

## 7. PELVIC ORGANS/WOMAN'S HEALTH

### Celiac disease linked to use of antibiotics in first year of life

Gastroenterology. 2019 Jun;156(8):2217-2229. doi: 10.1053/j.gastro.2019.02.039. Epub 2019 Mar 2.

#### **Association Between Antibiotics in the First Year of Life and Celiac Disease.**

Dydensborg Sander S<sup>1</sup>, Nybo Andersen AM<sup>2</sup>, Murray JA<sup>3</sup>, Karlstad Ø<sup>4</sup>, Husby S<sup>5</sup>, Størdal K<sup>6</sup>.  
*BACKGROUND & AIMS:*

The intestinal microbiota is believed to be involved in the pathogenesis of celiac disease, in addition to genetic variants and dietary gluten. The gut microbiota is strongly influenced by systemic antibiotics-especially in early life. We explored the association between exposure to a systemic antibiotic in the first year of life and risk of diagnosed celiac disease.

#### *METHODS:*

We performed an observational nationwide register-based cohort study. We included all children born in Denmark from 1995 through 2012 or Norway from 2004 through 2012. Children born in Denmark were followed until May 8, 2015 (age at end of follow-up was 2.3-20.3 years) and children born in Norway were followed until December 31, 2013 (age at end of follow-up was 1-10 years). We collected medical information from more than 1.7 million children, including 3346 with a diagnosis of celiac disease. Exposure to systemic antibiotics was defined as a dispensed systemic antibiotic in the first year of life.

#### *RESULTS:*

Exposure to systemic antibiotics in the first year of life was positively associated with diagnosed celiac disease in the Danish and Norwegian cohorts (pooled odds ratio 1.26, 95% confidence interval 1.16-1.36). We found a dose-dependent relation between an increasing number of dispensed antibiotics and the risk of celiac disease (pooled odds ratio for each additional dispensed antibiotic 1.08, 95% confidence interval 1.05-1.11). No specific type of antibiotic or age period within the first year of life was prominent. Adjustment for hospital admissions with an infectious disease in the first year of life did not change the estimates; adjustment for the number of maternally reported infections in the child in 2 large sub-cohorts decreased the association slightly (pooled odds ratio 1.18, 95% confidence interval 0.98-1.39).

#### *CONCLUSION:*

In a nationwide study of children in Denmark and Norway, we found exposure to systemic antibiotics in the first year of life to be associated with a later diagnosis of celiac disease. These findings indicate that childhood exposure to systemic antibiotics could be a risk factor for celiac disease.

**Dietary fats linked to problems****Low-Fat Dietary Pattern among Postmenopausal Women Influences Long-Term Cancer, Cardiovascular Disease, and Diabetes Outcomes**

Ross L Prentice Aaron K Aragaki Barbara V Howard Rowan T Chlebowski Cynthia A Thomson Linda Van Horn Lesley F Tinker JoAnn E Manson Garnet L Anderson Lewis E Kuller

*The Journal of Nutrition*, nxz107, <https://doi.org/10.1093/jn/nxz107>

**Background**

The preferred macronutrient dietary composition, and the health consequences of dietary fat reduction specifically, have been debated for decades. Here we provide a comprehensive overview of long-term health outcomes in the Women's Health Initiative Dietary Modification (DM) trial.

**Objective**

The DM trial aimed to examine whether a low-fat dietary pattern would reduce the risk of invasive breast cancer, colorectal cancer, and, secondarily, coronary heart disease (CHD), with various other health outcomes also considered.

**Methods**

The DM trial is a randomized controlled trial conducted at 40 centers in the US, among 48,835 postmenopausal women aged 50–79 y with baseline intake of  $\geq 32\%$  energy from fat. Participants were randomly assigned to a low-fat dietary pattern intervention group or to a usual-diet comparison group, during 1993–1998. Intervention goals were to reduce fat intake from  $\sim 35\%$  to 20% of total energy, in conjunction with increasing vegetables and fruit to 5 servings/d and grains to 6 servings/d.

**Results**

Over an 8.5-y (median) intervention period, intervention and comparison group differences included lower fat by 8–10%, and higher carbohydrate by 8–10%, of total energy, in conjunction with higher consumption of vegetables, fruit, and grains. Time-to-outcome analyses did not show significant differences between intervention and comparison groups for invasive breast cancer, colorectal cancer, or CHD, either over the intervention period or over longer-term cumulative follow-up. Additional analyses showed significant intervention group benefits related to breast cancer, CHD, and diabetes, without adverse effects. Over a 19.6-y (median) follow-up period, HRs (95% CIs) were 0.84 (0.74, 0.96) for breast cancer followed by death, and 0.87 (0.77, 0.98) for diabetes requiring insulin.

**Conclusions**

Reduction in dietary fat with corresponding increase in vegetables, fruit, and grains led to benefits related to breast cancer, CHD, and diabetes, without adverse effects, among healthy postmenopausal US women.

**Pediatric chronic pain**

Clin J Pain. 2019 Jul;35(7):633-643. doi: 10.1097/AJP.0000000000000723.

**The Co-occurrence of Pediatric Chronic Pain and Depression: A Narrative Review and Conceptualization of Mutual Maintenance.**

Soltani S<sup>1</sup>, Kopala-Sibley DC<sup>2,3,4,5</sup>, Noel M<sup>1,3,4,5</sup>.

**OBJECTIVES:**

Internalizing mental health issues co-occur with pediatric chronic pain at high rates and are linked to worse pain and functioning. Although the field has prioritized anxiety and posttraumatic stress disorder, little is known about co-occurring depression and chronic pain in youth, despite its high prevalence. The purpose of this narrative review was to examine the existing literature on the co-occurrence of pediatric chronic pain and depressive disorders and symptoms and propose a conceptual model of mutual maintenance to guide future research.

**METHODS:**

The literature from both fields of pediatric pain and developmental psychology were searched to review the evidence for the co-occurrence of pediatric chronic pain and depression. Conceptual models of co-occurring mental health issues and chronic pain, as well as child depression, were reviewed. From both literatures, we provide evidence for a number of proposed child, parent, and neurobiological factors that may serve to mutually maintain both conditions over time. On the basis of this evidence, we propose a conceptual model of mutual maintenance and highlight several areas for future research in this area.

**RESULTS:**

Evidence was found for the prevalence of depression in pediatric chronic pain as well as the co-occurrence of both conditions. The key mutually maintaining factors identified and proposed included neurobiological, intrapersonal (eg, cognitive biases, sleep disturbances, emotion regulation, and behavioral inactivation), and interpersonal (eg, parent mental health and pain, genes, and parenting) factors.

**DISCUSSION:**

Given the dearth of research on mutual maintenance in this area, this review and conceptual model could drive future research in this area. We argue for the development of tailored treatments for this unique population of youth to improve outcomes.

**Mother obesity and infants' odds of obesity****The association between maternal body mass index and child obesity: A systematic review and meta-analysis**

Nicola Heslehurst, Rute Vieira, Zainab Akhter, Hayley Bailey, Emma Slack, Lem Ngongalah, Augustina Pemu, Judith Rankin

<https://doi.org/10.1371/journal.pmed.1002817>

**Background**

There is a global obesity crisis, particularly among women and disadvantaged populations. Early-life intervention to prevent childhood obesity is a priority for public health, global health, and clinical practice. Understanding the association between childhood obesity and maternal pre-pregnancy weight status would inform policy and practice by allowing one to estimate the potential for offspring health gain through channelling resources into intervention. This systematic review and meta-analysis aimed to examine the dose–response association between maternal body mass index (BMI) and childhood obesity in the offspring.

**Methods and findings**

Searches in MEDLINE, Child Development & Adolescent Studies, CINAHL, Embase, and PsycInfo were carried out in August 2017 and updated in March 2019. Supplementary searches included hand-searching reference lists, performing citation searching, and contacting authors. Two researchers carried out independent screening, data extraction, and quality assessment. Observational studies published in English and reporting associations between continuous and/or categorical maternal and child BMI or z-score were included. Categorical outcomes were child obesity ( $\geq 95$ th percentile, primary outcome), overweight/obesity ( $\geq 85$ th percentile), and overweight (85th to 95th percentile). Linear and nonlinear dose–response meta-analyses were conducted using random effects models. Studies that could not be included in meta-analyses were summarised narratively. Seventy-nine of 41,301 studies identified met the inclusion criteria ( $n = 59$  cohorts). Meta-analyses of child obesity included 20 studies ( $n = 88,872$ ); child overweight/obesity, 22 studies ( $n = 181,800$ ); and overweight, 10 studies ( $n = 53,238$ ). Associations were nonlinear and there were significantly increased odds of child obesity with maternal obesity (odds ratio [OR] 3.64, 95% CI 2.68–4.95) and maternal overweight (OR 1.89, 95% CI 1.62–2.19). Significantly increased odds were observed for child overweight/obesity (OR 2.69, 95% CI 2.10–3.46) and for child overweight (OR 1.80, 95% CI 1.25, 2.59) with maternal obesity. A limitation of this research is that the included studies did not always report the data in a format that enabled inclusion in this complex meta-analysis.

**Conclusions**

This research has identified a 264% increase in the odds of child obesity when mothers have obesity before conception. This study provides substantial evidence for the need to develop interventions that commence prior to conception, to support women of childbearing age with weight management in order to halt intergenerational obesity.

**Hormone exposure and endometrial CA**

Int J Cancer. 2019 Jun 7. doi: 10.1002/ijc.32494

**Associations of pregnancy-related factors and birth characteristics with risk of endometrial cancer: a Nordic population-based case-control study.**

Trabert B<sup>1</sup>, Troisi R<sup>1</sup>, Grotmol T<sup>2</sup>, Ekbohm A<sup>3</sup>, Engeland A<sup>4,5</sup>, Gissler M<sup>6,7</sup>, Glimelius I<sup>3,8</sup>, Madanat-Harjuoja L<sup>9,10</sup>, Toft Sørensen H<sup>11</sup>, Tretli S<sup>2</sup>, Ording AG<sup>11</sup>, Bjørge T<sup>2,5</sup>.

Many pregnancy-related factors are associated with reduced endometrial cancer risk. However, it remains unclear whether pregnancy-related complications (e.g., hypertensive conditions) are associated with risk and whether these associations vary by endometrial cancer subtype.

Thus, we evaluated the risk of endometrial cancer, overall and by subtype, in relation to pregnancy-related factors, pregnancy complications, and birth characteristics. Utilizing population-based register data from four Nordic countries we conducted a nested case-control analysis of endometrial cancer risk.

We included 10,924 endometrial cancer cases and up to 10 matched controls per case. Odds ratios (ORs) with 95% confidence intervals (CIs) were derived from unconditional logistic regression models. We further evaluated associations by individual histology (i.e., endometrioid, serous, etc.) or, for rare exposures (e.g., pregnancy complications), by dualistic Type (Type I (n=10,343) and Type II (n=581)). Pre-existing and pregnancy-related hypertensive conditions were associated with increased endometrial cancer risk [OR (95% CI): pre-existing hypertension 1.88 (1.39-2.55); gestational hypertension 1.47 (1.33-1.63); preeclampsia 1.43 (1.30-1.58)], with consistent associations across dualistic Type. Increasing number of pregnancies [ $\geq$ four versus one birth: 0.64 (0.59-0.69)] and shorter time since last birth [ $<$ 10 versus  $\geq$ 30 years: 0.34 (0.29-0.40)] were associated with reduced endometrial cancer risk, with consistent associations across most subtypes.

Our findings support the role for both hormonal exposures and cell clearance as well as immunologic/inflammatory etiologies for endometrial cancer. This research supports studying endometrial hyperplasia, a precursor condition of endometrial cancer, in the context of pregnancy-related exposures, as this may provide insight into the mechanisms by which pregnancy affects subsequent cancer risk. This article is protected by copyright. All rights reserved..

**KEYWORDS:** *Nordic countries; endometrial cancer; hypertension; preeclampsia; pregnancy timing*

## 8. VISCERA

### IBS and MS pain

Clin J Pain. 2019 Jul;35(7):559-568. doi: 10.1097/AJP.0000000000000698.

#### **Musculoskeletal Pain in Individuals With Inflammatory Bowel Disease Reflects Three Distinct Profiles.**

Falling C<sup>1</sup>, Stebbings S<sup>2</sup>, Baxter GD<sup>1</sup>, Gearry RB<sup>3</sup>, Mani R<sup>1</sup>.

##### *OBJECTIVES:*

Pain affects over 70% of individuals with inflammatory bowel disease (IBD), with abdominal and musculoskeletal pain representing the most common symptoms. Musculoskeletal pain in IBD is reported to be associated with multiple clinical features, however the scope and nature of pain is not well understood. Primary aims were to identify subgroups of musculoskeletal pain in individuals with IBD based on clinical features of pain and assess how these subgroups differ in aspects of demographics, comorbidity, and IBD characteristics.

##### *METHODS:*

Cross-sectional online survey was performed on adults with IBD. Domains included: demographics, comorbidity, and clinical IBD and pain features. Latent class analysis was used to identify subgroups with similar attributes of: pain (severity, location, interference, and quality), IBD (activity, quality of life, and abdominal pain), and symptoms related to central sensitization. Correlation and regression analyses were used to profile identified subgroups.

##### *RESULTS:*

Of 305 included participants, 208 indicated the presence of musculoskeletal pain. Three identified subgroups were characterized as "mixed mechanism," "central mechanism," and "regional and remission." Between subgroup differences included: total comorbidity score (P=0.005), osteoarthritis (P=0.027), osteoporosis (P=0.045), depression (P=0.001), anxiety (P=0.025), and chronic fatigue syndrome (P=0.020). Sex and age were identified as confounders for depression and anxiety.

##### *CONCLUSIONS:*

Study results suggest multiple mechanisms contributing to pain experiences in IBD, to include central mechanisms. Features related to demographics, extraintestinal manifestations, IBD subtype, and clinical IBD features were not predictors of subgroup membership. However, total comorbidity demonstrated association with pain subgroups in this population.

**Adolescents abdominal pain and chronic pain link**

Clin J Pain. 2019 Jul;35(7):618-624. doi: 10.1097/AJP.0000000000000716.

**Associations Between Physical Activity and Chronic Pain Severity in Youth With Chronic Abdominal Pain.**

Kichline T<sup>1</sup>, Cushing CC<sup>1,2</sup>, Ortega A<sup>1</sup>, Friesen C<sup>3</sup>, Schurman JV<sup>3</sup>.

**OBJECTIVES:**

The present study aimed to: (1) better understand physical activity levels in youth with chronic abdominal pain and (2) investigate the relationship between day-level physical activity related to next day pain intensity to identify any intraindividual heterogeneity.

**METHODS:**

Seventy-one youth (M=13.34 y, SD=2.67 y) with chronic abdominal pain provided reports of pain severity and continuous objective reports of sedentary behavior, moderate-to-vigorous physical activity (MVPA), and total sleep time using accelerometers over 14 days.

**RESULTS:**

Findings revealed that youth with chronic abdominal pain do not meet recommended levels of MVPA per day (M=34.64 min, SD=33.31 min). Further, results indicated a random effect of the previous day's MVPA predicting pain severity. There was a small significant negative effect of within-person total sleep time as a predictor of pain severity.

**DISCUSSION:**

The current study highlights the importance of separating between-person and within-person differences when examining the relationship between physical activity and pain severity. Future studies should explore moderating factors that may help to explain random effects to better understand the types of individuals with positive or negative relationships between physical activity and pain severity.

**10 A. CERVICAL SPINE****Neck and diminished force perception****July 2019** Volume 42, Pages 6–12**Higher variability in cervical force perception in people with neck pain**Derong Eric Li<sup>1</sup>, Kai En Bryan David<sup>1</sup>, Shaun O'Leary<sup>2</sup>, Julia Treleaven<sup>1</sup>.DOI: <https://doi.org/10.1016/j.msksp.2019.04.001>**Highlights**

- Higher variability in force generation perception in participants with neck pain.
- Potentially this might suggest impaired force sense.
- Reduced force sense may affect functional activities requiring precision.

**Abstract****Background**

A reduced capacity to generate and sustain cervical muscle force over a range of contraction intensities is a feature of some participants with neck pain. To date there have been no studies comparing the accuracy of force perception in participants with and without neck pain.

**Design**

Cross-sectional observational study.

**Methods**

Participants with (n = 25) and without (n = 25) neck pain performed isometric muscle contractions at three progressive self-perceived (no feedback provided) intensities (10, 25, 50) % of their maximal voluntary contraction (MVC) in cervical: flexion, extension, right and left lateral flexion. Absolute error (AE), constant error (CE), and variable error (VE) between actual and targeted force values were calculated.

**Results**

The neck pain group had: (1) AE-combined direction -significantly higher at 10% and lower at 50% (p < 0.05); (2) significantly lower CE in most measures (p < 0.05); (3) higher mean VE in all measures, with 10, 25, and 50% combined direction and overall combined % extension significantly higher (p < 0.05).

**Conclusions**

Findings indicate higher variability in force generation perception across all directions and intensities in participants with neck pain compared to healthy controls. Potentially this greater variability might suggest impaired force sense, a construct of proprioception in participants with neck pain. Reduced force sense may have implications for participants with neck pain during functional activities requiring precision and may need to be trained. Further research is required.



**13 B. TMJ/ORAL****Bruxism and TMJ problems in adolescents****Association between bruxism and temporomandibular disorders in children: A systematic review and meta-analysis**

Larissa de Oliveira Reis Rosangela Almeida Ribeiro Carolina Castro Martins  
Karina Lopes Devito

<https://doi.org/10.1111/ipd.12496>

**Background**

Bruxism in children and its relation to the development of temporomandibular disorders (TMD) has not been clearly determined yet.

**Aim**

The objective of this systematic review was to evaluate the possible association between bruxism and TMD in children.

**Design**

Seven databases were searched, and 497 articles were assessed. Methodological quality was assessed through Newcastle-Ottawa Scale. The meta-analysis was performed with the articles in which extraction of data was possible and the summary effect measure through odds ratio (OR) and respective 95% confidence intervals (CIs). Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) was used to assess the certainty of evidence.

**Results**

Ten cross-sectional studies were included in the systematic review. Of these, 8 showed a statistically significant association between bruxism and TMD. Seven studies however presented a high risk of bias. The meta-analysis was performed with 3 articles and obtained an OR of 2.97 (95% CI ranging from 1.72-5.15), indicating that children with bruxism are 2.97 times more likely to present TMD, with very low level of certainty defined by GRADE.

**Conclusions**

Although the studies showed high risk of bias, the qualitative analysis of individual studies showed that the children with bruxism have greater chance of developing TMD.

### Splint therapy reduces antioxidant properties

#### Changes in salivary oxidative status, salivary cortisol, and clinical symptoms in female patients with temporomandibular disorders during occlusal splint therapy: a 3-month follow up

- E. Vrbanović, I. Lapić, D. Rogić and I. Z. Alajbeg

*BMC Oral Health* 2019 **19**:100 <https://doi.org/10.1186/s12903-019-0791-8>

#### Background

Differences in the expression of oxidative stress (OS) markers between female patients with temporomandibular disorders (TMD) and healthy individuals indicate that OS plays a role in the pathogenesis of TMD. Because chronic exposure to stress generates oxidative damage during continuous stimulation of the hypothalamic-pituitary-adrenal axis, we expected that higher levels of cortisol might be associated with higher oxidative damage. Our aim was to test the association between OS markers, stress perception, and salivary cortisol (SC) in chronic, female TMD patients. We tracked changes in OS markers and SC during occlusal splint therapy in order to evaluate the influence of treatment on oxidative status. We hypothesized that the effects of TMD therapy would differ among individuals depending on the source and intensity of pain.

#### Methods

Sixteen female patients were recruited, and 12 finished the study. Clinical assessment and saliva sampling were performed at the baseline and follow-up appointments. Repeated measures analysis of variance and Pearson's correlation were used for analyzing the data.

#### Results

After 3 months, a significant reduction in afternoon total antioxidant capacity (TAC) was observed ( $p < 0.05$ ). A significant reduction in afternoon malondialdehyde (MDA) ( $p = 0.021$ ) and a decrease in afternoon MDA to superoxide dismutase ratios ( $p = 0.017$ ) were present in high-intensity pain patients. At baseline, higher levels of perceived stress were significantly associated with higher morning cortisol ( $\rho = 0.67$ ). At the end of the therapy, reduced perceived stress was positively correlated with morning SC changes when considering all TMD patients, but the association between perceived stress with OS markers was present only in myofascial pain (MP) group. The effect of treatment on the self-perceived quality of life was more pronounced in female MP patients while the reduction of spontaneous pain was significantly greater in high-intensity pain patients.

#### Conclusion

Our data indicate that occlusal splint therapy in female TMD patients contributes to increasing their capacity to remove free radicals. The question remains whether or not TAC decreases in this process as a result of avoiding unnecessary processes, once the increase in antioxidants effectively compensates for OS. The intensity and the source of pain should be considered important factors in future investigations evaluating salivary OS markers and their association with perceived stress and SC in TMD patients.

**Sleep disturbances and chronic pain**

Clin J Pain. 2019 Jul;35(7):569-576. doi: 10.1097/AJP.0000000000000711.

**Associations Between Sleep Disturbance and Chronic Pain Intensity and Function: A Test of Direct and Indirect Pathways.**

Burgess HJ<sup>1</sup>, Burns JW<sup>2</sup>, Buvanendran A<sup>3</sup>, Gupta R<sup>4</sup>, Chont M<sup>4</sup>, Kennedy M<sup>2</sup>, Bruehl S<sup>4</sup>.

**OBJECTIVES:**

Sleep disturbance and chronic pain are related. The present study evaluated both direct and indirect (mediated) pathways through which sleep disturbance might be related to chronic pain intensity and function.

**METHODS:**

In total, 87 individuals (64% female) with chronic low back pain but not using opioids daily completed questionnaires assessing their sleep disturbance, chronic pain intensity, function, depression, anxiety, positive affect, and catastrophizing.

**RESULTS:**

Greater sleep disturbance was associated with greater pain intensity, worse function, greater emotional distress, lower positive affect, and higher levels of catastrophizing. Cross-sectional mediation analyses revealed that the positive associations between sleep disturbance and chronic pain intensity were conveyed statistically not only by significant indirect effects of elevated emotional distress, lower positive affect, and greater catastrophizing associated with sleep disturbance, but also by significant direct effects of sleep disturbance on chronic pain intensity. Similarly, we found that the associations between sleep disturbance and impaired function were conveyed statistically not only by significant indirect effects of elevated chronic pain intensity associated with sleep disturbance, but also by significant direct effects of sleep disturbance on function.

**DISCUSSION:**

Sleep disturbance was related significantly with chronic pain intensity and function by both direct and indirect pathways. These results are consistent with an emerging literature highlighting the potential significance of sleep disturbance in chronic pain patients, and provide further support for addressing sleep disturbance in the assessment and management of chronic pain.

## 13 D. SLEEP

## Association of weight gain and nighttime artificial light

**Association of Exposure to Artificial Light at Night While Sleeping With Risk of Obesity in Women**

Yong-Moon Mark Park, MD, PhD<sup>1</sup>; Alexandra J. White, PhD<sup>1</sup>; Chandra L. Jackson, PhD, MS<sup>1</sup>; et al  
Clarice R. Weinberg, PhD<sup>2</sup>; Dale P. Sandler, PhD<sup>1</sup>

*JAMA Intern Med.* Published online June 10, 2019. doi:10.1001/jamainternmed.2019.0571

## Key Points

**Question** Is artificial light at night while sleeping associated with weight gain and obesity?

**Importance** Short sleep has been associated with obesity, but to date the association between exposure to artificial light at night (ALAN) while sleeping and obesity is unknown.

**Meaning** Exposure to artificial light at night while sleeping appears to be associated with increased weight, which suggests that artificial light exposure at night should be addressed in obesity prevention discussions. **Design, Setting, and Participants** This baseline and prospective analysis included women aged 35 to 74 years enrolled in the Sister Study in all 50 US states and Puerto Rico from July 2003 through March 2009. Follow-up was completed on August 14, 2015. A total of 43 722 women with no history of cancer or cardiovascular disease who were not shift workers, daytime sleepers, or pregnant at baseline were included in the analysis. Data were analyzed from September 1, 2017, through December 31, 2018. **Main Outcomes and Measures** Prevalent obesity at baseline was based on measured general obesity (body mass index [BMI]  $\geq 30.0$ ) and central obesity (waist circumference [WC]  $\geq 88$  cm, waist-to-hip ratio [WHR]  $\geq 0.85$ , or waist-to-height ratio [WHtR]  $\geq 0.5$ ). To evaluate incident overweight and obesity, self-reported BMI at enrollment was compared with self-reported BMI at follow-up (mean [SD] follow-up, 5.7 [1.0] years). Generalized log-linear models with robust error variance were used to estimate multivariable-adjusted prevalence ratios (PRs) and relative risks (RRs) with 95% CIs for prevalent and incident obesity. **Results** Among the population of 43 722 women (mean [SD] age, 55.4 [8.9] years), having any ALAN exposure while sleeping was positively associated with a higher prevalence of obesity at baseline, as measured using BMI (PR, 1.03; 95% CI, 1.02-1.03), WC (PR, 1.12; 95% CI, 1.09-1.16), WHR (PR, 1.04; 95% CI, 1.00-1.08), and WHtR (PR, 1.07; 95% CI, 1.04-1.09), after adjusting for confounding factors, with  $P < .001$  for trend for each measure. Having any ALAN exposure while sleeping was also associated with incident obesity (RR, 1.19; 95% CI, 1.06-1.34). Compared with no ALAN, sleeping with a television or a light on in the room was associated with gaining 5 kg or more (RR, 1.17; 95% CI, 1.08-1.27;  $P < .001$  for trend), a BMI increase of 10% or more (RR, 1.13; 95% CI, 1.02-1.26;  $P = .04$  for trend), incident overweight (RR, 1.22; 95% CI, 1.06-1.40;  $P = .03$  for trend), and incident obesity (RR, 1.33; 95% CI, 1.13-1.57;  $P < .001$  for trend). Results were supported by sensitivity analyses and additional multivariable analyses including potential mediators such as sleep duration and quality, diet, and physical activity.

**Conclusions and Relevance** These results suggest that exposure to ALAN while sleeping may be a risk factor for weight gain and development of overweight or obesity. Further prospective and interventional studies could help elucidate this association and clarify whether lowering exposure to ALAN while sleeping can promote obesity prevention. **Findings** In this cohort study of 43 722 women, artificial light at night while sleeping was significantly associated with increased risk of weight gain and obesity, especially in women who had a light or a television on in the room while sleeping. Associations do not appear to be explained by sleep duration and quality or other factors influenced by poor sleep.

## 14. HEADACHES

### MS impairments

July 2019 Volume 42, Pages 67–83

#### Cervical musculoskeletal impairments in migraine and tension type headache: A systematic review and meta-analysis

Zhiqi Liang<sup>a,m</sup>Olivia Galea Lucy Thomas Gwendolen Jull Julia Treleaven

DOI: <https://doi.org/10.1016/j.msksp.2019.04.007>

#### Highlights

- Systematic review of neck dysfunction in tension type headache and migraine.
- Very low level evidence of slightly reduced neck motion in migraine.
- Low level evidence of reduced neck motion and altered posture in TTH.
- Moderate to very low levels of evidence indicate other measures to be normal.

#### Abstract:

**Aims** Neck pain is common in migraine and tension type headache (TTH). This review aimed to examine the evidence for cervical musculoskeletal impairments in these headaches.

**Methods** Databases PubMed (Medline), EMBASE, CINAHL, SCOPUS, and Web of Science were searched from inception to December 2018. Observational studies using a comparator group were included. Risk of bias was assessed using the Appraisal tool for Cross-Sectional Studies. Results were pooled using random effects meta-analysis. Level of evidence for each outcome was assigned based on risk of bias, consistency of results and magnitude of difference between participants with headache and controls. (PROSPERO registration: CRD42018083683).

#### Results

Of 48 studies included, the majority were rated moderate risk of bias due to possible confounding influences. In total, 17 cervical outcomes were assessed, with confidence in findings ranging from very low to moderate levels. Compared to controls, participants with TTH had greater forward head posture (FHP) (MD =  $-6.18^\circ$ , 95% CI [ $-8.18^\circ$ ,  $-4.18^\circ$ ]) and less cervical range of motion (ROM) (greatest difference transverse plane MD =  $-15.0^\circ$ , 95% CI [ $-27.7^\circ$ ,  $-2.3^\circ$ ]). Participants with migraine demonstrated minimally reduced cervical ROM (greatest difference sagittal plane MD =  $-5.4^\circ$ , 95% CI [ $-9.9^\circ$ ,  $-0.9^\circ$ ]). No differences presented in head posture, strength, craniocervical flexion test performance or joint position error between migraineurs and controls.

#### Conclusions

TTH presented with more findings of cervical musculoskeletal impairments than migraine however levels of confidence in findings were low. Future studies should differentiate episodic from chronic headache, identify coexisting musculoskeletal cervical disorders, and describe neck pain behaviour in headache.

## 16. CONCUSSIONS

### Concussion Part I

July 2019 Volume 42, Pages 140–150

#### Concussion - Part I: The need for a multifaceted assessment

Kathryn J. Schneider

DOI: <https://doi.org/10.1016/j.msksp.2019.05.007>

#### Highlights

- In the acute setting, screening for red flags and more serious pathology is imperative.
- Concussion is a heterogeneous injury and a multifaceted assessment is recommended.
- Differential diagnosis to identify targeted areas for treatment can be informed by a comprehensive assessment.
- Evaluation may include assessment of cognition, vestibular/balance, coordination, visual, cervical spine and exertion.

#### Abstract

##### Introduction

Concussion is among the most commonly occurring sport and recreation injuries in today's society. An understanding of the heterogeneous nature of concussion will assist in directing a multifaceted and comprehensive interdisciplinary assessment following injury.

##### Purpose

The purpose of this masterclass article is to summarize the current state of the evidence in the area of concussion, describe typical symptom presentations and assessment techniques that may assist in directing appropriate management following concussion.

##### Implications

A comprehensive assessment including a thoughtful differential diagnosis will assist the clinician to direct care appropriately and efficiently in individuals who have suffered a concussion.

**Concussion Part II****July 2019** Volume 42, Pages 151–161**Concussion part II: Rehabilitation – The need for a multifaceted approach**

Kathryn J. Schneider

DOI: <https://doi.org/10.1016/j.msksp.2019.01.006>**Introduction**

While most individuals recover in the initial days to weeks following a concussion, in up to 30% of cases symptoms and functional limitations may persist beyond the initial four weeks. There is emerging evidence that multifaceted physiotherapy techniques for individuals who have ongoing symptoms following concussion may be of benefit.

**Purpose**

The purpose of this masterclass article is to summarize the evidence for rehabilitation, describe treatment techniques and multifaceted interventions following concussion.

**Implications**

Concussion is a heterogenous injury and multiple types of rehabilitation may be required to address ongoing alterations in function. A greater understanding of evidence based rehabilitative techniques will enable the clinician to direct treatment and facilitate recovery for individuals who have ongoing symptoms following concussion.

## Concussion Part III

July 2019 Volume 42, Pages 166–172

**Single and dual tandem gait assessment post concussion: What performance time is clinically relevant across adult ages and what can influence results?**

Olivia A. Galea\*<sup>†</sup> Hayden D. Bristow Scott M. Chisholm Michaela E. Mersch Jocelyn Nullmeyer Chantelle R. Reid Julia M. Treleven

DOI: <https://doi.org/10.1016/j.msksp.2019.04.006>

**Highlights**

- Mean single and dual tandem gait best times of 21 and 29s in healthy controls.
- Older adults (55+) are slower than younger adults for both tasks.
- Those with larger feet (>27 cm) may perform tasks up to 3s faster.
- Specificity of instructions does not appear to influence times for both tasks.
- Dual task cost-motor might be a useful measure.

**Abstract****Aim**

The three-metre tandem gait test (TG) is used to assess postural control during locomotion following sports concussion. However, values used to determine a pass/fail result are currently based on young athletic populations. Times for test completion may be influenced by several intrinsic or extrinsic factors. The aim of this study was to collate healthy individual single, dual task as well as dual task cost – motor TG times for a non-elite athlete population, across several age groups, and to investigate several potential influencing factors.

**Methods**

Healthy individuals aged 18–55+, who had never experienced a concussion completed single and dual task TG following the SCAT5 protocol. A separate group (n = 20, age, foot length and body mass index matched) performed the tests with alternate instructions.

**Results**

Mean best TG time for all participants were: single task 21.03 ( $\pm 5.26$ s), dual task 29.59 ( $\pm 9.84$ s) and DTC-motor 8.57 ( $\pm 7.5$ s:41.7%). Age and foot length but not specificity of verbal instructions were related to TG times. Significantly slower single and dual task times were identified for the 55+ age group when compared to the three youngest groups ( $p < 0.01$ ). No difference was seen for DTC-motor time or % between age groups ( $p > 0.05$ ).

**Conclusion**

Healthy individual data collected exceeded previously reported average times. Faster times were evident in younger participants and those with longer foot length. Results from this study can be used as a reliable guideline to inform clinical decisions around the pass/fail result of TGT across age ranges in non-elite athlete populations post-concussion.



## Concussion recurrence

**July 2019** Volume 42, Pages 173–185**History of concussion and risk of subsequent injury in athletes and service members: A systematic review and meta-analysis**Jennifer C. Reneker\*<sup>1</sup> Ryan Babl

Meredith M. Flowers

DOI: <https://doi.org/10.1016/j.msksp.2019.04.004>**Highlights**

- A concussion confers increased risk of injury in athletes and service members.
- After a concussion, the odds of a second concussion is nearly 3.73 times higher.
- The odds of sustaining a lower extremity injury is 1.60 higher after a concussion.
- The rate lower extremity injury per athlete exposure is higher after a concussion.

**Abstract**

Risk of secondary injury after a primary concussion in sports and military contexts is an emerging area of interest in research. The purpose of this review was to provide an evidence synthesis describing risk of injury in athletic and military populations with and without a history of concussion.

Electronic database searches were completed through September 7, 2018 in PubMed, EMBASE, CINAHL and SCOPUS. Peer-reviewed observational studies of any design with participants who were athletes or service members; measured the outcome of any type of injury; and compared injury between those with and without a history of concussion were included. Risk of bias was assessed using the Q-Coh II. Twenty-seven articles were included. Seventeen meta-analyses were completed for risk of any injury, risk of concussion, and risk of extremity injury using odds, hazard, and rate ratios. The results indicate significantly increased odds of all injuries (OR = 2.55; 95%CI 1.85,3.52); concussion (OR = 3.73; 95%CI 2.41,5.78); and lower extremity injuries (OR = 1.60; 95%CI 1.32,1.94) in those with a history of concussion compared to those without. Additional analyses reveal this increased risk is apparent when looking at time to event data and rate of injury based on number of exposures. While the reasons for the increased incidence of secondary injury associated with a concussion are not yet understood, there are potentially behavioral attributes and motor control deficits that contribute

. It is suggested that research is needed to determine if active therapeutic treatment for disturbances in sensorimotor and neuromotor control after concussion could attenuate the increased risk for injury.

## Concussion part IV

July 2019 Volume 42, Pages 186–192

**Relationship of athletic and academic identity to concussion reporting intentions**Heidi A. Wayment<sup>a</sup> Ann H. Huffman<sup>a,b</sup> Taylor S. Lane<sup>d</sup> Monica R. Lininger<sup>c</sup>DOI: <https://doi.org/10.1016/j.msksp.2019.04.003>**Highlights**

- Reporting potential concussion symptoms an important health behavior.
- Assessed two self-identity dimensions and three intention behaviors.
- Athletic identity associated with lower likelihood of reporting symptoms.
- Academic identity associated with greater likelihood of reporting symptoms.
- Only academic identity associated with reporting on behalf of a teammate.

**Abstract****Background**

Understanding concussed athletes' motivations for reporting concussion symptoms is important for health care professionals who are charged with the care, management, and prevention of future injury.

**Objectives**

To examine if athletic and academic identity predict concussion symptom reporting intentions above and beyond traditional socio-cognitive predictors.

**Design**

Cross-sectional study using self-report measures during the 2016 collegiate football season.

**Method**

In a sample of National Collegiate Athletic Association (NCAA) Division I American football athletes ( $N = 205$ ) we examined the relationship of athletic and academic identity with three indices of symptom reporting behavior: reporting during a game, reporting 24 h after a game, and reporting on behalf of a teammate. We used descriptive statistical analyses, correlations, and linear regression to examine hypotheses.

**Results**

Controlling for traditional predictors, athletic identity was associated with a lower likelihood to report symptoms during a game ( $\beta = -0.22$ ,  $t = -3.28$ ,  $p < .001$ ) or within 24 h ( $\beta = -0.28$ ,  $t = -4.12$ ,  $p < .001$ ). Academic identity was positively associated with reporting intentions during a game ( $\beta = 0.12$ ,  $t = 1.68$ ,  $p < .05$ ), 24 h later ( $\beta = 0.13$ ,  $t = 1.85$ ,  $p < .05$ ), and on behalf of a teammate ( $\beta = 0.22$ ,  $t = -3.36$ ,  $p < .001$ ).

**Conclusions**

Athletic and academic identities offer additional insight into athletes' motivation for concussion symptom reporting intentions, above and beyond traditional socio-cognitive predictors. Discussion focuses on the benefit of incorporating these important self-identities into educational health interventions to improve their impact.

## 19. GLENOHUMERAL/SHOULDER

### Distance perceptual deficits

July 2019 Volume 42, Pages 120–124

#### Distorted distance perception to reachable points in people with chronic shoulder pain

Rafael K. Alaiti<sup>a,\*</sup> Maria Helena Leite Hunziker<sup>c</sup> Marcelo F. da Costa<sup>a,c</sup>

##### Highlights

- Perceptual distortions are not a universal consequence of having chronic pain.
- Sensory stimulus that were not related to the action were judged precisely.
- Individuals whose pain was highly related to movement distorted distance estimates.
- Spatial distortions occurred more often inside reaching distance.

##### Abstract

Perception is not simply a carbon copy of the real world, but is subject to distortions that may reflect protective drive. This study aimed to investigate whether people with chronic shoulder pain show perceptual distortions of space and body that may promote protective behavior.

Eighty-four people with shoulder pain and 51 healthy controls participated. Participants estimated (1) distances to points on a cork-board within and outside reaching distance, and (2) the perceived length of their own arms. A novel measure of movement-related pain was also used to determine whether movement-related pain relates to perceptual distortion. Overall, distance and arm length estimates did not differ between groups, nor did participants perceive their arms to be of different length. However, a moderate correlation between movement-related pain and the index of distance perception was found within the pain group, specifically for distance estimates to points within reach.

Our results suggest that distorted perception is not a typical consequence of chronic shoulder pain; however, that it may occur in cases where pain is strongly linked to movement. Our findings have implications for understanding avoidance of movement in people with persistent pain.

### 35. KNEE/TOTAL

#### Factors which may lead to post-surgical chronic pain

Clin J Pain. 2019 Jul;35(7):577-582. doi: 10.1097/AJP.0000000000000714.

#### **Presurgical Comorbidities as Risk Factors For Chronic Postsurgical Pain Following Total Knee Replacement.**

Skrejborg P<sup>1,2</sup>, Petersen KK<sup>1,3</sup>, Kold S<sup>2,4</sup>, Kappel A<sup>2,4</sup>, Pedersen C<sup>2</sup>, Østgaard SE<sup>2</sup>, Simonsen O<sup>2</sup>, Arendt-Nielsen L<sup>1</sup>.

#### *OBJECTIVES:*

Chronic postsurgical knee pain (CPSP) is a burden for ~20% of the patients following total knee replacement (TKR). Presurgical pain intensities have consistently been found associated with CPSP, and it is suggested that comorbidities are likewise important for the development of CPSP. This study aimed to identify presurgical risk factors for the development of CPSP 5 years after TKR on the basis of medical records containing information with regard to comorbidities.

#### *MATERIALS AND METHODS:*

Patients undergoing primary TKR surgery were contacted 5 years after TKR. Presurgical Knee Society Score and comorbidities were evaluated. Postsurgical knee pain at 5 years of follow-up was assessed on a Numeric Rating Scale (NRS, 0 to 10). Logistic regression models were utilized to identify patients with moderate-to-severe (NRS $\geq$ 3) and mild-to-no (NRS $<$ 3) CPSP at 5-year follow-up. Odds ratio (OR) for significant factors was calculated.

#### *RESULTS:*

A total of 604 patients were contacted, 493 patients responded, 352 patients provided a completed questionnaire. A total of 107 patients reported NRS $\geq$ 3 at follow-up. Significant presurgical factors associated with CPSP were fibromyalgia (OR=20.66; P=0.024), chronic pain in body parts other than the knee (OR=6.70; P=0.033), previous diagnosis of cancer (OR=3.06; P=0.001), knee instability (OR=2.16; P=0.021), younger age (OR=2.15; P=0.007), and presurgical knee pain (OR=1.61; P=0.044). Regression analysis identified 36 of 107 (33.6%) patients with CPSP on the basis of presurgical factors, and 231 patients (94.3%) without CPSP were classified correctly.

#### *DISCUSSION:*

The current study found that a variety of presurgical clinical factors can correctly classify 33.6% of patients at risk for developing CPSP 5 years following TKR.

## 38 B. FOOT TYPES

### Foot shape measurements

July 2019 Volume 42, Pages 98–103

#### The clinical measure of forefoot-shank alignment partially reflects mechanical properties of the midfoot joint complex

Bruno Dayrell da Costa Paes Thales Rezende Souza\*

DOI: <https://doi.org/10.1016/j.msksp.2019.04.016>

#### Highlights

- The FSA measure is moderately correlated to the MFJC tissues resistance to inversion.
- More inverted FSAs are related to lower resistance to MFJC inversion.
- This relation may mediate forefoot alignment association with foot pronation.

#### Abstract

##### Background

The clinical measure of forefoot-shank alignment (FSA) predicts the amount of foot pronation during weight-bearing tasks. This may be mediated by a relationship between FSA and the mechanical resistance of the midfoot joint complex (MFJC) to forefoot inversion, which is a component of weight-bearing foot pronation.

##### Objective

To investigate if the clinical measure of FSA is associated with MFJC mechanical resistance to inversion.

##### Design

Cross-sectional observational study.

##### Method

Forty-six healthy individuals (27 males; 19 females) with mean age of 26.4 years (SD 5.3) participated in this study. FSA was measured with photographs. The resistance torque of the MFJC against inversion was measured with a specially designed device. Mean torque, mean torque normalized by body mass, and joint resting position were calculated as variables related to MFJC mechanical resistance. Correlation analyses were carried out to test the association between each MFJC resistance variable and the FSA ( $\alpha = 0.05$ ).

##### Results

/findings: There were significant moderate correlations of FSA with mean torque ( $r = -0.44$ ,  $p = 0.002$ ), mean normalized torque ( $r = -0.42$ ,  $p = 0.004$ ) and resting position ( $r = 0.39$ ,  $p = 0.007$ ). The clinical measure of FSA is associated to the mechanical resistance of the MFJC: (a) the greater the FSA, the smaller the resistance torques; (b) the greater the FSA, the more inverted the forefoot resting position.

##### Conclusions

These results showed that the clinical measure of FSA is moderately related to mechanical properties of the MFJC.

## 45 A. MANUAL THERAPY LUMBAR &amp; GENERAL

## Red flags cauda equina syndrome

July 2019 Volume 42, Pages 125–133

**What is the diagnostic accuracy of red flags related to cauda equina syndrome (CES), when compared to Magnetic Resonance Imaging (MRI)? A systematic review**Dionne Nathalie<sup>a</sup> Adefolarin Abiodun<sup>a</sup> Kunzelman Dena<sup>a</sup> Trehan Nitin<sup>a</sup> Finucane Laura<sup>b</sup>,  
Levesque Lenerdene<sup>a</sup> Walton David M<sup>a</sup> Sadi Jackie<sup>a,\*</sup>DOI: <https://doi.org/10.1016/j.msksp.2019.05.004>**Highlights**

- Diagnostic accuracy of red flags used to identify cauda equina syndrome is poor.
- Most of the pooled red flags showed heterogeneity for sensitivity and specificity.
- Saddle anesthesia had the best overall diagnostic value of the red flags.
- Bilateral leg pain had the highest pooled sensitivity of the red flags.
- Back pain was the red flag with the best negative likelihood ratio.

**Abstract**

**Objective** To review and statistically pool available evidence on the diagnostic accuracy of red flags to clinically identify MRI confirmed Cauda Equina Syndrome (CES).

**Study design** Systematic review.

**Data sources** Embase, Scopus, Ovid Medline, Ovid Healthstar, Amed and CINAHL from inception to January 30, 2018 and a grey literature search.

**Inclusion criteria** Primary diagnostic studies, published in English; comparing red flags for CES; to Magnetic Resonance Imaging (MRI) as reference standard; in humans; older than 18 years.

**Methods**

Data extraction, assessment of study quality using a modified QUADAS-2 tool and the use of GRADE to synthesize the results for each test was performed by three independent assessors. Diagnostic accuracy statistics applied to the identified data and pooled analysis performed using Meta-DiSc, version 1.4. Moderator analyses planned for pooled results.

**Results**

Seven studies (total N = 569 participants) were included. Potential signs or symptoms of CES were compared to MRI findings. Diagnostic data could be pooled for reduced anal tone, leg pain, back pain, saddle anaesthesia, urinary retention, urinary incontinence and bowel incontinence from six of seven studies. The pooled sensitivity for the signs and symptoms ranged from 0.19 (95% CI 0.09 to 0.33) to 0.43 (95% CI 0.30 to 0.56) while the pooled specificity ranged from 0.62 (95% CI 0.59 to 0.73) to 0.88 (95% CI 0.85 to 0.92).

**Conclusion**

Red flags used to identify potential CES appear to be more specific than sensitive. As such, when these are present, they should be considered justification for prompt diagnostic workup.

## 45 B. MANUAL THERAPY CERVICAL

July 2019 Volume 42, Pages 90–97

**Association between sympathoexcitatory changes and symptomatic improvement following cervical mobilisations in participants with neck pain. A double blind placebo controlled trial**Ion Lascurain-Aguirrebeña<sup>a,c,\*</sup>, Di J. Newham<sup>b</sup>, Xabier Galindez-Ibarbengoetxea<sup>c</sup>, Xabat Casado-Zumeta<sup>d</sup>, Aitana Lertxundi<sup>e,f,g</sup>, Duncan J. Critchley<sup>a</sup>DOI: <https://doi.org/10.1016/j.msksp.2019.05.001>**Highlights**

- Cervical mobilisations are effective in the short term at reducing symptoms in people with neck pain.
- Cervical mobilisations cause increased skin conductance suggestive of sympathoexcitation.
- Sympathoexcitatory changes are not associated with symptomatic improvement.
- Changes may be caused by an orienting response unrelated to endogenous pain inhibition.

**Abstract****Background**

sympathoexcitation observed with passive cervical mobilisations may imply activation of an endogenous pain inhibition system resulting in hypoalgesia. However, research is mostly in asymptomatic participants and there is very limited evidence of a relationship between sympathoexcitation and symptomatic improvement in people with clinical pain.

**Objective** to investigate the effects of cervical mobilisations on the sympathetic nervous system in participants with neck pain, and to explore the relationship between symptomatic improvement and sympathoexcitation.

**Design** double-blind randomised controlled trial.

**Method**

40 participants with neck pain (aged 20–69 years, 25 female) were randomly allocated to either cervical mobilisations or motionless placebo. Skin conductance was measured before, during, and after intervention. After interventions were completed, their credibility was assessed. Participants were classified as responders or non-responders according to global symptom change.

**Results**

participants receiving mobilisations were more likely to be classified as responders (odds ratio: 4.33,  $p = 0.03$ ) and demonstrated greater change in most outcome measures of sympathoexcitation from baseline to during the intervention but not from during to after the intervention. There was no association between sympathoexcitation and symptomatic improvement. Mobilisations and placebo were equally credible.

**Conclusions**

These findings suggest sympathoexcitatory changes may be caused by an orienting response unrelated to the activation of an endogenous pain inhibition system. Alternatively, the observed lack of an association may be explained by the existence of various mechanisms for pain relief. This study used single outcome measures of sympathoexcitation and symptomatic improvement and other measures may reveal different things.

## 50 A. MOTOR CONTROL

### Motor control helps neck pain

Musculoskelet Sci Pract. 2019 Apr 20;42:52-59. doi: 10.1016/j.msksp.2019.04.010

#### **Motor control using cranio-cervical flexion exercises versus other treatments for non-specific chronic neck pain: A systematic review and meta-analysis.**

Martin-Gomez C<sup>1</sup>, Sestelo-Diaz R<sup>1</sup>, Carrillo-Sanjuan V<sup>1</sup>, Navarro-Santana MJ<sup>2</sup>, Bardon-Romero J<sup>3</sup>, Plaza-Manzano G<sup>4</sup>.

#### *BACKGROUND:*

Chronic neck pain affects a significant percentage of the adult population. Commonly, the pain is of unknown origin. In those cases, some alterations in motor control (MC) can appear in the deep cervical muscles. The specific training of these muscles could improve muscular function and reduce pain and disability.

#### *OBJECTIVE:*

To determine whether MC, using cranio-cervical flexion (CCF), is more effective than other treatments for non-specific chronic neck pain (NSCNP).

#### *DESIGN:*

Systematic review with meta-analysis.

#### *METHODS:*

A search was done in journals and in a variety of databases, between December 2017 and March 2018. Randomized clinical trials (RCTs) and systematic reviews of RCTs comparing MC with other treatments in adults with NSCNP, regarding pain and disability, were included. Risk of bias was analysed using the Cochrane risk of bias tool. Data was analysed using a random effects model. Heterogeneity was evaluated using the  $I^2$  statistic. The quality of the evidence was measured using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

#### *RESULTS:*

Ten articles were included for qualitative review; nine were used for a quantitative analysis about the effect of MC on pain and eight for the analysis regarding disability. The meta-analysis comparing MC versus other treatments showed significant differences regarding pain and disability.

#### *CONCLUSIONS:*

MC interventions for NSCNP patients reduces pain and disability. MC seems to be more effective to reduce pain and disability than other treatments.



## 52. EXERCISE

### Impact of muscular weakness during adolescents

#### **Muscular weakness in adolescence is associated with disability 30 years later: a population-based cohort study of 1.2 million men**

1. Hanna Henriksson<sup>1,2</sup>, Pontus Henriksson<sup>2,3</sup>, Per Tynelius<sup>4,5</sup>, Francisco B Ortega<sup>1,3</sup>

**Objective** To investigate the associations of muscular strength in adolescence with later disability pension (DP), across different body mass index (BMI) categories and in combination with aerobic fitness.

**Method** This prospective cohort study consisted of males aged 16–19 years, recruited from the Swedish military conscription register between 1969 and 1994. A total of 1 212 503 adolescents met all the inclusion criteria and were therefore included in the analyses. Knee extension, handgrip and elbow flexion strength and aerobic fitness (bicycle ergometer test) were measured during conscription. Causes of DP were retrieved from the Social Insurance Office between years 1971 and 2012 (average follow-up time: 29.6 years).

**Results** Knee extension strength in adolescence was inversely associated with men's risk of obtaining DP due to all causes (HR 1.40, 95% CI 1.36 to 1.44 for lowest vs highest strength quintile). Thus, muscular weakness was associated with DP. The risk associated with low muscular strength differed between specific causes of DP and the strongest associations were found for psychiatric, nervous system and other causes (HRs between 1.47 and 1.90 for lowest vs highest quintile). Being strong was associated with lower DP risk across BMI categories and being unfit, weak and obese was associated with the highest DP risk (HR 3.70, 95% CI 2.99 to 4.58).

**Conclusion** There was a strong association between muscular weakness and disability. A combination of muscular weakness and low aerobic fitness was an especially important risk factor for disability. This adds weight to call for muscular strength and fitness enhancing exercise for adolescents in all BMI categories.

<http://dx.doi.org/10.1136/bjsports-2017-098723>

**53. CORE****Multifidus cross section****July 2019** Volume 42, Pages 1–5**The relationship between cross-sectional area of multifidus muscle and disability index in patients with chronic non-specific low back pain**Fereshteh Rezazadeh<sup>a</sup> Seyed Mehdi Okhravi<sup>a</sup> Sayed Mohsen Hosseini<sup>b</sup>DOI: <https://doi.org/10.1016/j.msksp.2019.03.005>**Highlights**

- The thickness of lower lumbar Multifidus muscles are representative of their CSA.
- Measurement of multifidus thickness instead of CSA for calculating the muscle size.
- No relationship between lower lumbar multifidus size and disability in CNLBP.

**Abstract****Background**

Nonspecific low back pain (NSLBP) is a common problem that may have an effect on the level of functional ability. Imaging techniques indicated the degeneration of multifidus muscles in patients with low back pain. But its relationship with disability in NSLBP is unclear.

**Objective**

To assess the relationship between changes in multifidus muscle morphology in MRI as paraclinical data with changes in the level of disability as clinical data in patients with CNLBP, whose MRI studies are normal. Moreover, the relationship between multifidus CSA and its thickness was determined.

**Design**

Cross-sectional study.

**Methods**

A total of 45 subjects with CNLBP participated in this study. Multifidus muscle thickness and cross-sectional area (CSA) for both sides in L4-L5 and L5-S1 levels were measured with MRI and Image J software. Level of disability was assessed with Roland-Morris disability index.

**Results**

There was no significant relationship between multifidus muscle's CSA or thickness variations among the L4-L5 and L5-S1 levels and disability index score. Furthermore, Pearson's test showed significant positive relationship between thickness and CSA of muscles ( $p < 0.05$ ).

**Conclusion**

The relationship between lumbar multifidus Thickness and disability in CNLBP with normal MRI study, is not proven in this study. Multifidus muscle thickness in L4-L5 or L5-S1 level can be representative of its CSA in patients with CNLBP and normal MRI.

## 55. SCOLIOSIS

### Vital Capacity

European Spine Journal pp 1–8| Cite as

#### **Impact of fusion for adolescent idiopathic scoliosis on lung volume measured with computed tomography**

Nobuyuki Fujita Mitsuru Yagi Morio Matsumoto Kota Watanabe

#### **Purpose**

Although lung volume (LV) can be measured directly by computed tomography (CT), the literature regarding CT-assessed LV in adolescent idiopathic scoliosis (AIS) patients is limited, and the influence of posterior spinal fusion with instrumentation (PSF) on LV has not been established. This study aimed to identify factors associated with decreased LV after PSF in AIS patients.

#### **Methods**

We retrospectively reviewed 111 consecutive AIS patients who were between 10 and 20 years of age and were treated by PSF at our facility. We assessed age at surgery, sex, height, body weight, Risser stage, Lenke classification, radiographic parameters, pulmonary function tests, and LV. Factors associated with a postoperative decrease in LV were identified by multivariable analysis.

#### **Results**

The mean total LV had increased at the 2-year follow-up, although marginally significant ( $p = .06$ ), and there was a significant increase in the left LV ( $p = .01$ ) but not the right LV ( $p = .25$ ). We observed a postoperative reduction in total LV, defined as a total LV postoperative/preoperative ratio  $< 0.9$ , in 20 of the 111 patients (18.0%). Univariable analysis showed a significant correlation between  $\geq 11$  fusion levels and postoperative LV reduction (OR 3.11, 95% CI 1.13–8.57). This factor remained significant in the multivariable analysis, which yielded an adjusted OR of 2.82 (95% CI 1.01–7.93) for postoperative LV reduction in patients with  $\geq 11$  fusion levels.

#### **Conclusion**

Our data suggest that a longer fusion area is associated with postoperative LV reduction. Therefore, avoidance of a longer fusion area of  $\geq 11$  will be preferable for preserving LV.

## 56. ATHLETICS

### Importance of a break from competition

#### **Elite football teams that do not have a winter break lose on average 303 player-days more per season to injuries than those teams that do: a comparison among 35 professional European teams**

1. Jan Ekstrand<sup>1,2,3</sup>, Armin Spreco<sup>2,4</sup>, Michael Davison<sup>2,5</sup>

**Objective** To compare injury rates among professional men's football teams that have a winter break in their league season schedule with corresponding rates in teams that do not.

**Methods** 56 football teams from 15 European countries were prospectively followed for seven seasons (2010/2011–2016/2017)—a total of 155 team-seasons. Individual training, match exposure and time-loss injuries were registered. Four different injury rates were analysed over four periods within the season, and linear regression was performed on team-level data to analyse the effect of winter break on each of the injury rates. Crude analyses and analyses adjusted for climatic region were performed.

**Results** 9660 injuries were reported during 1 447 011 exposure hours. English teams had no winter break scheduled in the season calendar; the other European teams had a mean winter break scheduled for 10.0 days. Teams without a winter break lost on average 303 days more per season due to injuries than teams with a winter break during the whole season ( $p < 0.001$ ). The results were similar across the three periods August–December ( $p = 0.013$ ), January–March ( $p < 0.001$ ) and April–May ( $p = 0.050$ ). Teams without a winter break also had a higher incidence of severe injuries than teams with a winter break during the whole season (2.1 severe injuries more per season for teams without a winter break,  $p = 0.002$ ), as well as during the period January–March ( $p = 0.003$ ). A winter break was not associated with higher team training attendance or team match availability. Climatic region was also associated with injury rates.

**Conclusions** The absence of a scheduled winter break was associated with a higher injury burden, both before and during the two periods following the time that many European teams take a winter break. Teams without a winter break (English clubs) had a higher incidence of severe injuries following the time of the year that other teams (other European clubs) had their scheduled break.

<http://dx.doi.org/10.1136/bjsports-2018-099506>

**59. PAIN****Peds chronic pain and anxiety**

Clin J Pain. 2019 Jul;35(7):625-632. doi: 10.1097/AJP.0000000000000720.

**Characterizing Social and Academic Aspects of School Anxiety in Pediatric Chronic Pain.**

Gibler RC<sup>1</sup>, Beckmann EA<sup>1</sup>, Lynch-Jordan AM<sup>2</sup>, Kashikar-Zuck S<sup>2</sup>, Mano KEJ<sup>1</sup>.

*OBJECTIVE:*

School anxiety is a prevalent and debilitating mental health problem among youth with chronic pain. Despite evidence that anxiety in the context of school is associated with significant school-related disability, no studies have examined specific aspects of school anxiety in a pediatric chronic pain population.

*MATERIALS AND METHODS:*

Adolescents with chronic pain (n=30) and age-matched and sex-matched controls (n=30) and their parents completed questionnaires assessing school anxiety and functioning.

*RESULTS:*

Adolescents with chronic pain reported significantly more cognitive, behavioral, and psychophysiological symptoms of school anxiety relative to healthy controls. Youth with pain also endorsed significantly greater school anxiety in situations involving negative social evaluation and peer aggression. Exploratory analyses indicated that adolescents with chronic pain reporting school refusal behaviors more strongly endorsed behavioral and psychophysiological school anxiety symptoms, and more symptoms in social-evaluative situations. Youth with pain reporting lower school functioning endorsed more cognitive school anxiety symptoms and anxiety in situations involving academic failure relative to those reporting higher functioning.

*DISCUSSION:*

Present results offer a nuanced perspective into the underlying sources of school anxiety among adolescents with chronic pain. Our findings may inform future research efforts and targeted school functioning interventions. In particular, findings suggest that an individualized approach to the assessment of school anxiety which considers the unique sources of anxiety (eg, social vs. academic) may lay the groundwork for the refinement of school functioning interventions in pediatric chronic pain.

## 61. FIBROMYALGIA

### New assessment for FM

Clin J Pain. 2019 Jul;35(7):611-617. doi: 10.1097/AJP.0000000000000717.

#### **Empirical Grouping of Pain Zones in Fibromyalgia: A Preliminary Study.**

Vallejo MA<sup>1</sup>, Rivera J<sup>2</sup>, Vallejo-Slocker L<sup>1</sup>.

##### *OBJECTIVES:*

Widespread pain is important for the diagnosis of fibromyalgia (FM). For this purpose, the sum of pain regions obtained from a topographical distribution has been used to compute a Widespread Pain Index (WPI), but there is no empirical basis for choosing the regions. The aim of this study was to find an empirical distribution of the pain regions.

##### *MATERIALS AND METHODS:*

We evaluated 228 female patients with FM. They completed the Fibromyalgia Survey Questionnaire, Fibromyalgia Impact Questionnaire (FIQ), Combined Index of Severity in Fibromyalgia (ICAF), and Short Form-36 Health Survey. The pain regions of the WPI were grouped by the topographical distribution (WPIR) and compared with a new empirical distribution (WPIE) obtained through exploratory factor analysis. A decision- tree analysis was conducted to identify the optimal algorithm for selecting pain regions related to the severity of FM.

##### *RESULTS:*

The WPIE has a normal distribution compared with the WPIR. It also shows higher correlations with FM severity. From the factor analysis, 4 factors explain 48.5% of the variance. Two factors (emotional and physical) can conform to the decision-tree analysis using the dependent variables FIQ and ICAF. These factors are very congruent with the cutoff points previously proposed for FIQ and ICAF. The emotional factor is the first in the decision-tree.

##### *DISCUSSION:*

WPIE has a normal distribution and shows better predictive qualities than WPIR. The emotional factor is conceptualized as emotional because of the relative importance of the right hemisphere in negative emotions and pain. The physical factor could be responsible for the decreased ability to coordinate left-right stepping.

## 63. PHARMACOLOGY

### Opioids consideration

Arthroscopy. 2019 Jun 2. pii: S0749-8063(19)30133-1. doi: 10.1016/j.arthro.2019.01.049.

#### **Opioid Prescription Refills After Osteochondral Procedures of the Knee.**

DeMik DE<sup>1</sup>, Rojas EO<sup>2</sup>, Anthony CA<sup>1</sup>, Bedard NA<sup>1</sup>, Dowdle SB<sup>1</sup>, Bollier M<sup>1</sup>, Wolf BR<sup>1</sup>, Westermann RW<sup>1</sup>.

#### *PURPOSE:*

(1) To assess the incidence of postoperative opioid prescription refills in patients undergoing osteochondral autograft transplant (OAT) and osteochondral allograft transplant (OCA) procedures of the knee; (2) to evaluate the effect of filling preoperative opioid prescriptions on the incidence of postoperative filling; and (3) to assess the impact of age, sex, and diagnosis of low-back pain on postoperative opioid prescription filling.

#### *METHODS:*

The Humana administrative claims database was queried for patients undergoing knee OAT and OCA procedures between 2007 and 2017 by use of Current Procedural Terminology codes. Patients were stratified by age, diagnosis of low-back pain, preoperative opioid use, autograft and allograft procedures, and open and arthroscopic procedures. Preoperative opioid users were defined as those having filled an opioid prescription within 3 months before surgery. The relative risk (risk ratio) for opioid prescription refills was calculated monthly for 12 months. Multivariate logistic regression analysis was performed to determine odds ratios (ORs) at 3, 6, and 12 months.

#### *RESULTS:*

We identified 300 patients: 133 (44%) underwent OAT and 167 (56%) underwent OCA procedures. Of the patients, 236 (79%) were aged 49 years or younger, and 31% of patients filled opioid prescriptions preoperatively. Of those who filled preoperative opioid prescriptions, 28% were still filling prescriptions 12 months after surgery. Multivariate analysis showed an increased risk of opioid prescription filling at 3 months (OR, 7.46 [95% confidence interval (CI), 3.26-17.38]), 6 months (OR, 15.41 [95% CI, 5.52-41.99]), and 12 months (OR, 13.45 [95% CI, 5.41-33.75]) postoperatively in preoperative opioid users.

#### *CONCLUSIONS:*

Filling opioid prescriptions preoperatively increased the risk of postoperative filling of opioid prescriptions after cartilage restoration procedures of the knee. Over 30% of patients were found to have filled an opioid prescription preoperatively. Univariate analysis showed that age of 50 years or older and low-back pain increased the risk of postoperative prescription refilling, but only age of 50 years or older provided a significantly increased risk at 3 months postoperatively using a multivariate analysis.

#### *LEVEL OF EVIDENCE:*

Level III, retrospective case-control study.