with neuromuscular adaptations. In addition, vertical ground reaction forces (VGRF) within the same phases were analyzed in order to receive further information on movement pattern alterations. The groups' EMG and VGRF derived parameters were compared using Mann-Whitney-U-test with a significance level $p \leq 0.002$.
Results: No significant differences were found for any of the EMG and VGRF derived variables.
Conclusion: Stair climbing seems to be not demanding enough to differentiate between women with and without joint hypermobility. Future studies should use higher impact activities to test for hypermobility induced adaptations of thigh muscle reflex activity.

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The effect of additional visual and tactile instruction methods on the movement performance in motor control tests in patients with non-specific chronic low back pain: A single group intervention study

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Background: Low back pain (LBP) causes high costs and individual suffering in our society. The origin of non-specific LBP complaints is heterogeneous, clinical subgrouping is therefore important. In research and physiotherapy practice the motor control test (MCT) battery is used to assess the movement control dysfunction (MCD). However, no standardisation for verbal, visual and tactile instruction methods has been established. This study attempts to evaluate the influence of additional instruction methods on MCT.
Methods: 15 participants with a history of non-specific chronic low back pain (NSCLBP) were recruited for a single group intervention study. A marker based opto-electronic motion capture system recorded the trunk and lower limb kinematics. The performance of six different MCT after the common verbal instruction was used as baseline and a standardised visual and tactile method as repeated measures. The primary outcome was the ratio (R) of the angular displacement of the stabilised (S) and the moving (M) body segment, specifically defined for each test. The Friedman-test (analysis of variance by ranks) and the Wilcoxon-test for posthoc analysis were used for statistical evaluation of the between instruction effects.
Results: The rocking back test (RB) kinematics showed significant changes after the additional instructions in the R value. The S showed significant differences between baseline and additional instruction methods for the waiters` bow (WB), pelvic tilt (PT), RB and rocking forward test (RF). Significant effects on M were present for the WB, the RB and the RF. No difference between the visual and the tactile instruction was found.
Conclusion: The dependence of the MCT performance on the instruction method was shown for the RB. The WB and the RF failed to show similar results because of the decrease of the M value. The effects for the remaining three MCT were considered as too small to be of clinical importance. These results indicated that the validity of the MCT could be improved by additional instruction methods and may therefore be revaluated. We recommend the usage of the additional instructions in research and practical physiotherapy.

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Blood pressure variability during the 6-minute walk test in patients with Chronic Obstructive Pulmonary Disease (COPD)

Background: There is conclusive evidence that physical exercise is characterized by a sudden and marked blood pressure rise as well as in increased blood pressure fluctuations. Patients with COPD have steeper blood pressure changes at rest than healthy subjects. It may be postulated that the steepness of blood pressure changes increases even more during physical exercise.
Objectives: To compare the speed of beat-to-beat changes in systolic blood pressure (vSBP) during physical exercise between patients with COPD and healthy subjects.
Methods: Non-invasively obtained continuous hemodynamic measurements of beat-to-beat arterial blood pressure were recorded with the FinometerTM PRO using a photoplethysmographic arterial/ volume clamp. Measurements were conducted during a resting period of five minutes as well as during the 6-minute walk test (6MWT).
Results: Analysis of within-group differences demonstrated a highly significant difference of vSBP from rest to physical exercise in both groups. The vSBP from the patients with COPD increased from 5.2 (SD±5.2) to 10.0 (SD±5.3) mmHg/IBI ($p<0.001$). In healthy subjects vSBP increased from 4.3 (SD±1.6) to 13.9 (SD±8.1) mmHg/IBI ($p<0.001$). Analysis of between-group differences during physical exercise demonstrated a significant steeper increase in vSBP of the healthy subjects ($p=0.033$).
Conclusion: vSBP increased significantly from rest to exercise in both study groups. Contrary to our expectations, the increase in vSBP of the patients with COPD was less pronounced. The major finding is that patients with COPD may have a loss of ability to achieve a sympathetic response as the baseline sympathetic tone is elevated.

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The effect of foot orthoses with forefoot cushioning or metatarsal pad on peak plantar pressure in running

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Background: Foot orthoses are frequently used in sports for the treatment of overuse injuries despite lacking clear evidence. One important aim can be to reduce plantar pressure under prominent areas like metatarsal heads. For the forefoot region two common strategies exist: metatarsal pad (P) and forefoot cushioning (C). The aim of this study was to evaluate which of these orthoses concepts is superior to reduce plantar pressure in the forefoot in running.
Methods: Twenty-three (13 female, 10 male) asymptomatic runners participated in this cross-sectional experimental trial. Participants ran in randomized order with the two experimental (P, C) and a neutral (N) condition on a treadmill (2.78 ms-1) for 2 minutes respectively. Plantar pressure was measured with the in-shoe plantar pressure measurement device Pedar-x®-System and mean peak pressure [kPa] under the forefoot and total foot was analyzed. The insole comfort was measured with the Insole Comfort Index (ICI, sum score 0-100) after each running trial. The primary outcome, peak plantar pressure under the forefoot, was tested with the Friedman test (α=0.05). Secondary outcomes were analyzed descriptive (mean±SD, lower & upper 95%-CI, median, interquartile-range (IQR)).
Results: Peak plantar pressure [kPa] under the forefoot was significantly lower wearing C (281±80, 95%-CI: 246-315) compared to both N (313±69, 95%-CI: 283-343; p=.003) and P (315±80, 95%-CI: 280-350; p=.001). No significant difference was found between N and P (p=.858). Peak plantar pressures under the total foot were: N: 364±82, 95%-CI: 328-399; P: 357±80, 95%-CI: 326-387; C: 333±81 95%-CI: 298-368. Median ICI sum scores were: N 50, P 49, C 64.
Conclusion: In contrast to the metatarsal pad orthosis, the forefoot cushioning orthosis achieved to significantly reduce peak plantar pressure in the forefoot of recreational runners. Consequently, the use of a metatarsal pad orthosis in recreational runners should be avoided in favour of a forefoot cushioning orthosis.

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Inter- and intrarater reliability and internal consistency of the German version of the «Agitated Behavior Scale» (ABS-G) in patients with moderate to severe traumatic brain injury

Background: Agitation is frequently observed during early recovery after traumatic brain injury (TBI). The aim of the study was to translate the Agitated Behavior Scale (ABS) into German (G) and to investigate the inter- and intrarater reliability and internal consistency in patients with moderate to severe TBI.
Methods: A formal nine-step translation and cross-cultural adaptation procedure (TCCA) was defined and implemented for the ABS. Subsequently a prospective observational study was conducted. The inter- and intrarater reliability was evaluated with the Spearman rank correlation coefficient and the quadratic weighted kappa. The internal consistency was tested with Cronbach's alpha. To examine the interrater reliability and internal consistency, two therapists rated 20 patients independently after a therapy session. This procedure was repeated twice on a weekly basis. The intrarater reliability was assessed through video recordings from three patients. Nine raters scored the demonstrated behaviour on the videotape with the ABS-G independently twice within one month.
Results: Behaviour of 20 patients (18 males; mean age 41, SD 20.7; mean total FIM score on admission 31.2, SD 25.4) was assessed. Interrater reliability yielded a correlation coefficient for ABS-G total score of all 60 paired observations of r=0.845 and a weighted Kappa of 0.738. Intrarater reliability for ABS-G total score ranged between rs 0.719 and 0.953 and showed a weighted Kappa between 0.871 and 0.953. Cronbach's alpha indicated moderate internal consistency with 0.661.
Conclusion: This study demonstrates that the ABS-G is a reliable instrument for evaluating agitation in patients with TBI.

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Influence of hip-abductor fatigue on sagittal plane ankle kinematics and lower limb muscle activity during a single-leg forward jump: a retrospective data analysis

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Background: Hip-abductor fatigue has been shown to influence ankle kinematics and lower limb muscle activities during balance tasks. However, its influence was never assessed before during challenging tasks.
Aim: Purpose of this study was to evaluate the influence of hip-abductor fatigue on the ankle kinematics in sagittal plane and the lower limb muscles during a single-leg jump.
Methods: A group of twenty healthy women and men performed a hip-abductor fatigue protocol. Before and after fatigue they had to do a 25cm single-leg forward jump on their dominant leg. Difference of the maximum voluntary isometric contraction (MVIC) of the hip-abductor served as a parameter to determine the state of fatigue. Postfatigue changes in kinematics and in muscle activity 200ms before, at initial contact (IC) and 250ms after IC were evaluated.
Results: Participants were fatigued after 343 seconds ± 228 (median ± IQR). Prefatigue MVIC (median 280N ± (IQR 111N)) and post-fatigue MVIC (median 107N ± (IQR 71N)) force decreased by 62% ($p<0.001$). The maximal ankle plantar-flexion before IC decreased by 4.39° ($p<0.004$) at IC by 3.55° ($p<0.027$) and after IC by 3.55° ($p<0.036$) towards a more dorsi-flexed position. Onset of the gastrocnemius activity was significantly delayed ($p<0.018$). Peak activity and average muscle activation of the tibialis anterior before IC increased significantly after fatigue (peak activity: $p<0.030$; average activity: $p<0.014$).
Discussion and conclusion: Hip-abductor fatigue changes the neuromuscular control in distal joints. These changes might lead to a higher risk for ankle injuries.

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Usability und Validität der Smartphone-Applikation therapp zur Messung des Schulterwinkels

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Hintergrund und Ziele: Die Schulterbeweglichkeit ist ein wichtiges klinisches Zeichen bei der medizinischen Beurteilung des Schultergelenks. Das therapp ist eine Applikation für alle iPhone® ab der Generation 4S und soll es dem Benutzer ermöglichen, ohne Hilfspersonal den eigenen Schulterwinkel zu bestimmen. Ziel dieser Studie war das frühzeitige Erkennen von Usability-Problemen bei der Anwendung des therapp V-1.0.0, sowie das Prüfen der Übereinstimmungsvalidität und der Testsituation im Rahmen einer Pilotstudie.
Methoden: Zwölf gesunde Probanden nahmen an der Studie teil, wovon die Hälfte Vorkenntnisse bezüglich Schultermessungen hatte (6 Physiotherapeuten, 6 Laien). Die Usability des therapp wurde mit der laborbasierten Methode des lauten Denkens untersucht. Die Tests wurden auf Video aufgezeichnet, mittels qualitativer Inhaltsanalyse ausgewertet und die festgestellten Usability-Probleme auf die Dringlichkeit einer baldigen Bearbeitung beurteilt. Die Übereinstimmungsvalidität wurde mit dem Messsystem Xsens MVN BIOMECH Awinda geprüft und mittels deskriptiver Statistik ausgewertet. Die Erkenntnisse zur Usability und Validität wurden entsprechend einem ‹parallel analytic approach› erst in der Schlussauswertung gemischt.
Resultate: Bezüglich der Usability wurden 78 Stolpersteine ermittelt, wovon 29 zur baldigen Überarbeitung empfohlen werden. Insbesondere in den Bereichen Kommunikation mit dem Anwender, Messgenauigkeit, störungsfreier Messablauf, kohärente Begrifflichkeiten und Zielgruppenbestimmung besteht Verbesserungsbedarf. Die Validitätstests ergaben eine unerwartete Häufung an Fehlmessungen. Die Korrelation zwischen den beiden Schultermessgeräten ergab r_p=0.382, r_p=0.590 respektive r_p=0.709 für die drei untersuchten Übungen.
Schlussfolgerung: Die Untersuchung zeigt ein breites Spektrum an Problemen in den Bereichen Usability und Validität auf und unterstreicht die Bedeutung einer frühzeitigen Zwischenevaluation bei der Entwicklung eines neuen Produktes.

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Reliability and validity of the step-down test in individuals with chronic ankle instability

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The underlying mechanism in 27% of ankle sprains is a fall while navigating stairs. Therefore, the step-down test (SDT) may be useful to investigate dynamic postural stability deficits in individuals with chronic ankle instability (CAI). Time-to-stabilization (TTS) was assessed in 23 individuals with CAI and 23 uninjured controls to investigate the psychometric properties of the forward and lateral SDT. The absolute reliability (SEM=0.04 to 0.12 s) (SDD=0.11 to 0.33 s) of the SDT protocol was acceptable, whereas the relative reliability (ICC3,k=0.12 to 0.63), discriminant validity (p=0.42 to 0.99) (AUC=0.50 to 0.57) and convergent validity (Spearman Correlation r=-0.29 to 0.19) were not. The SDT appears to not be challenging enough to detect dynamic postural stability differences between individuals with and without CAI. The good absolute reliability is an indication that the SDT is capable of measuring change over time.

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Intra-session reliability of pelvic floor muscle electromyography tested on healthy women and women with stress urinary incontinence or weak pelvic floor muscle

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Introduction and hypothesis: Electromyography (EMG) is a well-established method to quantify the relative level of pelvic floor muscle (PFM) activity. To date, PFM EMG has been tested as a reliable instrument in healthy women. However, reliability has not been tested in women with stress urinary incontinence (SUI) or women with weak PFM. Therefore, the aim of this study was to investigate the intra-session reliability of PFM EMG variables analyzed by three different analysis methods in healthy women and women with PFM dysfunction.
Methods: An EMG data analysis was performed including 20 healthy women, 50 women with SUI and 17 women with weak PFM. The reliability of EMG during rest, maximum voluntary contraction (MVC) and peak EMG as well as visual and calculated muscle activity onset determination were evaluated. All variables were checked for normality (Shapiro-Wilk). Descriptive statistics (mean, SD), possible systematic error within repeated measures (Wilcoxon) and reliability indexes were tested and presented descriptively (ICC, SEM, SEM%, MD, MD%).
Results: ICC ranged from 0.780-0.994, SEM% (7.5-15.7) and MD% (21.0-43.8).
Conclusion: ICCs showed good intra-session reliability in all methods and in all variables. In contrast, SEM and MD showed high values which relativized reliability. This study maintains all analysis methods in group healthy, but prefers the visual onset determination in group SUI and group weak, since there was no benefit in onset calculation. In further studies, inter-session reliability in women with pelvic floor dysfunction should be performed.

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The influence of prolonged-release Fampridine on leg muscle activity during treadmill walking in individuals with multiple sclerosis

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Background: Ambulatory impairment is common in individuals with multiple sclerosis (MS). Fampridine-PR (4-aminopyridine, prolonged-release formula), a potassium channel blocker leads to increased walking speed in some patients with MS. However, the underlying functional mechanisms and effects on other aspects of ambulatory function, such as changes in muscle activity are unknown.
Objectives: The aim of this sub-study was to investigate the effects of Fampridine-PR on walking speed, endurance and muscle activity in individuals with MS.
Methods: In a randomized, double-blind and placebo-controlled phase 2 trial with crossover design, the Timed-25-Foot Walk (T25FW) and the 6-minute Walk Test (6MWT) were performed to compare walking function under treatment with Fampridine-PR and placebo. Surface electromyography (sEMG) of four leg muscles were recorded bilaterally during walking on a treadmill in 55 individuals with MS. Outcome parameters for sEMG were muscle activity duration, time point of muscle «on»- and «off»-set and time point of peak activity.
Results: In the T25FW and the 6MWT significant improvements were detected under Fampridine-PR treatment. For all sEMG parameters, there were no general treatment-induced changes. There was a trend towards a reduced activity in flexor muscles. However, subject-specific changes of muscle activity were found in a subset of patients.
Conclusion: Treatment with Fampridine-PR improved ambulatory performance in a short- and a long-distance clinical walking test in subjects with MS while a common effect on leg muscle activity was absent. In a heterogenic disease like MS, individual modifications of leg muscle activity may contribute to an improved walking function under Fampridine-PR.

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Reliability and Validity of the Second Generation Kinect Sensor for Measuring Kinematics of the Lower Limbs during Functional Movements

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Introduction: Marker based systems (MBS) provide a reference to kinematics of the human body during movement patterns, but are expensive, time consuming and, therefore, not a practicable method for the daily practice. Since the launch of Kinect®, a markerless motion capture system, several studies have evaluated the validity of this sensor. However, the agreement for the lower extremities was found to be poor. The second generation Kinect (Kinect2) appears to be a promising solution to poor lower body tracking due to improved technical properties. The objective of this study was a comparison between Kinect2 and MBS measured joint angles of the lower limbs during functional movements.
Method: Squats, single leg squats and countermovement jumps were measured simultaneously with Kinect2 and MBS. Intra-class correlation coefficients and standard errors of measurement were calculated to assess reliability. Limits of agreement, Pearson's correlation coefficients, root mean square errors and paired Student's t-Tests for differences between systems were calculated for outcome parameters to evaluate concurrent validity.
Results: Reliability of Kinect2 and MBS was comparable. Further, high correlations between Kinect2 and MBS were found for all outcomes. Absolute agreement however was poor: Differences between Kinect2 and MBS were statistically significant for all outcome parameters.
Discussion: Kinect2 allows reproducible measurements of joint angles of the lower extremity during squat, single leg squat and countermovement jump and is able to measure gross movements. However, the absolute agreement found in this study is not sufficient for the use in daily practice. Future research focusing on better tracking algorithms and calibration methods for Kinect2 is needed and may improve results.

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Perspectives and experiences of health-care professionals regarding pain management after spinal cord injury: a qualitative approach

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Purpose: Chronic pain is a significant problem after spinal cord injury (SCI) with a high impact on quality of life. Chronic pain management is difficult and outcomes are unsatisfactory for a substantial percentage of patients. There seems to be a gap between patients' wishes and the treatment offered by health-care professionals (HCP). Therefore, the purpose of this study was to investigate the view of HCPs towards this topic.
Methods: Two focus groups were conducted with HCPs involved in multidisciplinary pain management by presenting patients' experiences. Afterwards, qualitative content analysis was used to identify major problems of the pain management.
Results: Three main themes were identified: perception of the problem which includes a possible general underestimation of pain conditions after SCI and an underestimation of the biopsychosocial nature of pain, the need for multidisciplinary settings which was seen as the basis for successful treatment, and the importance of a good patient-HCP collaboration with communication, education, and treatment adjusted to the patient.
Conclusion: In the view of HCPs, more knowledge about the biopsychosocial nature of chronic pain SCI, a multidisciplinary treatment approach and improved patient-HCP collaboration seem to be key factors to improve chronic pain management after SCI.

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Psychometric properties of the EuroQoL EQ-5D to assess quality of life in patients undergoing carpal tunnel release surgery

Purpose: Investigation of reliability, validity, responsiveness and interpretability of the EuroQol EQ-5D-5L questionnaire (EQ-5D) in patients undergoing carpal tunnel release surgery.
Methods: Intraclass correlation coefficient (ICC) and Cronbach's alpha were calculated for reliability purpose. Validity was proven with spearmen's correlation coefficient (rs) responsiveness with effect sizes (ES). Interpretability was tested computing the area under the receiver operating characteristic curve (AUC) and the minimally important change (MIC).
Results: The EQ-5D demonstrated reliability with ICC=0.80 and Cronbach's alpha =0.84. A positive correlation with rs=0.7 between EQ-5D and SF-12 was found and an ES=0.5 for the EQ-5D was verified. The AUC=0.64 and the MIC=1.07.
Conclusion: The EQ-5D presented good reliability and construct validity, whereas responsiveness was moderate. However, the EQ-5D was not able to differentiate between improved and unimproved patients undergoing carpal tunnel release surgery.

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Closing the gap in Kinect research by devising a test setup using a ground truth

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Background/Objective: Motion analysis is an important part of physiotherapy research and in recent years markerless systems (MLS), such as the Kinect, have been tested and validated for this use, as an inexpensive and easy to use alternative to marker-based systems (MBS), which are considered the gold standard. This study tries to span the gap between technical capability testing using objects and clinical validation testing using comparisons with MBS of the Kinect by developing a test set up using a robot to move a mannequin as ground truth.
Methods: An industrial robot is chosen to deliver the ground truth movement. This movement is designed to evoke occlusion, which is seen as one limitation of the Kinects use in motion analysis. The data from two Kinects is fused into one skeleton, which positional data and positional data from a set up using only one Kinect (v1 and v2) is compared with the positional data from the robot using visual comparison of trajectories, mean differences, ICC, SEM and Bland and Altman analysis.
Results: Bias of 6-7 cm is found for the x- and y-axis and up to 11 cm for the z-axis, getting higher if occlusion was present, indicating low accuracy. Statistical analysis shows gut reliability.
Discussion/Conclusion: The set up developed, presents a precise and clinically useful solution to span the existing gap in research and could be used to further develop the Kinect, which shows good reliability but low validity, as a motion analysis tool.

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Development and evaluation of an online fall risk questionnaire A pilot study

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Introduction: Falls are frequent and may have serious consequences but awareness of the fall risk is often low. A self-administered questionnaire might help to raise the awareness of the fall risk. The aim of the study was to test the feasibility of an online application of a questionnaire and to assess preliminary predictive values.
Materials and Methods: In a prospective cohort study with a six-month follow-up, community-dwelling German or French speaking elderly persons over 60 years were recruited by an e-mail snowball sampling method.
Results and Discussion: We included 134 persons. Response rates during the monthly follow-ups were high varying between 38 and 90%. There were more men than women (45% female) and the proportion of present risk factors was low. Falls during follow-up were reported by 25 participants. The Area Under the Curve value was 0.67 (95% CI 0.54 to 0.81) and there was significant miscalibration (p-value<0.0001). The understandability of the questionnaire was good with the exception of five questions.
Conclusion: Measure needs to be taken to increase the monthly response rates and further research need to improve the understandability of some questions before test-retest reliability and the final predictive values can be assessed.

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The Influence of Radloff-Intervention on Disability and Cortical Representation in Chronic Nonspecific Low Back Pain. A Single-Case-Research Study

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Background and Purpose: The European Guidelines for the management of chronic nonspecific low back pain (CNSLBP) emphasize the need for further research by evaluating specific components of treatments commonly used by physical therapists, by comparing their individual and combined use. Although they do not recommend acupuncture and only summarize to consider a short course of manipulation as a treatment option for CNSLBP, this study was carried out to investigate the influence of this very combination.
Objective: The objective of this study was to describe the effects of a Radloff-intervention on participants' disability and tactile acuity as an image of the cortical reorganization.
Design: A single-case research design study, replicated with 3 participants, was used for this study.
Methods: Three participants with CNSLBP were assessed twice a week, during a 4 week baseline period. In the treatment period, each patient received 5 sessions with the Radloff-intervention. In this period, patients were assessed before and directly after the treatment. In the one-month follow-up period, data were collected weekly.
Results: Pain and perceived disability were reduced and could maintain partly throughout the follow-up period. However tactile acuity did not improve. No adverse events were experienced.
Limitations: This study had an explorative character. All participants had a medical record of more than 7 years. A treatment period of only 4 weeks might be too short to maintain improved functionality of the back and health in generally terms speaking.
Conclusion: The positive outcomes may conclude that a Radloff intervention can be an alternative treatment for CNSLBP, however, further research has to be done with more robust study designs.

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Effectiveness of conservative interventions in adults with shoulder impingement – A systematic review and meta-analysis

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Objective: To investigate the effectiveness of different conservative interventions for pain, function and active range of motion in adults with shoulder impingement.
Design: Systematic review and meta-analysis of randomized controlled trials.
Data sources: Systematic searches in Medline, CENTRAL, CINAHL, EMBASE, Web of Science, and PEDro up to June 2014 and hand searches of reference lists and forward citation tracking of included trials.
Study selection criteria: Randomised trials published in full text including adult participants with shoulder impingement and evaluating at least one conservative intervention against sham or active treatments.
Results: One hundred sixty-eight trials included a total of 10011 participants. For the outcome pain at the longest follow-up, there is very low quality evidence that exercise had a large standardized mean difference (SMD) of -0.94 with a 95% CI from -1.69 to -0.19 compared to doing nothing and specific exercises were better than generic exercises with a SMD of -0.54 (-0.79 to -0.28). Corticosteroid injections had a large SMD of -0.65 (95% CI -1.04 to -0.26) compared to no treatment, ultrasound guided injections were better than non-guided (-0.82 (95% CI -1.54 to -0.11), NSAIDS had a small to moderate SMD of -0.29 (95% CI -0.53 to -0.05), manual therapy was better than placebo -0.46 (95% CI from -0.84 to -0.08) and manual therapy plus exercise was non-significantly better than exercise alone -0.28 (95% CI -0.68 to 0.13); laser had a large SMD of -0.81 (95% CI -1.06 to -0.55) compared to exercise and -0.65 (95% CI -1.24 to -0.06) compared to sham laser. Extracorporeal shockwave therapy was better than sham therapy with a small to moderate SMD of -0.39 (95% CI -0.78 to -0.01). Tape was better than exercise and manual therapy 0.45 (95% CI -0.80 to -0.09).
Conclusion: Although there is only very low quality evidence, general and specific exercises should be prescribed for patients with shoulder impingement symptoms. Tape, laser or manual therapy might be added to exercise. NSAIDS can be recommended if necessary. Corticosteroid injections might only be recommended when exercise or other modalities are not possible. If corticosteroid injections are applied, they should be provided under ultrasound guidance.

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