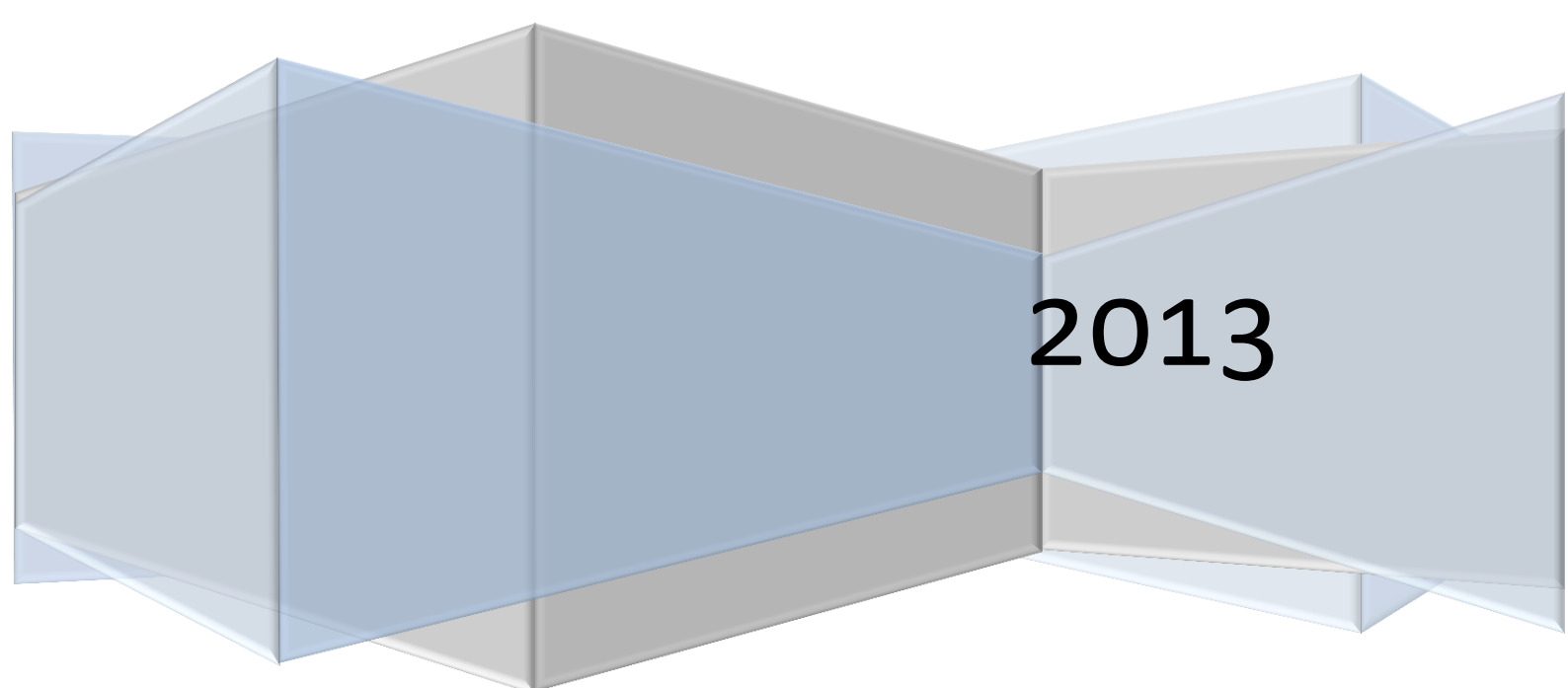


Physiotherapy Research Society

Abstracts from the 32nd Conference 2013

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Oral Abstracts

Determinants of adherence in musculoskeletal physiotherapy: A systematic review

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Background: Lack of successful interventions for enhancing adherence in musculoskeletal physiotherapy (MSPT) points to poor understanding of determinants of adherence. Therefore this review aims to identify determinants of attendance at appointments and adherence to exercise recommendations in MSPT.

Methods: Electronic databases (AMED, CINAHL, SCOPUS, MEDLINE and SPORTDISCUS) and scientific directories (Google scholar, SCIRUS, DOAJ) were searched till March 2012 for English language papers. Reference screening and citation matching were also conducted. Studies were included if they (i) were peer reviewed RCTs, prospective studies, CCTs or cross-sectional surveys, (ii) reported results for adherence and attendance separately (iii) involved adult patients with mechanical musculoskeletal dysfunction, (iv) related to treatment administered by MSPT practitioners and (v) evaluated determinants of attendance and adherence. Quality assessment was conducted using an assessment tool for systematic reviews of prognostic factors in musculoskeletal research. Abstract, full text screening, quality assessment and data extraction were conducted independently by two reviewers.

Results: The review of 42 included studies showed that lesser time from referral to first appointment and good general health status emerged to have a strong evidence of a significant relationship with attendance while poor social support, low self-motivation and external locus of control emerged as barriers to in-clinic adherence. Increased pain levels during exercise, poor social support, sedentary lifestyle, decreased satisfaction with physiotherapist, low self- motivation, low in-treatment adherence with exercise were identified as significant barriers to home exercise adherence (HEA).

Conclusions: The review indicates that there is wide heterogeneity in measurement of adherence as well as included determinants. It is notable that most determinants had limited or no evidence of relationship to either of adherence constructs.

Implications: Future research should focus on large scale cohort studies using standardised measures of adherence. Considering the multifaceted nature of the problem, combining strategies addressing psycho-social, organizational and therapeutic factors might be needed to enhance adherence.

References: -

The effects of Exergaming on postural stability, user-acceptance and flow in Multiple Sclerosis: a randomised controlled trial

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Background: Exergaming (exercise using computer-gaming technology) has been shown to influence both physical^{1,2} and psychological clinical outcomes³. The aims of this study were to investigate of the effect of exergaming using both physical and psychological measures in Multiple Sclerosis (MS) participants.

Methods: Ethics approval was granted by a local Ethics Committee. Fifty-one MS participants were randomly assigned to four weeks, twice weekly, balance orientated exercise; using either: the Nintendo Wii Fit™ (n = 20), traditional balance training (BT) (n= 16), or no intervention (control) (n = 15). Postural stability was measured using a Kistler™ force platform. User-acceptance and flow-state experience (a psychological state of immersion) was measured using the Unified Theory of Acceptance and Use of Technology (UTAUT) and the Flow State Scale (FSS) questionnaires, respectively.

Results: An analysis of covariance (ANCOVA) showed significant post-intervention differences between the Wii Fit™ and control group for three of the five bipedal measures, and for two of the bipedal measures between the BT and control group ($p < 0.05$). A mixed analysis of variance (mixed ANOVA) showed significant improvements over-time in three of the bipedal, and one of the five unipedal stability measures for the Wii Fit™ group ($p < 0.05$); one of the bipedal measures in the BT group ($p < 0.05$); and none in the control group. For both UTAUT and FSS questionnaires, significant improvements were found over-time (mixed ANOVA, $p < 0.05$) and for FSS only differences between-groups were found (ANCOVA, $p < 0.05$).

Conclusions: Both interventions improved balance when compared to the control condition. Both interventions showed high acceptance; however, the Wii Fit™ group showed significant improvements in all nine flow-state subscales, compared to only three in the BT group. This would suggest the Wii Fit™ to be highly immersive, which may not only assist in exercise uptake, but also concordance.

Implications:

References:

1. Brumels, K. A., Blasius, T., Cortright, T., Oumedian, D., and Solberg, B. (2008) Comparison of Efficacy Between Traditional and Video Game Based Balance Programs, *Clinical Kinesiology* 62(4), 26-31.
2. Brosnan, S. (2009) The Potential of Wii-Rehabilitation for Persons Recovering From Acute Stroke. *Physical Disabilities*, 32(1), 1-3.
3. Devereaux, J., Pack, M., Piccott, V., Whitten, K., Basset, F., Rohr, L.E. (2012) Comparison of rates of perceived exertion between active video games and traditional exercise, *International SportMed Journal*, 13(3), 133-140.

Cognitive Functional Feedback Intervention in Subgroups of Non-Specific Chronic Low Back Pain: Feasibility Study

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Background: Non-specific chronic low back pain (NSCLBP) is associated with motor control impairments (MCIs) potentially perpetuating the disorder¹. Evidence exists that cognitive functional therapy (CFT) with laboratory visual feedback brings benefits to NSCLBP subgroups². This study investigated whether CFT with visual feedback (CFT-V) in clinical setting is feasible and can benefit NSCLBP patients' reported disability, pain, function and physical activity.

Methods: Thirteen NSCLBP patients with flexion pattern (FP,n=8) and active extension pattern (AEP,n=5) MCI were recruited and undergone a 6 week CFT-V intervention. Primary outcome: disability (Oswestry Disability Questionnaire;ODQ). Secondary outcomes: pain (VAS), fear avoidance (Tampa Scale of Kinaesiophobia;TSK), physical activity (International Physical Activity Questionnaire;IPAQ), psycho-social status (distress and risk assessment method; DRAM,STarTBack), self-efficacy (perceived self-efficacy questionnaire) and global improvement satisfaction questionnaire. Paired t-tests assessed the difference in pre- and post-intervention scores ($p<0.05$). Ethical approval was gained (Reference number 10/MRE09/28)

Results: Statistically significant improvement was shown in all measured outcomes with mean reduction in ODQ by 14.9 (95%CI 10.0-19.7), VAS 2.1 (95%CI 1.1-3.1), TSK 12.4 (95%CI 8.1-16.8), DRAM 8.4 (95%CI 5.5-11.3), STarTBack 2.2 (95%CI 1.2-3.2) and mean IPAQ increase of 1855.6 points (95%CI 1199.7-2511.5). Patients reported high satisfaction levels and post-intervention self-efficacy mean score of 53.3. Visual feedback was reported as highly beneficial allowing patients to learn about their movement behaviour, enhancing awareness and coping ability.

Conclusions: CFT-V is a novel intervention that is feasible, appears to bring benefits to FP and AEP MCI subgroups of NSCLBP and meets with high levels of patient satisfaction.

Implications: Patients' reported positive perceptions of learning to alter their habitual movement behaviour using visual feedback may have implications for motor learning interventions in clinical practice and for further development of visual motor learning methods that best engage patients and aid in recovery.

References:

1. O'Sullivan (2006) *Manual Therapy*; 11:169-70
2. Sheeran et al (2013) *Spine*; Accepted for submission

Do people with Benign Joint Hypermobility Syndrome (BJHS) have reduced joint proprioception? Systematic review & meta-analysis

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Background: Joint proprioceptive deficit has been documented in a variety of musculoskeletal conditions. No systematic reviews have assessed joint proprioception in people with Benign Joint Hypermobility Syndrome (BJHS). This study is a systematic review to determine whether people with BJHS exhibit reduced joint proprioception.

Methods: The published literature was assessed using the databases: AMED, CINAHL, MEDLINE, EMBASE, PubMed and the Cochrane Library. Unpublished literature and trial registries were assessed including: OpenGrey, the WHO International Clinical Trials Registry Platform, Current Controlled Trials, the UK National Research Register Archive. All studies comparing the proprioceptive capability of people with and without BJHS were included. Study methodological quality was assessed using the CASP appraisal tool. Meta-analysis techniques were used when study homogeneity permitted.

Results: A total of five studies including 254 people were identified. People with BJHS demonstrated statistically significantly poorer lower limb joint position sense (JPS) ($p < 0.001$), and threshold detection to movement ($p < 0.001$) than those without BJHS. The evidence for upper limb proprioceptive difference was less convincing, with no statistically significant difference between the cohorts for shoulder JPS ($p = 0.10$), but a statistically significant difference in finger JPS ($p < 0.001$). The only study which assessed childhood BJHS, reported reduced knee proprioceptive capability in those with BJHS ($p < 0.001$).

Conclusions: Joint proprioception is reduced in those with BJHS compared to non-BJHS cohorts. Further study is now required to investigate this area in childhood populations and to begin to examine possible interventions to address this deficit.

Implications: Joint proprioception deficit appears a pathological entity to BJHS. Assessment of this may be important in evaluating treatment success and risks of recurrent disability and injury. Examination of the reliability of such assessment methods, and whether proprioceptive-based exercises are valuable to address this deficit for adult and childhood populations is now warranted.

References:

PROSPERO Registration Number: CRD42012002370

Exercise Experiences of People with Huntington's Disease (HD)

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Background: Huntington's Disease (HD) is a hereditary, progressive neurodegenerative disorder resulting in severe motor dysfunction, cognitive decline and behavioural changes. Apathy is a common clinical characteristic. Exercise may be beneficial in HD but little is known about promoting exercise engagement in this patient group. This study explored the experiences and adherence of people with HD attending a 12 week supported exercise programme delivered in a gym environment 1x/ week and a home walking programme 2x/week.

Methods: Semi-structured interviews were conducted (n=9) on completion of the exercise programme in which exercise experiences and condition specific challenges were explored. Interviews were transcribed verbatim and transcripts examined to identify themes. Weekly records of gym activity and walking programme with reasons for non adherence were obtained. Ethics approval was obtained for the study from a NHS research ethics committee.

Results: Participants perceived various physical and psychological benefits in terms of their HD and general well-being. Seven of the nine participants achieved at least 150 minutes exercise per week and attended >75% of the gym sessions. Adherence was enhanced by family support and one-to-one gym instructor led sessions which enhanced motivation and confidence. Incorporation of the home programme into the daily routine was important in promoting regular exercise. Barriers that limited engagement included holidays, weather, other commitments and fatigue.

Conclusions: People with HD demonstrated good overall levels of adherence to both elements of the intervention and perceived various condition related benefits from the exercise programme. Implementing strategies that facilitate motivation whilst limiting barriers are important to the success of exercise based interventions.

Implications: People with HD can enjoy participating in exercise and achieve perceived benefit. Individualised support and development of a structured routine are important components of exercise programmes in this population.

References:

The understanding of joint hypermobility syndrome, current practice and difficulties encountered by paediatric physiotherapists

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Background: Physiotherapy is the mainstay of treatment for children with Joint Hypermobility Syndrome (JHS) but there is very little robust evidence to inform practice and currently no standardized physiotherapy assessment or management guidelines (Hakim and Grahame 2003). The aim of this survey was to understand the community paediatric physiotherapists' current knowledge, management and difficulties encountered managing this group in the community. A secondary objective was to identify any training needs and use the data to inform and assist in the future development of clinical management guidelines.

Methods: A survey, used a mixed method approach, of an email/ web delivered questionnaire utilizing both open and closed questions. Purposive sampling was used and community paediatric physiotherapists were invited to participate via direct email of members of the Association of Paediatric Chartered Physiotherapists (APCP), an note in the Physiotherapy magazine and on the Chartered Society of Physiotherapy's Special Interest Group web page. Ethical approval for this survey was obtained via Sheffield Hallam University.

Results: 115 Questionnaires were received between September and October 2012 of which 95 were complete. Only 18% (n=21) provided an inaccurate description of key signs and symptoms of JHS. The poorest response rate was related to the use of outcome measures (52%), (n=64). Following qualitative content analysis, 4 categories emerged to barriers to management with the most significant related to the management of chronic pain. 13 (12%) participants reported that they faced no difficulties managing this group and within many of the responses were examples of good practice.

Conclusions: This survey gives a strong indication that community physiotherapists have a good understanding of JHS and are a highly skilled professional group that are well placed to offer early detection and long term management.

Implications: Further research into the effectiveness of current treatment modalities and clinical Management guidelines are required.

References:

HAKIM, A. and GRAHAME, R. (2003). Joint hypermobility. Best practice & research. Clinical Rheumatology, 17 (6), 989.

Adapted Dynamic Cycling for Children and Young Adults with Cerebral Palsy: A Pilot Study

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Background: Children and Young People (C & YP) with Cerebral Palsy (CP) have limited opportunities to experience physical activities such as cycling¹. Learning to cycle is a major childhood milestone that can provide many health benefits. C & YP with CP have altered muscle activation patterns and muscle weakness² which may improve with the sensory stimulation and motor strategies required for cycling³. This mixed methods study explored effects of adapted cycling participation in C & YP with CP.

Methods: Ethical approval was granted by Cardiff University. 35 C & YP (2-18 years) participated: a non-cycling control group (n=17) and a cycling group (n=18). The cycle group participated in 6 outdoor cycling sessions, using adapted trikes. Interviews were conducted with families, C & YP, and cycling diaries kept; all being analysed for emerging themes. Right (R) and Left (L) Quadriceps and Hamstrings strength measures were taken before and after the intervention period for both groups using the Hand-Held Dynamometer (JTech Medical). Differences in strength measures were analysed using ANCOVA (SPSS 18).

Results: Qualitative data analysis revealed many families, C & YP perceived improvements in social interaction, cycling pedalling skills, control of cycling speed and steering. Quantitative data analysis revealed no statistically significant difference between groups, although a trend of increased strength was observed for the cycle group: (Quadriceps strength increased by, R=12.14 Newtons (N)±6.5; L=15.56N±13.87; and Hamstrings by, R=5.19N±3.5; L=4.23N±5.94) and a trend of decreased strength was observed in the control group: (Quadriceps strength decreased by, R=3.62N±4.73; L=0.41N±1.4; and Hamstrings by, R=1.03N±0.06; L=1.05N±3.05).

Conclusions: Emerging themes from this study, demonstrate adapted cycling has potential social and physical health benefits. Observed improvements in cycling skills and strength trends deserve further investigation with larger sample sizes.

Implications: Therapists, educators and policy makers should consider providing adapted cycling opportunities for C & YP with disabilities.

References:

¹Colver A; SPARCLE Group 2006 Study protocol: SPARCLE—a multi-centre European study of the relationship of environment to participation and quality of life in children with cerebral palsy. BMC Public Health;6:105.

²Lauer et al 2007 Lower extremity muscle activity during cycling in adolescents with and without CP Clinical Biomechanics 23(4); 442-449

³Thorpe D and Valvano J 2002 The effects of knowledge of performance and cognitive strategies on motor skill learning in children with Cerebral Palsy Paediatric Physical Therapy 14: 2-15

Meaningful visual feedback for upper and lower limb rehabilitation early after stroke

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Background: Key principles of stroke rehabilitation are practice and feedback. 3D motion capture has the potential to provide accurate kinematic data required for objective assessment and feedback. This study explored the use of a novel feedback aid in which patients, and their therapists, are presented with a stick figure visualisation that is able to mimic the user in real-time or post-hoc, dependent on the task and the patient's ability to process information.

Methods: Ethical committee approval was obtained. Case studies were undertaken to assess the effectiveness of a 6 week visual feedback programme consisting of 12 upper limb or gait training therapy sessions. A 54 year old male 9 days post-stroke and a 56 year old female 3 months post-stroke participated in the upper limb and gait training programme respectively. Outcome and 6 month follow-up measures used were the Action Research Arm Test (ARAT), 5 Metre Walk Test (5mWT) and the Stroke Impact Scale Recovery Level (SIS-R) and mobility score (SIS-16).

Results: The male increased his ARAT score from 88% to 100% and reported an increase in SIS-R from 50% to 85% (90% at follow-up). The female demonstrated a reduction in the 5mWT from 14.8 to 10.34 seconds (7.16 seconds at follow-up) and reported an increase in SIS-16 from 59% to 85% (91% at follow-up). Moreover, participants commented on the system's role in providing an increased sense of involvement and understanding of their rehabilitation, and in maintaining motivation levels.

Conclusions: Findings suggested visual feedback to be a useful adjunct to stroke rehabilitation. Feasibility RCTs are currently being undertaken to further assess the effectiveness and feasibility of this intervention.

Implications: Visual feedback has the potential to assist patients and their therapists in interpreting their movement performance, to encourage correct movements over compensatory patterns and enhance mobility outcomes after stroke.

Mirror Visual Feedback for phantom pain: how is it practised internationally and what side effects occurred? A Delphi Study

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Background: MVF (mirror visual feedback therapy) is practised worldwide in very different ways to alleviate phantom pain; no study has compared these yet and very little is known on side effects. Therefore, the objectives were to investigate the use of MVF after amputation, to explore side effects' occurrence and handling, and to increase knowledge on contributing factors.

Methods: Experiential knowledge of 13 experienced practitioners from six countries and five professions was explored with a three round Delphi technique. The study received ethical approval from the Coventry University Research Ethics Committee.

Results: Five different treatment plans emerged: a tele-guided plan, an intense one-off plan, two structured and controlled plans of which one is preceded by laterality training and imagery, and one plan using a projector system for unilateral MVF. The expectations of response time varied which influenced the treatment outcome. Side effects were reported as emotional reactions, pain increase, sensory reactions, freezing of the phantom limb, and sweating. The attitude towards and the handling of side effects varied in patients as in practitioners. A tool to fine-tune the experience was reported with covering the limb during therapy. Consent amongst the panel, defined at 70% of agreement, was reached for eight of twelve statements.

Conclusions: The results suggest that the different treatment plans suit different patients and practitioners. Matching these could enhance effectiveness and compliance. Knowledge about side effects and response times needs to inform practice.

Implications: These findings triggered the implementation of a mirror therapy gateway to match patients to practitioners and collect further data from the practitioners to expand the data base that will serve as a basis for clinical decision making for practitioners and patients alike.

Development of iKnee: A web-based application using biomechanical data to optimize knee rehabilitation within the home environment

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Background: Movement adaptations and reduced functional performance in Anterior Cruciate Ligament deficient (ACL D) and reconstructed (ACL R) individuals are well documented¹. Rehabilitation aimed at maximising functional recovery and techniques to promote self-care are recommended. The aim of this study is to integrate movement analysis data (stage 1) into a web-based application named iKnee (stage 2) to support self-care (stage 3).

Methods: Stage 1: An experimental research design has been used to collect movement data of walk and hop on 30 ACL D, 30 ACL R and 30 controls. Stage 2: A mixed methods design integrating multiple data sources has been used in the development of iKnee. This includes systematic reviews of knee rehabilitation² and outcome measures³, a UK wide survey defining 'standard' knee rehabilitation⁴ and development of an ontology for knee conditions. Ethical Approval was gained from the South East Wales Research Ethics Committee. Ref: 10/MRE09/28

Results: Stage 1: Gait performance was recovered ($p=0.148$; ACL D 1.45 ± 0.17 ; ACL R 1.50 ± 0.19 ; CONT 1.48 ± 0.16 m/s) but performance of the more challenging distance hop was not recovered for ACL D ($p<0.05$; ACL D $57.1\pm 14.1^*$; ACL R 75.1 ± 17.8 ; CONT $77.7\pm 14.1\%$ height). Even though performance was recovered both ACL D and ACL R used kinematic and kinetic compensation strategies^{5,6}.

Stage 2: The prototype iKnee has been successfully developed and is available at <http://apps.facebook.com/ikneerts/>. To support self-care iKnee has the following features: *Self monitoring and feedback tool, peer support through social networking, comprehensive knowledge base, exercise programmes and progressions.*

Stage 3: Novel methods of integrating movement data into iKnee are being developed to provide feedback and address compensation strategies identified in stage 1.

Conclusions: Biomechanical analysis provides detailed insights into compensation strategies during functional activities informing targeted exercise programmes and feedback tools. The novelty of iKnee is that it supports home based rehabilitation by integrating biomechanical knowledge with clinical expertise.

Implications: Combining biomechanical data with iKnee will enable patients to better self-manage their injury and enhance recovery in the home environment. This will need to be evaluated in a future randomised control trial.

References:

1. Ardern CL, Webster KE, Taylor NF, Feller JA. Return to sport following anterior cruciate ligament reconstruction surgery: a systematic review and meta-analysis of the state of play. *Br J Sports Med.* 2011;45(7):596-606.
2. Button, K. et al. 2012. Clinical effectiveness of knee rehabilitation techniques and implications for a self-care treatment model. *Physiotherapy* 98(4), pp. 287-299.
3. Letchford, R. et al. 2012. Assessing activity participation in the ACL injured population: a systematic review of activity rating scale measurement properties. *Physical Therapy Reviews* 17(2), pp. 99-109.
4. Button, K., Roos, P. and Van Deursen, R. W. M. 2011. Development of a documentation tool to define

and quantify rehabilitation. Presented at: Patellofemoral Pain Syndrome: Proximal, Local and Distal Factors: An International Research Retreat, Ghent, Belgium, 31 August - 1 September 2011.

5. Roos, P., Button, K. and Van Deursen, R. W. M. 2012. Control of coronal plane kinematics and kinetics during a single leg hop for distance in individuals with anterior cruciate ligament injury. Presented at: 36th Annual American Society of Biomechanics Meeting, Gainesville, FL, USA, 15-18 August 2012.

6. Roos, P., Button, K. and Van Deursen, R. W. M. 2012. Hop performance in individuals with anterior cruciate ligament injuries. Presented at: 36th Annual American Society of Biomechanics Meeting, Gainesville, FL, USA, 15-18 August 2012.

Poster Abstracts

The effect of unstable footwear on trunk muscle EMG and postural control in healthy adults.

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Background: There is preliminary evidence that unstable footwear might be beneficial for people with chronic lower back pain (CLBP). It has been postulated that this improvement might be mediated by the effects of unstable footwear on trunk muscle activity. The postural imbalance created by the footwear may encourage more activity in deep, postural muscles such as the Transversus Abdominus (TrA) a muscle often shown to be dysfunctional in individuals with CLBP. The aim of this repeated measures study was to investigate if trunk electromyography (EMG) in healthy adults was affected by unstable footwear in comparison to usual footwear or barefoot conditions.

Methods: The bilateral muscle activity of the TrA, External Obliques (EO) and Rectus Abdominis (RA) were measured using surface EMG, and postural sway was assessed using a Kistler force plate. Ethics approval was granted by the School of Health and Social Care Research Governance and Ethics Committee at Teesside University. Written informed consent was obtained from all participants.

Results: Twenty two participants volunteered for this study. 21 healthy participants (Age 27 ± 7 years; 13 female, 8 Males; BMI 22.9 ± 3.4 Kg.m⁻²) completed the study and there was no missing data. Repeated measures ANOVA found increased postural sway in the unstable footwear condition compared to both the barefoot condition [4.2 (1.7 to 6.7) mm] [mean difference (95CI)], and the usual footwear condition [4.9 (3.2 to 6.7) mm]. However there was no statistically significant difference in trunk muscle activity between conditions.

Conclusions: The current study found no evidence that unstable footwear can increase trunk muscle activity which suggests that the positive effects of unstable footwear on low back pain may be mediated via different mechanisms other than core muscle training effects. However, further investigation with a clinical population over longer time periods, using different functional tasks is warranted.

Movement Quality: Can it be measured

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Background: Measurement of spinal motion has traditionally focussed on range of motion (ROM) with disregard for how this motion is achieved. Clinicians however are increasingly interested in quality of motion, therefore driving a need for novel measurement methods to encompass movement quality.

Methods: Twenty acute (ALBP) and 20 chronic low back pain (CLBP) sufferers completed spinal movements whilst having their lumbar motion measured with two inertial sensors over the S1 and L1 spinous processes. Relative angles between the sensors were calculated and ROM data was differentiated to yield angular velocity. Angular velocity-ROM plots, known as spatial plots, were used to reveal the movement trajectory. Movement quality was measured by first sectioning the spatial plot into quartiles. Quartile 1 represents standing to peak maximum velocity; 2 from peak velocity to end-range; 3, end-range to peak minimum velocity and 4 from peak minimum velocity to standing. Each quartile was fitted with a 4th order polynomial from which the difference in fitted and actual data was calculated to result in a movement irregularity score for each quartile. Ethical approval was granted by the national research ethics service of the NHS.

Results: Greater irregularity scores were noted for the second quartile (from peak velocity to end-range) both groups. Extension demonstrated the greatest irregularity scores in the ALBP group and rotation for the CLBP. Significant differences were evident between groups for extension (2nd quartile), side flexion (1st and 4th quartile) and rotation (1st quartile).

Conclusions: Movement quality can be quantified by studying the relationship between velocity and ROM.

Implications: This is the first time a method of quantifying spatial plots has been proposed. The method could easily be incorporated into automated computer software. The resultant information can be used to identify the portion of motion displaying aberrant quality to then be targeted by interventions or be used as real-time feedback.

A Systematic Review and Meta-Analysis to Determine the Diagnostic Test Accuracy of Ultrasound for the Detection of Lateral Epicondylitis

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Background: Whilst previous research has investigated the use of magnetic resonance imaging (MRI), magnetic resonance arthrography (MRA), computed tomography arthrography (CTA) and ultrasound for diagnosing soft-tissue injuries of the elbow, there remains limited consensus on the accuracy, reproducibility and cost-effectiveness of these investigations. This study specifically assessed the diagnostic test accuracy of ultrasound for the diagnosis of lateral epicondylitis.

Methods: An electronic search of published and unpublished literature databases was conducted. All diagnostic accuracy studies which compared the accuracy of ultrasound (index test) with clinical assessment (reference standard) for lateral epicondylitis were included. The methodological quality of the literature was appraised using the QUADAS tool. When appropriate, the pooled sensitivity and specificity analyses were conducted.

Results: Ten studies investigating 711 participants (1077 elbows) were included. Overall, ultrasound had variable sensitivity and specificity (sensitivity: 64%-100%; specificity: 36%-100%). Three studies were deemed appropriate for meta-analysis. These reported a sensitivity of 0.82 (95% Confidence Intervals (CI): 0.76-0.87) and specificity of 0.66 (95% CI: 0.60–0.72). The available literature had modest methodological quality.

Conclusions: The use of ultrasound in the diagnosis of lateral epicondylitis is variable. Its accuracy appeared highly dependent on numerous variables such as operator experience, stage of pathology, equipment used. Judgement should be used when considering the benefit of ultrasound in clinical practice. Further research assessing variables such as transducer frequency is warranted.

Implications: Diagnostic imaging is a rapidly evolving specialty in musculoskeletal physiotherapy. It has been hypothesised to optimise outcomes by improving the accuracy of diagnosis. Whilst this review supports the use of ultrasound within physiotherapy, caution should be exercised based on the variable results recorded. Further assessment of ultrasound is warranted, specifically assessing physiotherapist's accuracy since this has yet to be reported within the literature.

Immediate effects of scapular stabilisation exercise with and without real-time visual feedback in scapular dyskinesia: preliminary study

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Background: Scapular control is considered to be crucial for normal shoulder function and its alterations are linked to shoulder pathologies. Scapular stabilisation exercises (SSE) are regularly employed, although its success in improving scapular control varies. One possible explanation could be the difficulty to visually monitor scapular movements during the exercises. This study investigated the effect of real-time visual feedback on scapular control and function.

Methods: Prospective, within-subject study design was used. Seventeen subjects with scapular dyskinesia undergone the same set of SSE, first without visual feedback (noVF) and then with real-time visual feedback (VF) two weeks apart. Electromyographic (EMG) mean amplitude ratios of upper trapezius/lower trapezius (UT/LT), upper trapezius/serratus anterior (UT/SA) and the throw distance during overhead medicine ball throw before and after each session was measured. Wilcoxon sign ranked test evaluated the difference between the mean change following noVF and VF SSE. Cardiff University Research Ethics Committee approval was gained.

Results: There was a significant difference between the effect of SSE with and without visual feedback on EMG ratio of UT/SA [Mean change (SD): noVF=-0.06(0.41), VF=0.12(0.13); $p=0.015$] but there was no difference in UT/LT [Mean change (SD): noVF=0.64(1.07), VF=0.49(0.54)]. No significant difference was shown between the effect of the two interventions on throw distance ($p=0.96$) with both interventions actually reducing the throw distance.

Conclusions: SSE with real-time visual feedback helps in activation of SA during the overhead functional activity. It also improves LT activity but not significantly. These improvements do not seem to reflect in shoulder overhead throw performance.

Implications: This study results indicate that real-time visual feedback may have positive effect on scapular stabilisation by improving SA activity during overhead throw task. Reduction in the throw distance may be due to short practice duration and different focus of attention during the throw, which needs to be investigated further.

Does gait in pre-school children undergoing Ponseti management for CTEV differ from typically developing peers?

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Background: Children with pathology present with gait abnormalities. Reliable longitudinal measurement of gait is essential to allow meaningful interpretation of data. Developmental centiles for gait measurements based on 138 typically developing (TD) children were developed and their clinical utility supported¹. Work is on-going to extend the sample and explore clinical application. Manipulation techniques are optimal treatments for Congenital Talipes Equinovarus (CTEV). Previous studies compared techniques², or outcomes in unilateral cases against the unaffected side³, few compared gait with a TD population.

Objective: To compare gait analysis of Ponseti and TD children, evaluating Ponseti treatment outcomes. Ethics: Jan 2012, Bloomsbury REC.

Methods: Data was collected using the GAITRite®. Ponseti participants were identified in clinics; TD through pre-school groups. Participants crossed the GAITRite® 3 times at 3 speeds. A screening questionnaire compares developmental milestones and functional ability.

Results: Ponseti n=10; 6 male, 4 female; compared against age matched peers. Ponseti median age 37 months, height 90.6cm, leg length left and right 42.5cm. TD median age 36.5 months, height 95cm, leg lengths 43.5 cm left and right. The greatest correlation was in self-selected velocity; the TD increased velocity more consistently across 3 speeds. Unpaired t-test comparing Ponseti and TD self-selected and fast step lengths showed no statistical significance (SL Left self-selected p = 0.9, fast p = 0.15, SL Right self-selected p = 0.6, fast p = 0.155). Footfall data for stance phase highlighted differences in transition across the weight bearing surface.

Conclusions: Development of 'normal' gait patterns supports Ponseti as optimal CTEV treatment. Further evaluation of footfall data is in progress.

Implications: This supports GAITRite® as an accurate method of gait analysis. Obtaining data in the pre-school age is challenging however results suggest the centile charts will be successful extended and prove useful in gait analysis.

References.

1. Alderson L, 2007 Measuring normal and impaired walking in children using the GAITRite® walkway. PhD thesis University of Hertfordshire.
2. R. El-Hawary, L. A. Karol, K. A. Jeans, and B. S. Richards. Gait analysis of children treated for clubfoot with physical therapy or the Ponseti cast technique. *Journal of Bone & Joint Surgery, American Volume* 90A (7):1508-1516, 2008.
3. M. F. Sinclair, K. Bosch, D. Rosenbaum, and S. Böhm. Pedobarographic analysis following Ponseti treatment for congenital clubfoot. *Clinical Orthopaedics & Related Research* 467 (5):1223-1230, 2009.

Experience of Children with Cerebral Palsy with Augmented Treadmill Training: A Pilot Study

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Background: Living with cerebral palsy (CP) can be difficult for both children with CP and their families. Treadmill training has been suggested as one approach to improve motor capacity^{1,2}. However, although treadmill training is being used with some success in children with CP, motivation remains an issue². The purpose of this pilot study was to investigate the feasibility of an in-house developed treadmill training augmented with virtual reality (VR) environments³ to address the motivation issue and improve rehabilitation outcomes.

Methods: Children were asked to walk across a VR city within 70 s using the augmented treadmill. The speed of the augmented treadmill is controlled by the (relative) position of the child's pelvis on the treadmill belt, so that the child or therapist do not need to adjust the speed using the conventional buttons on the treadmill frame. The game challenged them to control their walking speed in order to avoid colliding with obstacles that appear at various places in the VR city. After walking on the treadmill children responded to five closed-ended questions relating to safety, enjoyment, and ease of walking on the treadmill. Ethical approval was granted by the London Bloomsbury Research Ethics Committee.

Results: Two children with CP volunteered for the study. The children used a well-planned strategy to walk across the city safely and easily in a reasonable time (64 s and 50 s). They reported enjoying the augmented treadmill exercise and they would like it to complement their existing rehabilitation programme.

Conclusions: The pilot study suggests that augmented treadmill training is feasible for children with CP. Further research is required to examine clinical effectiveness and potential implications for routine clinical use.

References:

1. ZWICKER, J.G. and MAYSON, T.A. (2010) "Effectiveness of Treadmill Training in Children with Motor Impairments: An Overview of Systematic Reviews", *PEDIATRIC PHYSICAL THERAPY*, 22 (4), pp. 361-377.
2. LANCIONI, G.E., SINGH, N.N., O'REILLY, M.F., SIGAFOOS, J., DIDDEN, R., MANFREDI, F., PUTIGNANO, P., STASOLLA, F., and BASILI, G. (2009) "Fostering Locomotor Behavior of Children with Developmental Disabilities: An Overview of Studies Using Treadmills and Walkers with Microswitches", *RESEARCH IN DEVELOPMENTAL DISABILITIES*, 30 (2), pp. 308 - 322.
3. AL-AMRI, M., ABÁSULO, D., GHOUSSAYNI, S., and EWINS, D. (2012) Development of an Augmented Treadmill for the Rehabilitation of Children with Cerebral Palsy: Pilot Perspectives from Young Healthy Adult Users. *INTERNATIONAL CONFERENCE ON DISABILITY, VIRTUAL REALITY AND ASSOCIATED TECHNOLOGIES*. Laval, France, 10-12 Sept. 2012, pp. 77-85.

A modified systematic review (MSR) of the effectiveness of aerobic exercise in stroke patients

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Background: A MSR was undertaken to establish a clearer prescription of aerobic exercise for stroke rehabilitation with regards to Frequency, Intensity, Time and Type (FITT) principles.

Methods: Ethical approval was gained from the School's Research Ethics Committee. Inclusion criteria: Randomised Control Trials published 01/01/2000 to 21/11/2011, peer-reviewed papers in English, aerobic exercise (structured rhythmic exercises), acute (0-1 month), sub-acute (1-6 months) and chronic (6+ months) stroke. MeSH headings were searched in relevant databases. 727 articles were identified of which 717 articles failed to meet the inclusion criteria. Ten papers¹⁻¹⁰ were appraised using the Downs and Black Tool (1998)¹¹ and the CASP tool¹² was used to extract relevant data.

Results: Studies demonstrated cycle ergometry and treadmill/over ground walking had significant improvements in peak VO₂ (p<0.001), walking capacity (cycling p<0.05; treadmill p<0.0001) and resting HR (cycling p<0.01). Exercise duration and walking velocity also improved. Effective treadmill training necessitated session durations of 20-40 minutes [1-6], up to three sessions per week [3, 4, 6]. Programme durations ranged from 12-26 weeks [1-6] with exercise intensities of 60-70% of HRR [3, 4] or speeds of 3.2km/hour [1]. Effective cycling training necessitated session durations of 25-30 minutes [7-10], three times per week [8], with programme durations of 2-10 weeks [7-10] including exercise intensities of 50-85% of HR Max [8, 9].

Conclusions: Review results indicate prescription should be based on cycle ergometry for sub-acute and chronic recovery, and treadmill training for all stages of recovery. Exact prescription remains unclear due to differences in protocols demonstrating desirable effects. Implications: Further research is required to selectively train aerobic exercise compared with conventional treatment to avoid biased results and help clinicians determine a more specific prescription of aerobic exercise in stroke rehabilitation.

References:

1. Duncan PW, Sullivan KJ, Behrman AL, Azen SP, Wu SS, Nadeau SE, Dobkin BH, Rose DK, Tilson JK, Cen S, Hayden S 2011 Body-weight-supported treadmill rehabilitation after stroke. *The New England Journal of Medicine* 364: 2026-2036
2. Eich HJ, Mach H, Werner C, Hesse S 2004 Aerobic treadmill plus Bobath walking training improves walking in sub-acute stroke: A randomised controlled trial. *Clinical Rehabilitation* 18: 640-651
3. Luft AR, Macko RF, Forrester LW, Villagra F, Ivey F, Sorkin JD, Whittall J, McCombe-Waller S, Katzel L, Goldberg AP, Hanley DF 2008 Treadmill exercise activates subcortical neural networks and improves walking after stroke: A randomised control trial. *Stroke* 39: 3341-3350
4. Macko RF, Ivey FM, Forrester LW, Hanley D, Sorkin JD, Katzel LI, Silver KH, Goldberg AP 2005 Treadmill exercise rehabilitation improves ambulatory function and cardiovascular fitness in patients with chronic stroke: A randomised controlled trial. *Stroke* 36: 2206-2211
5. Peurala SH, Airaksinen O, Huuskonen P, Jakala P, Juhakoski M, Sandell K, Tarkka IM, Sivenius J 2009 Effects of intensive therapy using gait trainer or floor walking exercises early after stroke. *Journal of Rehabilitation Medicine* 41: 166-173
6. Yang YR, Chen IH, Liao KK, Huang CC, Wang RY 2010 Cortical reorganisation induced by body weight-supported treadmill training in patients with hemiparesis of different stroke durations. *Archives of Physical Medicine and Rehabilitation* 91: 513-518

7. Duncan P, Studenski S, Richards L, Gollub S, Min Lai S, Reker D, Perera S, Yates J, Koch V, Rigler S, Johnson D 2003 Randomised clinical trial of therapeutic exercise in sub-acute stroke. *Stroke* 34: 2173-2180
8. Katz-Leurer M, Carmeli E, Schochina M 2003 The effect of early aerobic training on independence six months post stroke. *Clinical Rehabilitation* 17: 735-741
9. Lennon O, Carey A, Gaffney N, Stephenson J 2008 A pilot randomised controlled trial to evaluate the benefit of the cardiac rehabilitation paradigm for the non-acute ischaemic stroke population. *Clinical Rehabilitation* 22: 125-133
10. Mead GE, Greig CA, Cunningham I, Lewis SJ, Dinan S, Saunders DH, Fitzsimmons C, Young A 2007 Stroke: A randomised trial of exercise or relaxation. *Journal of the American Geriatrics Society* 55(6): 892-899
11. Downs SH, Black N 1998 The feasibility of creating a checklist for the assessment of the methodological quality both of randomized and non-randomized studies of health care interventions. *Journal of Epidemiology Community Health* 52: 377-384
12. Guyatt GH, Sackett DL, Cook DJ 1993 Users' guide to medical literature. II. How to use an article about therapy or prevention. *The Journal of the American Medical Association* 270(21): 2598-2601

Abbreviations List:

- CASP tool – Critical Appraisal Skills Programme tool for RCT's
- VO₂ – Volume of maximal oxygen consumption
- HR – Heart Rate
- HRR – Heart Rate Reserve
- HR Max – Maximum Heart Rate

Reliability of Measuring decision making time (DMT) and task time (TT) in cutting manoeuvres, using a contact mat system in healthy adults

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Background: A variety of functional performance tests (FPT) have been developed to simulate sport activities aiming to assess athlete's functional level. These tests tend to be planned movement tasks, where the individual is not required to respond to a stimulus, which would be more typical of sporting activity. Incorporating decision making (DM) into functional tests may provide more appropriate information about an individual's ability to cope with returning to sporting activity using newly designed contact mats. The purpose of this study was to determine the reliability of this contact mat system.

Methods: Ethical approval has been received by Cardiff and Vale UHB. Twenty-one healthy subjects performed a 45° cutting manoeuvre in response to a random sequence of auditory stimulus. All trials were performed on a 10 m runway at a standardised running speed of 2 ± 0.45 m•s and then repeated at a minimum of 1 day to maximum 10 days.

Results: ICC result demonstrated fair to excellent values 0.39 (95%CI: -.041- 0.697) to 0.814 (95% CI: 0.660- 0.913) and SEM (0.114 seconds, 0.084 seconds) for DMT between and within days respectively. TT result showed poor ICC values of -.096 (95% CI: -0.498- 0.341) to 0.459 (95%CI: 0.192- 0.703) and SEM (0.458 seconds, 0.44) between and within days respectively.

Conclusions: These results indicate that the contact mat system is reliable tool for measuring DMT. However, the variation in ICC could be related to the difficulty in measuring DM but could also be affected by learning or could also be a factor of natural variation of movement, particularly if the task was novel. However, more than three practice trials are needed to overcome the learning effect with DMT assessment.

Effect of Pixelation and Visual Field Shape on Visual Dependence in Young and Older Healthy Subjects

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Background: Dynamic visual dependence, the extent of reliance upon vision for spatial orientation, is commonly assessed by the Rod and Disc Test (RDT)¹, where subjects orientate a rod to their subjective vertical whilst being exposed to a background of rotating discs. However, pixelation and/or visual field shape may provide strategies to decrease apparent subjective visual vertical (SVV) tilt, thereby obscuring the true extent of visual dependence, which is thought to be higher in older subjects². This study investigated the effect of pixelation and peripheral visual field shape upon dynamic visual dependence in young and older healthy subjects.

Methods: Study 1: Eleven healthy young subjects (age $30 \pm \text{SD } 5$ yrs) performed the RDT in three conditions; 1) Rectangular TV screen (TVrec); 2) Round TV screen (TVround); 3) Round back projected image (PROJ) without visible pixelation. Static SVV was analysed by one-way ANOVA with post-hoc Bonferroni testing while dynamic SVV was analysed using Friedman's ANOVA with post-hoc Wilcoxon signed-rank testing between conditions. Study 2: TVrec and PROJ was performed by 10 healthy young (30 ± 5 yrs) and 10 healthy older (75 ± 7 yrs) subjects. All data were analysed by two-way ANOVA with post-hoc independent and paired t-tests between groups and conditions respectively. The study had local ethical approval.

Results: Study 1: Dynamic SVV was significantly greater in PROJ than TVrec ($p=0.003$) and TVround ($p=0.003$). Study 2: Both age groups had significantly higher dynamic SVV in PROJ compared with TVrec ($p=0.03$ in both groups). Static SVV did not differ in any condition or between groups.

Conclusions: Pixelation underestimated dynamic visual dependence, whereas visual field shape had no effect in young subjects.

Implications: The greater error in judging verticality for PROJ than TVrec, independent of age, suggests that TV screens are unsuitable for dynamic visual dependence testing and that healthy ageing per se may not lead to increased visual dependence.

References:

1. Dichgans J, Held R, Young L, Brandt M (1972) Moving visual sciences influence the apparent direction of gravity. *Science* 178: 1217-1219
2. Kobayashi H, Hayashi Y, Higashino K, Saito A, Kunihiro T, Kanzaki J, Goto F (2002) Dynamic and static subjective visual vertical with aging. *Auris Nasus Larynx* 29(4): 325-328

Flo's story: the development of an online interactive learning package about persistent pain in older people: A proposal.

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Background: It is important that students understand and appreciate older people's experiences of living with pain. A key question is how to give students sufficient exposure to the yearlong day-to-day challenges of living with persistent pain. Blending web technologies and social media into education may provide a unique approach.

The aim of this project is to create a learning package for health and social care students to facilitate their understanding of, and empathy with, older people with persistent pain.

Methods: We will build a learning object in the form of a Facebook account for a fictitious older person (called Flo) with persistent pain, based on real-life accounts, with a social network including international "friends." The learning package will be accompanied by self-directed learning outcomes and assessments. This project is supported by a grant from the Higher Education Academy.

Results: Thus far, in this development project, the Facebook storyline has been written by a professional playwright using older peoples' stories collected as part of the EOPIC (Engaging with Older People to develop and deliver Interventions for the self-management of Chronic pain) project, which is funded by the joint research councils' Lifelong Health & Well-being initiative. A focus group with health care students, provided with extracts from the story, found that students felt the story was interesting and would be happy to engage with this Facebook based educational package. Students provided recommendations about delivery and assessment of the educational resource. For example, it was suggested that the assessment task could be to write a letter to Flo in the role of an old friend who had "found" her on Facebook.

Conclusions: This feedback will be used to modify the resource as part of an iterative development process. Once developed, the resource will be made freely available to all health and social care students' in the UK.

Quantification of wobbleboard performance - a normative data study

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Background: The wobbleboard is a common rehabilitation tool in clinical practice. Despite this popularity, objective measurement of wobbleboard performance remains elusive. The aim of this study was to produce a normative database of wobbleboard performance using an instrumented wireless wobbleboard.

Methods: Twenty-two university students without pain or lower limb injury were invited to take part in the study. Bournemouth University granted ethical approval and written consent was provided. Participants completed double and single leg wobbleboard tasks with eyes open, closed and roaming. Order of testing was randomised and each task was completed three times. Data was collected using an instrumented wireless wobbleboard where tilt angle was determined at 15Hz and relayed to a computer. Wobbleboard performance was determined by calculating the time spent with the wobbleboard in the inner third, middle third and outer third of the maximum tilt angle as well as on the edge. The number of edge contacts was also determined.

Results: Mean %, standard deviation and 95% confidence intervals - Table 1

Task	Inner		Middle		Outer		Edge	
	Mean (Sd)	CI	Mean (Sd)	CI	Mean (Sd)	CI	Mean (Sd)	CI
DLSEF	28(11)	25-30	40 (6)	39-42	24 (8)	22-27	7 (5)	6-8
DLSER	28 (10)	30-25	40 (5)	41-38	26 (9)	28-23	7 (4)	8-6
DLSEC	6 (2)	5-7	16 (4)	15-17	32 (5)	31-34	45 (10)	12-8
SLSEF	27 (10)	29-24	39 (7)	41-38	24 (7)	26-22	10 (8)	12-8
SLSER	29 (14)	33-26	39 (7)	41-37	21 (9)	23-19	10 (10)	13-8

DLS, double leg stance; EF, eyes fixed; EC, eyes closed; ER, eyes roaming; SLS single leg stance.

Conclusions: This data represents normative profiles for wobbleboard performance. The availability of such data can be used clinically to assess whether individuals display good or poor wobbleboard performance implying potential impairments to balance.

Implications: This equipment could be utilised effectively within clinical practice.

References:

- Fitzgerald, D., Trakarnratanakul, N., Smyth, B., Caulfield, B. 2010. Effects of a Wobble Board - based therapeutic exergaming system for balance training on dynamic postural stability and intrinsic motivation levels. *Journal of Orthopaedic and sports Physical Therapy*. 40 (1) 11-19
- Karime, A., Al-Osman, H., Alja'am, J., Gueaieb, W., El Saddik, A., 2012. Tele-Wobble: A Telerehabilitation Wobble Board for Lower Extremity Therapy. *IEEE Transactions on Instrumentation and Measurement*. 61 (7) 1816-1824

To investigate the role of 'therapeutic alliance' in the client-physiotherapist relationship in Traumatic Brain Injury (TBI) rehabilitation – A qualitative study

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Background: To increase understanding regarding the nature of the therapeutic alliance between therapist and client within TBI rehabilitation.

Methods: Individual in-depth semi-structured interviews with clients and therapists. Interviews conducted in quiet location of interviewees' choice. A purposive sample of 4 TBI clients (39 ± 17 years) and 4 therapists from client-therapist pairs having private neurological physiotherapy treatment in the North West of England.

Results: The expectations of therapists and clients differed, with therapists having a lower expectation of rehabilitation. Characteristics of an 'ideal' TBI physiotherapist were identified by both groups with some shared attributes. All client-therapist pairs reported favourable working relationships. Barriers and drivers to 'therapeutic alliance' were identified and discussed.

Conclusions: 4 main themes:

1. Identification of key characteristics of an ideal TBI physiotherapist as discussed by clients and therapists
2. Importance of the therapeutic alliance towards successful TBI rehab – as important or more so than clinical skills
3. Importance of good communication skills in promoting a positive therapeutic alliance - new model of communication (Therapeutic Alliance Model) developed based on Ozar (1984)
4. Drivers and barriers to therapeutic alliance discussed and explored

Implications: Efforts should be made to increase therapeutic alliance within TBI rehab. More training in this area would be useful to complement clinical hands-on skills. It is suggested that increasing therapeutic alliance would promote client engagement, compliance and possibly improve clinical outcome. This study contributes to established literature in this area.

References:

Ozar, D.T (1984) Patient's autonomy: three models of the professional-lay relationship in medicine, *Theoretical Medicine*, Vol 5, pp61-68

Within- and between-day reliability of functional movements in healthy subjects using 3d motion analysis: a preliminary study

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Background: Variability of functional movement of the spine is rarely reported. To explore potential movement dysfunctions in back pain subjects, variability of repeated functional movements in healthy subjects, using 3D motion analysis, needs to be better understood.

Methods: Six healthy subjects (4 females, 2 males; age 38.3 ± 14.4 years) underwent 3D spinal-pelvic kinematic motion analysis (VICON) during three functional tasks (stand-to-sit, step-up and reaching) repeated on two separate days (minimum 7 days apart). Maximum flexion sagittal spinal angle for stand-to-sit and maximum extension angles for step-up and reach tasks were evaluated for thoracic, lumbar and pelvic regions. Four trials were recorded for each task on each day. Within- and between-day intra-class correlation coefficients (ICCs) and standard error of measurement (SEM) were calculated. Ethical committee approval was gained.

Results: Within-day: Reach Thoracic ICC 0.92 (95% Confidence Interval 0.75-0.99) SEM 2.06°, Lumbar 0.85 (0.58-0.97) SEM 4.30°, Pelvis 0.95 (0.83-0.99) SEM 0.7°. Step-up Thoracic 0.92 (0.75-0.99) SEM 2.07°, Lumbar 0.25 (-0.97-0.78) SEM 8.11°, Pelvis 0.84 (0.55-0.97) SEM 2.11°. Stand-to-sit Thoracic 0.92 (0.74-0.99) SEM 2.93°, Lumbar 0.97 (0.91-0.97) SEM 1.52°, Pelvis 0.92 (0.75-0.99) SEM 1.79°.

Between-day: Reach Thoracic ICC 0.90 (95% Confidence Interval 0.46-0.99) SEM 2.26°, Lumbar 0.44 (-0.90-0.47) SEM 2.29°, Pelvis 0.75 (-0.02-0.96) SEM 1.05°. Step-up Thoracic 0.16 (-0.68-0.82) SEM 0.05°, Lumbar 0.22 (-0.64-0.84) SEM 1.64°, Pelvis 0.79 (0.09-0.97) SEM 1.69°. Stand-to-sit Thoracic 0.61 (-0.27-0.93) SEM 1.51°, Lumbar 0.11 (-0.80-0.71) SEM 3.41°, Pelvis 0.72 (-0.07-0.96) SEM 2.73°.

Conclusions: The preliminary results suggest within-day sagittal spinal movement to be consistent in all spinal regions during each task. Between-day reliability appears poor in the thoracic and lumbar spine but good in the pelvis, thus suggesting the pelvis to demonstrate the least movement variability when re-tested.

Implications: Movement variability differs in spinal and pelvic regions and is an important factor to consider when evaluating the impact of physical interventions on spinal movement behaviour.

Therapist's perception on the clinical application of the SMART assessment

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Background: Evaluating level of consciousness in brain damaged patients can play a major part in their daily management. Accurate, consistent assessment of a patient with impaired consciousness is crucial to determine deterioration or improvement and to determine long term prognosis and treatment. Sensory Modality assessment and rehabilitation technique (SMART) is widely used to assess awareness in patients with brain injury. This study investigates therapist perception on clinical application of the SMART assessment.

Methods: A multi disciplinary qualitative study using a focus group as the method of data collection. Using expert SMART assessors from Royal hospital of neuro disability . Five occupational therapists took part in the study. Ethics approval was gained for the study from Sheffield Hallam University.

Results: SMART helps understand brain injury, understanding BI helps to understand SMART, SMART improves observation Skills, Training to use SMART takes time and Experience, Performing and documenting the SMART takes time but streamlining the process may compromises validity and sensitivity, SMART helps in understanding Prognosis, plan individualised Rehabilitation programmes and allows us to fulfil a moral obligation to understand people's level of awareness and communicate with people.

Conclusions: SMART is said to have its strengths and weaknesses but the study shows that the strengths by far outweigh the weaknesses and therapists that currently use SMART acknowledge a need for such an assessment.

Implications: Clinically the findings provide valuable insight for the practitioner, into what SMART is and how it can impact patients in low awareness states. This study also shows that it is worthwhile assessing patients in an in depth manner as now that there is an assessment that is sensitive enough to detect the smallest of changes and can detect awareness in patients that were previously misdiagnosed