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Abstracts 2021

Masterarbeiten Master of Science in Physiotherapie (MScPT) Studiengang 2018

Editorial

Sehr geehrte Leserin, sehr geehrter Leser

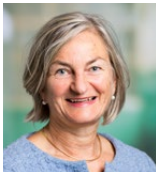
Es ist eine schöne Tradition geworden, dass Sie im Herbst den Abstractband der Masterarbeiten des Studiengangs Master of Science in Physiotherapie (MScPT) erhalten. 2021 ist er vom inzwischen neunten Studienjahrgang, dem MScPT2018.

In diesem Jahr findet aber auch die Dernière dieses Formats statt, denn der MScPT-2018 ist der letzte Studiengang der Kooperation zwischen der BFH und der ZHAW.
Seit 2008 haben die beiden Hochschulen gemeinsam den MScPT aufgebaut und mit dem Start 2010 einen Meilenstein gesetzt. Darauf wurde nicht ausgeruht, sondern bis 2015 der MScPT weiterentwickelt zur heutigen Form mit klinischen Schwerpunkten und dem Schwerpunkt 'Professionsentwicklung'. Dann war an beiden Hochschulen die Zeit reif für mehr interprofessionelles Zusammengehen und Studieren und 2019 starteten an beiden Hochschulen MScPT Studiengänge mit interprofessionellen Anteilen.

Die Masterarbeiten des MScPT2018 setzen einen würdigen Schlusspunkt und sind auch sonst besondere Arbeiten. Während der Durchführung ihrer Projekte sahen sich viele Studierende mit äusserst schwierigen Umständen konfrontiert. Lockdowns mit geschlossenen Institutionen und Labors und zuhause bleibenden Studienteilnehmenden haben die Studierenden zusätzlich gefordert. Sie mussten praktikable Lösungen finden und Geduld und Nerven behalten. Das haben sie hervorragend gelöst.
So sind wir dieses Mal besonders stolz auf unsere Absolvierenden. Wir schätzten ihre Motivation und ihr Engagement für und während des Studiums, sind beeindruckt von den steilen Lern- und Entwicklungsprozessen, die sie in den vergangenen drei Jahren gemacht haben, und freuen uns nun über ihre methodisch vielfältigen, spannenden und sorgfältigen Masterarbeiten.
Unsere Freude verbinden wir mit einem grossen Dank an unsere Dozierenden und Betreuenden, die all das ermöglicht haben.

Den MScPT2018 Absolvierenden gratulieren wir herzlich zu ihren gelungenen Masterarbeiten und zu ihrem Abschluss!

Ihnen wünschen wir Lesevergnügen!



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

Prof. Dr. Amir Tal
Leiter Studiengang
MSc in Physiotherapie (BFH)

Masterarbeiten (Abstracts)

Kathrin Abächerli
Bern University of Applied Sciences, Department of Health Professions, Bern

Co-Autorinnen/Co-Autoren
Heiner Baur, PhD[1]

Angela Blasimann, PT, MSc[1]

Aglaja Busch, MSc[1]

Philipp Henle, MD[2]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

[2] Sonnenhof Orthopaedic Center, Department of Knee Surgery and Sports Injury, Bern

Neuromuscular Activity During Stair Descent in Conservatively and Surgically Treated ACL-Injured Subjects – A Cross Sectional Study

Background: The rupture of the anterior cruciate ligament (ACL) is one of the most common injuries in physically active people. The mechanism of maintaining active joint stability is thought to be disturbed after such an injury. One reason appears to be altered neuromuscular control. Therefore, it is important to investigate neuromuscular activity of the knee stabilizing muscles during functional tasks. The aim of the study was to investigate neuromuscular activity during stair descent in surgically and conservatively treated ACL-injured one year after injury or surgery compared to a healthy control group.
Methods: Neuromuscular activity of M. vastus medialis (VM) & lateralis (VL), M. biceps femoris (BF) and M. semitendinosus (ST) was recorded by electromyography in 18 conservatively (ACL-C) and 18 operatively treated (ACL-O) compared to 18 healthy matched controls (ACL-H). Participants descended 10 times a six-step stairway. This movement was divided into 3 phases: Pre-activation (PRE), weight-acceptance (WA) and push-off (PO). Per each muscle, limb and movement phase a root mean square (RMS) was calculated and (submaximal) normalized with the activation of normal level walking. Comparisons between groups were then made using Kruskall-Wallis' one-way analysis of variance (ANOVA) (α = 0.05).
Results: The injured legs of the ACL-C group showed a tendency of higher VM und VL activity and lower BF activity especially in the WA and PO compared to the ACL-H group. Furthermore, the non-affected legs especially of the ACL-O group showed the same pattern of higher VM and VL activity and lower BF activity in all phases.
Conclusion: This study has shown that neuromuscular activity one year after ACL injury or surgery is altered in both legs, affected and non-affected compared to a healthy control group. Reasons for this bilateral change could be central adaptation due to altered afferent information, but also an already existing altered neuromuscular activation pattern before the injury. The findings of the study suggest that it is important to promote neuromuscular control during rehabilitation to restore appropriate muscle activity.

Betreuungsperson
Heiner Baur, PhD

Laura Böhringer
Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Spinal Movement Biomechanics Group, Bern

Kinematics and Segmental Loading of the Spine During Stair Climbing and Walking in Healthy Subjects: A Normative Database

Co-Autorin/Co-Autoren
Stefan Schmid, PT, PhD[1]

Lukas Connolly, MSc[2,3,4]

Magdalena Suter, PT, MSc[2]

Michael L. Meier, PhD[2,3]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

[2] University of Zürich, Balgrist University Hospital, Department of Chiropractic Medicine, Integrative Spinal Research, Zürich

[3] University of Zürich, Zürich

[4] ETH Zürich, Department of Health Science and Technology, Zürich

The evaluation of spinal biomechanics during daily activities leads to a better understanding of the mechanical factors and may provide insight into pathophysiological processes of various musculoskeletal disorders. Therefore, the present study aimed to assess spinal kinematics and segmental loading in healthy individuals during the functional tasks stair ascent, stair descent and walking. Fifty-three healthy participants performed a movement analysis during the tasks. Five trials per subject were collected using a 27-camera motion capture system. The parameters of interest were the three-dimensional continuous curves and parametrized angles of the thoracic and lumbar spine as well as the continuous and parametrized intersegmental compressive and anterior posterior shear forces. The intrasession reliability was calculated by analyzing the systematic errors, the intraclass correlation coefficients (ICCs) and minimal detectable changes (MDCs). Group comparisons were conducted using repeated measures ANOVAs and post hoc pairwise comparisons. For the continuous data statistical analysis was performed with one- dimensional Statistical Parametric Mapping (SPM). Intrasession reliability of spinal kinematic and intersegmental loading parameters indicated good to excellent relative consistency (ICCs 0.75 - 0.99) for all of the three functional tasks. MDCs for kinematic data were overall below 7.5°, with relative values between 25% and 88%. For segmental loading all MDCs were below 0.45 BW and the relative MDC values ranged between 13% and 336%. The majority of the continuous and discrete group comparisons showed statistically differences. For both continuous and discrete data the task stairs up showed less lumbar lordosis than in the other two tasks. In stair descent a reversed pattern of the kinematic curves in the frontal and transverse plane was detected compared to the kinematic values in stair ascent and walking. For intersegmental compressive and ap shear forces higher values were measured in the task stairs ascent than in the two other tasks.
The data set of the present study serves as a basis for a better understanding of the spinal biomechanics during the functional tasks stair climbing and walking and could be used for further investigations in spinal motion behaviour.
Keywords: spine biomechanics, spinal kinematics, segmental loading, stair climbing, walking, intrasession reliability, continuous data

Betreuungsperson
Stefan Schmid, PT, PhD

Stephanie Miriam Brezina
University Hospital Zurich, Department of Neonatology, Zurich, Switzerland

Co-Autor
Giancarlo Natalucci, PhD[1]

[1] University Hospital Zurich, Department of Neonatology, Zurich, Switzerland

Movement Imitation Therapy for Preterm Babies (MIT-PB) – Ein neuer physiotherapeutischer Behandlungsansatz für Frühgeborene mit abnormal General Movements in der Schweiz?– eine Machbarkeitsstudie

Hintergrund/Ziele: Frühgeborene zeigen ein erhöhtes Risiko für einen motorischen Entwicklungsrückstand bis hin zu einer Zerebralparese. Zur Vorhersage dieses Risikos im Frühgeborenen- und Säuglingsalter ist die General Movements (GM)-Beurteilung ein valides, reliables Instrument. Eine darauf aufbauende, spezifische physiotherapeutische Intervention beginnend schon im Frühgeborenen-Alter wurde bisher jedoch noch nicht definiert.
Ende 2019 beschrieben Soloveichick et al. die Movement Imitation Therapy for Preterm Babies (MIT-PB) als neue vielversprechende Behandlungsmethode auf Basis der GM. Die geringe Teilnehmenden-Zahl schränkt jedoch die Übertragbarkeit dieser Ergebnisse ein, weshalb ein RCT zur näheren Überprüfung der Wirksamkeit geplant ist. Als Vorbereitung wurden in dieser Masterarbeit die essenziellen Prozesse des geplanten RCT (Rekrutierung, Randomisierung, Intervention inklusive Aufnahme der Sicherheitsdaten und Follow-up) im Kontext der Schweizer Level III/IIb Neonatologien geplant und anschliessend in einer Erprobungsphase auf Machbarkeit überprüft.
Methode: Nach der Planung der Prozesskomponenten durchliefen vier Teilnehmende den Gesamtprozess. Die Machbarkeitsevaluation fand in einer Mixed-Method-Analyse unter dem Paradigma des Pragmatismus statt. In die Auswertung flossen á priori definierte Machbarkeitsmerkmale (quantitativ), sowie Anmerkungen der Mitarbeitenden (qualitativ) ein, die gleichzeitig, während der Erprobungsphase aufgenommen wurden.
Resultate: Der Gesamtprozess zeigte sich zu 59% an sich machbar und zu 41% machbar mit Verbesserungsvorschlägen, also insgesamt entweder machbar oder lösbar. In den Bereichen Rekrutierung, Ressourcen und Management bedarf es der meisten Anpassungen. Ausserdem stellte die Qualität der GM-Videos und Behandlungsintensität eine Herausforderung dar.
Diskussion/Schlussfolgerung: Insgesamt zeigte sich der geplante Gesamtprozess für die untersuchte Teilnehmenden-Gruppe als machbar, obgleich noch einzelne Komponenten einer Anpassung bedürfen. Die geplante Folgestudie kann auf diesen Erkenntnissen aufbauen.

Betreuungsperson
Giancarlo Natalucci, PhD

Alice Bridel
University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

Fall Prevention in Older Adults. Evaluation of the Predictive Value of the Stopping Elderly Accidents, Death and Injuries (STEADI) Algorithm

Co-Autorin/Co-Autor
Roger Hilfiker, PT, PhD[1]

Anne-Gabrielle Mittaz Hager, PT, MSc[1]

[1] University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

Background: The Stopping Elderly Accidents, Death and Injury (STEADI) is a decision-tree algorithm designed to facilitate systematic screening for falls risk in older people. It is in line with the recommendations of the guidelines on falls prevention. However, its predictive value remains poorly evaluated and other falls predictors would seem to improve it.
Method: Baseline measures from a Swiss randomised controlled trial were used to assess the prediction of falls over a one-year follow-up. As a survival «time-to-fall» analysis, univariable and multivariable Cox regressions were used to assess different indices performance of prediction (calibration and discrimination) for the different STEADI components and other predictors.
Results: Among the 405 participants with a mean age of 79 years, 163 (41%) fallers were identified. 19 univariable predictors and six multivariable models (combination of predictors) were analysed. For all of them, the concordance c statistics (corresponding to the area under the ROC curve) was below 0.7, showing a low discrimination to predict a future fall. The model with the highest discrimination was the STEADI combined with five other predictors (c=0.653) and the lowest was the STEADI only composed by the Three Key Questions (c=0.558). Among univariable predictors, the number of reported falls (c=0.603) and the fear of falling measured by the Fall Efficacy Scale International (FES-I) (c=0.567) also showed good predictive value.
Conclusion: The Three Key Questions, first stage of the STEADI, appeared to be insufficient to predict future risk of falling on their own in this study. The addition of other fall predictors (for example the reported number of previous falls and the FES-I) would enhance the predictive value for screening.
Key Words: Falls, Elderly, Screening, Prediction, Risk Assessment, STEADI

Betreuungsperson
Roger Hilfiker, PT, PhD

Svenia Verena Bühler
Swiss Concussion Center, Institute for interdisciplinary Diagnosis and Therapy of Concussion, Zurich

Isometric Neck Strength of Healthy Swiss American Football Players Compared to Healthy Recreational Athletes Measured with the Multi-Cervical Unit

Co-Autoren
Mario Bizzini, PT, PhD[1]

Fausto Romano, PhD[1]

Manuel Hangarter, PT, BSc[2]

Daniel Agostino, MSc[1]

[1] Swiss Concussion Center, Institute for interdisciplinary Diagnosis and Therapy of Concussion, Zurich

[2] Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Background: Concussions are common injuries in American Football (AFB). Among other factors, neck strength could be a modifiable risk factor for concussions and might differ between elite athletes and less active subjects. Reference values for specific populations are needed for appropriate therapy and monitoring rehabilitation and training.
Purpose: The purpose of this study was providing isometric neck strength reference values for swiss AFB players for cervical flexion and extension and comparing these to a control group (CTR).
Study Design: Case-control study
Methods: Two groups of each 15 healthy AFB players (mean age 28.2 years) and CTR's of recreational athletes (mean age 26.5 years) were measured with the Multi-Cervical Unit on one day according to a self-developed protocol. Data analysis incorporated values of three repetitions in each direction with a 10 second rest between trials, using the mean strength over a muscle contraction period of 3 seconds. T-test for independent data was calculated to compare the neck strengths of AFB players and CTR's.
Results: Significant higher flexion neck strength was detected for AFB players (n = 13, mean = 104.9 N) compared to CTR (n = 14, mean = 81.1 N, $p \leq 0.016$). The extension neck strength of AFB (n =15, mean = 187.9 N) was higher compared to CTR (n = 15, mean = 142.7 N), but barely not significantly different between the groups ($p \leq 0.053$).
Conclusion: AFB players demonstrated higher strength values of the flexor and extensor neck muscles compared to CTR's. These strength differences may be due to training and sport-specific adaptations. More research will lead to a better understanding of the multidirectional isometric strength between various athletes of different levels and positions, leading to more reference values.

Betreuungsperson
Mario Bizzini, PT, PhD

Rachel Cott
Abteilung Entwicklungspädiatrie, Universitäts-Kinderspital Zürich – Eleonorenstiftung, Zürich

Unterschiede in der Verteilung der General Movements-Klassifikation zwischen neonatalen Risikogruppen im Kinderspital Zürich: Eine Beobachtungsstudie

Einleitung: Kinder auf der Neonatologie weisen ein erhöhtes Risiko für motorische Entwicklungsstörungen auf.
Ziel: Vergleich der General Movements (GMs)-Klassifikation zwischen drei neonatalen Risikogruppen, Korrelation des GMs-Assessment (GMA) mit einer standardisierten, entwicklungsneurologischen Untersuchung (SENU) sowie Bestimmung von Risikofaktoren für abnormale GMs.
Methodik: Monozentrische Beobachtungsstudie mit drei Risikogruppen (Kinder mit operierten, angeborenen Herzfehlern (aHF) n=26, mit operierten, angeborenen, gastrointestinalen Fehlbildungen (GIF) n=17 und mit fetal operierter Myelomeningozele (MMC) n=12, die stationär videobasiert untersucht wurden. Das GMA wurde gemäss Klassifikation nach Hadders-Algra bewertet und in 4 Kategorien eingeteilt: normal optimal (NO), normal suboptimal (NS), leicht abnormal (LA), deutlich abnormal (DA).
Ergebnisse: Es zeigte sich folgende Verteilung: aHF 80.8% NS, 19.2% LA, GIF 5.9% NO, 64.7% NS, 29.4% LA, MMC obere Extremitäten 100% NS, untere Extremitäten 33.3% NS, 33.3% LA und 33.3% DA (Gruppenvergleich Kruskal-Wallis 10.729, p=0.003). Das GMA korrelierte signifikant mit der SENU (Spearman rs= 0.869, p<0.001). Die binär logistische Regressionsanalyse zeigte, dass nur das Gestationsalter (Chi2=11.93, p<0.001) mit abnormalen GMs korrelierte.
Schlussfolgerung: Die Mehrheit der Kinder zeigte normale GMs. Kinder mit MMC und solche mit tieferem Gestationsalter wiesen ein erhöhtes Risiko für abnormale GMs auf. Das GMA und die SENU stellen ergänzende «bedside tools» dar, um früh motorische Auffälligkeiten zu erkennen.

Co-Autorinnen

Bea Latal, PhD[1]

Cornelia Hagmann, PhD[2]

[1] Abteilung Entwicklungspädiatrie, Universitäts-Kinderspital Zürich – Eleonorenstiftung, Zürich

[2] Abteilung Intensivmedizin und Neonatologie, Universitäts-Kinderspital Zürich – Eleonorenstiftung, Zürich

Betreuungspersonen

Bea Latal, PhD
Cornelia Hagmann, PhD

Valentin Serge Deiss
Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Bern

Co-Autoren
Heiner Baur, PhD[1]

Patric Eichelberger, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Bern

Measurement of Anterior Tibial Translation in Loaded & Unloaded Condition: An Exploratory Cross-Sectional Pilot Study to Assess Quality Criteria

Background: Magnetic resonance imaging (MRI) and manual tests remain the standard for diagnosing anterior cruciate ligament (ACL) rupture. Furthermore, the passive knee displacement, also described as anterior tibial translation (ATT), is used in order to make decisions about surgery or to assess rehabilitation outcomes. Unfortunately, these manual tests are limited to passive situations, and their application to assess knee stability in weight-bearing positions are missing. Therefore, a new device with high-performance sensors and a new sensor setting was developed. The aim of this pilot study was to evaluate its quality criteria.

Methods: A total of 20 healthy volunteers were measured. The validity of the new device was assessed during the Lachman test with the Lachmeter® as the reference instrument. Consistency of the new device was evaluated in a functional, loaded position through artificial knee perturbation in a test-retest procedure. Intraclass correlation coefficient (ICC), standard error of measurement (SEM), the minimal detectable change (MDC) and Bland & Altman analysis (mean difference and limits of agreement) were evaluated to assess validity and reliability.

Results: The results, measured with the new device, showed a mean ATT of 5.5 ±2.2 mm in the passive test situation, where the SEM was 0.66mm and the MDC resulted in 1.8mm. In functional loaded position the mean ATT was 2.1 ±1.2 mm, while the SEM was 0.49mm and the MDC showed to be 1.4mm. The new device presented good intra-class correlation compared to the reference instrument ($r > 0.8$). The ICC to assess intrasession reliability was also found to be good ($r > 0.77$). The Bland & Altman analysis showed reasonable agreement for both procedures.

Conclusion: The evaluation of quality criteria of the new device has demonstrated a valid and clinically relevant measurement instrument to assess ATT in passive Lachman test setting. Furthermore, the quality criteria demonstrated the ability to detect the cut-off value (of 3-5mm) described in the literature for the diagnosis of ACL-deficient knees. Finally, it could also be shown that the knee stability testing in a functionally loaded situation presented good intersession reliability and thus good measurement consistency.

Betreuungsperson
Heiner Baur, PhD

Mirjam Veerle Douma
Schulthess Clinic, Human Performance Lab, Zürich

Sex-specific Differences in Hip Muscle Cross-Sectional Area and Fatty Infiltration in Patients With Femoroacetabular Impingement Syndrome

Co-Autoren
Nicola A. Maffiuletti, PhD[1]

Nicola C. Casartelli, PhD[1]

[1] Schulthess Clinic, Human Performance Lab, Zürich

Purpose: This study aimed to compare hip muscle cross-sectional area (CSA) and fatty infiltration between men and women with femoroacetabular impingement syndrome (FAIS) and to investigate possible associations with patient-reported levels of hip pain and dysfunction.
Methods: Retrospective analyses of preoperative axial pelvic magnetic resonance imaging (MRI) scans. The main outcome measures were side-to-side percent asymmetries in hip muscle CSA and the fatty infiltration measured with the Goutallier scale in a total of 10 hip/pelvic muscles. Patient-reported outcomes included duration of hip symptoms, the 12-item international Hip Outcome Tool (iHOT-12) and the Hip Sports Activity Scale (HSAS).
Results: 104 patients (54 women) who underwent hip surgery for FAIS were included. Women showed larger hip abductor muscle CSA asymmetry than men (P=0.018), particularly for the gluteus medius (P=0.049), whilst men showed more fatty streaks (grade 1) in the gluteus medius (P=0.015). Duration of symptoms was only associated with fatty infiltration of obturator externus in men (rs=-0.552, P=0.018). iHOT-12 was associated with CSA percent asymmetry of gluteus minimus (r=-0.407, P=0.011) and iliopsoas (r=-0.356, P=0.028) in men and with fatty infiltration of piriformis (rs=-0.560, P=0.030) in women. HSAS was associated with iliopsoas CSA asymmetry (rs=0.321, P=0.026) and with fatty infiltration of tensor fasciae latae (rs=-0.450, P=0.046) and obturator externus (rs=-0.504, P=0.023) in women.
Conclusions: Women and men with FAIS demonstrated few sex-specific hip muscle morphologic and quality alterations. Women showed larger hip abductor muscle atrophy than men, particularly for the gluteus medius, whilst men showed a higher degree of fatty infiltration in this same muscle. The duration of hip symptoms was not associated with muscle atrophy. Patient-reported hip pain/function and sport-activity level were only associated with isolated muscular variables.
Level of Evidence: IV

Betreuungsperson
Nicola A. Maffiuletti, PhD

Morgane Emma Duc
University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

Current Practices of Physiotherapists in Switzerland Regarding Fall Risk-Assessment for Community-Dwelling Older Adults: A National Cross-Sectional Survey.

Co-Autorin/Co-Autoren
Roger Hilfiker, PT, PhD[1]

Anne-Gabrielle Mittaz Hager, PT, MSc[1]

Guillaume Roulet, PT, BSc[2]

Damiano Zemp, PT, MSc[3]

[1] University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

[2] Lausanne University Hospital, Lausanne

[3] Mendrisio Regional Hospital, Mendrisio

Background: Falls can strongly impact older people's quality of life, health, and lifestyle. Multifactorial assessment can determine an individual's risk of falling as the first step for fall prevention intervention. Physiotherapists have an essential role to play in assessing fall risk by older adults living in the community. In the absence of published data on this topic in Switzerland, this study investigated the current practices of physiotherapists to determine whether those are in line with recommendations.

Methods: An anonymous cross-sectional survey was undertaken among physiotherapists practising in Switzerland between the 21st of November and the 31st of December 2020. A priori and exploratory hypotheses were tested. Responses to open-ended questions were grouped into themes for analysis.

Results: A total of 938 questionnaires from all three language regions of Switzerland was analysed. Participants worked in different settings, with a higher representation of private practice self-employees (56%). Standardised fall risk assessments or instruments were used by 580 (62%) participants, while 235 (25%) preferred subjective assessment of fall risk only. Differences in fall risk assessment were observed according to the workplace setting (adjusted OR 1.93, 95% CI 1.37 to 2.7) and education level (trend test, $p<0.001$). The standardised assessments most frequently employed were the Berg Balance Scale (57.5%), the Timed-Up-and-Go (56.5%) and the Tinetti Balance Assessment tool (46.7%). Risk factors for falls were frequently queried, particularly history of falls (88.3%), home hazards (84.1%), and functional ability (81%). Technical resources (39.8%), knowledge (30.3%), and time (22.2%) were common barriers to implement a systematic fall risk assessment.

Conclusions: This study provides an overview of the current practices of physiotherapists in Switzerland in fall risk assessment. There is still room to optimise the standardisation and systematisation of this assessment to implement a best practice strategy and prevent avoidable falls.

Keywords: Elderly; Falls; Fall prevention; Assessment; Physiotherapists.

Betreuungsperson
Roger Hilfiker, PT, PhD

Nicole Gadola
Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Clinical Assessments of Cervical Movement Sense and Joint Position Error in Adolescents

Co-Autor
Markus Ernst, PT, MSc[1]

[1] Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Background: Despite the high prevalence of neck pain in adolescents, research on the influence of neck pain on the proprioception ability of the neck in adolescents is scarce.
Objectives: First, to investigate the relationship between proprioception of the neck and neck pain in adolescents. Second, to examine whether there are differences between genders in the proprioception of the neck.
Design: Exploratory cross-sectional study.
Methods: Joint position error test (JPE) and cervical movement sense test (CMS), which are typical assessments in clinical practice to evaluate proprioception ability of the neck were performed in adolescents aged 14-16 years. JPE was expressed in linear and angular error and was performed in extension, flexion, protraction–retraction and retraction-protraction movement directions of the neck. In CMS, time and total number of errors were recorded while tracking the patterns «zigzag» and «figure of eight». The Young Spine Questionnaire in German version was used to assess neck pain
Results: 25 adolescents have participated. Linear errors of JPE after neck extension movement showed to be significantly higher in adolescents with more frequent neck pain ($p<0.05$). Regarding gender differences, girls showed significantly less angular error in neck extension movement than boys ($p<0.008$) and boys were faster tracking the zigzag pattern in CMS ($p<0.008$).
Conclusions: This study shows a tendency that adolescents with neck pain have an impaired proprioception of the neck. The findings of this study are consistent with those of similar research in adults.

Betreuungsperson
Markus Ernst, PT, MSc

Simon Alexander Greiner
Bern University of Applied Sciences, Departement of Social Work, Institute for Organization and Socialmanagement, Bern

Co-Autor
Christoph Gehrlach, PhD[1]

[1] Bern University of Applied Sciences, Departement of Social Work, Institute for Organization and Social-management, Bern

Potential Quality Indicators for Outpatient Physiotherapy: A modified Delphi Approach

Objectives: To identify potential quality indicators for outpatient physiotherapy in Switzerland concerning relevance, feasibility and verifiability.
Design: A modified Delphi study
Method: 54 potential QIs were extraced from an extended literature review and participating experts. All QIs were rated on a 5-point Likert scale and commented over three rounds according to relevance, feasability and verifiability in a online survey. In the second and third rounds, the experts received quantitative feedback on the results of the preliminary rounds as well as qualitative summaries of the comments after qualitative content analysis.
Participants: An expert group consisting of various stakeholders in the swiss health care system (service providers, prescribers, insurers, politicians) was formed.
Main Outcome Measures: Median, mean, agreement (Consensus threshold was set a priori at 80% ratings within two adjectant points on 5-point likertscale).
Results: 17 experts participated in the study. Response rate was over 80% in all rounds.25 QIs reached consensus on all three criteria and were rated as high or highly relevant, and feasible and verifiable. 25 QIs reached consensus on all criteria and were rated with high or highest relevance and medium to high feasibility and verifiability.
Conclusion: The list of potential QIs obtained, could serve as a basis for future projects in this area. Further research should focus on implementation in practice, its impact and further development. Efforts should be made to standardise documentation and, together with software manufacturers, solutions should be sought to easily and efficiently extract and evaluate potential indicator data in the future.

Betreuungsperson
Christoph Gehrlach, PhD

Johannes Gruppe
Bern University of Applied Sciences, Department of Health Professions, Bern

The Spatial Distribution of Quadriceps Activity

Co-Autor
Patric Eichelberger, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

The aim of this study was to investigate the spatial distribution of quadriceps activity in healthy adults. We wanted to test two hypotheses: First, the location of the center of activity (CoA) differs between different contraction intensities, and second, the location of the CoA changes over time. For this, we took high-density surface electromyography signals from the rectus femoris, vastus lateralis, and vastus medialis muscles during isometric knee extension. Twenty-five healthy adults (11 women, 14 men) performed two testing protocols. The first protocol consisted of 3-second contractions at 20% and 70% maximum voluntary contraction (MVC) and the second protocol consisted of a contraction until exhaustion at 40% MVC. During the first protocol, the CoA was located more laterally at 70% MVC compared to 20% MVC ($p < 0.05$) and the activity distribution was less uniform at 20% MVC compared to 70% MVC ($p < 0.05$). During the second protocol, the CoA shifted in the caudal direction ($p < 0.05$) and the lateral direction ($p < 0.05$) over time. It was concluded that the location of the CoA of the quadriceps varies between different contraction intensities and shifts over time.

Betreuungsperson
Patric Eichelberger, PhD

Cynthia Oktavia Gschwind
University Department of Geriatric Medicine FELIX PLATTER, Basel

Co-Autorin/Co-Autor
Oliver Mauthner, PhD[1,2]

Nadine Beerli, PT, MSc[1,2]

[1] University Department of Geriatric Medicine FELIX PLATTER, Basel

[2] University of Basel, Department of Public Health, Institute of Nursing Science, Basel

Predictiveness of Single Fried Frailty Phenotype Items for Hospital Length of Stay and Readmission in Kidney Transplantation
A Secondary Data Analysis of a Multicenter, Prospective Cohort Study

Background: Understanding how pre-transplant collected single items of the Fried Frailty Phenotype assessment are predictive of length of hospital stay (LOS) and readmission after kidney transplantation (KTx) can help increase their applicability in clinical practice and facilitate decision making for treatment options, such as prehabilitation planning.
Methods: In this study a secondary data analysis from a nationwide, prospective multicenter cohort study on KTx recipients was performed. Descriptive statistics, univariate (item to item and item to outcome Kendall's τ_c correlations) and multivariate analyses (linear and logistic regression) were executed. Each item of the Fried Frailty Phenotype assessment and additionally, donor type, were used as predictors in the model.
Results: 230 KTx recipients were included in the study. Univariate, as well as multivariate analyses, showed slowness to be predictive for longer LOS (each second slower on 5m distance resulted in 10% increased LOS). Readmission was not predicted by the items of the Fried Frailty Phenotype assessment but by the variable donor type. Recipients of deceased donors were 3 times more likely (OR 3.074, 95%CI 1.773-5.332) to encounter readmissions after KTx.
Conclusion: Slowness as single item of Fried Frailty Phenotype assessment might be a predictor for increased LOS following KTx. This finding could enhance estimation of KTx outcomes in clinical practice in order to better prepare patients for KTx. No single item of the Fried Frailty Phenotype assessment predicted hospital readmission. In light of our findings, which suggest an influence of the variable donor type on the outcomes LOS and readmission, further research should be conducted to investigate these relationships.

Betreuungsperson
Oliver Mauthner, PhD

Selina Rabea Güttinger
Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur

Implementierung des Frühinterventionsprogramms COPCA (Coping with and Caring for infants with special needs) in der pädiatrischen Physiotherapie: Herausforderungen und Stärken aus der Perspektive der COPCA-Coaches

Hintergrund und Ziel: Mit der familienzentrierten Frühintervention COPing with and CAring for infants with special needs (COPCA) begleiten pädiatrische Physiotherapeutinnen und Physiotherapeuten (PPT) in der Coach-Rolle Familien mit einem Kind mit neuromotorischen Entwicklungsauffälligkeiten in ihrem Alltag. Ziel dieser Arbeit war es, in den Erfahrungen von PPT hinderliche und förderliche Faktoren zu identifizieren, welche die Implementierung von COPCA in der Schweiz beeinflussen. Die Ergebnisse werden für die weitere nationale Implementierung von COPCA genutzt.
Methode: Gewählt wurde ein qualitatives Studiendesign mit phänomenologischem Ansatz. In drei Fokusgruppen wurden 13 in der Schweiz tätige PPT mit COPCA-Zertifikat, anhand eines semistrukturierten Interviewleitfadens befragt und die Transkripte mittels thematischer Analyse ausgewertet.
Resultate: Die Analyse ergab ein alles übergreifendes Thema «bereichernd und herausfordernd», elf Haupt- und zwölf Subthemen. Die Themen neue Rollenverteilung, lösungsorientiert, Gestaltungsfreiraum & Übertragbarkeit, Erleben persönlicher Weiterentwicklung und Unsicherheit mit dem Coaching konnten dem professionellen Kontext zugeordnet werden. Im sozialen Kontext fanden sich zielgerichtete Zusammenarbeit und nachhaltige Lernerfahrung wieder. Im organisatorischen Kontext ergaben sich Setting als entscheidender Faktor sowie nicht wirtschaftliche und aufwändige Domizilbehandlungen. Im wirtschaftlich-politischen Kontext waren dies: fehlender Standard für physiotherapeutische Frühintervention und Entwicklungsbedarf für COPCA.
Schlussfolgerung: Der Gestaltungsfreiraum, die Nachhaltigkeit sowie der lösungsorientierte und familienzentrierte Grundgedanke des COPCA-Programms bilden die Basis für dessen Etablierung in der Kinderphysiotherapie. Um dieses fest in den Therapiealltag zu integrieren, gilt es die Coaching-Fähigkeiten der PPT zu festigen und damit die neue Rollenverteilung und die Zusammenarbeit mit den Familien zu unterstützen. Systembezogene Regelungen müssen angepasst werden, damit Domizilbehandlungen im gewohnten Umfeld einer Familie wirtschaftlich sind.

Co-Autorin
Irina Nast, PhD[1]

[1] Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur

Betreuungsperson
Irina Nast, PhD

Joachim Haab
Idiag AG, Fehraltorf

Learning Effect and Test-retest Reliability of the Incremental Respiratory Muscle Test in Healthy Adults

Co-Autorinnen
Corina E. Schaer, PhD[1]

Nadja E. Roth, PT, BSc[2]

[1] Idiag AG, Fehraltorf

[2] Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Purpose: Recently a novel incremental respiratory muscle test (IncRMT) was developed with the aim to test the respiratory muscle performance. Due to its novelty, data must be established to determine its test-retest reliability and the learning effect which may occur during the first test trials. This is necessary for adequate application and interpretation of IncRMT data in practice. Methods: Seventeen healthy, physically active adults (8f/9m age: 26.9 ± 4.8 yr) performed the IncRMT using the Idiag P100® (Idiag AG, Fehraltorf, Switzerland) on 5 separate standardized visits. Learning effect and between days test-retest reliability of the IncRMT were examined using total work of breathing (WOBex), maximal power of breathing (POBmax) and test duration (Tlim). Results: One-Way repeated measures ANOVA (p=0.035) with post hoc analysis showed a significant increase of WOBex from the first visit to the second visit (p=0.017) but not between the others. Tlim showed an ICC of 0.163 (95%CI 0-0.462), WOBex 0.288 (95%CI 0.059-0.578) and POBmax 0.466 (95%CI 0.22-0.718). Standard error of measurement (SEM) was calculated as 2.5 min for Tlim, 683 J for WOBex and 3.4 W for POBmax. Smallest detectable change (SDC) was calculated as 6.0 min for Tlim, 1892 J for WOBex and 9.4 W for POBmax.

Conclusion: The learning effect could be excluded after the first IncRMT trial, this proposes only one familiarization trial to be necessary. Reliability of the IncRMT is poor to moderate. SEM respectively SDC values only allow for very large changes to be detected. This renders the IncRMT performed with the test version of the Idiag P100® unsuitable for clinical use and calls for the development of an improved version of the test.

Betreuungsperson
Corina Schaer, PhD

Marry Everdina Hamberg
University Children's Hospital Zurich – Eleonore Foundation, Paediatric Orthopaedics and Traumatology, Zurich, Switzerland

Impact of Running on Hip Rotation in Children with Decreased Femoral Torsion

Co-Autorinnen/Co-Autor
Britta K. Krautwurst, PhD[1,2]

Thomas Dreher, PhD[1]

Christina Villefort, PhD[1]

[1] University Children's Hospital Zurich – Eleonore Foundation, Paediatric Orthopaedics and Traumatology, Zurich, Switzerland

[2] Motion Analysis Zurich, A collaboration between University Children's Hospital Zurich and Balgrist University Hospital, University of Zurich, Zurich, Switzerland

Background: Information on dynamic components of gait may help orthopaedics to optimise treatment to avoid long-term damage in children with decreased femoral torsion (FT). However, possible kinematic gait deviations are not known in these children compared to typically developing children (TDC).
Research question: Do 3D gait kinematics deviate during running compared to walking in patients with reduced FT? Does the kinematic gait pattern differ in patients compared to TDC? Is the difference from running to walking influenced by other factors in patients?
Methods: An explorative 3D motion analysis study was conducted to measure gait deviations during running and walking in patients with decreased FT (n=15) compared to TDC (n=11). Linear mixed model was used for within and between-group comparisons. Linear regression model was used in patients to investigate the relation between the clinical examination, spatial parameter and difference mean hip rotation from running to walking.
Results: Patients walked with an external mean hip rotation compared to an internal mean hip rotation in controls and had higher peaks for the hip external rotation, knee valgus and foot progression angle in the direction out-toeing. The same kinematic gait pattern was observed during running and was significant for the peak knee valgus. For the differences from running to walking, patients turned their external rotated hip 3.84° internally, where controls kept the same internal hip rotation. Patients revealed similar kinematic gait deviations during running compared to walking as controls. The passive hip range of motion, torsions and velocity had no notable influence on the difference mean hip rotation from running to walking.
Significance: Patients with decreased FT showed deviation in 3D gait kinematics and this may be associated with physical complaints and accelerated development of early hip-osteoarthrosis. Therefore, motion analysis should be used as an additional tool to help orthopaedics in individual clinical decision-making.

Betreuungsperson
Britta K. Krautwurst, PhD

Manuel Hangarter
Swiss Concussion Center, Institute for interdisciplinary Diagnosis and Therapy of Concussion, Zurich

The Concurrent Validity of Strength Measurements for Neck Flexion and Extension obtained by Hand-Held Dynamometry: A Comparison with the Multi-Cervical Unit

Co-Autoren
Mario Bizzini, PT, PhD[1]

Fausto Romano, PhD[1]

Daniel Agostino, MSc[1]

[1] Swiss Concussion Center, Institute for interdisciplinary Diagnosis and Therapy of Concussion, Zurich

Background: While rehabilitation and prevention of sports-related concussions have become a field of interest in physiotherapy research, so far, the relevance of neck strength in association with concussion remains unclear. Valid devices and user-friendly measuring protocols for clinical practice are needed to further investigate the importance of neck strength in rehabilitation and the prevention of concussions.
Purpose: The purpose of the present study was to evaluate the concurrent validity of a user-friendly and time-efficient protocol to measure cervical flexion and extension strength using a hand-held dynamometer (HHD) and the Multi-Cervical Unit (MCU) as a reference device.
Study Design: Descriptive Laboratory Study
Methods: The MCU and an HHD measured neck flexion and extension strength of 30 active, healthy males (mean age 27.1 years) on one measuring day. Data analysis used maximum voluntary strength values in Newton (N). Concurrent validity was determined using paired t-test and Pearson correlation. Bland-Altman plots and boxplots were used to illustrate differences between the devices.
Results: Neck flexion and extension strength were significantly different between the devices ($p < 0.01$). Weaker correlations between the two devices were found for flexion ($r = 0.35$, 95% CI: -0.02 to 0.63, $p < 0.06$) than for extension ($r = 0.63$, 95% CI: 0.35 to 0.81, $p < 0.001$). Bland-Altman Plots revealed sizable limits of agreement for both directions.
Conclusion: Neck strength measured with an HHD and the protocol used were different from those obtained with the MCU. The strength of the tester and deviations in positioning potentially limited absolute agreement between the MCU and the HHD. Therefore, values retrieved through different devices should be interpreted with caution and not used interchangeably by clinicians. Future studies should focus on establishing a gold standard which measures neck strength.

Betreuungsperson
Mario Bizzini, PT, PhD

Cornelia Manuela Heeb-Weber
Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Evaluation of online Training Programs in Individuals with Axial Spondylarthritis

Co-Autorin
Karin Niedermann-Schneider, PT, PhD[1]

[1] Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Background: Frequent physical activity is an effective treatment for individuals with axial spondylarthritis. The amount of exercise required is high and often difficult for patients to implement. Online training offers can help to increase the frequency of exercise. The Swiss Association for axial spondylarhtritis has set up training videos on the rheumafit platform, which are little used. Therefore, they initiated another type of online training with the pilot project Online Course.
Aims: The study with two aims compared two online programs. One aim examined whether individuals in the two programs differed in physical activity, self-efficacy, and demographics. The other aim evaluated satisfaction and training frequency.
Methods: Present work is an observational study with two independent online surveys. The first online survey included validated measurement instruments and questionnaires and 45 persons participated. A T-test for independent samples was used for mean comparison of physical activity and self-efficacy. For the comparison of demographic data and for the results of the second survey which included 33 participants, a questionnaire was used and analyzed using Pearson Chi2- test.
Results: The people in the two programs did not differ significantly in their physical activity, self-efficacy and demographic data. Exercise frequency and duration showed significant differences (p: 0.00; 0.01).
Conclusion: Individuals in the rheumafit group exercised less frequently but longer than individuals in the Online Course group. The similarity of the online programs could explain the non-significant differences.

Betreuungsperson
Karin Niedermann-Schneider, PT, PhD

Beatrice Hubacher
Inpatient Multidisciplinary Chronic Pain Therapy, University Children's Hospital Basel, Basel

Acceptance of PNE4Kids, a Pain Neuroscience Education Program for Children, among Pediatric Physical Therapists in Switzerland: A mixed Methods Approach

Co-Autorin/Co-Autor
Andreas Wörner, PhD[1]

Christine Wondrusch, PT, MSc[1]

[1] Inpatient Multidisciplinary Chronic Pain Therapy, University Children's Hospital Basel, Basel

Introduction: Chronic pain is defined as pain lasting longer than three months and occurring as persistent or intermittent. Prevalence in children and adolescents ranges from 11-38%. Pain Neuroscience Education explains the biological mechanisms of pain and is carried out by more than one medical specialty. Especially regarding musculoskeletal pain, physical therapists are usually involved early in treating chronic pain patients. An interactive Pain Neuroscience Education program resembling a board game, PNE4Kids, was developed by Pas in 2018 for children aged 6 -12 years. It is designed as a board in form of a simplified human body representing the nervous system. Scientific terms were avoided and replaced by metaphors, which were incorporated on the board. PNE4Kids has not yet been evaluated among physical therapists. The aim is to evaluate a German translation of PNE4Kids among German-speaking pediatric physical therapists regarding its acceptance, general feasibility and need for cultural adaptations.
Methods: This study consists of two parts. In the first part the manual was translated into German. In the second part the feasibility of PNE4Kids was evaluated among pediatric physical therapists, using a mixed methods approach. Participants were individually recruited via email. The feasibility of the translation of PNE4Kids was assessed using the System Usability Scale and one-on-one interviews, which were analyzed using deductive qualitative content analysis with codes and categories on the interview guide.
Results: 13 female physical pediatric therapists participated in this study. The System Usability Score was 83.5 (95% CI: 81.3, 85.6), indicating excellent acceptability. Four main topics emerged from the qualitative content analysis: (1) the components of PNE4Kids, (2) the content of PNE4Kids, (3) feasibility of PNE4Kids, and (4) cultural adaptation.
Discussion: PNE4Kids is a promising new tool but not yet thoroughly researched. The participating Swiss pediatric physical therapists see no need for cultural adaptation. They suggest the program should be adapted to every child individually, regardless of cultural background. Opinions differed on the use of the army as an allegory for the nociceptive system and the need for further adaptations to implement PNE4Kids itself and the knowledge the patients gain from it into everyday physical therapy.

Betreuungspersonen
Andreas Wörner, PhD
Christine Wondrusch, PT, MSc

Larissa Kristina Ilchmann
University Hospital Basel, Department of Orthopaedics and Traumatology, Functional Biomechanics Laboratory, Basel

Strength and Postural Stability in Patients After Total Hip Arthroplasty and in Age-Matched Controls – A Cross-Sectional Study

Co-Autorinnen/Co-Autor
Annegret Mündermann, PhD[1,2,3]
Corina Nüesch, PhD[1,2,3,4]
Petros Ismailidis, MD[1,2,3]

[1] University Hospital Basel, Department of Orthopaedics and Traumatology, Basel
[2] University of Basel, Department of Biomedical Engineering, Basel
[3] University of Basel, Department of Clinical Research, Basel
[4] Department of Spine Surgery, University Hospital Basel, Basel

Background: Patients after total hip arthroplasty (THA) have been shown to have persisting muscle strength deficits, reduced postural stability and an increased risk of falling. Various factors may influence postural stability, but the potential contribution of strength deficits to diminished postural stability is unknown.
Research question: Do hip abductor muscle strength and postural stability correlate in patients after THA and in age-matched controls and how are they associated with participant-related and functional factors?
Methods: In a cross-sectional study, 34 patients 1 year after THA for unilateral hip osteoarthritis and 29 age-matched asymptomatic controls were included. Isometric hip abductor muscle strength was measured in upright standing position with a dynamometer. Centre of pressure movements in bipedal and unipedal stance were assessed with a stable force plate. Information regarding hip specific pain and function were derived from the Hip Osteoarthritis Outcome Score (HOOS). Between-group comparisons were calculated with the Mann-Whitney U test and relationships between the parameters were visualised with scatterplots and quantified with Spearman correlation coefficients.
Results: THA patients had a deficit in hip abductor muscle strength in the operated limb of 22.4% (p=0.036) compared to the control group. They showed slightly more postural sway in bipedal stance with eyes closed and in unipedal stance, with no postural stability parameter having a statistically significant difference between the groups. Strength did not correlate with any postural stability parameter. The variability in postural stability was explained primarily by age, with older participants showing more postural sway. Functional parameters assessed with the HOOS did not correlate with strength or postural stability.
Conclusion: THA leads to persistent muscular weakness and increasing age reduces postural stability. The potential contribution of strength deficits on postural stability remains unclear. Diminished strength and reduced postural stability have been shown to be factors associated with a higher risk of falling. It is crucial to prevent THA patients from falling and it is recommended to specifically target muscle strength deficits of the hip abductors in rehabilitation and to promote postural stability, especially in older patients.

Betreuungsperson
Annegret Mündermann, PhD

Matthias Jörger
Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Influence of Seat Stability on EMG and Kinematics during Selective Trunk Movements in the Frontal Plane

Co-Autorin/Co-Autoren
Bettina Sommer, MSc[1]

Martin Huber, PT[1]

Samuel Karrer, PT, BSc[1]

Daniel Baumgartner, PhD[2]

Christoph Michael Bauer, PT, PhD[1]

[1] Zurich University of Applied Sciences, School of Health Professions, Institute of Physiotherapy, Winterthur

[2] Zurich University of Applied Sciences, School of Engineering, Institute of Mechanical Systems, Winterthur

Background: A new type of therapy chair (T-Chair) offers the possibility of sitting with either a mobile or stable seat. It has not yet been investigated how the two seating surface conditions affect the musculoskeletal system and kinematics.
Objective: The aim of the study was to find out to what extent the trunk movements are influenced by the stability of the seat surface (mobile/stable) in the frontal plane.
Method: Trunk lateral flexion initiated from the pelvis was studied in 15 healthy subjects. The primary outcome was the surface electromyographic activity of the M. obliquus externs abdominis measured on both sides. As a secondary outcome, the range of motion of the lumbar spine in the frontal plane was measured using an optical motion capture system (Vicon).
Results: There was no significant difference between the two conditions of seat stability and the two body sides for the surface EMG data. There was a significant main effect (p=,001) of the seat surface condition on the range of motion. There was no significant main effect for the side nor for the interaction between the effects of seat surface and side. The correlation between EMG and lumbar spine range of motion on the mobile seating surface was not significant, neither was the correlation on the stable seating surface.
Conclusion: The T-Chair seems to enhance the lumbar spine range of motion for lateral flexion in the mobile condition.
Application: The T-Chair can be used to enhance the lumbar spine lateral flexion, either in office workers to stimulate motion or after stroke to reduce side asymmetries, but the therapeutic effects of training on the T-Chair needs to be further explored.

Betreuungsperson
Christoph Bauer, PT, PhD

Svenja Kaczorowski
Zurich University of Applied Sciences, School of Engineering, Institute of Mechanical Systems, Winterthur, Switzerland

EMG Activities of the Shoulder Muscles during a simulated Downhill compared to dynamic Shoulder Exercises – A Cross-Sectional Study

Co-Autoren

Daniel Baumgartner, PhD[1]

Roman P. Kuster, PhD[1,2]

[1] Zurich University of Applied Sciences, School of Engineering, Institute of Mechanical Systems, Winterthur, Switzerland

[2] Division of Physiotherapy, Department of Neurobiology, Care Sciences and Society, Karolinska Institutet, Stockholm, Sweden

Context: Mountain biking is associated with a high injury risk for the upper extremity. Neither a definition of when a return to biking is safe after injury nor a guideline for the rehabilitation of mountain bikers exists. Moreover, muscular activities of the shoulder muscles during mountain biking are not well investigated. The aim of this study was to evaluate whether electromyographic (EMG) activities of the pectoralis major and the deltoid are similar during the dynamic shoulder exercises Bear Hug and Wall Push to the EMG activities during a downhill ride on a bike simulator. Moreover, it was investigated if the anteversion angle of the shoulder is associated with the average EMG amplitude of the examined muscles during the simulated downhill.
Design: Cross-sectional.
Methods: Normalized surface EMG has been obtained from the deltoid and pectoralis major during the simulated downhill and the dynamic shoulder exercises from 12 (6f, 6m) healthy participants. Average shoulder anteversion angle has been measured with an inertial motion capture system. Two one-sided t-test evaluated similarity between average and peak EMG amplitude. Correlation coefficients revealed associations between shoulder angle and EMG amplitude.
Results: Average and peak EMG activities of the pectoralis major during the Wall Push were similar to the simulated downhill (average: mean difference (MD)=-0.01%MVIC, p=.009; peak: MD=-4.22%MVIC, p=.032). The Bear Hug with 2 and 3kg showed similar average EMG activities compared with the downhill (2kg: MD=1.02%MVIC, p=.017; 3kg: MD=0.85%MVIC, p=.021). No correlation between anteversion angle and EMG activity on the bike was found.
Conclusions: Bear Hug and Wall Push can be used in rehabilitation to prepare the ventral and lateral shoulder muscles for the return to biking, taking into account that the results refer to a laboratory investigation. Joint loading and the influence of the rotator cuff muscles have to be investigated further

Betreuungsperson

Daniel Baumgartner, PhD

Samuel Karrer
Zurich University of Applied Science, School of Health Professions, Institute of Physiotherapy, Winterthur

Differences between a stable and unstable Lateral Reaching Task in the Movement of the Trunk on a novel assistive Therapy Chair (T-Chair)

Co-Autorinnen/Co-Autoren
Eveline S. Graf, PhD[1]

Christoph M. Bauer, PT, PhD[1]

Bettina Sommer, MSc[1]

Martin Huber, PT[1]

Matthias Joerger, PT, BSc[1]

Daniel Baumgartner, PhD[2]

[1] Zurich University of Applied Science, School of Health Professions, Institute of Physiotherapy, Winterthur

[2] Zurich University of Applied Sciences, School of Engineering, Institute of Mechanical Systems, Winterthur

Background: The T-Chair was developed as a novel training tool to provide unstable trunk exercises in early stroke rehabilitation. To date, there is no information about the effect of the unstable surface on trunk movement and the reaching task. Additionally, there is no information about the movement sway of the T-Chair's seat during a performed unstable reaching task. Primarily, we investigated differences in the trunk movement and the maximal reaching distance between the stable and unstable surface of the T-Chair during a lateral reaching task. Secondarily, the amount of seat movement was evaluated.
Methods: An exploratory, cross sectional study with within-subject design was carried out. Fifteen healthy subjects performed a seated maximal lateral reaching task on the stable and unstable seat of the T-Chair. To reveal condition differences, trunk movement, maximal reaching distance and the movement of the seat was assessed using 3D motion capture system. As outcome measures, maximal peak angle (MAX), minimal peak angle (MIN) and range of motion (ROM) were calculated for the lumbar segment, thoracic segment and trunk segment in the sagittal-, frontal- and (only for trunk segment) transversal plane.
Results: For lumbar lateral flexion during unstable reaching, subjects showed 13° lower MAX and 12° lower MIN and for lumbar flexion 9° higher MAX mean (all $p < 0.05$). Trunk flexion showed 11° higher MAX, 6° higher MIN and 5° higher ROM mean during unstable reaching compared to stable reaching (all $p < 0.05$). No significant condition differences were found for the thoracic segment. Maximal reaching distance was significantly lower (7cm) during stable reaching. The seat movement during unstable reaching was 5.72cm.
Conclusion: It might be hypothesized that the unstable condition leads to a pronounced flexed position in the lumbar spine and posterior tilt of the pelvis and facilitates a lateral extension of the dominant side of the lumbar spine during a maximal lateral reaching task in healthy subjects. Additionally, the unstable condition appears to reduce the maximal lateral reaching distance. Furthermore, during the unstable reaching task, the seat seems to have moved rather little in relation to the total possible movement of the seat.

Betreuungsperson
Eveline S. Graf, PhD

Sebastian Köcker
Bern University of Applied Sciences, Department of Health Professions, Bern

Hamstrings Stretch Reflex Activity in Healthy, ACL Reconstructed and Conservatively Treated ACL Subjects. A Cross Sectional Study.

Co-Autorinnen/Co-Autoren
Heiner Baur, PhD[1]
Angela Blasimann, PT, MSc[1]
Aglaja Busch, MSc[1]
Philipp Henle, MD[2]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

[2] Sonnenhof Orthopaedic Center, Department of Knee Surgery and Sports Injury, Bern

Background: Injuries of the anterior cruciate ligament (ACL) are very common especially in young athletes. Early onset osteoarthritis, reduced sports performance, and elevated risk of secondary knee injuries are known as long term consequences. Neuromuscular reflex activity plays the decisive role in functional stability, performance, and resistance to injury of the knee joint. As non-surgical treatment can be a successful treatment option, adequate neuromuscular activity might be even more important than mechanical stability. Current studies on neuromuscular reflex activity often lack in homogeneous groups, comparisons between surgical (ACLR) and conservatively treated individuals (ACLC) and a healthy control group (ACLI). The aim of this study was therefore to examine hamstrings reflex activity in a tibia perturbation task in ACLC and ACLR in comparison to ACLI.

Method: Neuromuscular activity of the m. biceps femoris (BF) and the m. semitendinosus (ST) was recorded by electromyography in 14 ACLC, 14 ACLR one year after injury (months 12±1) and 14 matched healthy controls. A treadmill warm-up was used for submaximal normalization. Hamstrings stretch reflexes were elicited by artificially induced tibia translation in standing position. Normalized root mean squares for each muscle and limb were calculated in four timeframes (preactivity; short latency; medium latency; late latency). Univariat ANOVA compared ACLC and ACLR injured and contralateral legs and a randomized leg of the ACLI (α=0.05).

Results: In comparison to healthy ACLI significantly elevated activity was found in the ST in the T0 preactivity in ACLC and ACLR. The BF showed significantly reduced activity in the T1 short latency. Significantly reduced ST activity was observed in the T2 medium latency in ACLC and ACLR in comparison to ACLI. Injured legs of ACLC and ACLR showed no significant difference in comparison to the contralateral healthy leg.

Conclusion: Altered neuromuscular reflex activities are present one year after ACL injury in non-surgical treated and ACL reconstructed patients in comparison to matched healthy controls. Injured and contralateral legs are equally affected. Standard rehabilitation protocols may not able to normalize neuromuscular control. Since neuromuscular training can address the found deficits, it should be implemented as elementary part of rehabilitation and prevention programs.

Betreuungsperson
Heiner Baur, PhD

Nicole Kofler
Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur

Wenn Roboter therapieren: Wie sind die Erfahrungen, Motivation und Erwartungen von Patientinnen und Patienten in Bezug auf das Training mit roboter-assistierten Systemen? Eine qualitative Studie

Co-Autorin
Mandy Scheermesser[1]

[1] Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur

Hintergrund/Ziel: Roboter-assistierte Systeme (RAS) werden in der Rehabilitation von motorischen und funktionellen Einschränkungen des Körpers in Form von roboter-assistiertem Training (RAT) eingesetzt. Bisher ist nur wenig über die Wahrnehmung der Patientinnen und Patienten hinsichtlich RAT bekannt, obwohl zur Verbesserung der Effektivität von RAT die Sichtweise aller Beteiligten essenziell ist. Das Ziel war, mit einem explorativen Ansatz einen Einblick in die Wahrnehmung von RAT zu gewinnen, um dadurch Themenschwerpunkte, Handlungsempfehlungen oder weiterführende Forschungsfelder zu erkennen.
Methode: Es wurde ein qualitatives Design mit phänomenologischem Ansatz verwendet, um die Wahrnehmung von zehn Patientinnen und Patienten durch semistrukturierte Leitfadeninterviews anhand der Kategorien «Erfahrungen», «Motivation» und «Erwartungen» zu eruieren. Ausgewertet wurde mit der inhaltlich strukturierenden qualitativen Inhaltsanalyse nach Kuckartz (2018).
Resultate: Nach der Analyse wurden die Themenschwerpunkte «Positive Einflüsse auf psychische Gesundheit durch RAT», «Vergleich RAT mit den konventionellen Therapien», «Gefühle gegenüber/während RAT», «Erwartungen ans RAT zu Beginn», «Motivation durch die Zeit», «Positiv und negativ beeinflussende Faktoren (Motivation)» unterschieden. Die Handlungsempfehlung beinhalten Anamnese- und Standortgespräche mit Bedürfnis- und Präferenzabklärungen betreffend Betreuungszeit, Spielen und Setting/Umgebung sowie die Aufklärung über die Aufgabenbereiche der verschiedenen Therapieformen und das Einholen der Erwartungen. Es empfiehlt sich die Förderung der interprofessionellen Zusammenarbeit, die Einnahme einer reflektierten Haltung des Betreuungspersonals und Forschung im Bereich des Einflusses von RAT auf die psychische Gesundheit.
Schlussfolgerung: Um der grossen Vielfalt an Bedürfnissen, Erwartungen und Ansichten betreffend RAT gerecht zu werden, soll im RAT ein patientenzentrierter Ansatz gefördert werden. Es gilt, die Relevanz der Kontextfaktoren und die Rolle der Betreuungsart zu untersuchen.

Betreuungsperson
Mandy Scheermesser

Florian Wolfgang Krames
Idiag AG, Fehraltorf

Differences in lumbar Posture and Mobility measured with the Idiag M360® between People with and without Low Back Pain – A cross-sectional Study

Co-Autorin/Co-Autor
Corina Schaer, PhD[1]

Andri Feldmann, MSc[1]

[1] Idiag AG, Fehraltorf

Background: Changes in lumbar posture and mobility are associated with low back pain (LBP). However, LBP dependent differences have not yet been consistently documented using non-invasive measurement methods.
Objective: To estimate differences in lumbar posture (LLA) and mobility (ROM) between people with and without LBP using the non-invasive surface measurement device Idiag M360®.
Methods: LLA and ROM of 23 manual workers with chronic LBP between 18 and 60 years (mean age 46.6 yrs (SD = 11.9); female/male 11/12) was assessed and compared with corresponding data from 267 individuals without LBP between 18 and 60 years (mean age 39 yrs (SD = 12.8); female/male 133/134) extracted from a normal value database.
Results: Individuals with LBP showed reduced LLA (ΔLLA = 5.71°; 95% CI 2.24°, 9.18°), flexion ROM (ΔRoF = -9.67°; 95% CI -15°, -4°) and extension ROM (ΔRoE = 6.33°; 95% CI 3°, 9.67°). A between-group difference in lateral flexion ROM that was independent from the effect of age could not be estimated.
Conclusions: Findings reconfirm an association between chronic LBP and lumbar function resulting in decreased LLA, RoF and RoE when measured with the Idiag M360®.

Betreuungsperson
Corina Schaer, PhD

Stephan Marc Kunz
Bern University of Applied Sciences, Department of Health Professions, Bern

Co-Autor
Jan Taeymans, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

Agreement in Diagnosis and Treatment Management Between Physiotherapist and Physician for Patients With Musculoskeletal Disorders

Background: To respond to the shortage of general practitioners (GP) advanced physiotherapy practice (APP) roles have already been successfully investigated and implemented internationally. In Switzerland, this topic is new and evidence supporting APP remains scarce. The aim of this Master thesis was to evaluate the degree of concordance of diagnostic, treatment and discharge planning between APP and GP in patients with minor musculoskeletal disorders (MSKD) visiting a Swiss rural outpatient clinic.
Methods: Patients with MSKD presenting in an outpatient clinic were consecutively assessed by an APP and a GP. Diagnosis and treatment management agreement between both healthcare professionals were assessed using raw concordance proportion as well as calculations of Gwet's AC1 (AC1), Cohen's kappa (k) and Prevalence and Bias Adjusted Kappa (PABAK).
Results: A total of 28 patients, 17 women and 11 men with a mean age of 50.07 (SD 18.7) years were recruited for the study. About 54% of all disorders affected the lower extremity, 25% the upper extremity and 21% the spine. Raw concordance of diagnoses was 78.6%. Interrater reliability is substantial (Landis & Koch, 1977) with a Gwet's AC1 of 0.76 (95% CI 0.59-0.94), a Kappa value of 0.72 and a PABAK of 0.76. There was moderate concordance in treatment planning for imaging prescription (AC1 = 0.59) and medication recommendations (AC1 = 0.59), and substantial concordance for referral to outpatient physiotherapy (AC1 = 0.64). Concordance in medical follow-up was moderate (AC1 = 0.5) while referrals to specialist was substantial (AC1 = 0.79) in relation to discharge planning.
Conclusion: Significant and substantial agreement in terms of diagnosis, prescription for outpatient physiotherapy and referral to specialists were found between APP and GP for patients with MSKD. Slightly lower values with moderate concordance were observed for the areas of medical imaging and medication recommendations as well as for medical follow-up. The new APP model can be an important opportunity to respond to the increasing shortage of physicians, especially in the care of patients with MSKD but further research is now needed.

Betreuungsperson
Jan Taeymans, PhD

Melanie Nadia Liechti
Bern University of Applied Sciences, Department of Health Professions, Bern

Relationship Between Fear Avoidance Beliefs and Lumbar Paraspinal Muscle Activation in Pain-Free Individuals During an Object Lifting Task: A Multi-Channel Electromyography Study

Pain-related fear and fear avoidance beliefs are common in people with low back pain (LBP) and also present in healthy pain-free individuals. Especially lifting tasks are believed to be dangerous for the back. Evidence showed reduced spinal range of motion (ROM) and reduced spatial distribution of muscular activity of the back during lifting in persons with LBP. Equally, pain-free individuals with pain-related fear demonstrated reduced spinal ROM during lifting. Yet, it is unknown if similar muscular activity patterns exist in the presence of fear avoidance beliefs in pain-free individuals. Therefore, the aim of this study is to investigate the relationship between fear avoidance beliefs and the vertical muscle activity shift of the lower back in pain-free individuals. Thirty participants filled out two pain-related fear questionnaires and performed a repetitive lifting task, while multi-channel electromyographic signals were recorded from the lumbar erector spinae muscle. Simultaneously, kinematics were assessed using a full body marker set and used to calculate lumbar sagittal ROM. To visualise the vertical activity shift, the centre of muscle activity (weighted centroid) was computed. Multiple linear regression analyses were performed to examine the relationship between the centroid shift and belief scores. The regression analysis showed that task-specific pain-related fear of round-back lifting was significantly correlated with a caudal shift of the centre of muscle activity (R2adj. = 0.1832; p = 0.045). This caudal shift of muscle activity may be an expression of behavioural alteration to prevent the back from possible harm and should be further investigated.

Co-Autoren

Stefan Schmid, PT, PhD[1]

Michael von Arx, PT, BSc[1]

Patric Eichelberger, PhD[1]

Michael L. Meier, PhD[2,3]

[1] Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Spinal Movement Biomechanics Group, Bern

[2] University of Zurich, Balgrist University Hospital, Department of Chiropractic Medicine, Integrative Spinal Research, Zürich

[3] University of Zurich, Zürich

Betreuungsperson

Stefan Schmid, PT, PhD

Seraina Liechti
Karolinska Institutet, Department of Neurobiology, Care Sciences and Society, Division of Physical Therapy, Huddinge

Prognostic Factors for Quality of Life After Interdisciplinary Rehabilitation in Patients With Chronic Pain – A Systematic Review

Co-Autorin/Co-Autoren

Wilhelmus Grooten, PT, PhD[1,2]

Elena Tseli, PT, PhD[1,3]

Jan Taeymans, PhD[4,5]

[1] Karolinska Institutet, Department of Neurobiology, Care Sciences and Society, Division of Physical Therapy, Huddinge

[2] Karolinska University Hospital, Women's Health and Allied Health Professionals Theme, Medical Unit Occupational Therapy and Physiotherapy, Stockholm

[3] Dalarna University, School of Education, Health and Social Studies, Medical Science, Falun

[4] Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Bern

[5] Vrije Universiteit Brussel, Department of Movement and Sport Science & Rehabilitation, Brussel

Objective: This systematic review aimed to identify prognostic factors for health-related quality of life (hrQoL) at least six months after interdisciplinary rehabilitation in patients with chronic musculoskeletal pain.
Methods: A systematic literature search was conducted in MEDLINE, PsycINFO, EMBASE, CINAHL, Web of Science and Cochrane CENTRAL up to September 2020. The included full text studies were assessed for internal validity with The Quality in Prognostic Studies-tool (QUIPS). Potential prognostic factors at baseline for the domains pain, psychological and physical functioning were qualitatively synthesized for the four categories of hrQoL. Grading of Recommendations Assessment, Development and Evaluation was used to evaluate the level of evidence (GRADE).
Results: Fourteen studies (6668 participants) were considered eligible for this review. With a very low level of evidence, pain intensity, emotional distress and physical functioning at baseline were inconsistent predictors of hrQoL and pain duration did not predict hrQoL at least six months after interdisciplinary rehabilitation. There was low level of evidence for fewer pain sites, for lower level of cognitive behavioral negative factors and for higher level of cognitive behavioral positive factors to predict a better outcome of hrQoL at follow-up.
Conclusions: The overall quality of evidence in this review was low which results in difficulties to draw final conclusions at present. More prognostic factor studies with a predefined core set of predictors using objective measures investigating hrQoL in patients with chronic musculoskeletal pain after interdisciplinary rehabilitation are needed.
Key words: chronic musculoskeletal pain, interdisciplinary rehabilitation, health-related quality of life, prognostic factors, systematic review

Betreuungsperson

Wilhelmus Grooten, PT, PhD

Lea Meier-Egger
Research Department, Swiss Children's Rehab, University Children's Hospital Zurich, Affoltern am Albis

Testing the tactile Function of the Foot Sole: Feasibility, Reliability, and Relation to Motor Function in Children with Upper Motor Neuron Lesions.

Co-Autorin/Co-Autor
Hubertus van Hedel, PhD[1,2]
Petra Marsico, PT, MSc[1,2]
[1] Research Department, Swiss Children's Rehab, University Children's Hospital Zurich, Affoltern am Albis
[2] Children's Research Centre CRC, University Children's Hospital Zurich, Zurich

Aim: This study investigated the feasibility and interrater reliability of testing tactile function at the foot sole using monofilaments and relationships between tactile function threshold and selective voluntary motor control and gait in children and adolescents with upper motor neuron lesions (UMNL).
Method: Thirty-five participants (26 females, mean age 11 years 4 months, SD 3 years) were included. Two independent physiotherapists performed monofilament testing. Further assessed were the Selective Control Assessment of the Lower Extremity and Timed Up and Go test. The treating physiotherapist filled in the Functional Mobility Scale and Gillette Functional Assessment Questionnaire. Descriptive statistic was used for feasibility, quadratic weighted kappa was calculated for interrater reliability and Spearman's correlation quantified relationships.
Results: The total test duration including explanation is less than 15 minutes. Most participants have normal tactile function. Interrater reliability is substantial to almost perfect (quadratic weighted kappa 0.64-0.86). No statistically significant correlations with selectivity or gait were detected.
Interpretation: Testing tactile function at the foot sole using monofilaments is feasible and reliable in children and adolescents with UMNL. As tactile function of the foot sole did not correlate with selectivity or gait, other somatosensory functions such as proprioception might be more relevant for function.

Betreuungspersonen
Hubertus van Hedel, PhD
Petra Marsico, PT, MSc

Silvia Minder
Bern University of Applied Sciences, Department of Health Professions, Bern

Co-Autor
Patric Eichelberger, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

Measurement of the Neck Muscle Onset Time After Checking in Swiss Male Junior Ice Hockey Players – A Feasibility Study

Objective in-field recognition of concussion is challenging due to the lack of measurement methods. As concussed athletes show an extended delay of the muscle reaction, the question arises whether it can be measured on field within minutes after the impact leading to this injury. However, such measurements have never been conducted in a real-world situation. Therefore, the aim of the study is to determine the feasibility of measuring the muscle onset time from on-field collected data. Data of four male U20 Elite ice hockey Junior players were analysed from regular training sessions. The delay was calculated from electromyographic measurements of the m. trapezius descendens, m. splenius capitis and accelerations recorded from their localisation. The data collected showed 31 qualitatively satisfying events with acceleration over 3 g, including one bodycheck. From those 31 events, 22 showed negative delays, i.e., muscle activation before the acceleration, while the remaining were positive. Quality of the recordings was constant over the full duration of the training. Hence, simultaneous measurement of electromyographic and acceleration data during training sessions is feasible. However, data quality needs to be improved with methodological upgrades, including accelerometers with high sampling frequency, higher operating range as well as recording during real-world matches.

Betreuungsperson
Patric Eichelberger, PhD

Manuel Monteiro Alves
University of Zurich and University Hospital Zurich, Epidemiology, Biostatistics and Prevention Institute, Division of Occupational and Environmental Medicine

Test-Retest Reliability of Lung Diffusion Capacity for Nitric Oxide during light to moderate Intensity Cycling Exercise

Co-Autoren
Thomas Radtke, PhD[1]

Holger Dressel, PhD[1]

[1] University of Zurich and University Hospital Zurich, Epidemiology, Biostatistics and Prevention Institute, Division of Occupational and Environmental Medicine

This study examined test-retest reliability characteristics of single-breath lung diffusing capacity for nitric oxide (DLNO) and carbon monoxide (DLCO) during exercise. Sixteen healthy subjects (age 20 to 67 years) performed DLNO-DLCO tests during light and moderate intensity cycling exercise at 50% and 80% of individual anaerobic threshold (IAT) at two study visits. Primary endpoint was DLNO at 80% IAT. Precision of DLNO, DLCO, and alveolar volume was quantified by within-subject standard deviation (SDws, measurement error) and intraclass correlation coefficients (ICC). Reproducibility was determined by SDws*2.77. Overall, reliability was excellent for all outcomes. SDws and reproducibility, and ICCs for DLNO at 80% IAT were 4.6 and 12.7 mL.min-1, mmHg-1, and 0.992 (95% CI 0.977-0.999). Median (IQR) dyspnoea at 80% IAT was 4 (3-6). Our data suggest excellent reliability of DLNO during light and moderate intensity exercise. Perceived levels of dyspnoea during single-breath DLNO-DLCO measurements limit its usefulness in patients with respiratory diseases.

Betreuungsperson
Thomas Radtke, PhD

Daniele Moretti
University of Applied Sciences of Southern Switzerland (SUPSI), Department of Business Economics, Health and Social Care, Manno

How Do Patients With Musculoskeletal Conditions Experience Pain Drawing? A Qualitative Study in Southern Switzerland

Co-Autorinnen/Co-Autor
Marco Barbero, PT, PhD[1]

Maria Caiata Zufferey, PhD[1]

Anna Folli, PT, BSc[1]

[1] University of Applied Sciences of Southern Switzerland (SUPSI), Department of Business Economics, Health and Social Care, Manno

Objective: This study examines with a qualitative approach, the role and utility of the Pain Drawing tool on patients presenting with musculoskeletal conditions characterised by somatic pain in the Southern part of Switzerland. Specifically, it aims to explore the experience from patient's perspective, to possibly identify its best clinical and communicational application.
Methods: Semi-structured interviews have been conducted with a purposive and consecutive sample of 13 patients who have been using Pain Drawing in the last 3 months. Participants were recruited in physiotherapy private practices in Southern Switzerland and at the Pain Clinic of the Ente Ospedaliero Cantonale (EOC) in Lugano. Data collection and analysis was conducted on phenomenological theoretical grounds with a mixed deductive-inductive approach and based on a thematic analysis process described in the SAGE Handbook of Qualitative Research in Psychology (Terry et al., 2017).
Results and discussion: Reportedly, the main roles of PD seem to be the aid in building awareness and acceptance of pain and assisting patients in communicating about a complex phenomenon. The utilities of PD identified can be resumed as the importance of a clinical diagnostical and longitudinal application and the complementary use to verbal communication about pain. Some additional results were identified regarding the possibility of applying it in paediatric settings and the importance of adapting PD application techniques to help patients communicate about pain and its main characteristics.
Conclusion: The study suggests that PD might have an important role for patients in enhancing pain awareness and acceptance as well as for assisting them in the communication with clinicians about this complex phenomenon. Two meaningful PD's applications have been identified: (1) in the history taking, to ease and improve pain communication especially regarding its location and extent and (2) in the definition of optimized therapeutic strategies using longitudinal evaluation of both pain extent and location. Finally, in somatic pain patients' words, PD appears to be a very promising tool in facilitating communication about pain and more in general it favours freedom of expression for patients.

Betreuungsperson
Marco Barbero, PT, PhD

Anna Isabel Oeschger
Division of Paediatric Pulmonology, Children's Hospital Lucerne, Switzerland

Effects of Prone Positioning on Vital Signs in Infants with Acute Bronchiolitis: An Interventional Pilot Study

Co-Autor
Nicolas Regamey, PhD[1]

[1] Division of Paediatric Pulmonology, Children's Hospital Lucerne, Switzerland

Objectives: To evaluate the short-term effects of prone positioning on respiratory distress signs in infants with acute respiratory syncytial virus (RSV) bronchiolitis compared to supine position.
Hypothesis: Infants with RSV bronchiolitis would benefit from prone positioning by improving respiratory parameters.
Study design: Prospective, monocentric interventional pilot study at Children's Hospital Lucerne.
Patient-subject selection: Infants under 12 months of age hospitalized with mild or moderate RSV bronchiolitis.
Methodology: Respiratory distress signs were measured in the supine position at baseline. After standardized prone positioning, respiratory distress signs were measured at three time points during a one-hour data collection period. The primary outcome parameter was a change in respiratory rate (RR). Secondary outcome parameters were changes in oxygen saturation, heart rate, transcutaneous partial pressure of carbon dioxide (pCO2), respiratory symptoms assessed by the Modified Tal Score (MTS) and occurrence of cough.
Results: 26 infants were included, of which full data set was available in 18. Prone positioning led to a RR decrease from 44.0 breaths at baseline T0 to 41.5 breaths at the last measurement time point T3 (p= 0.033). It further led to a decrease of one score point in accessory respiratory muscle use of the MTS (p= 0.040). An increase of pCO2 from 5.0 kPa at T0 to 5.4 kPa at T3 was observed (p= 0.011).
Conclusion: Prone position showed short-term improvement in respiratory distress signs (RR and accessory respiratory muscle use). Further research is needed to assess whether this translates into long-term clinical improvement.

Betreuungsperson
Nicolas Regamey, PhD

Jonas Pfeifle
Human Performance Lab, Schulthess Clinic, Zurich, Switzerland

Co-Autoren
Nicola A. Maffiuletti, PhD[1]

David Hasler[2]

[1] Human Performance Lab, Schulthess Clinic, Zurich, Switzerland

[2] Institute for Human Movement Sciences and Sport, ETH Zurich, Zurich, Switzerland

Should we use unilateral or bilateral Tasks to assess maximal and explosive Knee Extensor Strength in Patients with Knee Osteoarthritis? A cross-sectional Study

Deficits in maximal and explosive knee extensor strength, which are usually assessed with unilateral tasks, are substantial in patients with knee osteoarthritis (KOA). The aim of this study was to investigate the clinical relevance of unilateral vs. bilateral tasks for assessing knee extensor strength in patients with KOA. This was done primarily by comparing unilateral and bilateral inter-limb strength asymmetries and secondarily by examining the relationship between unilaterally- and bilaterally-measured strength, performance-based and self-reported function. Twenty-four patients with unilateral KOA (mean age: 65 ± 7 years) performed isometric gradual and explosive maximal voluntary contractions to assess maximal and explosive strength. Additionally, performance-based and self-reported function were quantified. Inter-limb asymmetries of maximal and explosive strength did not differ significantly between unilateral (mean inter-limb asymmetry: 26 ± 15%) and bilateral tasks (mean inter-limb asymmetry: 22 ± 21%). In the same way, the relationships between knee extensor strength – measured either unilaterally or bilaterally – and performance-based or self-reported function were not influenced by the type of task. In conclusion, it does not seem to make a difference in terms of clinical relevance whether maximal and explosive knee extensor strength are evaluated with unilateral or bilateral tasks in patients with KOA.

Betreuungsperson
Nicola A. Maffiuletti, PhD

Mario Rohrer
Bern University of Applied Sciences, Department of Health Professions, Bern

Intraday and Interday Reliability of an Accelerometry-Based Assessment of Dynamic Postural Stability

Co-Autor
Patric Eichelberger, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

Landing from a jump is a common injury mechanism in sports and requires good dynamic postural stability (DPS). Time to stabilization (TTS) is an outcome measure that is often used to quantify DPS in jump landings. However, the assessment depends on a laboratory setting and a low-cost and portable alternative is missing. The purpose of this study was to evaluate the relative and absolute intraday and interday reliability and validity of accelerometers to assess TTS. Twenty-one subjects (14 females, 7 males) were equipped with one accelerometer over the fifth lumbar vertebrae (L5) and one on the sternum. A horizontal hop, a lateral hop and single leg drop jump were performed. TTS was calculated from force plate and acceleration data. Accelerometers demonstrated moderate to good relative intraday and interday reliability (ICC 0.55–0.84), except the interday reliability of the lateral hop demonstrated poor reliability (ICC 0.2–0.25). Absolute reliability (SEM) was 0.36–0.44 s (L5) and 0.24–0.38 s (sternum). The accelerometer at the lumber level showed good agreement compared to force plate-derived TTS for the horizontal hop (bias 0.17 s) and single leg drop jump (bias -0.09 s). In contrast the accelerometer at the sternum significantly underestimated TTS (-0.61– -0.78 s). An accelerometer placed on the lumbar spine is a promising low-cost and portable alternative for the assessment of TTS during a horizontal hop and a single leg drop jump.

Keywords: Accelerometer, Time to stabilization, Reliability, Dynamic postural stability, Jump landing

Betreuungsperson
Patric Eichelberger, PhD

Nadja Elisabeth Roth
Idiag AG, Fehraltorf

Wie wirkt sich Atemmuskelermüdung auf den Incremental Respiratory Muscle Test (IncRMT) aus?

Co-Autorin/Co-Autor
Corina Schaer, PhD[1]

Andri Feldmann, MSc[1]

[1] Idiag AG, Fehraltorf

Hintergrund: Der Incremental Respiratory Muscle Test (IncRMT) ist ein neues Testverfahren zur Beschreibung der Atemmuskelausdauer und deren Ermüdung. Die Ausführung des Testes erfolgt mittels einem Atemmuskeltrainingsgerät (P100®), welches die Atemmuskelarbeit in Work of Breathing (WOB) aus exspiratorischem Druck und Volumen ausrechnet. Das Ziel dieser Arbeit war es, durch eine provozierte Ermüdung die Veränderungen im Test (WOB und Testdauer) und der Sauerstoffsättigung der Atemmuskulatur zu beobachten.
Methode: In dieser explorativen Grundlagenforschung atmeten 22 Probanden vor und nach einer ermüdenden Tätigkeit den IncRMT bis zur Atemerschöpfung durch. Die provozierte Ermüdung bestand aus einer Constant Load Cycling Belastung auf 80 % des Leistungsniveaus. Zur Dokumentation der Sauerstoffsaturierung wurde die Atemmuskulatur (M. Rectus abdominis (RA), M. Sternocleidomastoideus (SCM) und M. Intercostales (IC)) mittels Nahinfrarotspektroskopie (NIRS) überwacht.
Resultate: Die Stichprobe umfasste Datensätze von 19 Probanden (10=w, 9=m; Alter 26.95±4.6). Beide Parameter nahmen mit -396 ± SD 516 kJ (p = 0.00016) und -119 ± SD 100 Sekunden (p = 0.000063) ab. Die Saturierung des RA demonstrierte eine Zunahme des deoxygenierten Hämoglobin (deoxyHb) +1.37 ± SD 0.88 AUs (p = 0.000015). Der IC zeigte mit einer Abnahme des totalen Hämoglobins (tHb) -0.12 ± SD 0.22 AUs (p = 0.038) und einer Zunahme des deoxyHb (+0.90 ± SD 1.71 AUs; p = 0.038) metabolisch relevante Anpassungen. Diskussion: Der IncRMT eignet sich zur Messung von Atemmuskelermüdung, sofern die Ausführung korrekt ist und vollständig in die Atemerschöpfung geatmet wird. Die Genauigkeit und Grundeinstellung des IncRMT muss jedoch für zukünftige Anwendungen genauer untersucht werden.

Betreuungspersonen
Corina Schaer, PhD
Andri Feldmann, MSc

Madeleine Salathe
University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

The Prediction of Outcome in Patients with Subacromial Pain Syndrome under conservative Treatment with Physiotherapy is still unclear: a Systematic Review of different Prognostic Aspects

Co-Autor
Roger Hilfiker, PT, PhD[1]

[1] University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

Questions: What is known about the different prognostic aspects (prognostic factors, prognostic models, predictors of treatment effect) in patients with subacromial pain syndrome (SAPS)? The research questions are 1) Which factors can provide a prediction of the clinical outcome under physiotherapy for patients with a SAPS? 2) Which factors have a causal influence on the clinical outcome under physiotherapy in patients with a SAPS and can these be addressed therapeutically? 3) Which model has the greatest explanatory power to predict the outcome under physiotherapy in patients with SAPS and how is the applicability in daily practice? 4) What factors can predict the response to physiotherapy in patients with a SAPS and can they be used to stratify therapy?
Design: Systematic review of prospective cohort studies and randomized controlled trials with subgroup analysis (multivariable analysis) which investigated at least one prognostic aspect. Participants: Adults (≥18 years) diagnosed with a SAPS.
Intervention: Physiotherapy, with an active therapy approach as main intervention.
Outcome measures: Primary outcomes are shoulder pain and shoulder disability/function and the secondary outcome is health-related quality of life.
Results: There is only very low evidence regarding the predictive power of prognostic factors and causal relationships have not yet been identified. There is no prognostic model with satisfactory predictive power. Predictors of the treatment effect have not yet been sufficiently investigated.
Conclusion: It is still largely unclear which factors can predict or influence the prognosis of patients with a SAPS. Further studies of high methodological quality according to the current guidelines and adequate sample sizes are needed.

Betreuungsperson
Roger Hilfiker, PT, PhD

Elisabeth Maria Schenk
Bern University of Applied Sciences, Department of Health Professions, Bern

Retired Physiotherapists Guiding Physiotherapy Students During Self-Study in the First Semester – A Pilot Study

Co-Autoren
Slavko Rogan, PT, PhD[1,2,3]

Jan Taeymans, PhD[1,3]

Stefan Zuber, PT, MSc[1]

Evert Zinzen, PhD[3]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

[2] Akademie für integrative Physiotherapie und Trainingslehre, AfiPT, Grenzach-Wyhlen

[3] Vrije University Brussel, Faculty of Physical Education and Physiotherapy, Brussel

Background: Guided self-study (GSS) and free self-study (FSS) are increasingly used as learning methods in physiotherapy education to achieve a long-term learning effect in knowledge and skills. For the GSS there are few pilot studies in physiotherapy education at the moment. The primary aim of this study is to investigate the feasibility in terms of concept fidelity. The secondary aim is to investigate the effectiveness on learning success of six units each of retired physiotherapists (RP) of GSS in physiotherapy students in the first semester, in comparison to the FSS that has taken place so far at the Bern University of Applied Sciences of Health Professions (BFH).
Method: 53 physiotherapy students in their first semester voluntarily participated in this pilot study. They were randomised for the intervention GSS or FSS (control group). The intervention is a GSS provided by RP. The GSS was performed in an eight-day cycle and with a total of six different clinical cases. The primary objectives of this study are the feasibility of the six units of RP GSS, responsiveness and acceptance by the students. Secondary outcome parameters are the learning success of the six units of GSS, compared to FSS, based on the semester grades of the written examination in the form of a multiple-choice test (MC) and the practical examination, the Objective Structured Clinical Examination (OSCE). An ITT analysis was conducted.
Results: All six units of the GSS by RP were completed as planned. The participation rate was 64.10%. The target of 83% could not be achieved due to the overall workload in the study. In an open exchange on the last day of the presentation, the feedback from the students was consistently positive. There were significant group differences between OSCE 5x ($p < 0.000$, $r = -0.61$) and OSCE 6x ($p < 0.000$, $r = -0.57$), each with a strong effect size in advantage of GSS by RP after the ITT analysis.
Conclusion: Further adaptations regarding embedding in the timetable still need to be made. The GSS by RP units induce a significant learning gain in bachelor physiotherapy students in the first semester.

Betreuungsperson
Slavko Rogan, PT, PhD

Helen Linda Schwerdt
University of Applied Sciences and Arts Western Switzerland - Vaud, Lausanne

Exercise Adherence in Musculoskeletal Physiotherapy: Analysis of Patient-Physiotherapist Interaction

Co-Autorin
Veronika Schoeb Mezzanotte, PT, PhD[1]

[1] University of Applied Sciences and Arts Western Switzerland - Vaud, Lausanne

Introduction: Patient's adherence to the home exercise program (HEP) is important for a good therapeutic outcome in physiotherapy. Nevertheless, poor adherence can often be observed. The literature provides important aspects in physiotherapy but there is a gap of knowledge about the interactional part to enhance the adherence in HEP. The aim of the present work is to investigate the communication strategies used by patients and physiotherapists when talking about HEP in order to foster patient's adherence (adherence-talk).
Methods: An ethnomethodological approach was chosen as a framework for a conversation analytic method. Six videos out of a previous project from musculoskeletal physiotherapy were analysed. Three consecutive treatment sessions were chosen from two patient-physiotherapists (PT) pairs. By an inductive process, recurrent interactional sequences were identified.
Results: The results revealed verbal and nonverbal actions, which the patient applied to demonstrate difficulties. Five utterances from the therapist were identified as responses to these difficulties: acknowledgement, positive evaluation, contextualization, adaption, and more details. Another two therapist utterances from the therapists could be assigned to promote adherence: negative evaluation and insisting. These seven therapist utterances, illustrated as extracts, referred to three aspects to facilitating adherence to the HEP: Improving performance, promoting motivation, and showing empathy.
Conclusion: The work illustrates adherence behaviour of the patient. It begins with demonstrating difficulties in exercise performance. Adherence is not only about following the agreed recommendations. To improve adherence to HEP, interactions in therapy sessions could be applied instrumentally by the therapist and should be further explored.

Betreuungspersonen
Veronika Schoeb Mezzanotte, PT, PhD

Martina Steiner
Bern University of Applied Sciences, Department of Health Professions, Discipline of Physiotherapy, Bern

Gender-Specific Differences in Neuromuscular Activation in the Knee Stabilizing Muscles in Adults

Co-Autorin/Co-Autor
Angela Blasimann, PT, MSc[1,2]

Heiner Baur, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Discipline of Physiotherapy, Bern

[2] University of Antwerp, Faculty of Medicine and Health Sciences, Department of Rehabilitation Sciences and Physiotherapy, Antwerp

Introduction: The rupture of the anterior cruciate ligament (ACL) is one of the most common injuries of the knee. Women have a higher injury rate for ACL ruptures than men. Various indicators for this gender-specific difference are controversially discussed.
Aim: A systematic review of the literature that compares surface electromyography (EMG) values of adult female and male subjects to find out if there is a difference in neuromuscular activation of the knee stabilizing muscles.
Methods: Studies which examined gender-specific difference with surface EMG measurements (integral, RMS, mean, time and amplitude analysis) of the knee stabilizing muscle were retrieved via searches from the databases PubMed, CINAHL, Embase, Cochrane and SPORTDiscus. The quality of included studies was assessed according to the National Heart, Lung and Blood Institute (NHLBI) study quality assessment tool. A descriptive analysis was performed for relevant outcomes.
Results: Fifteen studies were included in the qualitative synthesis. The methodological quality of the studies was mostly rated «fair» (40%). 462 healthy participants, 233 women and 299 men, were tested. The mean (SD) age was 21.9 (± 2.29) years for women and 22.6 (± 2.43) years for men. A significantly higher activity of the musculus vastus lateralis, the vastus medialis, respectively, in females was found in three studies. Two studies found significantly lower neuromuscular activity in the muscles biceps femoris and semitendinosus in females. The remaining studies found no significant difference or even contradicting results.
Conclusion: The controversial findings do not allow for a concluding answer to the question of a gender-specific neuromuscular activation. Further research with higher statistical power and a more homogeneous methodical procedure (tasks and data normalisation) of the included studies may help to get a tendency about a possibly existing gender-specific difference in neuromuscular activation. This systematic review could help to improve future studies in their methodical design and considerations to get a more valid conclusion of the issue and therefore a basis for a successful prevention of ACL injuries.
PROSPERO registration number: CRD42020189504
Keywords: electromyography, gender-specific, ACL, sex-differences, knee, activation

Betreuungsperson
Angela Blasimann, PT, MSc

Vreni Studer
Bern University Hospital, Department of Physiotherapy, Bern

Cervical Flexion Rotation Test and Vestibular/Ocular Motor Screening in Patients With Cervicogenic Dizziness: A Feasibility Study

Background: Cervicogenic dizziness is complex to assess and often a diagnosis of exclusion. In the field of physiotherapy, there are two tests for patients with neck pain that could be helpful in detecting cervicogenic dizziness: the cervical flexion rotation test and the vestibular ocular motor screening.
Objectives: The primary aim of this study was to evaluate the feasibility in terms of recruitment and measurement. The secondary aim was to assess potential differences in the two tests between patients with cervicogenic dizziness and healthy controls.
Design: Cross-sectional feasibility study
Methods: The two tests were investigated in six participants with cervicogenic dizziness and six healthy controls. To evaluate feasibility the following outcomes were assessed: eligibility-, screen failure- and recruitment rate, willingness to participate, acceptability of the measurement procedure and resources. For the secondary aim, the tests were compared between groups.
Results: Three criteria for success were achieved: screen failure rate at measurement (0%), willingness to participate (75%) and tolerance of measurement procedure. Eligibility rate (21%), screen failure rate at phone calls (73%), and recruitment rate (21%) were below expected levels. In the vestibular ocular motor screening, there was more total symptom provocation in dizziness participants (median 9.5) compared to healthy controls (0). In the flexion rotation test no clear differences between groups were measured.
Conclusions: Overall feasibility of measurement procedure was good, whereas problems occurred in recruitment. A future study is feasible with modifications in recruitment and the two tests should be assessed in patients with cervicogenic dizziness compared to healthy

Co-Autorinnen/Co-Autoren
Balz Winteler, PT, MSc[1]

Sue Reid, PT, PhD[2]

Georgios Mantokoudis, MD[3]

Athanasia Korda, MD[3]

Martin L Verra, PT, PhD[1]

[1] Inselspital, Bern University Hospital, Insel Gruppe, Department of Physiotherapy, Bern

[2] Australian Catholic University Faculty of Health Sciences Department, School of Allied Health, North Sydney

[3] Inselspital, Bern University Hospital, Insel Gruppe, Department of Otolaryngology, Head and Neck Surgery, Bern

Betreuungspersonen
Balz Winteler, PT, MSc
Sue Reid, PT, PhD

Mathieu Tripod
Bern University of Applied Sciences, Department of Health Professions, Bern

Perception of Injury Prevention in Swiss Elite Youth Soccer Players, Coaches and Staff Members of Their Teams – A Survey.

Co-Autoren
Slavko Rogan, PT, PhD[1]

Jan Taeymans, PhD[1]

[1] Bern University of Applied Sciences, Department of Health Professions, Bern

Background: Injuries in youth elite soccer players are present and result in loss of practice and economic costs. Since the 1980's research groups have been interested in developing injury prevention programs. Physiotherapy had an important role to play in the development of general injury prevention strategies. Due to the absence of published data in Switzerland, this project aimed to collect data on current injury prevention strategies in Switzerland and to determine if players had sufficient awareness of injury prevention principles to limit the risk of injury.

Methods: This study was conducted as a cross-sectional anonymous online survey. The Swiss Football Association contacted by e-mail 65 teams of 14 clubs from the Swiss youth elite soccer league between November 2020 and March 2021.

Results: A total of 321 players and 75 coaches and staff members representing 11 clubs from the Swiss youth elite soccer league was analyzed. The use of general injury prevention strategies in training sessions was different between players (55%) and coaches and staff members (88%) ($p<0.001$). Awareness of the existence of the injury prevention program "FIFA11+" was different between players (10%) and coaches (staff members) (71%) ($p<0.001$). Capability to implement the injury prevention program "FIFA11+" was different between players (14%) and coaches (staff members) (51%) ($p<0.001$). The mean of the injury prevention belief score between injured and non-injured players showed a difference, but was not statistically significant. The mean of the injury prevention belief score between players and coaches (staff members) was different, but statistically not significant.

Conclusion: The injury prevention strategies in Swiss youth elite soccer seem to be in line with the current literature. However, this knowledge seems to be more in the possession of the coaches than the players. Hence, strategies to increase players' awareness about the existence of injury prevention programs such as FIFA11+ and knowledge about implementation of such prevention programs are needed to empower the players towards better injury prevention.

Key words: FIFA11+, football, belief, implementation

Betreuungspersonen
Slavko Rogan, PT, PhD
Jan Taeymans, PhD

Michael Andreas von Arx
Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Spinal Movement Biomechanics Group, Bern

Stoop vs Squat: Comparing Lumbar Loads Among Different Lifting Styles

Co-Autorin/Co-Autoren
Melanie Liechti, PT, BSc[1]

Lukas Connolly MSc[2,3]

Christian Bangerter, PT, MSc[1]

Michael L. Meier, PhD[2,4]

Stefan Schmid, PT, PhD[1,5]

[1] Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Spinal Movement Biomechanics Group, Bern

[2] University of Zurich, Balgrist University Hospital, Department of Chiropractic Medicine, Integrative Spinal Research, Zürich

[3] ETH Zurich, Department of Health Science and Technology, Zürich

[4] University of Zurich, Zürich

[5] University of Basel, Faculty of Medicine, Basel

Introduction: Lifting has been identified as a risk factor for low back pain and a rounded back while lifting is still often associated with producing high loads in the lumbar spine. Contrary, newer research questions these allegedly higher loads in a stooped spine compared to a straight back when lifting. This study aimed to compare different lifting styles and their resulting spinal loads.
Method: A motion capture-driven musculoskeletal modeling approach was used to record picking up a 15 kg box from the floor with freestyle, squat and stoop lifting. Thirty healthy subjects were included in the experiment. Continuous and peak total loads, compressive loads and AP shear loads along with lumbar flexion angles and lift time between the three lifting styles were analyzed.
Results: In all lumbar segments, stoop lifting showed significantly smaller total and compressive loads (-0.3 to -1 BW) when compared to freestyle or squat lifting. Stoop produced larger AP shear loads (+0.1 to +0.8 BW) in segments T12/L1 to L4/L5, but smaller in L5/S1 (-0.2 to -0.4 BW). Compared to stooping, peak total and compressive loads occurred around 30% earlier in the lifting cycle with squatting. Stoop showed significantly larger lumbar range of motion angles (35.9 ± 10.1 degrees) compared to freestyle (24.2 ± 7.3 degrees) and squat (25.1 ± 8.2 degrees). Lifting speed differed significantly with freestyle being executed the fastest (4.6 ± 0.7 s) followed by squatting (4.9 ± 0.7 s) and stooping (5.9 ± 1.1 s).
Conclusion: Stooping will not generally generate larger lumbar loads when compared to squatting. Compressive loads overall are 2 to 43 times larger than shear loads. Yet shear loads may still be an influential aspect due to their share in the total loads acting on the spine, especially in the L5/S1 segment. Lifting time was identified as an important factor, suggesting that slower speeds result in smaller loads. Other factors than lifting technique might be equally relevant in determining strain on the spine when lifting.

Betreuungsperson
Stefan Schmid, PT, PhD

Felicitas Margareta von Hülsen
Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur

Erfahrungen mit dem familienzentrierten COPCA-Programm von Eltern mit Säuglingen und Kleinkindern mit Risiko oder Manifestation einer Entwicklungsverzögerung

Co-Autorin
Schirin Akhbari Ziegler, PT, PhD[1]

[1] Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur

Hintergrund / Ziel: Bei «Coping with and Caring for Children with special Needs» (COPCA), stellt Coaching die wichtigste Interventionsform dar. Durch den Einsatz von Coaching ist in der pädiatrischen Physiotherapie (PPT) ein Paradigmenwechsel entstanden. Anstelle des kindzentrierten und problemorientierten Ansatzes, wie in der PPT üblich, geht der Fokus über zu familienzentriertem, alltagsorientiertem und selbstbestimmtem Coaching. Wie Familien mit einem Säugling oder Kleinkind mit Entwicklungsverzögerung COPCA erfahren, kann mit den bestehenden Assessments nicht gemessen werden, da Behinderungsgrad oder Diagnose oft noch nicht feststeht. Ziel dieser Studie war, positive und negative Erfahrungsaspekte von Müttern, Vätern und anderen Bezugspersonen zu erheben, um eine Grundlage für eine Fragebogenentwicklung zu schaffen.
Methode: Für diese qualitative Studie mit phänomenologischem Ansatz wurden semistrukturierte Interviews mit Eltern geführt, welche Erfahrungen mit COPCA gemacht haben. Die Datenauswertung der Transkripte erfolgte anhand der Thematischen Analyse.
Resultate: Acht Elternteile partizipierten an der Studie, woraus die folgenden sechs Hauptthemen resultierten: «Identifikation mit Rolle / Kompetenzen», «Nachhaltige Lernerfahrung», «Umsetzung Förderung im Alltag», «hilfreich», «irritierend» und «Erwartungen an Therapeutin». 44 Subthemen spiegeln ein breites Erfahrungsspektrum. Eltern haben sich selbstwirksam erlebt, empfanden, dass Entscheidungen gemeinsam getroffen wurden und sie als Familie stark eingebunden waren. Die Therapie wirkte sich positiv auf Aspekte ihrer Lebensqualität, der Partizipation, des Copings und des Selbstvertrauens aus. Alltagsrelevanz und die Selbstbestimmung wurden besonders geschätzt.
Diskussion / Schlussfolgerung: Positive sowie negative Erfahrungsaspekte von Vätern und Müttern konnten erfasst werden. Sie können als Grundlage für eine Fragebogenentwicklung verwendet werden, welche die Wahrnehmung im Therapieprozess der Familie darstellen kann.

Betreuungsperson
Schirin Akhbari Ziegler, PT, PhD

Matthias Michael Walter
Lund University, Department of Clinical Sciences Lund, Orthopaedics, Lund

Is Fear of Movement Predicting Therapy Outcome in Knee and Hip Osteoarthritis? An Exploratory Analysis of a Six-Month Cohort Study.

Osteoarthritis (OA) is a worldwide growing public health concern. Education, weight management and exercise therapy are the first-line treatment of knee and hip osteoarthritis. Despite the strong evidence in favour of first-line treat-ment strategies, fear of movement (FOM) is a well-known issue in knee OA patients. However, there is little published data on the influence of FOM on therapy out-come of OA patients. The aim of this study was to investigate whether FOM at baseline and at six months was associated with therapy out-come after six-month digital first-line treatment self-management program (FTSP).

In total 1813 patients with hip or knee OA attended this register-based explo-ra-tory analysis of an observational longitudinal cohort study. FOM was assessed using a dichotomous question. Pain was estimated on the numeric rating scale and physical function by 30-s Chair Stand Test. All outcomes were self-assessed at baseline and six-months by using the interface of the digital FTSP. Analyses were performed using linear and non-linear regression models.

FOM at baseline was not associated with therapy outcome after six-months digi-tal FTSP for knee and hip OA. FOM at baseline and at 6 months had an influence on pain intensity depending on the respective time point (FOM at baseline esti-mates (95% CI) 0.3 (0.1-0.6); FOM at six months 0.6 (0.2-0.9)). FOM after 6 months was associated with decreased odds of 36% for respond-ing to the digi-tal FTSP (FOM at six months OR (95% CI) 0.6 (0.5-1.0)).

FOM at baseline did not predict therapy outcome following a 6-months digital self-management program. However, FOM at baseline and at 6 months was asso-ciated with increased pain intensity depending on the respective time point. Regular assessment of FOM could possibly improve therapy results for knee and hip patients by targeting people with ongoing or developed FOM with specific treatments.

Co-Autoren

Håkan Nero, PT, PhD[1,2]

Slavko Rogan, PT, PhD[3]

[1] Lund University, Depart-ment of Clinical Sciences Lund, Orthopaedics, Lund

[2] Arthro Therapeutics, Malmö

[3] Bern University of Applied Sciences, Department of Health Professions, Bern

Betreuungsperson

Håkan Nero, PT, PhD

Line Myléne Wider
Universität Bern, Institut für Sportwissenschaft, Bern

Körperwahrnehmung im Traum nach einer Amputation

Co-Autor
Daniel Erlacher, PhD[1]

[1] Universität Bern, Institut für Sportwissenschaft, Bern

Hintergrund: In Deutschland werden jedes Jahr Schätzungen zufolge mindestens 50'000 Amputationen durchgeführt. In den USA sind es über 150'000 Personen pro Jahr, die amputiert werden. Unabhängig von der Ursache ist eine Amputation ein einschneidendes Ereignis und führt sowohl zu strukturellen Anpassungen auf physischer Ebene, als auch zu Veränderungen auf psychischer Ebene wobei es zu Diskrepanzen der beiden Ebenen kommen kann. Beispielsweise zeigte eine retrospektive Fragebogenstudie mit 250 Personen, die eine Amputation aufweisen, dass mehr als 40% der Studienteilnehmer sich im Traum als körperlich intakt wahrnehmen. Für das Erleben eines unversehrten Körpers im Traum werden sowohl intrinsische (z.B. Phantomschmerzen) aber auch methodische Faktoren diskutiert. Bislang fehlen Studien mit systematischen REM-Weckungen, die das Körpererleben im Traum untersuchen.
Ziel: Das Ziel dieser Schlaflaborstudie ist es durch direkte, systematische REM-Weckungen von Amputierten Traumberichte zu erhalten und anhand dieser herauszufinden, wie oft die Amputierten ihren Körper im Traum als intakt (ohne Amputation) wahrnehmen.
Methode: Es handelt sich um eine explorative Schlaflaborstudie. 10 Versuchsteilnehmende (VT) haben 8 Stunden im Schlaflabor des Instituts für Sportwissenschaften (ISPW) der Universität Bern verbracht. Mit Hilfe der Darstellung von Elektroenzephalographie (EEG), Elektrokardiogramm (EKG), Elektrookulographie (EOG) und submentaler Elektromyographie (EMG) Elektrodensignalen weckte die Versuchsleitung (VL) die VT in der zweiten Nachthälfte während deren REM-Phasen und befragte die VT. Die erhaltenen Traumberichte wurden zeitgleich mittels eines Diktiergeräts aufgenommen, transkribiert und auf die intakte KW analysiert. Durch den explorativen Ansatz blieb die Analyse der Anzahl intakter KW im Traum bei REM-Weckungen auf der deskriptiven Ebene.
Ergebnisse: Insgesamt wurden 30 REM-Weckungen durchgeführt und dabei 28 Traumberichte erhoben. Davon beinhalteten drei Traumberichte eine KW. Vier weitere Traumberichte mit KW konnten mit Fragen eruiert werden, zwei mit intakter KW.
Diskussion: Die Ergebnisse dieser Studie zeigen die Tendenz, dass die Anzahl der tatsächlich im Traum erlebten intakten KW bei REM-Weckungen tiefer liegt als in anderen retrospektiven Studien zuvor herausgefunden wurde. Diese Ergebnisse sind mit Vorsicht zu interpretieren und sind nicht generalisierbar. Das phänomenale Traumerleben amputierten Personen ist ein schwer objektivierbarer und schwer zu erklärender Forschungsgegenstand. Die vorliegenden Studienergebnisse leisten einen Beitrag zu seiner Erforschung.

Betreuungsperson
Daniel Erlacher, PhD

Annika Zind
Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Effect of Dynamic Trunk Strength Endurance on Dynamic Knee Valgus in Healthy, Adolescent Athletes

Co-Autorin
Eveline Graf, PhD[1]

[1] Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur

Context: Decreased trunk stability is suggested to facilitate noncontact and overuse injury mechanisms of the knee such as dynamic knee valgus. The effect of dynamic trunk strength endurance on dynamic knee valgus has not yet been investigated using sports-related measurement conditions in healthy adolescents practicing high impact team sports with high loads on the knee. Therefore, the purpose of this study was to examine the effect of dynamic trunk strength endurance on dynamic knee valgus in healthy male and female adolescents practicing high impact team sports.
Design: This was a cross-sectional, prospective study. Multiple and single linear regression were used to estimate the effects of ventral, lateral, and dorsal dynamic trunk strength endurance on dynamic knee valgus.
Methods: Forty-five healthy male and female adolescents aged 14-17 years practicing organized handball, basketball, volleyball, and football were recruited. Measurements took place in swiss gyms. Main outcome measures were dynamic knee valgus and dynamic trunk strength endurance. Dynamic knee valgus was video recorded at single leg jump landings and analyzed two-dimensional. Ventral, lateral and dorsal dynamic trunk strength endurance were assessed with one test each.
Results: Multiple and single linear regression revealed no significant effects of ventral, lateral, and dorsal dynamic trunk strength endurance on dynamic knee valgus. In the multiple linear regression, the regression coefficient of lateral dynamic trunk strength endurance was negative. Conclusions: No effect of dynamic trunk strength endurance on dynamic knee valgus was found. The effect of lateral dynamic trunk strength endurance on dynamic knee valgus was in accordance with our hypothesis that lower dynamic trunk strength endurance was associated with greater dynamic knee valgus. Hence, our results indicate limited support for the effect of dynamic trunk strength endurance on dynamic knee valgus in healthy male and female adolescents aged 14-17 years practicing organized handball, basketball, volleyball, and football.

Betreuungsperson
Eveline Graf, PhD

Simone Karin Zingg
University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

Generalized Cognitive Functional Therapy in Patients With Persistent Musculoskeletal Pain: A Single Case Experimental Design

Co-Autoren
Roger Hilfiker, PT, PhD[1]

Maurice de Graaf, PT, MSc[2]

[1] University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad

[2] PhysioMetrics, Biberist

Purpose: Persistent musculoskeletal pain (PMP) is a multifactorial condition causing increasing societal and financial burden. Multidimensional analysis and an interdisciplinary and multifactorial treatment approach is recommended. To assess the potential for interdisciplinary Cognitive Functional Therapy (CFT) in three patients with PMP (persistent low back, shoulder and knee pain), a Single Case Experimental Design was performed. Outcome measures such as pain, disability, maladaptive movement behavior, subjective overall improvement, health related quality of life and work status were monitored on a regular basis over the one year intervention (at the end of each module 1-6) and statistical and visual analysis was performed. A second aim was to facilitate the translational process by presenting a detailed description of the clinical journey of the included patients. The third aim was to improve clinical insight of the course and association of the proposed outcome measures. Key novelties were an intersubjective multifactorial analysis and decision-making method to address the multifactorial nature of the patient's problem and a documented functional loading approach aimed at work reintegration and increase of health related quality of life.

Results:A systematic change after introducing CFT was verified by visual analysis for almost all outcome measures and a medium to large treatment effect (effect sizes of Non-overlap of All Pairs 0.67-1) can be stipulated by statistical analysis for all proposed outcome measures. All associations between changes of the outcome measures were significant and large ($r \geq 0.50$) and changed concurrently according to cross-lagged correlation analysis. Minimally clinically important difference thresholds were exceeded for all outcome measures and two patients achieved successful work reintegration.

Conclusion:These findings suggest that the extended and interdisciplinary CFT was effective with a heterogeneous small sample of patients with PMP and highlight the clinical importance of a multifactorial analysis and treatment approach. Replication of the study is needed to further validate these promising findings and establish the generalizability of the intervention with similar and more diverse patients. As integration of multifactorial management approach in this patient group remains challenging for most clinicians, the detailed descriptions of the clinical processes might function as a tool to improve clinical care.

Key Words: Musculoskeletal pain; chronic pain; cognition; behavioral change; biopsychosocial

Betreuungsperson
Roger Hilfiker, PT, PhD

Valerie Zumbrunnen
University of Zurich, Epidemiology, Biostatistics and Prevention Institute, Zürich

The Impact of Seat-Height on 1-Minute Sit to Stand Test Performance in Chronic Obstructive Pulmonary Disease: A Randomized Cross-Over Trial

Study question: Is there a difference in the number of repetitions on the 1-minute sit to stand (1MSTS) test using an individually adapted seat-height to 90-degree knee flexion (1MSTSindividual), compared with the commonly used chair seat-height of 46cm (1MSTSstandard), in people with COPD.
Design and Setting: We conducted a single-centre, single blinded randomized cross-over trial in people with COPD between August 2020 to March 2021 at a specialised rehabilitation clinic in Switzerland.
Intervention: All participants performed two 1MSTS tests in random order on consecutive days. Participants were blinded, as they did not receive detailed information on the testing protocols.
Results: 49 individuals with COPD (47% female) participated. In a regression model adjusted for experimental condition, period and subject, 1MSTS test performance was lower on 1MSTSindividual compared to 1MSTSstandard (-0.78 repetitions, 95% CI, -1.47 to -0.11). In a second regression model including additionally the knee angle and an interaction term (1MSTSindividual x knee angle), the interaction term was significant: 0.18 (95% CI, 0.05 to 0.30). The limits of agreement are between -5.5 to 4 repetitions. Two participants (knee angle 72° and 82°; individual seat-height 38.8cm and 40.5cm) performed 6 and 8 repetitions more on 1MSTSstandard and one participant (knee angle 93°; chair height 48.2cm) performed 6 repetitions more on 1MSTSindividual.
Conclusion: Although we observed a statistically significant difference between 1MSTSindividual and 1MSTSstandard on a population level, the difference is negligible. However, for individual subjects (i.e., very tall, or very short subjects), individual adaptation of seat-height may impact on 1MSTS performance in COPD.
Trial registration: ClinicalTrial.gov Identifier NCT04579055, BASEC-ID 2020-01677
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Co-Autorin/Co-Autoren
Thomas Radtke, PhD[1]

Thomas Riegler, PT, MSc[2,3]

Sarah R. Haile, PhD[1]

[1] University of Zurich, Epidemiology, Biostatistics and Prevention Institute, Zürich

[2] Berner Reha Zentrum AG, Heiligenschwendi

[3] Zurich University of Applied Sciences, School of Health Professions, Institute of Physiotherapy, Winterthur

Betreuungspersonen
Thomas Radtke, PhD
Thomas Riegler, PT, MSc

Annina Zürcher
Inselspital, University Hospital Bern, Insel Gruppe, Medical Ethics, Medical Directorate, Bern

Co-Autor
Rouven Porz, PhD[1]

[1] Inselspital, University Hospital Bern, Insel Gruppe, Medical Ethics, Medical Directorate, Bern

The Importance of Qualitative Research Methodology for Physiotherapy. Implications for Evidence-Based Practice

Background and purpose: Qualitative research methodology is relatively rarely used in physiotherapy, although it could provide promising findings and integrate biopsychosocial aspects into evidence-based practice. This study aims to describe research and care contexts, to propose possible applications of qualitative methods and to draw implications from these findings.

Methods: To identify expert knowledge six semi-structured interviews with persons from physiotherapy practice, research and teaching were conducted. Subsequently, a Thematic Analysis was performed. Furthermore, a literature review with a systematic search strategy was applied to reflect the current state of research.

Results: In the literature review, 14 publications were included, thus providing an overview of the scientific context, possible applications of qualitative studies and reasons for their low status in physiotherapy, such as a biomedical and positivist research environment, the state of professional research development, the complex qualitative research process and insecurities in evaluation of qualitative research. An urgent need for a paradigm shift in health care and research was addressed.

Thematic Analysis of the semi-structured expert interviews revealed 13 themes: Recognition of a biopsychosocial model, critical use of scientific evidence, biomedical paradigm, difficult basic conditions for qualitative research, dealing with uncertainty and grey zones, application of scientific quality criteria, interpretation of outcomes from qualitative research, professional development of physiotherapy, qualitative research of psychosocial issues, generation of hypotheses and basic research, knowledge implementation and deepening, method diversity and interdisciplinarity.

Conclusion: Qualitative and quantitative approaches should complement each other. Broad methodological competence including qualitative research principles should be promoted, acknowledging the significance of interprofessional cooperation. Qualitative approaches can be used to generate hypotheses as well as to develop patient-reported outcome measurements (PROMs). Suitable forms of application are combinations with quantitative methods or syntheses to investigate topics such as heterogeneity, psychosocial or individual phenomena. Qualitative methodology can support the explanation of causal relationships, the consideration of vulnerable people and underrepresented pathologies, improve knowledge management and promote professional development.

Keywords: physiotherapy, qualitative research, evidence-based practice, methodology

Betreuungsperson
Rouven Porz, PhD

Die Diplomandinnen und Diplomanden

des Master-Studiengangs Physiotherapie 2021 und ihre Betreuungspersonen

Name	Arbeitsort	E-Mail
Kathrin Abächerli	Kantonsspital Obwalden, Sarnen	kathrinabaecherli@gmx.ch
Laura Böhringer	Salina Physiotherapie im Parkresort Rheinfelden, Rheinfelden	Laura.Boehringer@parkresort.ch
Stephanie Brezina	Brühlgut Stiftung, Therapiestelle, Kinderphysiotherapie, Winterthur	stephanie.brezina@outlook.com
Alice Bridel	Physiothérapie du Midi, Sion	bridel.alice@gmail.com
Svenia Bühler	Physio Chantal Bläuenstein, Langenthal und Zug United Unihockey	svenia.buehler@hotmail.com
Rachel Cott	Gruppenpraxis «Kind im Zentrum», Zürich HPS Limmattal, Dietikon	rachel.cott@hispeed.ch
Valentin Deiss	Medbase WIN4, Winterthur	valentin.deiss@gmail.com
Mirjam Douma	FisiOliveto, Ponte Tresa	mirydouma@hotmail.com
Morgane Emma Duc	Physiothérapie du Midi - Marina Schaffner, Sion	morganeduc@hotmail.com
Nicole Gadola	SRK Therapiestelle für Kinder und Jugendliche	gadola.nicole@hotmail.com
Simon Alexander Greiner	Top-Physio GmbH, Winterthur	simongreiner87@gmail.com
Johannes Gruppe	Physiothérapie / Ostéopathie Ann Sheppard, Lausanne	hannes@diegruppes.de
Cynthia Gschwind	Universitäre Altersmedizin FELIX PLATTER, Basel	cynthiagschwind@gmail.com
Selina Güttinger	Therapiezentrum Spital Zollikerberg, Zollikerberg	selina.guettinger@gmail.com
Joachim Haab	Physiotherapie Seebach	physio.haab@gmail.com
Marry Everdina Hamberg	Brühlgut Stiftung, Winterthur	hamberg.m.e@gmail.com
Manuel Hangarter	Medbase WIN4, Winterthur	m.hangarter92@googlemail.com

Betreuungsperson/-en	Affiliation der Diplomandinnen und Diplomanden
Heiner Baur, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Stefan Schmid, PT, PhD	Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Spinal Movement Biomechanics Group, Bern
Giancarlo Natalucci, PhD	University Hospital Zurich, Department of Neonatology, Zurich, Switzerland
Roger Hilfiker, PT, PhD	University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad
Mario Bizzini, PT, PhD	Swiss Concussion Center, Institute for interdisciplinary Diagnosis and Therapy of Concussion, Zurich
Bea Latal, PhD Cornelia Hagmann, PhD	Abteilung Entwicklungspädiatrie, Universitäts-Kinderspital Zürich – Eleonorenstiftung, Zürich
Heiner Baur, PhD	Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Bern
Nicola A Maffiuletti, PhD	Schulthess Clinic, Human Performance Lab, Zürich
Roger Hilfiker, PT, PhD	University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad
Markus Ernst, PT, MSc	Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur
Christoph Gehrlach, PhD	Bern University of Applied Sciences, Departement of Social Work, Institute for Organization and Socialmanagement, Bern
Patric Eichelberger, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Oliver Mauthner, PhD	University Department of Geriatric Medicine FELIX PLATTER, Basel
Irina Nast, PhD	Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur
Corina Schaer, PhD	Idiag AG, Fehraltorf
Britta K. Krautwurst, PhD	University Children's Hospital Zurich – Eleonore Foundation, Paediatric Orthopaedics and Traumatology, Zurich, Switzerland
Mario Bizzini, PT, PhD	Swiss Concussion Center, Institute for interdisciplinary Diagnosis and Therapy of Concussion, Zurich

Die Diplomandinnen und Diplomanden

des Master-Studiengangs Physiotherapie 2021 und ihre Betreuungspersonen

Name	Arbeitsort	E-Mail
Cornelia Heeb-Weber	Universitätsklinik Balgrist, Zürich	c.heeb@mail.ch
Beatrice Hubacher	Universitäts-Kinderspital beider Basel	beatrice.hubacher@outlook.com
Larissa Kristina Ilchmann	Kantonsspital Olten, Olten	larilchmann@hotmail.com
Matthias Jörger	Universitäres Zentrum für Prävention und Sportmedizin Balgrist, Zürich	matthiasjoerger@gmx.de
Svenja Kaczorowski	Physio Neuhof, Bülach	svenja.kaczorowski@gmx.net
Samuel Karrer	TuricumFit, Zürich	karrersamuel@gmail.com
Sebastian Köcker	Universitätsklinikum Freiburg, Freiburg im Breisgau	sebastian.koecker@gmx.de
Nicole Kofler	Physiotherapie Pfungen	nicole.kofler@gmx.ch
Florian Krames	Briefzentrum Zürich-Mülligen, Post CH AG, Zürich	florian.krames@post.ch
Stephan Marc Kunz	Physiotherapie Trainingscenter Lenk GmbH, Lenk	s.kunz@physio-training-lenk.ch
Melanie Nadia Liechti	Physio360 GmbH, Flamatt	mel.na.liechti@gmail.com
Seraina Liechti	Spital STS AG, Thun	seraina.liechti@gmx.ch
Lea Meier-Egger	Kinder-Reha Schweiz, Kinderspital Zürich, Affoltern am Albis	meier_lea@bluewin.ch
Silvia Minder	Franckphysiofitness AG, Ipsach	silvia.minder@sunrise.ch
Manuel Monteiro Alves	Universitätsspital Zürich, Physiotherapie Innere Medizin und Pneumologie, Zürich	manuel.monteiro.a@gmail.com
Daniele Moretti	Scuola Universitaria della Svizzera Italiana (SUPSI), Dipartimento Economia Aziendale Sanità e Sociale, Manno	daniele.moretti@supsi.ch
Anna Isabel Oeschger	Kindertherapiezentrum Reha Rheinfelden	aoeschger@gmx.de

Betreuungsperson/-en	Affiliation der Diplomandinnen und Diplomanden
Karin Niedermann-Schneider, PT, PhD	Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur
Andreas Wörner, PhD Christine Wondrusch, PT, MSc	Inpatient Multidisciplinary Chronic Pain Therapy, University Children's Hospital Basel, Basel
Annegret Mündermann, PhD	University Hospital Basel, Department of Orthopaedics and Traumatology, Functional Biomechanics Laboratory, Basel
Christoph Bauer, PT, PhD	Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur
Daniel Baumgartner, PhD	Zurich University of Applied Sciences, School of Engineering, Institute of Mechanical Systems, Winterthur, Switzerland
Eveline S. Graf, PhD	Zurich University of Applied Science, School of Health Professions, Institute of Physiotherapy, Winterthur
Heiner Baur, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Mandy Scheermesser	Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur
Corina Schaer, PhD	Idiag AG, Fehraltorf
Jan Taeymans, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Stefan Schmid, PT, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Wilhelmus Grooten, PT, PhD	Karolinska Institutet, Department of Neurobiology, Care Sciences and Society, Division of Physical Therapy, Huddinge
Hubertus van Hedel, PhD Petra Marsico, PT, MSc	Research Department, Swiss Children's Rehab, University Children's Hospital Zurich, Affoltern am Albis
Patric Eichelberger, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Thomas Radtke, PhD	University of Zurich and University Hospital Zurich, Epidemiology, Biostatistics and Prevention Institute, Division of Occupational and Environmental Medicine
Marco Barbero, PT, PhD	University of Applied Sciences of Southern Switzerland (SUPSI), Department of Business Economics, Health and Social Care, Manno
Nicolas Regamey, PhD	Division of Paediatric Pulmonology, Children's Hospital Lucerne, Switzerland

Die Diplomandinnen und Diplomanden

des Master-Studiengangs Physiotherapie 2021 und ihre Betreuungspersonen

Name	Arbeitsort	E-Mail
Jonas Pfeifle	Rehaklinik Dussnang	jonas.pfeifle@gmail.com
Mario Rohrer	Physiotherapie Nessi, Köniz	mario_rohrer@bluewin.ch
Nadja Roth	Kantonsspital Uri, Altdorf	roth.nadja@bluewin.ch
Madeleine Salathe	Hirslanden Training, Aarau	madeleine.salathe@gmail.com
Elisabeth Schenk	Physio Zofingen, Zofingen	e_schenk@gmx.ch
Helen Schwerdt	Luzerner Kantonsspital, Luzern	Helen.schwerdt@gmx.net
Martina Steiner	Spital Münsingen Inselgruppe AG, Münsingen	steiner-martina@gmx.ch
Vreni Studer	Luzerner Kantonsspital Wolhusen, Wolhusen	vreni_st@gmx.ch
Mathieu Tripod	Zénith Physio 2300 GmbH, La Chaux-de-Fonds	Mat.tripod@gmail.com
Michael von Arx	Aare Physiotherapie, Olten	michael.vonarx@gmx.net
Felicitas von Hülsen	Stiftung RGZ, Therapiestelle Zumikon	felicitas.vonhuelsen@gmail.com
Matthias Michael Walter	Medbase Bern Zentrum, Bern	Walter_Matthias@outlook.com
Line Myléne Wider	PhysioHildebrandt, Bern	line.wider@rega-sense.ch
Annika Zind	adrik mantingh therapie reha training, Zürich	annika.zind@t-online.de
Simone Zingg	Berner Fachhochschule, Bern	simonezingg@bluewin.ch
Valerie Zumbrunnen	Berner Reha Zentrum AG, Heiligenschwendi	valerie@zumbrunnen.be
Annina Zürcher	Spital STS AG, Thun	annina.zuercher@gmail.com

Betreuungsperson/-en	Affiliation der Diplomandinnen und Diplomanden
Nicola A. Maffiuletti, PhD	Human Performance Lab, Schulthess Clinic, Zurich, Switzerland
Patric Eichelberger, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Corina Schaer, PhD Andri Feldmann, MSc	Idiag AG, Fehraltorf
Roger Hilfiker, PT, PhD	HES-SO Valais – School of Health Sciences - Degree programme Physiotherapy, Leukerbad
Slavko Rogan, PT, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Veronika Schoeb Mezzanotte, PT, PhD	University of Applied Sciences and Arts Western Switzerland - Vaud, Lausanne
Angela Blasimann, PT, MSc	Bern University of Applied Sciences, Department of Health Professions, Discipline of Physiotherapy, Bern
Balz Winteler, PT, MSc Sue Reid, PT, PhD	Bern University Hospital, Department of Physiotherapy, Bern
Slavko Rogan, PT, PhD Jan Taeymans, PhD	Bern University of Applied Sciences, Department of Health Professions, Bern
Stefan Schmid, PT, PhD	Bern University of Applied Sciences, Department of Health Professions, Division of Physiotherapy, Spinal Movement Biomechanics Group, Bern
Schirin Akhbari Ziegler, PT, PhD	Zürcher Hochschule für Angewandte Wissenschaften, ZHAW, Institut für Physiotherapie, Winterthur
Håkan Nero, PT, PhD,	Lund University, Department of Clinical Sciences Lund, Orthopaedics, Lund
Daniel Erlacher, PhD	Universität Bern, Institut für Sportwissenschaft, Bern
Eveline Graf, PhD	Zurich University of Applied Sciences ZHAW, School of Health Professions, Institute of Physiotherapy, Winterthur
Roger Hilfiker, PT, PhD	University of Applied Sciences and Arts Western Switzerland – Valais-Wallis, School of Health Sciences, Leukerbad
Thomas Radtke, PhD Thomas Riegler, PT, MSc	University of Zurich, Epidemiology, Biostatistics and Prevention Institute, Zürich
Rouven Porz, PhD	Inselspital, University Hospital Bern, Insel Gruppe, Medical Ethics, Medical Directorate, Bern

Berner Fachhochschule
Gesundheit
Master-Studiengang Physiotherapie
Murtenstrasse 10
CH-3008 Bern

bfh.ch/gesundheit
mscphysiotherapie.gesundheit@bfh.ch
Telefon +41 31 848 47 22

Zürcher Hochschule für Angewandte Wissenschaften
Departement Gesundheit
Master-Studiengang Physiotherapie
Katharina-Sulzer-Platz 9
CH-8400 Winterthur

zhaw.ch/gesundheit
master.physiotherapie@zhaw.ch
Telefon +41 58 934 63 77