Berner
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Abstracts der Master-Thesen 2026
Master of Science in Physiotherapie

▸ Gesundheit

Editorial

Prof. Dr.
Amir Tal

amir.tal@bfh.ch

Liebe Leser*innen

Mit der vorliegenden Ausgabe des Abstractbuchs präsentieren wir die Masterthesen unserer Absolvierenden des MSc Physiotherapie an der Berner Fachhochschule. Seit den ersten Masterthesen-Verteidigungen im Jahr 2013 haben unsere Studierenden eindrückliche Arbeiten vorgelegt und damit wesentlich zur Weiterentwicklung der physiotherapeutischen Forschung in der Schweiz beigetragen.

Die Vielfalt und Qualität der eingereichten Arbeiten spiegeln die Reife unseres Studiengangs wider. Die Absolvierenden bearbeiten klinisch relevante Fragestellungen mit unterschiedlichen Forschungsansätzen und Studiendesigns – von quantitativen und qualitativen Methoden bis hin zu Mixed-Methods-Studien. Dadurch entstehen neue Erkenntnisse, die bestehendes Wissen erweitern und die Physiotherapie in innovative und zukunftsweisende Forschungsfelder führen.

Besonders erfreulich ist, dass ein Grossteil unserer Absolvierenden nach dem Studium in der klinischen Praxis tätig sein wird. Dort übernehmen sie Verantwortung als klinische Expert*innen und tragen dazu bei, evidenzbasierte Physiotherapie im Berufsalltag zu verankern und weiterzuentwickeln. Viele von ihnen werden zudem wichtige Funktionen im Bereich der Advanced Practice Physiotherapy (APP) übernehmen und damit die zukünftige Gestaltung der physiotherapeutischen Versorgung in der Schweiz mitprägen. Einige werden ihren akademischen Weg weiterverfolgen und sich in Promotionsprogrammen engagieren, wodurch sie die wissenschaftliche Entwicklung unseres Berufes zusätzlich stärken.

Für mich persönlich hat diese Ausgabe eine besondere Bedeutung. Nach beinahe 18 Jahren im Aufbau, Weiterentwicklung und Leitung des MSc-Studiengangs ist dies die letzte Kohorte, die ich auf ihrem Weg bis zum Masterabschluss begleiten durfte. Rückblickend erfüllt es mich mit grosser Freude und Stolz zu sehen, wie sich unsere Absolvierenden fachlich, wissenschaftlich und persönlich entwickeln und welchen Beitrag sie für die Physiotherapie leisten.

Mein herzlicher Dank gilt allen, die zum Erfolg dieses Studiengangs beitragen. Ich danke meinen Kolleg*innen im MSc-Team, den Schwerpunktleitenden, Modulverantwortlichen und Dozierenden für ihr grosses Engagement, ihre fachliche Expertise und ihre kontinuierliche Unterstützung. Ebenso danke ich den Praxispartner*innen, den Betreuenden der Masterarbeiten sowie allen weiteren Beteiligten, die unsere Studierenden auf ihrem Weg begleitet haben. Ein besonderer Dank gilt auch unseren Mitarbeitenden in der Administration, deren oft unsichtbare, aber unverzichtbare Arbeit wesentlich dazu beiträgt, dass der Studienbetrieb und die Abschlussverfahren reibungslos funktionieren.

Vor allem aber gratuliere ich unseren Absolvierenden herzlich zu ihren Leistungen. Mit ihren Masterthesen haben sie nicht nur einen wichtigen Meilenstein ihrer Ausbildung erreicht, sondern auch einen wertvollen Beitrag zur Weiterentwicklung der Physiotherapie geleistet. Ich wünsche ihnen für ihren weiteren beruflichen und persönlichen Weg viel Erfolg, Freude und Neugier – und hoffe, dass sie die evidenzbasierte und wissenschaftlich fundierte Weiterentwicklung unseres Berufsstandes auch künftig aktiv mitgestalten werden.

Ich wünsche Ihnen eine anregende Lektüre.

Inhalt

Editorial

2 Prof. Dr. Amir Tal

Master-Thesen (Abstracts)

8 Cédric Barbuzzi
Translation and Cross-Cultural Adaptation Of The Map-Knee Tool Into French: Clinicians' Perspectives on Clarity and Usability

9 Annina Bard
Effects of the Menstrual Cycle on Physical and Psychological Performance and Sleep Quality in Female Football Players: A Prospective Longitudinal Study

10 Simon Benz
Scalpel or Movement: A Cost-Utility Analysis of Conservative Versus Surgical Management of Cervical Radiculopathy in Switzerland

11 Sabrina Bohni
Virtual Walking and tDCS for Chronic Neuropathic Pain Due to Spinal Cord Injury: A Feasibility Study

12 Vanessa Briegel
Evaluation of Physical Performance Tests – Using the Example of a Professional Swiss Ice Hockey Team

13 Carmen Brun
Respiratory Therapists and Interprofessional Collaboration in Neurological Care: A Mixed-Methods Study

14 Iris de Boer
User-Experience and Usability of a Wheelchair-Mounted Robotic Arm in Daily Lives of People with Tetraplegia: A Mixed-Methods Pilot Study

15 Giulia Gallizia
Beyond the Binary: Dose-Response Estimation of Physical Inactivity-Attributable Years of Life Lost And Years Lived With Disability for Cancer and Cardiovascular Disease in Switzerland A Population Attributable Fraction Approach

16 Sindy Gmür
Complex Associations of Psychological, Cognitive, and Physical Factors With Falls in Neurorehabilitation: A Retrospective Cohort Study

17 Paul Grimm
How Do Physiotherapists in Switzerland Progress Rehabilitation After an Ankle Sprain, and Do Their Practices Align With the Latest Scientific Evidence?

18 Coralie Guntern
Healthcare Professionals' Perceptions Regarding the Implementation of Best Practices for Preventing Post-Stroke Shoulder Pain

19 Tamara Höhn
Is There a Relationship Between Anterior Knee Laxity and Menstrual Cycle Phases in Healthy Women Without Hormonal Contraception?

20 Daniela Huber
Dose-Response of Therapy Intensity and Rehabilitation Duration on Functional Independence After Traumatic Brain Injury

21 Dominique Landtwing
Association Between Ankle-Go Score And The T-Test In Floorball Players: A Cross-Sectional Pilot Study

22 Taina Lauber
Association Between Spatio-Temporal Gait Asymmetry and Walking Endurance in Individuals With Chronic Stroke : A Cross-Sectional Ancillary Study

23 Faneromeni Mani
Injury Epidemiology and Awareness of Prevention Strategies Among Greek Basketball Players: A Retrospective Study

24 Pascal Mauerhofer
Beveridge = Beveridge? Theory, Practice, and the Role of Physiotherapy

25 Ramona Monai
Retention, Adherence, Acceptability, and Safety of a Four-Week Home-Based Breathing Intervention in Healthy Adults Without Prior Meditation Experience: A Pilot Pre-Post Study

26 Fabienne Sarah Müller
Changes in Acceleration and Deceleration in Elite Ice Hockey and Speed Compared to On-Ice Test, A Retrospective Data Analysis

27 Samira Oulouda
Needs Analysis of a Digital Multidomain Lifestyle Intervention for Spinal Cord Injury: A User-Centered Mixed Methods Study

28 Timas Peteraitis
Ground Sense Alteration Through Mandibular, Ocular, Cervical and Shoulder Blade Movements and the Centre of Pressure Migration

29 Lindsay Peyer
Does Resting-State EEG Have the Potential to Identify Non-Copers Early After ACL Reconstruction?

30 Anja Ringele
Validity and Reliability of App-Controlled Calf Raise Tests in Patients With Achilles Tendon Rupture

31 Angélique Roidt
Neuromuscular Activity, Postural Control and Movement Quality During Single-Leg Landings Following ACL Reconstruction: A Retrospective Cross-Sectional Study

32 Samuel Janik Schär
Biering-Sorenson Test: A Multi-Modal Analysis Using MRI, EMG, and Dynamometry

33 Julian Schmid
Acute Effects of a Single Session of Neuroathletic Training on Static and Dynamic Postural Stability: A Randomized Crossover Study

34 Syra Naomi Schmid
Comparison of Time to Stabilisation and Muscle Activation During Jump Landings in Individuals with ACL Reconstruction versus a Healthy Control Group

35 Florin Schneeberger
EMG Validation of a Musculoskeletal Thoracolumbar Spine Model During Different Lifting Styles in Healthy, Pain-Free Individuals

36 Lina Schurter
Transcutaneous Tibial Nerve Stimulation (TTNS) in Patients with Neuro-urological Complaints: A Mixed-Methods Feasibility Study

37 Flora Stojkaj
The Competency Profile of a Respiratory Therapist in Neurology: A Mixed-Methods Study

38 Nina Stucki
Programmatic Assessment and Competency-Based Education in the Bachelor of Science in Physiotherapy at Bern University of Applied Sciences (Bfh)

39 Céline Vonlanthen
Stakeholder Analysis of Needs and Expectations in Physiotherapy Continuing Education - Scoping Review and Survey

40 Rebecca Wigger
Gait Recovery Following Stroke and Active Therapy – A Dose-Response Analysis. A Retrospective Cohort Analysis of Clinical Data

41 Barbara Catherine Wortmann
Adaptation & Validation of the Client Service Receipt Inventory Recording Healthcare Use and Cost for People With Tetraplegia in the German Speaking Part of Switzerland

42 Corina Zweifel
Stigma toward functional motor disorders – prejudice, stereotyping and discrimination among Swiss physiotherapists
A national cross-sectional quantitative online survey

Cédric Barbuzzi

Delémont University of Applied Sciences, Department of Health Professions, Delémont, Switzerland

Translation and Cross-Cultural Adaptation Of The Map-Knee Tool Into French: Clinicians' Perspectives on Clarity and Usability

Abstract

Background: Non-traumatic knee pain is common in adolescence and may cause persistent pain, reduced sports participation and impaired quality of life. Structured tools with credible explanations may help clinicians deliver more consistent, evidence-informed education and management.
Purpose: To translate and cross-culturally adapt the original English MAP-Knee Tool into French and evaluate the clarity and comprehensibility of the French version among French-speaking clinicians managing adolescents with non-traumatic knee pain.
Study Design: Measurement study (translation and cross-cultural adaptation with qualitative evaluation).
Methods: Following published guidelines, the MAP-Knee Tool was translated into French through forward translation, synthesis, independent back-translation and an expert committee review. Fifteen French-speaking clinicians (physiotherapists, paediatricians, sports physicians) involved in the care of adolescents with non-traumatic knee pain took part in individual semi-structured cognitive debriefing interviews. They reviewed the pre-final French version and commented on the clarity, comprehensibility and perceived usability of each component. Data were analysed using a qualitative descriptive approach.
Results: Clinicians generally considered the French wording clear and acceptable. Most comments on the SMILE diagnostic algorithm and credible explanations leaflet concerned sentence length, level of detail and terminology rather than translation errors. In contrast, the prognostic tool and grid of management options raised more substantial concerns about interpretability, structure and clinical messaging. These findings informed refinements to wording, layout and emphasis to improve clarity and usability.
Conclusion: This study provides a French translation and cross-cultural adaptation of the MAP-Knee Tool that was judged linguistically clear by French-speaking clinicians and identifies structural and content-related issues requiring refinement before wider implementation. Further research should examine how adolescents and their families understand and use the French materials and assess the impact of the adapted tool on consultations and outcomes.
Key Terms: adolescent, clinical decision-support tool, cognitive debriefing, cross-cultural adaptation, non-traumatic knee pain.

Co-Autor:

Florian Forelli
PT, PhD[1]

[1]Delémont University of Applied Sciences, Department of Health Professions, Delémont, Switzerland

Betreuungsperson:

Florian Forelli
PT, PhD[1]

Annina Bard

University of Basel, Department of Sports, Exercise and Health, Basel, Switzerland

Effects of the Menstrual Cycle on Physical and Psychological Performance and Sleep Quality in Female Football Players: A Prospective Longitudinal Study

Abstract

Introduction and Objectives: The influence of the menstrual cycle on the athletic performance of the female athletes is a topic that is receiving increasing scientific attention. Hormonal fluctuations during the cycle can affect neuromuscular, cognitive and sleep-related processes. The objective of this study was to investigate the influence of the four phases of the cycle on the physical and psychological performance as well as sleep quality among amateur female soccer players.
Method: As part of a prospective longitudinal study, two first division teams (FFV Basel and FC Concordia Basel) were studied over a period of nine weeks. The analysis sample considered n = 20 participants (age M = 25.4, SD = 4.3). Data collected included the 30-meter sprint, the standing long jump, psychological stress (Akutmass Erholung und Beanspruchung, AEB), and sleep quality (Pittsburgh Sleep Quality Index, PSQI). The menstrual cycle was tracked using the FitrWoman app. Statistical analyses were performed using linear mixed models (LMM) with cycle phases as fixed effects and individual constants per participant as random effects. The primary analysis used the best value per phase (Max/Min) and was supplemented with a sensitivity analysis conducted with the eumenorrheic participants (n = 13).
Results: In the 10-meter sprint (b = -0.069, p = 0.007, d = -1.060) and the 30-meter sprint (b = -0.100. p = 0.017, d = -0.922), significantly faster times were observed during follicular phase compared to the menstrual phase. During the luteal phase, a statistical trend was observed regarding sleep quality (p = 0.052, d = -0.924). No significant results were found for the standing long jump and AEB.
Conclusion: The follicular phase may provide favorable performance. Studies with larger sample size and hormone measurements for more precise phase classification are needed to verify these effects.

Co-Autor*innen:

Romina Ledergerber MSc[1]

Ralf Roth MD, PhD[2]

[1]University of Basel, Department of Sports, Exercise and Health, Basel, Switzerland

[2]University of Basel, Department of Sports, Exercise and Health

Betreuungsperson:

Romina Ledergerber MSc[1]

Simon Benz

Bern University of Applied Sciences, School of Health Professions, Institute of Health Economics and Health Policy, Bern, Switzerland

Scalpel or Movement: A Cost-Utility Analysis of Conservative Versus Surgical Management of Cervical Radiculopathy in Switzerland

Abstract

Background: Cervical radiculopathy syndrome caused by disc herniation can lead to neck and arm pain accompanied by neurological deficits such as sensory disturbances and muscle paresis. Clinical guidelines recommend conservative treatment as first-line management, with surgery reserved for persistent symptoms. Surgery may provide faster symptom relief but carries risks of complications and revision surgery, whereas conservative treatment is less costly. This study aimed to evaluate which treatment strategy to recommend from a cost-effectiveness perspective.
Methods: A decision tree model from the perspective of the Swiss health care system was used to compare primary conservative treatment (PCT) with primary surgical treatment (PST) over one- and two-year time horizons. Direct health care costs were derived from structured interviews with health care providers, reimbursement catalogues, and the diagnosis-related group system. Utility and probability parameters were extracted from the literature. The main outcomes included incremental cost-utility ratios (ICUR) and incremental net monetary benefits (INMB). A willingness-to-pay threshold of CHF 100,000 per QALY was used. One-way sensitivity analyses and scenario analyses were performed.
Results: The base case showed that primary conservative treatment results in an expected difference of −0.04 quality-adjusted life-years (QALYs) and a cost difference of CHF -12,695 per person compared to primary surgical treatment. The ICUR was CHF 360,582, and the INMB was CHF 9,174, which favours primary conservative treatment. In the two-year analysis, the ICUR increased to CHF 980,518, with a corresponding INMB of CHF 12,029. Sensitivity analyses showed that utility values for PCT and PST, and probability for PCT, had the greatest impact on the results and could change the INMB in favour of primary surgical treatment.
Conclusion: These findings support guideline-based management of patients with moderate to severe cervical radiculopathy, with conservative treatment as first-line therapy, including medication, physical therapy, and escalation to surgical treatment when necessary.

Co-Autoren:

Tobias Müller PhD[1]

Niklaus Meier PhD[1]

[1]Bern University of Applied Sciences, School of Health Professions, Institute of Health Economics and Health Policy, Bern, Switzerland

Betreuungsperson:

Tobias Müller PhD[1]

Sabrina Bohni

Swiss Paraplegic Centre, Department of Pain Medicine, Nottwil, Switzerland

Virtual Walking and tDCS for Chronic Neuropathic Pain Due to Spinal Cord Injury: A Feasibility Study

Abstract

Objective: Chronic neuropathic pain is a frequent consequence of a spinal cord injury (SCI). Before evaluating clinical effectiveness, this study aimed to investigate the feasibility and acceptability of a combined virtual walking and transcranial direct current stimulation (tDCS) intervention from the participants perspective. The focus was on experiences, expectations, motivation and practical implementation to inform future trials.
Participants: Four adults with SCI-related neuropathic pain participated in the study at the Swiss Paraplegic Centre.
Methods: The intervention combining VW and tDCS consisted of ten sessions delivered over a two-week period. Acceptability and perceived feasibility were assessed using pre- and post-intervention semi-structured interviews and a post-intervention satisfaction survey. Procedural feasibility included recruitment, adherence, dropout and preparation time. Data collection feasibility was evaluated through completion rates of questionnaires, diaries and pain drawings. Safety was monitored after each session using an adverse event questionnaire.
Results: All participants completed the sessions with high adherence and no dropouts. Acceptability was consistently high, with participants describing strong engagement, good tolerability and a sense of immersion during virtual walking. Only mild tDCS-related side effects were reported, with no serious adverse events. Data collection procedures proved feasible. Logistical demands, particularly daily attendance and travel burden, were identified as key barriers to long-term implementation. Participants recommended longer intervention periods, improved accessibility and refinements to the virtual walking experience.
Conclusion: The combined virtual walking and tDCS intervention appears feasible, safe and acceptable for individuals with SCI-related neuropathic pain. Future studies should integrate participant perspectives, increase the number of intervention sessions beyond the two-week protocol and address practical barriers to enhance feasibility in clinical trials.

Keywords: spinal cord injury (SCI); neuropathic pain; virtual walking; transcranial direct current stimulation (tDCS)

Co-Autor*innen:

Karin van Holten PhD[1]

Karina Ottiger-Böttger PT[2]

Gunther Landmann MD[2]

Marco Barbero PT PhD[3]

[1]Bern University of Applied Sciences, School of Health Professions, Institute for Collaborative Practice and Leadership in Health Care, Bern, Switzerland

[2]Swiss Paraplegic Centre, Department of Pain Medicine, Nottwil, Switzerland

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

Betreuungsperson:

Karin van Holten PhD[1]

Vanessa Briegel

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

12 Evaluation of Physical Performance Tests – Using the Example of a Professional Swiss Ice Hockey Team

Abstract

Introduction: Physical Performance Tests (PPTs) are widely used in elite ice hockey to assess physical capacities and support performance diagnostics. Normative reference values comparing junior players and professional players remain limited, particularly in the Swiss context.
Methods: A retrospective cross-sectional design was employed, using preseason PPT data from the 2022/23 and 2023/24 seasons. A total of 144 male ice hockey players were included (Professional Players: n = 74; Junior Players: n = 70). This study compared physical performance between Professional Players and Junior Players using a standardised battery of jump, strength, and sprint tests. Group comparisons were performed using Welch›s t-test and Mann-Whitney U test, with Bonferroni correction applied to control for multiple comparisons. Effect sizes were reported as Hedges› g or effect size r.
Results: After Bonferroni correction, statistically significant group differences were identified for four variables. Professional Players demonstrated higher squat jump performance (p_adj = 0.002, Hedges› g = 0.87) and 60% squat velocity (p_adj ‹ .001, Hedges› g = 0.87). Junior Players demonstrated faster 5m off-ice sprint times (p_adj = 0.024, Hedges› g = 0.59) and higher hip adductor strength (p_adj = 0.015, Hedges› g = 0.57). No statistically significant differences were observed for the remaining variables.
Discussion: The performance differences between Junior Players and Professional Players were smaller than expected and the relationships more complex than a simple hierarchical model would suggest. Structured training programmes appear to be at least as influential as competitive level in shaping physical performance profiles. The descriptive data may serve as exploratory normative reference values for Swiss elite ice hockey players, with potential utility for performance diagnostics and benchmarking processes.

Keywords: ice hockey, physical performance testing, normative reference values, injury prevention, return-to-sport

Co-Autor:

Heiner Baur PhD[1]

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

Betreuungsperson:

Heiner Baur PhD[1]

Carmen Brun

Bern University of Applied Sciences, School of Health Professions,
Academy-Practice-Partnership Insel Group, Bern, Switzerland

Respiratory Therapists and Interprofessional Collaboration in Neurological Care: A Mixed-Methods Study

Abstract

Demographic change and the growing shortage of qualified healthcare professionals underscore the relevance of specialized roles such as Respiratory Therapists (RTs) and the necessity of effective interprofessional collaboration (IPC). This study aimed to describe the extent of RT integration into interprofessional teams and to identify key facilitating factors within neurological care settings in Germany, Austria, and Switzerland.

A mixed methods design was employed: Semi structured interviews (n=22) with RTs, staff members (SM) and leadership personnel (LP), as well as an online questionnaire (SIPEI) (n=81) assessing IPC perspectives.

The analysis revealed that RTs fulfil a pivotal interprofessional interface function, with their specialized expertise constituting a central prerequisite for successful IPC. A clearly delineated role profile and explicit support from leadership emerged as essential facilitators of integration. Mutual respect and professional appreciation further supported RT recognition. Yet perceptions of IPC diverged: LP evaluated structural conditions more favorably, whereas SM assessed the perceived effects of IPC more positively.

These findings indicate that RT integration depends on robust structural frameworks and well-functioning interpersonal processes. Formal IPC structures and their experienced impact do not necessarily align. Standardized education, competency profiles and structural embedding of the RT role may strengthen their long term integration across Germany, Austria, and Switzerland.

Keywords: Respiratory Therapists, Interprofessional Collaboration, Advanced Practice, Neurological Care, Role Integration

Co-Autorinnen:

Anja Raab
PhD[1]

Mirjam Körner
PhD[2]

Flora Stojkaj
PT, BSc[1]

[1]Bern University of Applied Sciences, School of Health Professions, Academy-Practice-Partnership Insel Group, Bern, Switzerland

[2]Bern University of Applied Sciences, School of Health Professions, Institute for Collaborative Practice and Leadership in Healthcare , Bern, Switzerland

Betreuungsperson:

Anja Raab
PhD[1]

Iris de Boer

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

14

User-Experience and Usability of a Wheelchair-Mounted Robotic Arm in Daily Lives of People with Tetraplegia: A Mixed-Methods Pilot Study

Abstract

Purpose: Assistive robotic systems are still rarely used in the everyday lives of individuals with tetraplegia and are predominantly implemented in therapeutic and rehabilitative contexts. With advances in assistive technologies, wheelchair-mounted robotic arms (WMRA) are increasingly becoming available to support activities of daily living (ADL). Despite their potential to enhance autonomy, research nowadays has focused primarily on technical feasibility, while practical benefits and long-term effects from the user perspective remain insufficiently investigated. This study aimed to examine the user-experience and usability of a WMRA in everyday life among individuals with tetraplegia.
Methods: This pilot study was conducted in Switzerland using a mixed-methods approach. Participants were adults with tetraplegia in a post-acute setting, using an electric wheelchair and having upper-limb impairments. Quantitative data were collected before and after six days of WMRA use through questionnaires on perceived performance, satisfaction, usability, pain burden, and quality of life. Additionally, semi-structured interviews were conducted to capture in-depth user experiences.
Results and Conclusions: Twelve individuals with tetraplegia (lesion levels between 2nd and 4th cervical vertebrae) were included in the tasting phase; four participants were female and eight were male. Findings indicate that the robotic arm (RA) can support people with tetraplegia in performing ADL particularly when picking up objects, drinking independently, or operating buttons. The RA system demonstrates good usability but requires further improvements regarding its construction and technical adaptations. Based on their user-experiences, participants identified optimization potentials that could enhance everyday practicality and, in the long term, contribute to greater autonomy and independence. For achieving long-term user acceptance, it is advisable to align the individual abilities of users with the technical capabilities of the robotic arm.

Keywords: Wheelchair-mounted robotic arms; mixed-methods; activities of daily living; tetraplegia; usability; user-experience

Co-Autor*innen:

Anja Maria Raab
PT, PhD[1]

Aline Christen
MSc[2,3]

Raphael Rätz
PhD[2]

Julian Rösch
MSc[2]

Barbara Catherine Wortmann
PT, BSc[1]

Gabriel Gruener
PhD[2]

[1]Bern University of Applied Sciences, School of Health Professions, Bern, Switzerland

[2]Bern University of Applied Sciences, School of Engineering and Computer Science, Institute for Human Centered Engineering, Biel, Switzerland

[3]Swiss Federal Institute of Technology Zürich, Department of Health Sciences and Technology, Zürich, Schweiz

Betreuungsperson:

Anja Maria Raab
PT, PhD[1]

Giulia Gallizia

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Beyond the Binary: Dose-Response Estimation of Physical Inactivity-Attributable Years of Life Lost And Years Lived With Disability for Cancer and Cardiovascular Disease in Switzerland A Population Attributable Fraction Approach

Abstract

Background: Cardiovascular disease (CVD) and cancer are leading causes of preventable health burden worldwide, with physical inactivity (PIA) as a key modifiable risk factor, making older adults a critical target population for physical activity (PA) interventions.
Methods: This cross-sectional study used population attributable fraction methodology to estimate PIA-attributable disability-adjusted life years (DALYs) among Swiss adults aged ≥35 years in 2022. PA was modeled across four levels (inactive, partially active, sufficiently active, trained), with prevalence data from the Swiss Health Survey 2022, and relative risks from dose-response meta-analyses. PA distribution was compared to four counterfactual (CF) scenarios: binary variable (active vs. inactive) (CF1), whole population meeting WHO PA guidelines (CF2), every individual increasing activity by one level (CF3), and 10% per activity stratum increasing by one level (CF4). Uncertainty was quantified via 95% uncertainty intervals using parametric bootstrapping.
Results: Three CVD and nine cancer types were considered. CF1 increased disease burden by 14,196 DALYs [12,079; 16,326]. CF2 showed that 18,031 DALYs [15,870; 20,274] could be prevented annually. CF3 indicated the highest preventable burden at 23,366 DALYs [19,368; 27,409] annually. CF4 suggested that 2,337 DALYs [1,937; 2,741] could be prevented annually. Adults aged ≥75 years contributed 67% of attributable burden, and CVD accounted for 62%, with coronary heart disease as the leading contributor.
Conclusion: PIA substantially contributes to Switzerland›s preventable health burden, with adults aged ≥75 years as the primary intervention target. Binary classification overestimates disease burden by misclassifying partially active individuals as inactive, highlighting the need for multilevel frameworks. Even a modest 10% upward shift in PA could prevent substantial disease burden. Future research should incorporate age-stratified relative risks and target interventions for adults aged ≥75 years.

Keywords: Physical inactivity, Global burden of disease, Attributable risk, Cardiovascular diseases, Neoplasms, Disability-adjusted life years, Dose-response relationship, Switzerland

Co-Autor:

Nathanael Lutz
PT, PhD[1]

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

Betreuungsperson:

Nathanael Lutz
PT, PhD[1]

Sindy Gmür

REHAB Basel, Department of Neurorehabilitation and Paraplegiology, Basel, Switzerland

16 Complex Associations of Psychological, Cognitive, and Physical Factors With Falls in Neurorehabilitation: A Retrospective Cohort Study

Abstract

Introduction: Falls are common in individuals with neurological conditions and involve psychological, cognitive, and physical factors. Their interrelationships and the distinction between fear of falling and general anxiety remain unclear. This study examined associations among psychological, cognitive, and physical fall risk factors, their relation to falls, and differences between general anxiety and fear of falling.
Methods: A retrospective cohort study used routinely collected inpatient neurorehabilitation data from REHAB Basel. Adults with neurological conditions were included. Psychological, cognitive, and physical variables were extracted, including 10MWT, TUG, FES-I, HADS-A/D, and MoCA. Associations between variables were analyzed using Spearman's rank correlation. Regression models investigated fall risk. Fear of falling and symptoms of anxiety were compared using Fisher's exact test.
Results: Significant associations among psychological, cognitive, and physical variables were observed. Greater fear of falling was associated with lower gait speed (admission: $\rho = -0.20$, $\rho = 0.215$; discharge: $\rho = -0.45$, $\rho = 0.002$) and poorer functional mobility (admission: $\rho = 0.34$, $\rho = 0.037$; discharge: $\rho = 0.55$, $\rho < 0.001$). Higher MoCA scores were associated with faster gait speed and shorter TUG times at discharge ($\rho = 0.23$, $\rho = 0.028$; $\rho = -0.32$, $\rho = 0.002$). Symptoms of anxiety and depression were not consistently related to physical performance. Regression analyses showed no robust associations with fall risk. Group comparisons using established cutoffs showed no differences in falls for symptoms of anxiety or fear of falling.
Conclusion: Psychological, cognitive, and physical factors were related. Fear of falling showed the most consistent relationship with physical performance. Correlations were generally low to moderate, suggesting that different domains provide complementary clinical information. No robust predictors of fall occurrence were identified, highlighting the need for improved data quality in future research.

Keywords: accidental falls, walking speed, physical functional performance, cognition, fear, anxiety, depression, neurological rehabilitation

Co-Autor*innen:

Rebecca Winter
PT, MSc[1]

Roger Hilfiker
PT, PhD[2]

[1]REHAB Basel, Department of Neurorehabilitation and Paraplegiology, Basel, Switzerland

[2]Physiotherapy Tschopp und Hilfiker, Glis, Switzerland

Betreuungsperson:

Rebecca Winter
PT, MSc[1]

Paul Grimm

Bern University of Applied Sciences, School of Health Professions,
Division of Physiotherapy, Bern, Switzerland

How Do Physiotherapists in Switzerland Progress Rehabilitation After an Ankle Sprain, and Do Their Practices Align With the Latest Scientific Evidence?

Abstract

Context: Lateral ankle sprain (LAS) is the most common musculoskeletal injurie of the lower limb. Conservative therapy by physiotherapists remains the first-line treatment approach for managing LAS. Therefore the aim of this study was to survey Swiss physiotherapists who treat patients with LAS to gather information on their approaches to rehabilitation, progression, utilized outcome measures, appropriate timing for seeking referral to physicians and employed outcome methods and if their practices align with latest scientific evidence.
Methods: A cross-sectional online survey using LimeSurvey was sent to physiotherapists working in Switzerland. The survey contained of 35 questions, including 26 closed-ended and nine open-ended questions. It was structured into four sections: participant demographics and clinical knowledge, caseload with an ankle sprain patient, including clinical vignettes and rehabilitation milestones, patient-related information and ankle sprain rehabilitation details. Nominal and ordinal data were analyzed descriptively. Open-ended responses were listed, categorized, and analyzed by calculating proportions.
Results: A total of 95 out of 289 physiotherapists completed the survey. The majority worked in the German-speaking part of Switzerland, held a bachelor's degree, treated between 1 and 20 patients annually, and worked in clinical practice. More than half of the physiotherapists used objective assessments to monitor rehabilitation, with most assessments conducted during the initial consultation. Most frequently assessed domains were Pain, Ankle impairments and swelling. As rehabilitation key milestones progressed, the focus shifted toward sport-and functional performance-based assessments and Sensorimotor control. Considerable variability was observed in the timing of rehabilitation milestones and the use of standardized criteria. Frameworks such as ROAST and PAASS remained inconsistently applied.
Conclusion: Overall, the findings suggested that participating physiotherapists in Switzerland increasingly incorporated functional and sport-specific assessments throughout LAS rehabilitation. However, substantial heterogeneity remained in the selection, timing, and standardization of outcome measures, with frameworks such as PAASS being inconsistently implemented during RTS decision-making.

Co-Autor*innen:

Alexander Philipp Schurz
PT, MPH[1]

Jente Wagemans
PT, PhD[1,2]

Chris Bleakley
PhD[3]

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

[2]University of Antwerpen, Fac. Medicine and Health Sciences, Dept of Rehabilitation Sciences and Physiotherapy, Antwerp, Belgium

[3]Ulster University, School of Health Science, Newtownabbey, Northern Ireland

Betreuungsperson:

Alexander Philipp Schurz
PT, MPH[1]

Coralie Guntern

University of Applied Sciences and Arts - Western Switzerland (HES-SO), School of Health Sciences (HESAV), Lausanne, Switzerland

Healthcare Professionals' Perceptions Regarding the Implementation of Best Practices for Preventing Post-Stroke Shoulder Pain

Abstract

Introduction: Post-stroke shoulder pain (PSSP) is a common complication that negatively impacts rehabilitation outcomes, functional recovery, and quality of life. Despite the availability of evidence-based guidelines for its prevention, PSSP remains highly prevalent, reflecting a gap between knowledge and clinical practice. Understanding the factors that influence the implementation of preventive strategies is therefore essential to improve care.
Methods: A qualitative study was conducted in a Swiss neurological rehabilitation clinic using focus groups (FG) with healthcare professionals from multiple professions. Purposive sampling was used to recruit participants. Data were collected through semi-structured discussions. An inductive reflexive thematic analysis (TA) was performed to identify perceived barriers and facilitators influencing the implementation of PSSP prevention.
Results: Sixteen healthcare professionals participated in three focus groups. Five main themes and 15 subthemes were identified. Key barriers included time constraints, workload, staff turnover, variability in roles and practices, limited understanding of best practices, patient-related challenges such as kinesiophobia and cognitive impairments, and inconsistent upper limb management. Facilitators included a supportive team climate, responsive leadership, open communication, structured interprofessional collaboration, clear guidance, access to training, active involvement of patients and relatives, and awareness of risk factors and prevention strategies, individualised prevention strategies.
Conclusion: This study highlights that the implementation of preventive practices for PSSP is influenced by multiple interacting factors in organisational, interprofessional, and individual levels. Although healthcare professionals demonstrated good awareness of prevention, variability in practice remain. Addressing organisational constraints, strengthening interprofessional collaboration and improving access to training may support a more consistent implementation. These findings emphasise the need for context-adapted, multifaceted strategies to bridge the gap between evidence and practice.

Keywords: Post-stroke shoulder pain; Prevention; Implementation; Rehabilitation; Qualitative research.

Co-Autorin:
Emmanuelle Opsommer PhD[1]

[1]University of Applied Sciences and Arts - Western Switzerland (HES-SO), School of Health Sciences (HESAV), Lausanne, Switzerland

Betreuungsperson:
Emmanuelle Opsommer PhD[1]

Tamara Höhn

Bern University of Applied Sciences, School of Health Professions,
Division of Physiotherapy, Bern, Switzerland

Is There a Relationship Between Anterior Knee Laxity and Menstrual Cycle Phases in Healthy Women Without Hormonal Contraception?

Abstract

Background: Female athletes are more likely to injure their anterior cruciate ligament (ACL) than male athletes. Hormonal fluctuations throughout the menstrual cycle have been proposed as an intrinsic risk factor, possibly influencing anterior knee laxity (AKL) and thereby increasing the risk of ACL injury. However, evidence on the relationship between menstrual cycle hormones and AKL remains inconsistent.
Methods: The present prospective longitudinal pilot study examined 16 healthy women without hormonal contraception (mean age: 28.3 ± 5.1 years, range: 18–39). The Lachmeter was utilised to measure AKL three times a week throughout a single menstrual cycle. The cycle phases (T1–T4) were defined based on menstrual bleeding, urinary LH (luteinising hormone) test strips, and the onset of the subsequent menstrual period. A linear mixed-effects model with participant ID as a random intercept was used to analyse the effect of the cycle phase on AKL. The presence of generalised joint hypermobility (GJH), assessed using the Beighton Score, was examined as a secondary outcome.
Results: A total of 127 measurement days were assigned to one of four cycle phases across 16 participants. The linear mixed-effects model revealed no significant effect of menstrual cycle phase on AKL ($F(3, 108) = 1.06$, $p = 0.369$). No significant differences were observed at T2 (+0.07 mm, $p = 0.610$), T3 (+0.20 mm, $p = 0.156$), or T4 (+0.20 mm, $p = 0.138$) compared to T1. A subsequent secondary analysis, incorporating the Beighton Score as a covariate, revealed no significant association between GJH and AKL ($p = 0.633$).
Conclusion: This pilot study found no significant relationship between different menstrual cycle phases and AKL in healthy women without hormonal contraception. Future studies should include larger sample sizes, hormonal verification, and targeted recruitment of hypermobile participants.

Keywords: anterior knee laxity, menstrual cycle, hormones, Lachmeter, Beighton Score, pilot study

Co-Autor*innen:

Melanie Liechti
PT, MSc[1]

Heiner Baur
PhD[1]

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

Betreuungsperson:

Melanie Liechti
PT, MSc[1]

Daniela Huber

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

20 Dose-Response of Therapy Intensity and Rehabilitation Duration on Functional Independence After Traumatic Brain Injury

Abstract

Background: Traumatic brain injury (TBI) is associated with persistent functional impairment and socioeconomic burden. Although multidisciplinary rehabilitation improves outcomes, the optimal therapy dosage remains unclear in routine clinical populations.
Objectives: The primary objective was to examine the association between therapy intensity (active minutes/day) and change in functional independence from admission to discharge following inpatient neurorehabilitation. The secondary objective examined the association between length of stay (days) and change in functional independence. Age was examined as a potential moderator.
Methods: In this retrospective cohort study, data from 2019–2024 were analysed from adults (≥18 years) with TBI undergoing inpatient neurorehabilitation at a specialised Swiss centre who provided general consent for data use. Exclusion criteria were a length of stay of less than 7 days or death during rehabilitation or within 7 days after discharge. The primary outcome was change in functional independence from admission to discharge, assessed using the Functional Independence Measure (FIM). Global, motor, and cognitive FIM scores were examined separately using linear mixed-effects models with random intercepts. Therapy intensity and length of stay were included as predictors, with age as a potential moderator. Statistical significance was set at $\alpha = .05$.
Results: Among 223 rehabilitation stays, therapy intensity was not significantly associated with change in functional independence, whereas length of stay showed positive associations with FIM change across all domains ($p < .05$). No age moderation effects were observed.
Conclusion: Rehabilitation duration but not therapy intensity (active therapy minutes/day), was associated with functional recovery after TBI, highlighting the need for a broader, multidimensional understanding of therapy dose within a precision rehabilitation framework.

Key Words: traumatic brain injury, neurorehabilitation, functional recovery, precision rehabilitation, dose-response relationship

Co-Autor*innen:

Clare Maguire
PT, PhD[1,2]

André Meichtry
PT, MSc[1]

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

[2]REHAB Basel, Clinic for Neurorehabilitation and Spinal Cord Injury, Basel, Switzerland

Betreuungsperson:

Clare Maguire
PT, PhD[1,2]

Dominique Landtwing

Bern University of Applied Science, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Association Between Ankle-Go Score And The T-Test In Floorball Players: A Cross-Sectional Pilot Study

Abstract

Introduction: Lateral ankle sprains (LAS) are among the most common sports injuries, with high recurrence rates. The Ankle-GO Score (AGS) is a validated clinical assessment tool that helps guide return-to-sport (RTS) decisions after LAS. However, it may lack sport-specificity for high-intensity court sports such as floorball, where rapid change of direction (COD), speed, and lower limb power are fundamental demands. The T-Test may therefore provide complementary value in RTS evaluation.
Purpose: To assess the feasibility of a larger cross-sectional study and explore the association between the AGS and Test in floorball players.
Methods: A cross-sectional pilot study design was employed. Male competitive floorball players were categorized into Healthy, Coper, and Chronic Ankle Instability (CAI) groups. Feasibility was assessed as the primary outcome against three predefined criteria: recruitment target, retention rate, and protocol feasibility. As a secondary outcome, the association between AGS and T-Test performance was examined using a linear regression model with the healthy subgroup as the reference group.
Results: All three criteria of success were fully or partially met: 22 athletes were recruited within four months with a retention rate of 82%, though additional time. Alternative testing locations were required; the T-Test proved unsuitable for ambulatory physiotherapy settings due to space requirements. A negative association between AGS and T-Test performance was observed ($\beta = -0.080$, 95% Confidence Interval (CI) [−0.147, −0.014]), indicating that higher ankle function was associated with faster agility performance. The model explained 33.2% of the variance in T-Test performance ($R^2 = 0.332$, Adjusted $R^2 = 0.188$).
Conclusion: A larger confirmatory study is feasible with minor adaptations to recruitment strategy, timeline, and testing location. The partial overlap between the two measures supports the potential complementary value of the T-Test in RTS evaluation following LAS.

Keywords: Athletic Injuries, Ankle Injuries, Ankle Joint, Return to Sport, Pilot Projects

Co-Autor*innen:

Alexander Schurz PT, MPH[1]

Jente Wagemans PT, PhD[2]

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

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

Betreuungsperson:

Alexander Schurz PT, MPH[1]

Taina Lauber

University of Applied Sciences and Arts Western Switzerland (HES-SO), Geneva School of Health Sciences (HEdS), Department of Physiotherapy, Geneva, Switzerland

Association Between Spatio-Temporal Gait Asymmetry and Walking Endurance in Individuals With Chronic Stroke : A Cross-Sectional Ancillary Study

Abstract

Introduction and goals: Post stroke gait asymmetry is associated with functional performance; however, its specific contribution to walking endurance remains unclear. This study aimed to investigate the associations between spatio-temporal parameters and gait endurance in individuals with chronic stroke.

Method: This cross-sectional study analyzes the baseline data from the TRANSGait study. Associations between spatio-temporal asymmetry parameters, clinical variables and walking endurance were assessed using correlation analyses. Simple and multivariable linear regression models were used to assess the respective contribution of spatio-temporal and clinical variables to walking endurance.

Results: Eighteen individuals with chronic stroke were included in this study. The ratios of stance, swing speed, foot pitch angle at toe off, swing, stride speed and loading were significantly associated with walking endurance. Significant correlations were observed between the 6MWT and FMA-LL. In univariate models, asymmetry parameters explained up to 39% of the variance of 6MWT, while FMA-LL explained 46%. In multivariable models, FMA-LL remained significantly associated with 6MWT distance, while none of the spatio-temporal asymmetry parameters reached statistical significance. An exploratory analysis suggested two profiles, with lower versus higher FMA-LL scores showing distinct asymmetry patterns.

Discussion: Although gait asymmetry parameters were associated with walking endurance, their contribution was no longer significant after adjustment, indicating that these relationships are largely driven by motor impairment severity. FMA-LL consistently emerged as the strongest predictor of 6MWT performance, outperforming spatio temporal parameters. This suggests that instrumented gait metrics do not provide additional explanatory value beyond motor impairment. The identification of two asymmetry profiles further indicates that gait patterns may reflect different locomotor strategies depending on impairment level.

Conclusion: Lower-limb motor impairment is the primary determinant of walking endurance after stroke, while gait asymmetry provides complementary information. Given the small sample size and exploratory design, these results should be interpreted cautiously and confirmed in larger studies.

Co-Autor:

Pierre Nicolo
PT, PhD[1]

[1]University of Applied Sciences and Arts Western Switzerland (HES-SO), Geneva School of Health Sciences (HEdS), Department of Physiotherapy, Geneva, Switzerland

Betreuungsperson:

Pierre Nicolo
PT, PhD[1]

Faneromeni Mani

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Injury Epidemiology and Awareness of Prevention Strategies Among Greek Basketball Players: A Retrospective Study

Abstract

Objectives: To determine injury incidence and characteristics among Greek basketball athletes and to assess awareness of injury prevention strategies.
Methods: 155 basketball players from Greek teams were invited to complete an online questionnaire, providing information regarding their demographic and injury characteristics and perceptions about injury prevention protocols during the Greek basketball season 2024-2025. Injury Incidence Rate (IIR) was calculated as (total number of injuries/total amount of exposure hours*1000). Binary logistic and Poisson regression examined associations between injury and different risk factors.
Results: 36 males and 20 female athletes; mean age 26.0 years; mean playing experience 12.5 years; mean height 1.82 meters and mean weight 77.8 kilograms reported in total 43 injuries. The most reported injuries were ankle (28.95%) and knee (28.95%) joints. Most of them occurred during training (52.63%), without contact (52.30%). Injury incidence rate was (IIR=3.1, 95% CI: [2.2 to 4],p=0.000009) injuries per 1000 hours of basketball play. Fatigue was associated with a higher injury incidence rate compared to no fatigue (IIR=0, IRR = 2.05, 95% CI: [0.88 to 5.35], p = 0.1), (OR = 16.3, 95%CI:[3.26 to 120.5], p=0.003). Awareness of prevention programs was reported by 44.64% of the participants and 51.79% acknowledged the importance of warm-up exercises to avoid an injury.
Conclusions: Lower limb injuries were most common in this cohort of Greek basketball players. Fatigue appears associated with injury occurence. Less than half of the participants were aware of prevention strategies in Greece, highlighting the need for structured education and implementation of targeted interventions in Greek basketball clubs.

Key words: injury epidemiology, prevention, basketball, Greek

Co-Autoren:

Jan Taeymans PhD[1]

Ron Clijsen PhD[2]

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

[2]University of Applied Sciences and Arts of Southern Switzerland (SUPSI), Landquart, Switzerland

Betreuungsperson:

Jan Taeymans PhD[1]

Pascal Mauerhofer

Bern University of Applied Sciences, School of Health Professions, Institute of Health Economics and Health Policy, Bern, Switzerland

24 Beveridge = Beveridge? Theory, Practice, and the Role of Physiotherapy

Abstract

Objective: This study examined systematic differences in healthcare costs, system outcomes, and provision indicators between the British and Scandinavian Beveridge systems (Denmark, Finland, Norway, Sweden) from 2000 to 2024, and analysed the association between physiotherapy and system outcomes.
Methods: A retrospective panel observational study used OECD macro-level data for five countries (STROBE/CHEERS guidelines). Linear regressions examined health expenditure, life expectancy, waiting times for elective procedures, and physiotherapist density from a payer perspective, accounting for structural, process, and outcome indicators.
Results: Scandinavian countries showed approximately 854 US dollars (PPP-adjusted; $p < 0.001$) higher per capita health expenditure than the United Kingdom (UK), despite a comparable share of public funding relative to gross domestic product (GDP) (Scandinavia 7.7 %; UK 7.6 %). Norway reached the highest life expectancy (83.2 years), the UK the lowest (80.9 years). Higher expenditure and specialist density positively correlated with life expectancy (both $p < 0.001$). The UK showed the lowest densities of computed tomography and magnetic resonance imaging scanners and physiotherapists. For hip and knee arthroplasty and coronary bypass surgery, UK waiting times converged towards Scandinavian levels. Scandinavian physiotherapist density was 3.7-fold higher than the UK›s (154 vs. 42 per 100,000 inhabitants) and correlated with a lower share of health expenditure relative to GDP ($p = 0.003$).
Conclusions: Despite a comparable funding logic, substantial differences in costs, outcomes, and care structures exist between these systems, appearing more strongly associated with differing care philosophies and capacity provisions than with the funding model itself. Norway combined the highest expenditure with the best population-level outcomes, while the UK showed structural limitations. Higher physiotherapist density may represent a possible efficiency indicator, although no causal conclusions can be drawn.

Keywords: Beveridge system, health economics, NHS, physiotherapy, system comparison, OECD, Scandinavia, UK

Co-Autor:

Tobias Müller PhD[1]

[1]Bern University of Applied Sciences, School of Health Professions, Institute of Health Economics and Health Policy, Bern, Switzerland

Betreuungsperson:

Tobias Müller PhD[1]

Ramona Monai

Bern University of Applied Sciences, School of Health Professions,
Division of Physiotherapy, Bern, Switzerland

Retention, Adherence, Acceptability, and Safety of a Four-Week Home-Based Breathing Intervention in Healthy Adults Without Prior Meditation Experience: A Pilot Pre-Post Study

Abstract

Background: Breathing techniques are increasingly used in preventive as well as clinical contexts due to their suggested positive effects on the autonomic nervous system. However, evidence regarding the feasibility of repeated breathing practice remains limited.
Objective: The primary objective was to examine retention, adherence, acceptability, and safety of a daily box breathing intervention in healthy adults. The secondary, exploratory aim was to describe changes in cortical activity and perceived stress following the intervention.
Methods: A single-arm pre-post design was used. Healthy adults without prior meditation experience completed a four-week, home-based intervention of box breathing for five minutes per day. Feasibility-related outcomes were assessed descriptively including retention (proportion of participants completing post-intervention measurement), adherence (completed relative to planned breathing sessions), acceptability (self-developed questionnaire evaluating perceived benefit and intervention modalities), and safety (severity classification of adverse events). Exploratory outcomes included frontal alpha, central alpha, and frontal midline theta power recorded by electroencephalography as well as self-reported stress (Perceived Stress Scale 4).
Results: 20 participants were enrolled. Retention rate was 100%, median adherence rate was 90% (IQR 90-100%). Acceptability data showed that most participants perceived the once-daily frequency and five-minute duration as appropriate. Median perceived benefit was 6.2/10. Feedback addressed the breathing technique, practice position, routine formation, and measurement procedures. One mild adverse event was reported, with no moderate or severe adverse events. Exploratory analyses showed heterogeneous changes in cortical activity, with moderate effect sizes in theta and small effect sizes in alpha power, alongside a reduction in self-reported stress.
Conclusion: The four-week box breathing intervention showed high retention and adherence, generally high acceptability, and no safety concerns. Exploratory findings suggest a reduction in perceived stress and moderate yet variable changes in frontal midline theta power.

Keywords: breathing exercise, home-based intervention, feasibility, safety, electroencephalography

Co-Autorinnen:

Eefje Luijckx
PT, PhD[1]

Aglaja Busch
PhD[1]

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

Betreuungsperson:

Eefje Luijckx
PT, PhD[1]

Fabienne Sarah Müller

Bern University of Applied Sciences, School of Health Professions,
Division of Physiotherapy, Bern, Switzerland

26 Changes in Acceleration and Deceleration in Elite Ice Hockey and Speed Compared to On-Ice Test, A Retrospective Data Analysis

Abstract

This study investigated positional differences in elite ice hockey between forwards and defensemen in acceleration and deceleration across game periods using a Local Positioning System. A retrospective data analysis was conducted using data from 28 home games (season 2024/2025) of a Swiss National League team (n=30). Acceleration and deceleration were categorized into four intensity zones and expressed as actions per minute. Generalized linear mixed models were applied to assess the effects of position and period, followed by post hoc pairwise comparisons with Bonferroni correction. For an additional exploratory analysis, 18 players completed a 30m on-ice sprint test. Maximum test speed was compared with competition peak speed using the Wilcoxon signed-rank test and Spearman's rank correlation analysis. Moderate-intensity accelerations decreased significantly in the 3rd period across both positions ($p=0.008$). Forwards demonstrated consistently greater high-intensity accelerations than defensemen across all periods ($p \leq 0.045$). High-intensity accelerations increased significantly from the 1st to the 2nd period before declining in the 3rd period. High-intensity decelerations were lower in the 2nd and 3rd period, primarily driven by defensemen's decreases from the 1st to the 2nd period. Very high-intensity decelerations were consistently higher in forwards than in defensemen across all periods and declined significantly from the 1st to the 3rd period and from the 2nd to the 3rd period. Peak skating speed during competition was significantly higher than peak speed achieved during the 30m on-ice sprint test in both forwards ($p=0.002$) and defensemen ($p=0.022$). Respective correlation analysis revealed a moderate, non-significant relationship in forwards ($\rho=0.45$, $p=0.164$) and a stronger, but still non-significant association in defensemen ($\rho=0.71$, $p=0.088$). The decline in very high- and high-intensity deceleration across periods may indicate fatigue-related effects. Furthermore, the analysis of peak competition speed data highlights the need to interpret 30m on-ice sprint tests with caution.

Keywords: local positioning system; external load; player position

Co-Autor:

Heiner Baur
PhD[1]

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

Betreuungsperson:

Heiner Baur
PhD[1]

Samira Oulouda

Bern University of Applied Sciences, School of Health Professions, Academy-Practice-Partnership Insel Group, Bern, Switzerland

Needs Analysis of a Digital Multidomain Lifestyle Intervention for Spinal Cord Injury: A User-Centered Mixed Methods Study

Abstract

Background: Individuals with spinal cord injury (SCI) face long-term health, participation, and self-management challenges and are at increased risk of secondary health complications. Mobile health (mHealth) interventions may support health-promoting behavior. However, SCI-related digital interventions have focused on single topics, particularly physical activity. According to the American College of Lifestyle Medicine, health behaviors are interrelated across six lifestyle domains. Little is known about the needs of individuals with SCI regarding a multidomain lifestyle mHealth app.
Objective: This study aimed to investigate the needs, expectations, and preferences of individuals with SCI regarding a holistic multidomain lifestyle mHealth app.
Methods: An explanatory sequential mixed methods design with a user-centered approach was used. An online survey among adults with SCI in the DACH region was followed by two focus group interviews with individuals with SCI and health professionals with SCI expertise. Quantitative data were analyzed descriptively and exploratorily by SCI subgroups. Qualitative data were analyzed using the RADaR technique, and findings were integrated at the interpretation stage.
Results: In total, 172 survey participants and 14 focus group participants were included. Current use of health-supporting apps was low (25/172, 14.5%), with lack of awareness of existing apps (56/147, 38.1%) as the most frequent reason for nonuse. Needs were expressed across all six lifestyle domains. Subgroup differences were mainly observed in function-dependent aspects, such as smartphone and tablet handling modes. Integrated findings identified accessibility, personalization, meaningful tracking, SCI-specific content, peer exchange, and professional support as central requirements.
Conclusion: Despite low current use, participants expressed clear interest in a holistic multidomain lifestyle mHealth app. Future app development should prioritize personalization, SCI-specific content with everyday benefit, and peer and professional support to promote meaningful self-management and help prevent secondary health complications.

Keywords: spinal cord injury; mobile health; mHealth; lifestyle medicine; self-management; accessibility; mixed methods; digital health; app

Co-Autor*innen:

Anja Raab
PT, PhD[1]

Renato Mattli
PhD[1]

Loredana Tschenett
PT, MSc[1]

Hanne Bjørg Slettahjell
MSc[2,3]

Anne Catrine Martinsen
PhD[2,4]

[1]Bern University of Applied Sciences, School of Health Professions, Academy-Practice-Partnership Insel Group, Bern, Switzerland

[2]Sunnaas Rehabilitation Hospital, Oslo, Norway

[3]University of Oslo, Oslo, Norway

[4]Department of Rehabilitation Science and Health Technology, Oslo Metropolitan University, Oslo, Norway

Betreuungsperson:

Anja Raab
PT, PhD[1]

Timas Peteraitis

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

28 Ground Sense Alteration Through Mandibular, Ocular, Cervical and Shoulder Blade Movements and the Centre of Pressure Migration

Abstract

Background: Equilibrium is closely and bidirectionally linked to the stomato-gnathic system, the visual system, and posture, yet the neurology underlying these systems remains poorly understood. To this day, no study has investigated whether the subjective sense of the floor and the centre of pressure shift correlate during the motions of the mandible, eyes, neck and shoulder blades.
Objective: To investigate whether such movements alter the perceived «sense of the floor» and whether it corresponds to measured lateral weight shift under normal (NHP) and forward (FHP) head postures in healthy adults.
Method: 38 healthy adults (25 female, 13 male) were recruited in a cross-sectional mixed-method feasibility study, who completed 14 standardised movements in NHP and FHP with eyes closed, while bilateral plantar force was recorded via Moticon sensory insoles. After each movement, participants reported which platform appeared elevated (left/right/neither), generating 1,064 paired perception–force trials. Analyses included McNemar, paired-samples t and Wilcoxon tests, Pearson chi-square, repeated-measures ANOVA, and Cohen›s κ.
Results: The floor perception was altered in 74.1% of movements. Perception corresponded to actual centre-of-pressure shifts in both postures to the opposite side (NHP $t(36) = -4.72$, $p < .001$; FHP $t(37) = -2.67$, $p = .011$), with fair categorical agreement ($\kappa = 0.22$). A robust left-foot loading bias ($d = 0.70–0.89$) and a significant movement-type effect ($p < .001$) emerged; head posture and gender did not modulate responses.
Conclusions: Subjective floor perception provides genuine information about weight centre lateralisation, confirming the protocol›s feasibility.

Keywords: Centre of pressure, Floor perception, Postural lateralisation, Postural neurology, Sensorimotor integration, Stomatognathic system, Forward head posture

Co-Autor:

Slavko Rogan PhD.[1]

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

Betreuungsperson:

Slavko Rogan PhD.[1]

Lindsay Peyer

Bern Universitiy of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Does Resting-State EEG Have the Potential to Identify Non-Copers Early After ACL Reconstruction?

Abstract

Background: Despite anterior cruciate ligament reconstruction (ACLR), some patients fail to return to their pre-injury activity levels and continue to experience functional deficits. Cortical adaptations after ACL injury suggest that electroencephalography (EEG) may help identify patients at risk of poor rehabilitation outcomes. This exploratory study investigated whether resting-state EEG can distinguish non-copers early after ACLR.
Methods: Resting-state EEG was recorded in 31 patients who underwent ACLR with a quadriceps tendon graft at 5–8 weeks post-surgery (M1) and one year later (M2). Frontal theta (4.75–6.75 Hz) and parietal alpha-2 (9.75–12.5 Hz) spectral power were extracted from 3-minute eyes-open resting-state EEG recordings. At one year, participants were classified as copers or non-copers using a composite outcome including the Tegner Activity Scale (TAS), Knee Injury and Osteoarthritis Outcome Score (KOOS), KOOS confidence item (Q3), and quantitative and qualitative single-leg hop performance. Between-group differences and within-group changes over time were analysed using non-parametric and paired statistical tests.
Results: Twenty-seven participants completed follow-up (13 copers, 14 non-copers). No significant between-group differences were found in frontal theta or parietal alpha-2 power at M1 or M2 (all $p > 0.05$). However, non-copers showed significant decreases in frontal theta power ($p = 0.028$) and parietal alpha-2 power ($p = 0.044$) from M1 to M2, whereas copers showed no significant changes. Effect sizes were small, and post hoc power analyses indicated limited statistical power.
Conclusion: Resting-state EEG spectral power was not effective for early identification of non-copers following ACLR. Although longitudinal cortical changes were observed in non-copers, resting-state EEG lacked early discriminatory value. Future studies should investigate task-related EEG or alternative analytical approaches to better characterize cortical adaptations after ACL injury.

Keywords: anterior cruciate ligament reconstruction; non-copers; resting-state electroencephalography; cortical activity

Co-Autor*innen:

Heiner Baur PhD.[1]

Aglaja Busch PhD[1]

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

Betreuungsperson:

Heiner Baur PhD.[1]

Anja Ringele

Schulthess Clinic, Human Performance Lab, Zürich, Switzerland

30 Validity and Reliability of App-Controlled Calf Raise Tests in Patients With Achilles Tendon Rupture

Abstract

Background: Achilles tendon rupture is a common injury with significant functional consequences, often resulting in persistent deficits in calf muscle function. The calf raise test is widely used to assess rehabilitation progress, yet considerable heterogeneity exists across protocols, limiting the comparability of results. A mobile application has recently been developed to standardize and objectify calf raise test outcomes, but its validity and reliability in patients with Achilles tendon rupture have not yet been established.
Objectives: To assess the discriminant validity and inter-rater reliability of app-controlled calf raise tests in patients with Achilles tendon rupture
Methods: 20 ATR patients and 20 matched healthy controls performed one endurance test and two power tests using the calf raise application. Discriminant validity was assessed through between-group comparisons and within-patient side-to-side analyses. Inter-rater reliability was evaluated by two physiotherapists administering the full test protocol with a 15-minute rest period in between.
Results: The endurance test demonstrated the strongest discriminant ability, with work consistently outperforming repetition count in both the between-group comparison (AUC = 0.835 vs. 0.716) and within-patient side-to-side analysis (AUC = 0.823 vs. 0.704). Both power tests demonstrated fair discriminant ability (AUC = 0.753-0.775) with significant side-to-side differences. Inter-rater reliability was good to excellent for all outcomes (ICC = 0.840-0.907), with no systematic differences between testers. Patient-reported outcomes confirmed functional limitations in ATR patients, with the ATRS showing a larger relative deficit between groups than the FAOS.
Conclusion: The app-controlled calf raise test is a valid and reliable tool for assessing calf muscle-tendon function in patients with ATR. Endurance work emerged as the most sensitive outcome measure and should be prioritized in clinical assessment.

Keywords: Achilles tendon rupture; calf raise test; discriminant validity; inter-rater reliability; mobile application; measurement properties

Co-Autor*innen:

Bizzini Mario
PT, PhD[1]

Maffiuletti, Nicola A.
PhD[1]

Bürgi Claudine
PT[1]

Friederichsen Philipp[2]

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

[2]Schulthess Clinic, Department of Foot and Ankle Surgery, Zürich, Switzerland

Betreuungsperson:

Bizzini Mario
PT, PhD[1]

Angélique Roidt

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Neuromuscular Activity, Postural Control and Movement Quality During Single-Leg Landings Following ACL Reconstruction: A Retrospective Cross-Sectional Study

Abstract

Introduction: Determining when athletes are ready to return to sport after anterior cruciate ligament (ACL) reconstruction is challenging. Neuromuscular activity, postural control, and movement quality should be assessed during return-to-sport testing. While neuromuscular activity and postural control require laboratory equipment, the Quality First Assessment (QFA) offers a practical method for evaluating movement quality during jump tasks. This study examined whether QFA scores predict neuromuscular activity and postural control during single-leg landings after ACL reconstruction.

Methods: In this retrospective cross-sectional study, 46 participants were included: 23 individuals one year after ACL reconstruction and 23 matched healthy controls. All operated participants received a quadriceps tendon autograft. During a single-leg hop for distance, neuromuscular activity of the quadriceps and hamstrings was measured using surface electromyography. Postural control was assessed using force plate measures, including time to stabilization, dynamic postural stability index, and sample entropy. Movement quality was evaluated using the QFA. Group differences were analysed, followed by a Cumulative Link Mixed Model.

Results: Only group variable significantly influenced QFA scores. The control group was more likely to achieve higher QFA scores than the ACL group. Neuromuscular activity and postural control were not associated with QFA scores. Compared with controls, ACL participants reported persistent complaints, demonstrated 16% shorter jump distances, 14% lower QFA scores, and 32% lower quadriceps neuromuscular activity. Results for postural control were mixed.

Conclusion: Neuromuscular activity and postural control were not associated with movement quality, suggesting that these domains should be assessed independently during return-to-sport evaluations. Persistent deficits one year after ACL reconstruction may increase re-injury risk and highlight the need for targeted rehabilitation strategies.

Keywords: Anterior cruciate ligament reconstruction, return to sport, movement quality, neuromuscular activity, postural control, single-leg hop test, Quality First Assessment

Co-Autor*innen:

Aglaja Busch PhD[1]

Patric Eichelberger PhD[1]

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

Betreuungsperson:

Aglaja Busch PhD[1]

Samuel Janik Schär

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

32 Biering-Sorenson Test: A Multi-Modal Analysis Using MRI, EMG, and Dynamometry

Abstract

Background: The Biering-Sorensen Test (BST) is the gold standard for measuring isometric back extensor endurance, serving as a critical tool for evaluating spinal health and stability in clinical and research settings. Objective: This study aimed to investigate the determinants of isometric trunk endurance in healthy adults through a multimodal approach. Specifically, it evaluated the correlations between BST duration, Maximal Voluntary Contraction (MVC) peak torque, surface electromyography (sEMG), and Magnetic Resonance Imaging (MRI), based Lean Muscle Area (LMA) of erector spinae (ES) and multifidus (MF).
Methods: The cross-sectional study of 26 healthy participants underwent multimodal assessments. Isometric endurance was assessed via the BST (seconds) and sEMG recording of the ES to determine the fatigue slope (Hz/s); maximal isometric strength (peak torque in Nm) was measured using the PEGASUS dynamometer. Lumbar MRI (axial) provided muscle cross-sectional areas (LMA) for the ES and MF. Data were analyzed using correlation, linear regression and t-tests.
Results: The mean BST was 179 ± 41s. Females averaged higher times than males (192s vs. 167s), though this difference was not significant (p=.12). A Pearson correlation analysis revealed a statistically significant positive correlation between the ES fatigue slope and BST (r = .59, p = .001), but showed no significant relationship with MVC (p = .06). While ES LMA predicted peak torque (r = .78, p < .001). only MF LMA (p = .03, β = .54) was a positive predictor of endurance. Additionally, higher BMI (r = -.55) and body weight (r = -.5) were moderately associated with shorter BST times.
Conclusion: The BST is a gold standard endurance assessment, but results must account for individual factors. Performance is primarily driven by MF quality, rather than size, and neuromuscular fatigue, with the ES playing a minor role.

Key Words: Biering–Sorensen Test; Physical Endurance; Muscle Morphology; Paraspinal muscles

Co-Autor*innen:

Jana Frangi
PT, MSc[1,2,3]

Fabio Galbusera
PhD[1]

Jacopo Vitale
PhD[4,5]

Nicola Maffiuletti
PhD.[1]

Tina Haltiner
PT, MSc[1]

Raphaela Lamprecht
MSc.[1]

[1]Spine Group, Schulthess Klinik, Zürich, Switzerland

[2]Medical Faculty, University of Zurich, Zürich, Switzerland

[3]Sensory Motor System Lab, ETH, Zürich, Switzerland

[4]LUDES University, University of Applied Sciences, Lugano, Switzerland

[5]Campus University, Department of Theoretical and Applied Sciences, Como, Italy.

Betreuungsperson:

Jana Frangi
PT, MSc[1,2,3]

Julian Schmid

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Acute Effects of a Single Session of Neuroathletic Training on Static and Dynamic Postural Stability: A Randomized Crossover Study

Abstract

Introduction: Neuroathletic training has gained popularity in sports to improve motor performance. While benefits of neuroathletic training have been reported, data of the acute effects of neuroathletic interventions such as oculomotor, vestibular or bimanual coordination exercises on static postural stability remain scarce. Besides that, their impact on dynamic postural stability tested via time to stabilization is unknown.
Objectives: This study aimed to evaluate the acute effects of a single session of neuroathletic training on postural stability in healthy active adults. It was hypothesized that the intervention will positively affect dynamic and static postural stability as well as subjectively perceived stability.
Study Design: This pilot study used a crossover within-subject design.
Methods: Fourteen recreationally active participants (7 females, 7 males) completed two measurement sessions in a laboratory setting on separate days in a randomized crossover design (Intervention/Sham or Sham/Intervention). Participants were recruited through the network of Unisport Bern. Participants completed nine oculomotor, vestibular and bimanual coordination exercises (20s each, 30s rest). Sham exercises matched attentional demands and volume but omitted specific stimuli. The primary study outcome was time to stabilization, with static postural stability using mean velocity and 95% prediction ellipse area as secondary outcome. Perceived stability using the visual analogue scale was the tertiary outcome.
Results: Compared to the sham condition, perceived static stability was significantly higher in the intervention condition (estimate mean = 0.581, 95% CI = [0.124, 1.04], p = 0.013). No additional benefits compared to the sham condition were observed for 95% prediction ellipse area or dynamic perceived stability. Furthermore, no significant effects were found for mean velocity, whereas time to stabilization increased.
Conclusion: A single session of neuroathletic training did not demonstrate acute objective superior effects on static or dynamic postural stability compared to a sham intervention.

Keywords: Neuroathletic training, dynamic postural stability, static postural stability

Co-Autor:

Heiner Baur PhD.[1]

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

Betreuungsperson:

Heiner Baur PhD.[1]

Syra Naomi Schmid

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Comparison of Time to Stabilisation and Muscle Activation During Jump Landings in Individuals with ACL Reconstruction versus a Healthy Control Group

Abstract

Introduction: Anterior cruciate ligament (ACL) injuries are associated with persistent neuromuscular deficits despite return-to-sport (RTS) clearance. Common RTS assessments, such as hop tests and limb symmetry index (LSI), may not fully capture dynamic postural stability and neuromuscular control.

Objectives: This study assessed time-to-stabilisation (TTS) and surface electromyography (EMG) during single-leg hop for distance (SLHD) landings in individuals following ACL reconstruction (ACLR) and healthy controls.

Study design: Cross-sectional laboratory study.

Methods: Individuals 9-10 months post-ACLR were matched with healthy controls. Participants performed SLHD landings while TTS and EMG were recorded. Isometric quadriceps and hamstring strength, SLHD distance, and the Knee injury and Osteoarthritis Outcome Score (KOOS) were assessed. TTS was derived from ground reaction forces, and quadriceps and hamstrings EMG activity was analysed across predefined time intervals. Comparisons between the reconstructed leg (ACL-I), contralateral leg (ACL-C), and matched controls (CG-M) were analysed using linear mixed-effects models.

Results: Twenty-two participants (11 ACLR, 11 controls; mean age 26.95 ±3.96 years; 64% female) were included. The ACLR group demonstrated significantly lower quadriceps strength LSI (MD = 16.35, 95% CI [4.66, 28.04]), SLHD distance LSI (MD = 7.55, 95% CI [2.20, 12.91]), and KOOS scores (MD = 14.88, 95% CI [10.58, 19.18]) compared with controls. No significant between-group differences were observed for TTS or EMG in any analysed interval.

Conclusions: Despite persistent deficits in quadriceps strength, SLHD distance, and KOOS scores, no significant between-group differences were identified for TTS or EMG during SLHD landings. Participants following ACLR demonstrated tendencies toward shorter TTS and greater quadriceps activation. These findings suggest conventional dynamic stability measures may not fully detect residual neuromuscular adaptations following ACLR. Future studies should include larger samples and additional biomechanical measures to better characterise compensatory landing strategies.

Keywords: Anterior Cruciate Ligament Reconstruction, Electromyography, Postural Balance, Neuromuscular Control, Return to Sport

Co-Autor:

Patric Eichelberger PhD[1]

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

[2]Department of Neurosciences and Movement Science, Faculty of Science and Medicine, University of Fribourg, Fribourg, Switzerland

Betreuungspersonen:

Nicole Hutmacher PT, MSc[1,2]

Heiner Baur PhD[1]

Florin Schneeberger

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

EMG Validation of a Musculoskeletal Thoracolumbar Spine Model During Different Lifting Styles in Healthy, Pain-Free Individuals

Abstract

Introduction: Musculoskeletal (MSK) models are increasingly used to estimate internal spinal loading during lifting; however, applicability depends on correspondence with physiological measurements. Agreement between model-predicted activations and surface electromyography (EMG) was evaluated for thoracolumbar extensor activity across commonly contrasted lifting strategies.
Methods: Freestyle, squat, and stoop lifting with 5-kg and 15-kg loads were performed by ten healthy, pain-free adults; simulations and model–EMG validation were restricted to the 5-kg condition. Bilateral EMG was recorded from thoracic (T9) and lumbar (L1) erector spinae and processed into normalized EMG envelopes (nEMG). Individualized OpenSim-based full-body simulations with an articulated thoracolumbar spine were generated from experimental kinematics and ground reaction forces. Muscle activations were estimated using static optimization with a cost function minimizing the sum of squared muscle activations. Predicted activations were compared with nEMG using root mean square error (RMSE) and zero-lag normalized cross-correlation (XCorr).
Results: Temporal agreement was high across strategies (XCorr = 0.97–0.99). Magnitude agreement was comparable between strategies (RMSE = 46.2–47.8%) but showed wide variability across comparisons (9.4–120.8%). Region- and strategy-dependent amplitude deviations were observed, characterized by higher model-predicted lumbar activity during freestyle and squat lifting and lower model-predicted thoracic activity during stoop, particularly during lowering.
Conclusion: The timing of erector spinae recruitment was reproduced robustly across lifting strategies, whereas amplitude agreement remained sensitive to spinal level, strategy, and the effort-minimizing formulation used for activation estimation. Systematic lumbar overprediction suggests that internal loading may be estimated on the safe side, supporting mechanistic comparisons between techniques, while absolute magnitudes warrant cautious interpretation.

Keywords: Thoracolumbar spine; Musculoskeletal modeling; Static optimization; Electromyography; Model validation

Co-Autor*innen:

Christian Bangerter PT, PhD[1]

Philippe Bähler MSc[1]

Stefan Schmid PT, PhD[1]

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

Betreuungsperson:

Stefan Schmid PT, PhD[1]

Lina Schurter

REHAB Basel, Physiotherapy, Basel, Switzerland

36 Transcutaneous Tibial Nerve Stimulation (TTNS) in Patients with Neuro-urological Complaints: A Mixed-Methods Feasibility Study

Abstract

Background: Transcutaneous tibial nerve stimulation (TTNS) is a non-invasive treatment for neuro-urological symptoms, yet its feasibility in real-world clinical settings remains insufficiently explored. This study aimed to evaluate the feasibility of a 12-week TTNS intervention and to explore preliminary outcomes and patients' experiences to inform a future trial.
Methods: We conducted a mixed-methods feasibility study with a 12-week pre-post design among patients with neuro-urological complaints in a clinical setting. Participants self-administered TTNS five times per week over 12 weeks. Feasibility outcomes included eligibility, enrolment, retention, data completeness, adherence and safety. Patient-reported outcome measures were collected at baseline (T1), 6 weeks (T2), 12 weeks (T3; end of intervention), and at 3 months post-intervention (T4). Semi-structured interviews were conducted to explore patient experience. Quantitative data were analysed descriptively, and qualitative data were analysed using thematic analysis.
Results: Of 275 screened patients, 18.9% (52/275) were eligible and 13.5% (7/52) were enrolled. The dropout rate was 14.3% (1/7). Data completeness at T3 was 55.3%. High adherence was observed, with 100% of participants meeting frequency and duration criteria. No moderate or serious adverse events were reported. Predefined feasibility criteria for eligibility, enrolment, and data completeness were not met. Qualitative findings highlighted that TTNS was generally acceptable and easy to integrate into daily life, while participants' experiences were shaped by contextual factors, hope-driven motivation linked to perceived effectiveness, and minor but manageable usability challenges. Exploratory outcomes suggested modest improvements in bladder-related symptoms and quality of life, particularly within the first six weeks.
Conclusion: TTNS appears feasible and acceptable in this clinical context, supporting its potential clinical practice use. However, several feasibility criteria were unmet, highlighting the need for optimised screening procedures, reduced assessment burden, and enhanced follow-up support in future trials to minimise missing data.

Keywords: TTNS; neuromodulation; neuro-urology; neurological rehabilitation; feasibility study; mixed methods

Co-Autorinnen:

Clare Maguire
PT, PhD[1,2]

Biljana Ilic
PT, MSc[2]

Sandra Möhr
MD[2]

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

[2]REHAB Basel, Physiotherapy, Basel, Switzerland

Betreuungsperson:

Clare Maguire
PT, PhD[1,2]

Flora Stojkaj

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

The Competency Profile of a Respiratory Therapist in Neurology: A Mixed-Methods Study

Abstract

Objective: To describe the advanced practice role of respiratory therapists in a neurological setting and to define key competencies and areas of responsibility. In addition, patient satisfaction with their respiratory therapists was assessed. The goal is to develop a transparent competency and role profile that will serve as the basis for clarifying roles and for making recommendations regarding education and continuing education.
Design: A mixed-methods study with convergent integration.
Subjects: Respiratory therapists from Germany, Austria, and Switzerland working in different settings, and adult neurological patients receiving respiratory therapy.
Methods: Qualitative data from focus groups were analyzed using RADaR; quantitative data from a patient satisfaction survey were analyzed. The results from both datasets were then integrated into a joint display.
Results: Twenty-three therapists and thirty-six patients demonstrated strong agreement on professional skills and the quality of patient relationships, with satisfaction levels exceeding 90%. Differences appeared mainly in information provision. Therapists emphasized the importance of individualization, while patients expressed dissatisfaction with therapy goals and family education. Competency gaps were infrequent. Overall satisfaction reached 80.6%.
Conclusion: Therapists significantly impact neurological care; standardization of roles, competencies, and training is needed due to the lack of formal recognition.

Key words: Clinical Competence, Interprofessional Relations, Patient Satisfaction, Professional Role, Respiratory Therapy

Co-Autor*innen:

Anja Raab
PT, PhD[1]

Sabrina Grossenbacher-Eggmann
PT, PhD[2]

Carmen Brun
PT, Bsc[1]

[1]Bern University of Applied Sciences, School of Health Professions, Academy-Practice-Partnership Insel Group, Bern

[2]Institute of Physical Therapy, Inselspital, University Hospital of Bern, Bern, Switzerland

Betreuungsperson:

Anja Raab
PT, PhD[1]

Nina Stucki

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Programmatic Assessment and Competency-Based Education in the Bachelor of Science in Physiotherapy at Bern University of Applied Sciences (BFH)

Abstract

Introduction: In the context of curricular reforms currently being implemented at the Bern University of Applied Sciences (BFH), Programmatic Assessment (PA) and Competency-Based Education (CBE) have emerged as important reference frameworks for curriculum design. Their implementation requires coherent and feasible curricula that systematically integrate continuous feedback, learner support, and transparent decision-making processes. PA and CBE provide the conceptual foundations for such curricular development. The aim of this thesis is to develop a curriculum for the Bachelor's program in Physiotherapy that translates key principles of PA and CBE into the context of BFH.

Method: A multi-stage study design was employed. In Step 1, a narrative review and an analysis of existing curricula were conducted. In Step 2, semi-structured expert interviews were carried out and analysed using qualitative content analysis according to Mayring. In Step 3, findings from the literature, document analysis, and interviews were integrated to develop and refine the curriculum.

Results: A curriculum draft was developed that consistently incorporates key design principles, including data points, coaching, portfolio use, and decision-making processes, while taking into account the structural requirements of BFH. Key challenges for implementation included ensuring feedback quality, clarifying roles and responsibilities, maintaining coherence across modules, and balancing standardization with flexibility. In addition, acceptance, learning culture, psychological safety, and the compatibility with further educational and professional practice were identified as important factors influencing implementation.

Conclusion: The developed curriculum is conceptually aligned with the principles of PA and CBE and provides a framework for further curricular development in physiotherapy education. However, further institutional clarification is required prior to implementation, particularly regarding the operationalisation of module decisions, minimum portfolio standards, quality criteria, and the scope of data points. A formative evaluation is recommended to examine feasibility, acceptance, workload, and potential effects.

Keywords: Programmatic Assessment, Competency-based Education, Curriculum Development, Physiotherapy, Feedback, Portfolio

Co-Autorin:

Eefje Luijckx
PT, PhD, MHP[1]

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

Betreuungsperson:

Eefje Luijckx
PT, PhD, MHP[1]

Céline Vonlanthen

Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Stakeholder Analysis of Needs and Expectations in Physiotherapy Continuing Education - Scoping Review and Survey

Abstract

Background: Continuing education is essential for maintaining professional competence and supporting evidence-based physiotherapy practice. At the same time, financial constraints, limited time resources, and organisational conditions may hinder participation. This study aimed to analyse perspectives of professional and specialist associations as well as physiotherapists on physiotherapy continuing education, participation conditions and developmental needs.
Methods: The study comprised two methodological components. A scoping review analysed association-related documents from relevant professional and specialist physio-37 therapy associations in Switzerland using qualitative categorisation. In addition, a national online survey was conducted among physiotherapists, and the data were analysed descriptively and using exploratory inferential statistics.
Results: The scoping review, based on association-related documents, showed a strong focus on quality standards, certification, and formal recognition. The national online survey (n = 850) indicated a high willingness to participate in continuing education, with a clear prioritisation of practice-oriented content alongside substantial financial and time-related barriers. Perceived educational needs were particularly pronounced in the areas of health promotion, interprofessional collaboration, and evidence-based practice.
Discussion: The findings reveal different priorities between associations and physiotherapists. While associations mainly emphasise quality standards and formal recognition mechanisms, physiotherapists highlight practice relevance as well as financial and time-related conditions as key factors influencing the use of continuing education.

Keywords: Physiotherapy; Continuing education; Professional associations; Practice relevance; Structural conditions

Co-Autorin:
Marina Paula Bruderer PT, PhD[1]

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

Betreuungsperson:
Marina Paula Bruderer PT, PhD[1]

Rebecca Wigger

REHAB Basel, Clinic for Neurorehabilitation and Paraplegiology, Basel, Switzerland
Bern University of Applied Sciences BFH, School of Health Professions,
Division of Physiotherapy, Bern, Switzerland

Gait Recovery Following Stroke and Active Therapy – A Dose-Response Analysis. A Retrospective Cohort Analysis of Clinical Data

Abstract

Background: Stroke frequently results in impaired gait, limiting functional independence. While higher doses of active therapy have been associated with improved motor outcomes, evidence on dose–response relationships and potential thresholds in gait recovery remains inconsistent.
Objective: To examine the dose-response relationship between daily active therapy (DAT), length of stay (LOS) and gait recovery following stroke and to determine moderating effects of baseline impairment and time since stroke.
Methods: Data was extracted from hospital records. Descriptive statistics summarized baseline characteristics. Linear and cumulative link mixed models assessed effects of DAT and LOS on 10 Meter Walk Test (10MWT), 6 Minute Walk Test (6MWT), and Functional Ambulation Category (FAC), with subgroup analyses for Functional Independence Measure (FIM) and time since stroke.
Results: 328 patients were included. DAT and LOS were associated with improved FAC (12% higher odds to improve FAC category per additional 30 min of DAT, 3% per rehabilitation day). DAT effects increased with longer time since stroke. DAT demonstrated statistically significant effects on 10MWT (0.001 m/s per min DAT) and 6MWT (0.61 m per min DAT) in patients with higher FIM, with thresholds of approximately 83 (10MWT) respectively 63 points (6MWT), suggesting a discriminatory cut-off. LOS was associated with improved 10MWT and 6MWT across all functional levels. No consistent moderation by time since stroke was observed.
Conclusion: DAT and LOS were associated with improved gait outcomes following stroke in a real-world setting. Effects varied by baseline function, with greater benefits in patients with higher FIM, supporting individualized rehabilitation and resource allocation.

Key Words: stroke, rehabilitation, gait, walking, dose-response relationship, functional status, treatment effect heterogeneity

Co-Autor*innen:

Clare Maguire
PT, PhD[1,2]

Francesca Primani
PT, MSc[1]

André Meichtry
PT, MSc[2]

[1]REHAB Basel, Clinic for Neurorehabilitation and Paraplegiology, Basel, Switzerland

[2]Bern University of Applied Sciences, School of Health Professions, Division of Physiotherapy, Bern, Switzerland

Betreuungsperson:

Clare Maguire
PT, PhD[1,2]

Barbara Catherine Wortmann

Bern University of Applied Sciences BFH, School of Health Professions, Bern, Switzerland

Adaptation & Validation of the Client Service Receipt Inventory Recording Healthcare Use and Cost for People With Tetraplegia in the German Speaking Part of Switzerland

Abstract

Background: People with tetraplegia require extensive healthcare, rehabilitation, support services and assistive technologies, resulting in substantial direct and indirect costs. Reliable data on healthcare utilisation are essential for health-economic evaluations. The Client Service Receipt Inventory (CSRI) is an internationally established instrument for collecting resource-use and cost data. However, no adapted version exists for the Swiss context or specifically for people with tetraplegia.
Aim: The aim of this study was to adapt the CRSI to the Swiss context (CSRI-CH) and evaluate its content validity for capturing healthcare utilisation and costs in people with tetraplegia.
Methods: The original CSRI was systematically adapted to the Swiss context. Content validity was evaluated in two phases. First, a Delphi study with experts from clinical practice, health economics and insurance administration assessed the relevance, comprehensibility and completeness of the questionnaire. Second, people with tetraplegia evaluated the clarity, completeness, feasibility and recallability of the adapted questionnaire. Quantitative ratings and qualitative comments informed further revisions.
Results: Sixteen experts participated in the Delphi process. Consensus was achieved for all thematic sections after three rounds. Expert feedback resulted in minor revisions, including wording adjustments, optimisation of response options and the addition of an item addressing unmet needs due to financial or administrative barriers. Twelve people with tetraplegia participated in the user validation. Overall, ratings for clarity, completeness and feasibility were high. Lower ratings were mainly observed for retrospective cost-related questions, reflecting challenges in recalling healthcare utilisation. Minor refinements were implemented following participant feedback.
Conclusion: The CSRI-CH demonstrated satisfactory content validity based on expert consensus and validation with people with lived experience. The instrument may provide a useful basis for capturing healthcare utilisation and associated costs among people with tetraplegia in Switzerland and support future health-economic evaluations.

Keywords: Tetraplegia; Client Service Receipt Inventory; Content validity; Healthcare utilisation; Cost measurement; Switzerland

Co-Autor*innen:

Anja Maria Raab
PT, PhD[1]

Marco Riguzzi
PhD[2,3]

Katharina Blankart
PhD[4]

Iris de Boer
PT, BSc[1]

[1]Bern University of Applied Sciences BFH, School of Health Professions, Bern, Switzerland

[2]University and University Hospital of Zurich, Implementation Science in Nursing and Centre for Clinical Nursing Science, Faculty of Medicine, Zurich, Switzerland

[3]University Hospital Zurich, Centre for Clinical Nursing Science, Zurich, Switzerland

[4]Bern University of Applied Sciences BFH, School of Health Professions, Institute for Health Economics and Health Policy, Bern, Switzerland

Betreuungspersonen:

Anja Maria Raab
PT, PhD[1]

Marco Riguzzi
PhD[2,3]

Corina Zweifel

University Hospital Zurich, Directorate of Research and Education, Physiotherapy Occupational Therapy Research Centre, Zurich, Switzerland

42

Stigma toward functional motor disorders – prejudice, stereotyping and discrimination among Swiss physiotherapists A national cross-sectional quantitative online survey

Abstract

Background: Functional Motor Disorders (FMD) are often stigmatised due to a lack of knowledge in healthcare professionals. However, validated instruments to assess FMD stigma are lacking. The purpose of this study was thus to develop such an instrument and to capture preliminary data on Swiss physiotherapist' stigma toward and knowledge about people living with FMD.
Methods: Project 1) In a systematic seven step approach including expert content validation and pre-testing with physiotherapists and people living with FMD, the "Stigma Scale for Functional Motor Disorder in Physiotherapy" (SSFMD-PT) was developed. Subsequently, internal consistency was assessed in a pilot testing using Cronbach's alpha. Project 2) Pilot testing took place in a cross-sectional online survey capturing Eligibility, SSFMD-PT, Knowledge, Education, Demographics. Preliminary analyses used a linear model to assess the influence of various covariates on the total SSFMD-PT score.
Results: Project 1) The final SSFMD-PT consisted of 33 items on a five-point Likert-scale with a total score ranging from 33 to 165. A higher score indicates higher stigma. Internal consistency was high (Cronbach's α=.91, 95% CI [.89, .92]). Project 2) Out of 576 people who engaged with the survey, 301 answered all SSFMD-PT items. The SSFMD-PT mean score was 68.5 (SD=13.2). Prior education (B=5.79, p=.01) and objective knowledge (B=−5.74, p<.001) were significantly associated with a lower SSFMD-PT total score.
Conclusion: The SSFMD-PT poses a useful tool to quantify FMD stigma in physiotherapists. Overall stigma scores in Swiss physiotherapists were in the lower third of the scale. Further threshold testing is required to determine if this translates to low stigma. While stigma did not depend on age or specialization, prior FMD education and objective knowledge was significantly associated with lower scores. Therefore, educators and policy makers should ensure that physiotherapists receive adequate education to enhance FMD-understanding and reduce stigma.

Co-Autor*innen:

Simone Karin Huber PhD[1]

Glenn Nielsen, PT, PhD[2]

[1]University Hospital Zurich, Directorate of Research and Education, Physiotherapy Occupational Therapy Research Centre, Zürich, Switzerland

[2]City St. George's University of London, Department of Psychology and Neuroscience, Neuromodulation and Motor Control Section, London, United Kingdom

Betreuungsperson:

Simone Karin Huber PhD[1]

Berner Fachhochschule
Departement Gesundheit
Fachbereich Physiotherapie
Murtenstrasse 10
3008 Bern

Telefon +41 31 848 35 68

adminmaster.gesundheit@bfh.ch
bfh.ch/msc-physiotherapie