



Berner  
Fachhochschule



# Abstracts der Master-Thesen 2023 Master of Science in Physiotherapie

# Editorial

Advanced Physiotherapie Practice (APP) ist im englischsprachigen Raum, insbesondere im muskuloskelettalen Bereich, seit einigen Jahren weit verbreitet. Im Rahmen der verschiedenen Schwerpunkte des Master-Studiengangs Physiotherapie an der BFH erlernen die Studierenden die Fähigkeiten, komplexe Patient\*innen sicher, effektiv und effizient zu behandeln. Sie lernen von Expert\*innen und haben die Möglichkeit, während ihren klinischen Praktika relevante Praxiserfahrungen innerhalb ihrer Spezialisierung zu sammeln.



Prof. Dr.  
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Die Entwicklung von neuen APP-Modellen in verschiedenen Bereichen kann eine wichtige Massnahme sein, um auf den zunehmenden Ärzt\*innenmangel zu reagieren – nicht nur in der Versorgung von Patienten\*innen mit muskuloskelettalen Erkrankungen, sondern auch in Bereichen wie Schmerz, Sport und Neurologie. Allerdings ist mehr Forschung erforderlich, um die Ergebnisse der bestehenden Studien weiter zu stärken.

Vor der Übernahme von APP-Rollen sollte jedoch die Übereinstimmung zwischen Physiotherapeut\*innen und Ärzt\*innen bei der Entscheidungsfindung in den Bereichen Diagnose, Behandlung und Entlassung bewertet werden. Dafür führen unsere Master-Studierenden unter Supervision diverse Untersuchungen und Forschungsarbeiten durch.

Durch das Master-Studium können die Absolvent\*innen einerseits als Expert\*innen fungieren, die auch komplexe, mehrdimensionale klinische Fragestellungen selbstständig und adäquat lösen können. Andererseits sind sie befähigt, die evidenzbasierte und wissenschaftlich fundierte Therapie in den Mittelpunkt zu stellen.

Unsere Freude über die erfolgreichen Studienabschlüsse verbinden wir mit grossem Dank an die Dozierenden und Betreuenden, welche die Studierenden in ihrer Entwicklung tatkräftig unterstützt haben.

Den Master-Absolvent\*innen in Physiotherapie gratulieren wir herzlich zu ihren gelungenen Master-Arbeiten und zu ihrer Diplomierung.

Prof. Dr. Amir Tal

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# Seline Brodmann-Alves

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## Entwicklung einer multiprofessionellen poststationären Intervention für ältere Menschen mit Sarkopenie: Eine Kontextanalyse

### Abstract

**Fragestellung:** Um eine nachhaltige Behandlung einer Sarkopenie zu gewährleisten, ist eine kompetente ambulante Nachversorgung essenziell. Damit eine multiprofessionelle Intervention entwickelt und erfolgreich implementiert werden kann bedarf es einer Analyse des Kontexts. Aus diesem Grund soll eruiert werden, welche Bedürfnisse ältere Menschen mit Sarkopenie betreffend einer ambulanten therapeutischen Nachbehandlung haben und welche erleichternde Faktoren und Hindernisse es aus Sicht der Betroffenen und des Behandlungsteams gibt. Darauf basierend soll ermittelt werden, wie eine evidenzbasierte Intervention aufgebaut sein muss und welche Implementierungsstrategien angewendet werden können.

**Methode:** Im Rahmen einer qualitativen Kontextanalyse wurden semistrukturierte Patient\*innen-, Ärzt\*innen- und Fokusgruppeninterviews durchgeführt, welche inhaltsanalytisch nach Mayring analysiert wurden. Darauf aufbauend wurde eine entsprechende Intervention für die beschriebene Zielpopulation angepasst. Abschliessend wurden Implementierungsstrategien zur erfolgreichen Umsetzung der Intervention definiert.

**Resultate:** Die Kontextanalyse ergab, dass Bedürfnisse in Bezug auf die Trainingsmodalitäten und das Trainingssetting, die Selbstständigkeit der Patient\*innen in den Aktivitäten des alltäglichen Lebens (ADL), sowie die Individualisierbarkeit, die Multiprofessionalität, die involvierten Professionen und die Information über Teilnahmemöglichkeiten an einem ambulanten Programm bestehen. Es wurden erleichternde Faktoren in Bezug auf die Überzeugungen und Einstellung der Patient\*innen, dem Bedarf und den sozialen Aspekt einer Intervention und die zunehmenden IT-Affinität der älteren Bevölkerung identifiziert. Hindernisse wurden in Bezug auf Ressourcen, wie die örtliche Distanz, Kosten und den Zeitaufwand genannt, sowie auf die Komplexität des Krankheitsbildes und die Adhärenz der Patient\*innen. Dementsprechend wurde die auf Evidenz basierte Intervention angepasst und Implementierungsstrategien, wie die Erschliessung von Finanzierungsmöglichkeiten und die Förderung der Anpassungsfähigkeit definiert.

**Schlussfolgerung:** Durch die Kontextanalyse konnten die Bedürfnisse der Zielpopulation, erleichternde Faktoren und Hindernisse identifiziert werden, die Intervention angepasst und geeignete Implementierungsstrategien festgelegt werden. Diese Vorgehensweise kann als Basis von anderen Therapeut\*innen, welche eine komplexe Intervention einführen wollen, genutzt werden. Gewonnene Erkenntnisse und Strategien aus dieser Studie können, als Basis für künftige Interventionen an der Universitären Altersmedizin FELIX PLATTER herangezogen werden.

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## 6 Factors That Influence the Attitudes of Physiotherapy Students Towards Older Adults and Their Future Career Choice. A Qualitative Research

### Abstract

**Introduction:** Willingness to work with the older adults is essential for future health workers given the fastest growing demographic group older adults represent (Hughes et al., 2008), (Promotion Santé Suisse, 2016). Questionnaires are often used to measure attitudes in studies that aimed to change attitudes towards older adults (Lucchetti et al., 2018). Undergraduate students at the School of Health Sciences in Lausanne (HESAV) using the Los Angeles Geriatrics Attitudes Scale (UCLA-GAS-F) indicated a positive attitude of the students towards older adults and caring for older patients (Opsommer et al., 2021). The purpose of this study was to discover factors that influence the attitudes of physiotherapy students towards this population and how it impacts their career choice.

**Method:** A qualitative semi-structured interview study was conducted with 16 physiotherapy Bachelor students and physiotherapists graduating in September 2022 from the School of Health Sciences in Lausanne (HESAV) to answer the research question. Interview data have been processed using the inductive content analysis.

**Results:** The results highlighted the following six influencing factors: Career interests, envisaged role as a physiotherapist, beliefs/representations, knowledge acquired during the training, older adults-therapist relationship and previous interactions with older adults. For each factor, sub-categories were also defined.

**Conclusion:** Most physiotherapy students have a positive or neutral attitude towards older adults, but only a quarter of them wish to work with this population in the future. In the context of Bachelor's training in physiotherapy, improved knowledge on this subject and increased interaction with older adults could be beneficial in improving students' attitudes towards them and increasing their willingness to work with this category of the population.

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## Effectiveness of Self-Management Programs in Older Adults With Chronic Pain: A Systematic Review and Meta-Analysis

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### Abstract

**Objective:** To evaluate the effectiveness of self-management programs (SMP) versus usual care, single intervention, or waiting list on pain, disability, quality of life, self-efficacy, and physical and emotional function in older adults.

**Introduction:** Chronic pain is common in older adults and leads to various limitations in daily living. SMP are designed to enable people to cope with their chronic condition.

**Inclusion criteria:** This review considered studies including individuals aged 60 and over who have chronic non-malignant pain. English, German, or French articles were included.

**Methods:** The databases Medline, CINAHL, PsychINFO, Cochrane, Embase, Web of Science, PEDro and ProQuest were searched until November 2022. Studies were screened and critically appraised by two independent reviewers. Data extraction was performed by one reviewer and checked by the second. Data were pooled using a random-effects model and presented as SMD. The grading of recommendations was used to assess the certainty of evidence.

**Results:** Of the eligible studies were 6 RCTs, 2 cluster-RCTs, 1 non-RCT, and 3 pretest-posttest designs. In all studies there was some risk of bias present. Pain intensity at post-intervention showed a small to no effect for SMP compared to control (SMD -0.25, 95% CI -0.52 to 0.02, 4 studies, 459 participants). For pain self-efficacy there was a small to moderate effect for SMP (SMD 0.44, 95% CI 0.25 to 0.64, 4 studies, 411 participants). There was no evidence found for a benefit of SMP compared to control groups for disability, depression and physical function. For quality of life was insufficient data.

**Conclusions:** There is low certainty evidence that SMP has a positive effect on pain self-efficacy when compared to control groups in this population. For all the other outcomes there is very low or low certainty of evidence indicating no difference.

**Keywords:** chronic pain; elderly; older adults; self-management

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## 8 Effectiveness of Neuromuscular Training on Rehabilitation of Lower Extremity Overuse Injury in Adults: A Systematic Review and Meta-Analysis

### Abstract

**Objectives:** Overuse injuries represent up to 50% of all sport-related injuries and lower extremity is the most frequent body part involved. Neuromuscular training (NMT) is commonly used for injury prevention or rehabilitation of sport-related injury. This study aimed to investigate the effectiveness of NMT in adults with lower extremity overuse injury on pain, function and/or kinematics outcomes.

**Design:** Systematic review and meta-analysis

Data sources: PubMed, Embase, Cochrane Library, CINAHL, SPORTDiscus and grey literature were searched from inception to February 2023.

**Eligibility criteria:** Interventional trials involving adults with lower extremity overuse injury comparing NMT with a control for pain, function and/or kinematics outcomes over a period of at least three months were included.

**Results:** Eight trials met the inclusion criteria. The meta-analysis included seven trials. Statistically non-significant results favouring NMT were found for pain (SMD 0.56, 95% CI -0.14 to 1.27), functional status based on questionnaires (SMD 0.44, 95% CI -0.16 to 1.04), strength (SMD 0.17, 95% CI -0.24 to 0.57), and functional performance (SMD 0.17, 95% CI -0.19 to 0.54) at last follow-up. At three months, statistically significant results favouring NMT were found for pain (SMD 0.81, 95% CI 0.00 to 1.62) and functional status based on questionnaire (SMD 0.78, 95% CI 0.05 to 1.52). GRADE assessment at outcome level varied from moderate to very low.

**Conclusions:** Results suggest that NMT may be used to improve pain and function in adults with lower extremity overuse injury. Further research is needed to determine the optimal setting of NMT.

**PROSPERO registration number:** CRD42022303212

**Keywords:** Neuromuscular Training; Cumulative Trauma Disorder; Tendinopathy; Patellofemoral Pain Syndrome, Achilles Tendon

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## Reliability of Two Recently Developed Procedures Assessing Biological Maturity by Ultrasound

### Abstract

To generate equal opportunity in talent selection in youth sports, the athlete's biological maturity should be considered. It is often estimated using an X-ray of the left hand and wrist. However, ultrasound (US) is a radiation-free imaging technique and presents many advantages. The aims of this study were to assess intrarater and interrater reliability within one experienced and one non-experienced examiner of an US- based examination on the knee of five anatomical landmarks and the interrater reliability of an US-based calculation of the ossification ratio (OssR) in 20 healthy females (10-17 years of age). Epiphyseal closure of the landmarks was staged (stages 1-3). Reliability was analyzed using Cohen's kappa (k). The OssR was calculated by dividing the diameter of the ossification center by the epiphyseal diameter. Interrater reliability was analyzed using the Bland-Altman method and the intraclass correlation coefficients (ICC) were calculated. Interrater and intrarater reliability for the stages ranged from  $k=0.69$  to  $k=0.90$  and from  $k=0.70$  to  $k=1.0$ , respectively. An ICC of 0.964 and a minimal detectable change (MDC) of 0.030 were found for the OssR. To conclude, experienced and non-experienced examiners can reliably assign individuals to different ossification stages and calculate an OssR using US-based imaging on the knee.

**Keywords:** ultrasound; bone age; ossification ratio; biological maturity; maturity stage; youth sport; talent selection; reliability

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## 10 Assessing the Lower Limb Muscle Contraction Perception: A Pilot Study

### Abstract

**Introduction:** Muscles activation deficits or impaired perception of muscle contraction are common in patients suffering from painful knee conditions or after surgery. This may contribute to symptoms and complications if left untreated. Therefore, it is important to detect and quantify these deficiencies in patients with lower limb muscle activation deficits. Currently, no cost-effective and clinical easily applicable method to assess Perception of Muscle Contraction (PMC) and no standard of PMC among healthy individuals exists. The purpose of this study was to assess the inter-session reliability of PMC of in a test-battery among healthy subjects.

**Methods:** Twenty healthy participants were enrolled in this pilot study. They performed twenty-six exercises and provided PMC feedback, drawing on a digital body chart. The assessed parameters included the surface area of the drawing and the centre's location in two coordinates Cx and Cy. The inter-session reliability of PMC was evaluated using various statistical measures.

**Results:** Most of Intraclass Correlation Coefficient (ICC) values were below 0.75, indicating a relatively low reliability. Only one exercise had an ICC above 0.9. Percentage of Standard Error of Measurement ranged from 24.48% to 76.50% for surface, from 2.08% to 24.25% for Cx and from 3.61% to 24.22% for Cy. Minimal Detectable Change (number of pixels) had a mean ( $\pm$ SD) of 5860.83 ( $\pm$  2240.37) for surface, 75.69 ( $\pm$ 42.40) for Cx, 180.50 ( $\pm$  91.79) for Cy.

**Conclusion:** All exercises exhibited relatively low reliability, and no exercise demonstrated significantly better reliability compared to the others. The high variability observed in the results further supported the idea that the exercises differed significantly. PMC is influenced by various individual characteristics. Therefore, it cannot be assumed that the PMC is reliable using this battery of exercises in healthy subjects and makes it challenging to establish a reliable standard for detecting pathological patients.

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## Exploring Physiotherapist's Roles and Needs in Home Care in French-Speaking Switzerland: A Qualitative Study

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### Abstract

**Background and objectives:** The world's population is aging. This demographic change which also appears in Switzerland, has several consequences, including increased homecare (HC) services. This study aims to explore and define the current roles, future roles, and potential needs of physiotherapists in HC in French-speaking Switzerland from the point of view of different groups of professionals.

**Methods:** One-on-one semi-structured interviews were conducted in French-speaking Switzerland with three groups, (1) physiotherapists working in HC settings, (2) other health care professionals working in HC settings, and (3) professionals involved in the development of the physiotherapy profession. Thematic analysis and qualitative description were used for data analysis.

**Results:** Fifteen interviews were conducted with five participants per group. According to the three groups, the main current role of physiotherapists in HC was "Aging in place agent" and their future role would be "Leaders in HC". The three main needs of physiotherapists were "Better collaboration with better communication", "Recognition of the profession" and "Quality through formation".

**Conclusions:** Physiotherapists are a cornerstone of aging in place in HC, and they could play a role of HC leader and develop it in the future. Communication and collaboration must be developed within the HC teams. Equalities in financing and billing must be found. The physiotherapy profession must create homecare-related formation courses as quickly as possible to meet the actual needs of the health care system. Further studies in Switzerland can be conducted to complete and compare the data.

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## 12 Associations Between Pain-Related Fear and Lumbar Movement Variability in Patients with Chronic Low Back Pain and Healthy Controls – A Cross-Sectional Study

### Abstract

Low back pain is an increasing global problem with contributing biological, psychological and social factors. Associations between motor behaviour and pain-related fear exist in low back pain patients as well as in healthy individuals. Regarding the association between pain-related fear and spinal movement variability, study results are divergent. To further investigate this relationship, the spinal kinematics of 58 patients with chronic low back pain and 112 healthy controls were recorded using a three-dimensional motion capture system during activities of daily life (walking, running, lifting, and stair climbing). Movement variability of the lumbar spine between 5 trials of each task was calculated using four indices: coefficient of variation, coupling angle variability in vector coding, deviation phase of the continuous relative phase and an angle-angular velocity variability. General pain-related fear was assessed with the Tampa Scale for Kinesiophobia, task-specific pain-related fear with items of the Photograph Series of Daily Activities – short electronic version. In linear regression analyses no significant association was found between movement variability and pain-related fear – regardless of activity, variability calculation method and whether general or task-specific pain-related fear was assessed. The results of the variability indices were weakly correlated and varied highly depending on the method used and the task performed. Therefore, comparisons between studies which used different calculation methods of movement variability or assessed different activities should be done with caution.

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## Quality Assessment of a Return-To-Sport Protocol After ACL Injury

### Abstract

**Background:** Clinicians quantify rehabilitation and decide whether to release patient for sport after anterior cruciate ligament (ACL) rupture using return to sport (RTS) measurements. Due to high variability of RTS protocols used and the unclear influence of each factor on re-injury, this study examines the re-injury rate in subjects following ACL injury with a successfully completed RTS protocol from the SportsMed Center and examines the influence of the different measurement variables on the outcome of re-injury.

**Methods:** The present study is a retrospective data analysis. Using a self-developed questionnaire, 226 subjects were interviewed about any re-injury after successful completion rehabilitation. The re-injury rate was calculated to assess quality of the applied protocol. Using lasso regression, different predictors (age, gender, strength values and jump performance) were tested for their influence on the outcome, re-injury yes/no. The odds ratios (OR) of the individual predictors should provide information about their influence on the outcome and thus allow prioritization in rehabilitation.

**Results:** 77 subjects completed the questionnaire, of which 68 were included in the regression analysis. 14 subjects reported a re-injury, representing a re-injury rate of 18.2 % of which 6.5% had a graft rupture, 1.3% had contralateral ACL rupture, 6.5% sustained muscular injuries and 3.9% had other injuries. Non-modifiable factors had an OR of 0.991-1.02, jump performance of 1.01-1.24, strength of 0.966-0.899 and balance of 0.464-0.638.

**Conclusion:** With a re-injury rate of 18.2%, the rate of secondary injury after a successfully completed RTS protocol is moderate to low. Lasso regression showed a protective effect with increased LSI values in strength and balance, but not in LSI values of Hop performance. Although important aspects such as psychological readiness were not assessed, the RTS protocol is still considered good. This approach also provides a good methodological template for further studies with increased cases of re-injury.

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## 14 Is There an Association Between Force, Function and Re-Injury Rate After Isolated Meniscal Repair? A Retrospective Data Analysis

### Abstract

**Introduction:** The re-injury rate after isolated meniscal repair is high with 22,3-27%. Literature on functional measurements in the context of return to sport (RTS) following isolated meniscal repair is scarce. The goal of this thesis was to evaluate the RTS test protocol of a local hospital and a private practice. The question was whether there is an effect of functional deficits on the re-injury rate after isolated meniscal repairs.

**Methods:** A retrospective data analysis was performed. Data of patients after isolated meniscal repair were selected. The test protocol consisted of six functional tests: two maximum strength tests of the quadriceps and hamstring muscles, the Y-Balance test (YBT), the Side hop test (SHT), the single hop for distance (SLHD) and the vertical jump test (VJT). Patients were followed up by telephone 2 years postoperatively to assess re-injury status and RTS. A survival analysis with the Kaplan-Meier procedure was conducted. The analysis of the effect of each test was done with Cox Regression.

**Results:** Data of 40 patients, 28 males, 11 females, 1 gender unknown, median age: 30 years (range 18-61 years), were included. 25% sustained re-injuries within 2 years postoperatively. There was a 63,7% (95 CI : 0,457 - 0,888) chance of not getting re-injured 23 months or more after meniscal repair. No significant effect was proven for SLHD, YBT and strength-test on the re-injury rate after meniscal repair. No statement could be made for the SHT und the VJT.

**Conclusion:** No significant effect of functional deficits on the re-rupture rate was found after isolated meniscal repair.

**Key Words:** meniscus repair, re-injury, function, force, return to sport

**Abbreviations:** <sup>1</sup>RTS (return to sport), <sup>2</sup>YBT (Y-Balance test), <sup>3</sup>SHT (side hop test), <sup>4</sup>SLHD (single hop for distance), <sup>5</sup>VJT (vertical jump test)

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## Cortical Activity During the First Four Months After ACL Reconstruction While Performing an Active Joint Position Sense Test A Longitudinal Study

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### Abstract

**Background:** The rupture of the anterior cruciate ligament (ACL) is one of the most common and most severe sports injuries. The current literature estimates the reinjury rate to be between 3-37%, and the risk of a subsequent contralateral ACL injury up to 235%. First studies found cortical alterations after ACL rupture. This study aims to investigate cortical activity during the first four months after ACL reconstruction.

**Methods:** 12 ACL reconstructed participants (nine males/three females;  $25.3 \pm 6.4$  years;  $173.6 \pm 8.0$  cm;  $71.1 \pm 9.1$  kg; Tegner activity score (TAS) before injury: 5-9) and 12 matched healthy controls (nine males/three females;  $28.8 \pm 9.7$  years;  $174.5 \pm 9.7$  cm;  $72.7 \pm 12.7$  kg; TAS: 3-6) performed an active joint position sense (JPS) test in an open kinetic chain with a target angle of  $50^\circ$  knee flexion during which cortical activity was recorded with dry electroencephalography (EEG) and angle reproduction performance was measured with an electrogoniometer. ACL patients were measured at 5-8 weeks post-operative (M1) and at 12-16 weeks post-operative (M2), the control group once. Power spectra for the frequencies, theta (4.75-6.75 Hz), alpha-1 (7.0-9.5 Hz) and alpha-2 (9.75-12.5 Hz) for each region of interest (ROI) (frontal, central, parietal) were calculated.

**Results:** ACL patients exhibited significantly more power at central theta with their uninvolved leg during M1 compared with M2 ( $F = 2.93$ ;  $p = 0.03$ ; post hoc:  $p = 0.02$ ; Cohens  $d = 1.33$ ).

**Discussion:** These results indicate that there are cortical alterations early on after ACL reconstruction. This emphasizes the importance of immediately exercising the uninvolved leg.

**Conclusions:** To our knowledge, this is the first study that reveals significant central alterations in the early phase of 16 weeks after ACL reconstruction. More research is needed to investigate further alterations in cortical activity and to evaluate possibly new interventions for influencing cortical activation patterns optimally to avoid re-rupture of the reconstructed ACL and a subsequent rupture of the contralateral ACL.

**Keywords:** ACL, ACL reconstruction, cortical activity, active JPS test, EEG, central theta power

**Abbreviations:** <sup>1</sup>ACL (anterior cruciate ligament)

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## 16 Multidisciplinary Headache Care – The Bern Way

### Abstract

**Aim of this study:** This study aimed to investigate if the Headache Management Program improves headache-related quality of life measured by the patient reported outcomes Headache Impact Test 6 (HIT-6) and Migraine Disability Assessment (MIDAS).

**Methods:** This was an open-label, single-arm interventional study designed to assess the effectiveness of the Headache Management Program at Inselspital, Bern University Hospital, on patient reported outcomes in people with migraine. Participants were aged 18 years or older and seen in the outpatient headache centre before the start of the program. Diagnosis was made by a headache specialist according to the International Classification of Headache Disorders 3. Participants followed a program consisting of seven lectures once a week. The primary outcome was headache-related quality of life measured by HIT-6 and MIDAS. Descriptive statistics were mean, median and standard deviation. Data before and after the program were compared using paired t test and Wilcoxon signed rank test as appropriate.

**Results:** There was significant improvement in HIT-6 ( $p = .012$ ,  $d = 0.62$ , paired t test) from before to after the program and scores decreased by 3.3 points, 95% CI [0.14, 1.10]. Similarly, median MIDAS post-program ( $Mdn = 27$ ) was significantly lower than the median ( $Mdn = 38$ ) pre-program ( $z = -2.53$ ,  $p = .011$ ,  $r = 0.40$ , Wilcoxon signed rank test).

**Conclusion:** This study suggests that the Headache Management Program has clinically significant patient reported outcomes and would be a good addition to standard headache care.

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## The Meaning of Values for the Culture of Action in Physiotherapy: A Systematic Review and Meta-Ethnography

17

### Abstract

**Introduction:** The culture of physiotherapeutic action can be derived from the everyday actions of experienced physiotherapists. These actions are influenced by personal and professional values. The value-based and value-oriented action practices represent an element of the professional culture as a culture of action. The importance of values for the culture of action has not yet been investigated by including the views of patients and physiotherapists. This fact leads to the question of the meaning of values for the culture of action in physiotherapy. The purpose of this study is to present the meaning of values for the culture of action in physiotherapy, using conceptual understanding as a starting point for discourse in the profession.

**Methods:** Incorporating Enhancing Transparency in Reporting the Synthesis of Qualitative Research (ENTREQ) and Meta-Ethnography Reporting Guidance (eMERGe), the comprehensive literature review and meta-ethnography synthesized the existing literature with the perspectives of patients and physiotherapists.

**Results:** Fifteen studies were included that mapped the value-based and value-oriented action practices of physiotherapy with the perspectives of patients and physiotherapists. Synthesis resulted in the constructs of open-mindedness, encounter, unity, sensitivity, devotion, esteem, integrity, life affirmation, completion, and truth, which serve as guides for orienting, reflecting, and regulating action in physiotherapy.

**Conclusion:** Values provide guidance for the direction, reflection, and regulation of action in physiotherapy. As the culture of action, the value-based and value-oriented practices of action allow for the unfolding of practice and interpersonal experience, from which patients and physiotherapists alike benefit. The relationships between values and the culture of action should be considered in physiotherapy research to advance the profession's self-understanding.

**Keywords:** Values, Culture, Action, Physiotherapy, Meta-Ethnography

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## 18 Effect of a Continuous Audio Biofeedback in Elderly on the Respect of a Partial Weight-Bearing in an Acute Context - A Randomised Pilot Trial

### Abstract

**Introduction:** Adherence to partial weight-bearing (PWB) after lower limb surgery is a real challenge for elderly. The use of audio biofeedback (AB) has been shown to be valid for PWB instruction and compliance. The objectives were to determine the effect of continuous AB throughout functional training of adults over 60 years for PWB compliance using OpenGo insoles, to test their feasibility and assess the influence of cognitive impairment and age.

**Method:** Twenty volunteers after lower limb surgery were randomised and receiving an AB training. The amount of WB was measured during four functional activities (walking, walking with a 5kg backpack, sit-stand-sit and standing) using OpenGo insoles with continuous AB (n=10) or without AB (n=10). The individual deviation from the prescribed PWB and influence of age and cognitive function were assessed. Statistical analyses were performed using a t-test with significance at a p-value < 0.05 and linear regression. The use of the OpenGo system was evaluated through the participant's experience.

**Results:** None of the participants met their PWB for the four measured activities. The intervention group managed better for three out of four activities. The relative deviation was  $10.4\% \pm 16.4$  vs.  $16.4\% \pm 16.4$  for the 5kg backpack walk,  $0.8\% \pm 10.2$  vs.  $3.9\% \pm 13.2$  for the sit-stand-sit and  $5.8\% \pm 10.7$  vs.  $8.7\% \pm 12.2$  for standing. For the 3-minute walking, the relative deviation was  $12.8\% \pm 12.2$  vs.  $11.6\% \pm 13.3$  in favor of the control group. The difference between the means was not statistically significant for any activities. Older age and a low MoCA Score were not associated with poor compliance with the PWB. The participants were satisfied with the insoles.

**Conclusion:** Despite functional training with continuous AB, compliance with PWB is still low. Nevertheless, the use of AB system via an insole seems to be an advantageous tool to measure postoperative PWB. Large-scale studies are needed to confirm these preliminary results.

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## Physiotherapy in the Emergency Department: Screening for Red Flags – A Retrospective Data Analysis

### Abstract

**Background:** To face the rising number of patients presenting themselves to the emergency department (ED) of the Inselspital, a new service had been established. “Physiotherapy in the ED” is a new process, that involves a physiotherapist treating patients with musculoskeletal disorders from the beginning of the supply chain on. This study is part of the scientific monitoring of the new service and is intended to fill knowledge gaps in the area of red flag screening by physiotherapists in the ED in the current state of protocol. Furthermore, it will also explore in which educational programmes a physiotherapist can acquire these skills.

**Methods:** This study is a retrospective observational study focussing on analysing and describing the number and kind of red flags screened by physiotherapists and medical doctors based on case documentation done during daily practice. Additionally, demographic data on the patients were assessed. Included were all patients treated by a physiotherapist in the ED within a defined time frame of 5 months. To evaluate the aspect of physiotherapeutic education, questions on training of red flag screening were sent to providers of educational programmes on different levels.

**Results:** The cohort consisted of 146 cases. Physiotherapists did additional screening in 78% of cases. Mainly neurological tests (38%) followed by manual provocation testing (31%), pressure tolerance (17%) and safety questions (15%). Mean age of the population was 44 years (SD ±17.6), lumbar spine (61%) was the most common area of complaint. 16 of 24 educational institutions answered the questions sent.

**Conclusions:** The results indicate that physiotherapists are screening for red flags in many cases, even though patients were seen by an MD before, and serious pathologies are unlikely. On educational level, first hints of a possible correlation between content of educational programmes and screened red flags in practice were found.

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## Differences in Running Kinematics Between Experienced and Unexperienced Runners: Effects of Skill Level and Speed on Movement Variability in Ankle Kinematics During Running on a Treadmill

### Abstract

**Introduction:** More than 70% of the reported lower-limb injuries during running were related to over-use. Movement variability (MV) allows flexibility in the choice of movement strategies to better distribute mechanical loads among the structures. This is important during a rehabilitation process after an injury or when learning a new movement or skill. Although several studies showed differences in MV between skilled and untrained performance in sports, the effects of skill level on MV in the field of running has rarely been investigated. Thus, the purpose of this study was to determine whether there is a difference in MV in running kinematics of the lower limb joint (i.e. ankle, hip and knee) between experienced and unexperienced runners at a preferred running speed and how the difference in MV behaves when they are running faster or slower.

**Methods:** 10 unexperienced and 10 experienced runners were recruited. After answering a training- and health-related questionnaire, joint kinematics were recorded, using an optoelectronic motion capture system, while the participants were running on a treadmill in the three different speeds ('preferred', 'slow', 'fast'). Movement variability was expressed as the maximum Lyapunov Exponent. For the statistical analysis a linear mixed-effect model with interaction effect was computed.

**Results:** In all three examined lower limb joints the experienced runners had significantly lower Lyapunov Exponent (LyE) than unexperienced runners. No significant interaction effect was found between running speed condition (i.e. "Slow", "Referred", "Fast") and group ("Unexperienced", "Experienced").

**Conclusion:** The present study showed that MV is influenced by motor skill level. The results suggest that experienced runners have more dynamic stability than unexperienced runners. This implies that in repetitive movement as running, explorative learning of unexperienced runners may increase the flexibility and adaptability of their movement pattern selection, which is required for stability and hence reduce the risk of injury.

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## Evaluation of a Digital Home Program in Clinical Practice From the Therapist's Perspective Implementability, Adherence, Benefits and Usability

21

### Abstract

**Background:** Demographic developments are leading to an increase in chronic diseases. Many research projects are developing innovative care models to ensure health care. Apps can be considered as complementary or substitutive and as effective therapy services. There is a lack of studies on the usability of apps, and how physiotherapists evaluate the use of digital devices in clinical practice.

**Objective:** To investigate the implementability and usability of the medicalmotion® App from the perspective of therapists for patients with chronic musculoskeletal disorders in terms of implementation of a home program in physiotherapy, its impact on adherence and on health-related parameters.

**Method:** Using a mixed method, qualitative and quantitative data were collected with 8 therapists and 26 patients. Patients with chronic musculoskeletal disorders performed a digital home program for 4 weeks (intervention) in addition to physiotherapy. A 4-week follow-up period followed, during which participants used the app voluntarily. Guided interviews were conducted, usability, quality of life, and activity questionnaires were evaluated, and app data were collected.

**Results:** The App was predominantly perceived as user-friendly and can promote efficient implementation of a home exercise program in patients with musculoskeletal disorders. In combination with physiotherapy, it had a positive effect on adherence during intervention period, with 84% of participants and 7.92 exercises. In the follow-up it decreased to 42% and 3.81 exercises. Therapists requested more influence on exercise options. Health-related parameters were positively influenced but inconsistently assessed by therapists.

**Conclusion:** The app, in combination with physiotherapy, led to the efficient delivery of a home program, had no influence on the therapist-patient relationship but a positive effect on adherence and influenced health-related parameters. Digital media, especially those with an individual exercise option, can be considered as a future-oriented approach in everyday practice. Further studies with larger samples and periods are needed to confirm these results.

**Keywords:** digital health, adherence, implementation, physiotherapist

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## Evaluation of a Digital Home Exercise Program in Terms of Usability, Behavior, Benefits & Health-Related Parameters for Patients With Musculoskeletal Diseases – A Quality Control Study

22

### Abstract

**Background:** Rising numbers of patients, a significant increase in musculoskeletal complaints and chronic pain patients as well as a rapidly progressing shortage of specialists

demand a rethinking of types of therapy, strategy and measures. A digital home exercise program can partially fill the gaps, support therapy, promote self-management, help increase physical activity and positively influence other health-related parameters.

**Objective:** Evaluating the ability of implementation, as well as the advantages and disadvantages, of the digital home exercise program created by the medicalmotion® app in patients with musculoskeletal diseases with regard to their usage behavior, motivation, experience, communication and health-related parameters.

**Method:** 26 patients with musculoskeletal diseases carried out the digital home exercise program for four weeks additionally to physiotherapy treatment. During the intervention period, various measurement parameters (pain, life quality, activity) were collected at two measurement points (T0 and T1) and recorded using the therapist's guide. After the intervention and four-week follow-up period, guideline-based interviews (T2 and T3) were conducted. At T4, app data collected over the entire study period, such as number of exercises, frequency, dropout, etc., were analyzed.

**Results:** The usability is evaluated as positive in terms of structure, handling, content. During the intervention under control, interaction and communication, the duration of use (3.38 weeks) and the number of training sessions (2.38 days/week a 3.34 exercises) were high. The subjective and objective measurement parameters of health-related data in predominantly chronic/subacute patients with a variety of different pain areas, showed a minimal positive change, which was consistent with the qualitatively collected data.

**Conclusion:** The usability of the app reached the 3rd quartile. Subjectively, it seems to achieve an improvement in the majority of patients and also positive effects in the objective health parameters. In order to be able to make a more specific and generalized statement, further clinical controlled studies must be conducted.

**Keywords:** Digital health, musculoskeletal diseases, home program, patient, health outcome

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