



Faculty Research Day Program – March 2nd 2018 Van Vliet Complex

10am: Three talks on KSR in 3-205 VVC:

- Dr. Darren DeLorey on *Kinesiology*
- Dr. Brian Soebbing on *Sport*
- Dr. Karen Fox on *Recreation*

11am: Undergraduate Student Poster Session in Social Street

- **Noah Underwood:** *#BeBoldForChange: How the US Women's National Hockey Team used Twitter and Labor Strategies to Strike a New Deal.* (Interactive slide show)
- **Yimin Wang:** *Effect of foot progression angle in healthy young male adults on knee adduction moment during running.* *International Recreation and Sports Study Program
- **Zhaojie Liu:** *Effect of Apelin and Aerobic exercise on Energy Metabolism for 4 Weeks.* *International Recreation and Sports Study Program
- **Bailey Sallis:** *Multichannel functional electrical stimulation (FES): Minimising contraction fatigue to maximise the benefits of FES-cycling.*
- **Carly O'Sullivan:** *Real time EMG relay and fatigue detection.*
- **Heather Coulter:** *Sympathetic respiratory modulation in normotensive pregnant and non-pregnant women.*

12pm: Graduate Student Poster Session in Social Street

- **Jodie Stearns:** *Association between friendship and physical activity in school and non-school periods: A social network study.*
- **Jane Hurly:** *"When you see nature, nature give you something inside": Exploring the Impact of Nature-based Leisure on Refugee Well-being.*
- **Andreea Mohora:** *A narrative inquiry of female athletes' experiences of retirement from elite sport.*
- **Brendan Wohlers:** *Alberta Teachers' Attitudes and Knowledge for Fostering Physical Literacy.*



- **Devin Phillips:** *Carotid Chemoreceptor Modulation of Resting Muscle Sympathetic Nerve Activity, Arterial Stiffness and Vascular Conductance in COPD.*
- **Chen Chen:** *Exploring Media Coverage of the 2017 World Indigenous Nations Games.*
- **Colin Deal:** *Factors Contributing to Severe Discipline Incidents in Men's Soccer.*
- **Kurtis Pankow:** *Provincial stakeholders' perceptions of barriers, opportunities, and communication strategies for using research evidence to inform youth sport delivery.*
- **Jay Gamma:** *Plasticity of the Calcineurin Signalling Pathway During Fast-to-Slow Muscle Fibre Type Transitions.*

12pm: Graduate Student Three Minute Thesis talks in PAW Student Lounge (2-610 VVC)

- **Meng Chen:** *Why do contractions fatigue during functional electrical stimulation?*
- **Heather Larson:** *Transitions from youth swimming into masters swimming—mind the gap!*

1pm: “Open House” Professors display research, research procedures, and tools from their research groups or labs

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|-------------------------|--|
| - Dr Kerry Courneya | - Dr Amber Mosewich |
| - Dr Pirkko Markula | - Dr Kelvin Jones |
| - Dr Val Carson | - Dr Tara-Leigh McHugh |
| - Dr Elizabeth Halpenny | - Nora Johnston (Alberta Centre for Active Living) |
| - Dr PearlAnn Reichwein | <u>Also featuring:</u> |
| - Dr Donna Goodwin | - Field Research Office (Environment Health, and Safety) |
| - Dr Nick Holt | |
| - Dr Dave Collins | |



Poster Abstracts

Noah Underwood: #BeBoldForChange: How the US Women's National Hockey Team used Twitter and Labor Strategies to Strike a New Deal.

After months of stalled negotiations, the US Women's National Hockey Team decided to take a bold new strategy in their labour negotiations with USA Hockey. In March of 2017, the team decided that they would #BeBoldForChange and went on 'strike' for the 2017 IIHF Women's World Hockey Championships. They declared that they would "not be playing in the 2017 World Championships unless significant progress has been made of the year long negotiations with USA Hockey over fair wages and equitable support." (Duggan, 2017). This statement was subsequently tweeted out by 20 of the 23 players on the team, and for the next two weeks the players, with support from their legal team at Ballard Spahr, released several coordinated tweets debunking misleading facts, garnering support, and inspiring girls and women across the country. Through this collective action, the team was able to secure an unprecedented deal with USA Hockey, and returned to the ice to win gold at the 2017 IIHF Women's World Championship. This presentation is a composition of the tweets sent out by the team, highlighting their preparedness, unity, and organization during their boycott. They were able to gain support of the public, sponsors, major sports leagues, and politicians, and their campaign was much more inspired than the counter campaign launched by USA Hockey. The tweets sent out during the campaign that are included in this presentation, are being used for a content analysis research paper, analyzing the labor tactics and social media strategy of the team in their fight for equitable support.

Yimin Wang: Effect of foot progression angle in healthy young male adults on knee adduction moment during running. *International Recreation and Sports Study Program

Knee adduction moment (KAM) is highly related to medial knee osteoarthritis which leads to the reduction of patient's life quality. Some researchers find that toe-out gait during walking (expanded foot progression angle) can reduce KAM. The purpose of this research is to find if the expanded foot progression angle can also reduce KAM during running through experiment.

Zhaojie Liu: *Effect of Apelin and Aerobic exercise on Energy Metabolism for 4 Weeks.* *International Recreation and Sports Study Program

Aerobic exercise is able to increase the energy expenditure. However, the mechanism of action of energy expenditure has not been determined. Apelin is a bioactive peptide that presents in both the central nervous system and peripheral tissues. Apelin exerts its physiological roles as the natural ligand for the APJ receptor and a role for apelin/APJ in energy metabolism has been found and attached more attention recently. This study aims at discussing the effect of apelin and aerobic exercise on energy metabolism for 4 Weeks.

Methods: C57BL/6J wild mice divided into non-training saline-treated group (SW), non-training apelin-treated group (SA), non-training F13A-treated (specific APJ receptor antagonist) group (SF), exercise saline-treated group (EW), exercise apelin-treated group (EA) and exercise F13A-treated group (EF)



respectively (n=10, 6 groups in total). The exercise program is 75% VO₂max of the mice, 5° degree, 1 h/day×6 days/week for 4 weeks. The Respiratory Quotient was tested between the 3rd and 4th week of treatment after 24 h of acclimatization by CLAMS (Coulumbus Instruments). The energy expenditure, glucose oxidation and lipid oxidation were calculated.

Bailey Sallis: Multichannel functional electrical stimulation (FES): Minimising contraction fatigue to maximise the benefits of FES-cycling *Purpose/Objectives*

The purpose of this study is to improve the current FES protocol by determining if more electrode channels reduces contraction fatigue. We predict that more electrode channels will result in less fatigue because motor units will be firing at lower rates.

Method

The main outcome measure is the amount of torque produced by the quadriceps measured with a Biodex dynamometer. Three different conditions of either 2, 4, or 8 electrode channels are applied to the participant's quadriceps over three separate visits. The drop in torque is measured over 100 contractions as an indication of fatigue. All contractions are normalized to a max voluntary contraction. We plan to collect data from 15 participants.

Results

Complete data from 2 participants have been collected. Averaged data shows a similar percent drop in fatigue of 42.8% and 42.1% (%MVC) for 2 and 4 channels respectively, and a larger drop in fatigue of 48.2% for 8 channels.

Conclusion

Contrary to our hypothesis, preliminary data shows more fatigue using more channels. More data must be collected to reach an appropriate conclusion.

Carly O'Sullivan: Real time EMG relay and fatigue detection

Purpose: The objective of the study is to demonstrate a consistent and sensitive measure of fatigue in real time.

Method: Maximum voluntary contraction (MVC) was recorded from the bicep brachii of the dominant arm from 100 individuals. Each participant performed three MVCs which were held for three seconds with one minute of rest between trials. The maximum value achieved was used as their MVC. After resting for five minutes participants maintained a contraction of 40% \pm 10 MVC until they were no longer able to maintain the required force. To ensure the required force was maintained, participants were given instantaneous visual feedback of force production.

Results: Analysis is in progress; it is predicted that by using frequency, amplitude, and temporal measures of the electromyography (EMG) signals, along with a neural network, fatigue detection will be possible in a relatively robust and instantaneous manner. Each metric is calculated in half second intervals during the contraction. All analysis is performed using MATLAB 2015b.

Conclusion: Based on current results it is likely that the previously outlined method of fatigue detection in real time is feasible. Potential applications include but are not limited to myoelectric control, sport performance and future methods of EMG data collection and analysis.



Heather Coulter: Sympathetic respiratory modulation in normotensive pregnant and non-pregnant women

HD Coulter, RJ Skow, MH Davenport and CD Steinback. Program for Pregnancy and Postpartum Health, Faculty of Kinesiology, Sport, and Recreation, University of Alberta, Edmonton, Alberta, Canada.

Introduction: Sympathetic nervous system activity (SNA) is linked with breathing such that during inspiration there is less SNA, and with expiration, more. This is the result of feedback reflexes from stretch receptors in the lungs. In pregnancy, both ventilation, and the activity of the sympathetic nervous system (SNA) are increased. However, we do not know if these changes influence the pattern of nervous system activation in pregnancy. We hypothesized that pregnancy would be associated a greater respiratory modulation (i.e. more SNA occurring during expiration) compared to the non-pregnant state.

Methods: Eight pregnant women in the second trimester (31.8 ± 3.4 years, 18 ± 1 weeks) and six non-pregnant (30.2 ± 7.0 years) women were recruited for participation in this study. We measured breath-by-breath ventilation (spirometer), and SNA (microneurography; peroneal nerve) during three to five minutes of quiet rest. Respiratory modulation of SNA was defined first as the percent of bursts occurring in each phase of the respiratory cycle (expiration and inspiration). Respiratory modulation was also expressed as the distribution of SNA burst occurrences across the duration of the respiratory cycle.

Results: There was no difference in the pre-pregnancy BMI, age, or height between the two groups ($p > 0.05$). In accordance with previous research, tidal volume was elevated during pregnancy (0.97 ± 0.15 L) vs controls (0.90 ± 0.13 L; $p = 0.046$). However, respiratory rate was not different between groups (12.5 ± 3.8 vs 13.8 ± 4.2 breaths/minute; $p = 0.27$). SNA burst frequency (33.8 ± 8.9 vs 28.0 ± 7.6 bursts/minute; $p = 0.40$) and burst occurrence (42.4 ± 8.6 vs 38.6 ± 4.2 bursts/100 heart beats; $p = 0.84$) were not significantly elevated during the second trimester of pregnancy. There was no difference in the number of bursts occurring during the expiratory phase of respiration (pregnant, 62%; non-pregnant, 66%; $p = 0.98$). However, there were differences in the pattern of sympathetic activation (% of bursts occurring progressively throughout the breath) occurring during expiration ($p = 0.049$), but not inspiration ($p = 0.248$); this difference disappeared when normalized for the volume at which the bursts were occurring ($p = 0.849$ and $p = 0.904$ for inspiration and expiration respectively).

Significance: These data indicate that the pattern of respiratory modulation of SNA is altered such that pregnant women have more bursts occurring in late expiration compared to non-pregnant women. The differences are likely the result of elevated tidal volume in pregnancy.

Funding: WCHRI, CIHR Doctoral Award (RS), Heart and Stroke Foundation of Canada (MHD).

Keywords: pregnancy, respiratory modulation, muscle sympathetic nerve activity

Jodie Stearns: Association between friendship and physical activity in school and non-school periods: A social network study.

Friendships in childhood play a significant role in development, and may help shape physical activity (PA) levels. Using a whole-network approach, this study examined whether school-based friends are more similar in their pedometer-determined PA compared to non-friends, and whether this effect holds for best and close friends, males and females, and at and outside of school periods. The analytical sample included



27 schools and 706 grade five students who were participating in the Alberta Project Promoting active Living and healthy Eating in Schools (APPLE Schools) in Edmonton and Fort McMurray, Canada in the spring of 2013. Students and parents completed surveys, and students wore time-stamped pedometers for 9 consecutive days and nominated up to 10 close friends and 5 best friends in their school and grade. Dyadic friendship variables (IV's) included close/best friendship and close and best friendship dummy codes. An absolute difference matrix represented each pedometer outcome (DV's) and included steps/hour/day for the entire week and at and outside of school periods. Multiple Regression - Quadratic Assignment Procedure (MR-QAP) was employed to analyze female and male networks separately with all schools combined, controlling for covariates and clustering within schools. For females, the difference in total PA between close/best friends was 20 steps/hour/day lower than the difference in PA between non-friends ($p < .01$). When close and best friends were examined separately in the same model, the difference in PA between close female friends was 20 steps/hour/day ($p < .05$) lower than non-friends, and the difference in PA between female best friends was 21 steps/hour/day ($p < .01$) lower. These findings held for some school day and non-school day periods. The only effect found for males was reciprocated best friends were more similar in their total PA compared to all other pairs in the network. Friendship-supportive programming is a potential strategy for increasing PA in children.

Jane Hurly: "When you see nature, nature give you something inside": Exploring the Impact of Nature-based Leisure on Refugee Well-being

My study investigated the impacts of nature-based leisure on refugee well-being in Canada. Using semi-structured interviews and photo-elicitation, I explored four refugees' experiences of a two-day winter camping experience in northern Alberta, Canada and how it might foster their well-being. The winter camping experience is a collaborative effort by an immigrant-serving agency and the provincial parks agency to afford refugees some respite from acculturative stress (Berry, 1997) and to mitigate trauma. Refugees responded positively to nature's ameliorative and restorative impacts (Kaplan, 1995), and those of nature-based leisure (Knopf, 1987). Participants appreciated the opportunity to gather with others in a welcoming environment, to share the experience with family, and to make friends (Knopf, 1987) in a convivial, natural retreat away from the city (Kaplan, 1995). Participants expressed deep enjoyment of the remote, natural setting, and reported heightened feelings of well-being (Wolsko & Lindberg, 2013) and belonging in Canada.

Immigrant-serving agencies and parks agencies may benefit from this knowledge in designing culturally-appropriate and inclusive parks programs targeting refugees—particularly given their vulnerability owing to their traumatic pre-migration experiences of conflict, hardship, loss, and torture (Fazel et al., 2005). In turn, refugees may value and return to these natural spaces for leisure purposes, and support their development, maintenance, preservation, and conservation.

Andreea Mohora: A narrative inquiry of female athletes' experiences of retirement from elite sport

Background: Being an elite athlete requires a lot of commitment and sacrifices from a fairly young age. Due to the extended involvement in sports, these people build their identity around their sport and are often ill prepared for life-after-sport. Existing research reveals that retiring elite athletes could face



significant challenges to their physical, psychological, social, and occupational well-being, struggling with a loss of identity, depression, and even self-harm or suicide.

Objective: This qualitative study tries to further the knowledge we have around the retirement period by exploring the experiences of retired elite female athletes from different sports (both individual and team sports). The study is also looking at factors that helped and/or hindered the athletes' transition from elite sport.

Methods: An narrative inquiry approach was used to explore the in-depth experiences of 10 retired elite female athletes. The participants were over 18 years of age, English speakers, competed at national/international levels in different sports, and were at least 2 years into their retirement.

Results: Seven participants perceived their transition to be positive, or even smooth, even though they had to work on certain aspects of their life. Three participants experienced a difficult retirement, with a period of time filled with intense struggles. The retired athletes also identified certain skills and traits that were very helpful during their athletic life, yet some of those did not transfer well in life-after-sport.

Conclusions: The athletes' experiences were all unique. Retirement from elite sport is a complex issue with many aspects that depend on both the athletes as well as on their environment. The recommendations that these participants had could help better support athletes during their sport careers and prepare them for a healthy retirement.

Brendan Wohlers: Alberta Teachers' Attitudes and Knowledge for Fostering Physical Literacy

Background: Physical literacy is defined internationally as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility in physical activities for life. It encompasses any situation where an individual is moving. As the foundational building blocks for an active lifestyle, promoting physical literacy may aid youth in meeting Canadian movement guidelines. Children who are physically literate are expected to engage in more physical activity. The benefits of physical activity in children and youth are well recognized. Ever Active Schools implemented this survey prior to conducting a professional development program.

Methods: The survey was designed by Ever Active Schools in consultation with researchers from the Faculty of Kinesiology, Sport, and Recreation. 394 teachers from 38 Alberta schools were surveyed. Data collection was in the 2016/2017 school year. The data collected was analyzed using descriptive statistics, Pearson's correlation, Cronbach's alpha, and thematic content analysis.

Results/discussion: Teachers appear to have considerably varied attitudes and knowledge about physical literacy. It is clear that opportunities exist for professional development about physical literacy. This may have positive impacts on the physical activity levels of children and youth.

Conclusion: Further research is needed to confirm these results and to establish the influence of physical literacy promotion in the education sector.

Devin Phillips: Carotid Chemoreceptor Modulation of Resting Muscle Sympathetic Nerve Activity, Arterial Stiffness and Vascular Conductance in COPD.

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RATIONALE: COPD patients demonstrate increased muscle sympathetic nerve activity (MSNA) and central arterial stiffness, both of which are linked to cardiovascular (CV) deterioration, and increased mortality. We have recently demonstrated enhanced activity/sensitivity of the carotid chemoreceptor (CC) in COPD which may contribute to increased peripheral arterial stiffness and CV dysfunction. However, there is limited work investigating the mechanisms of elevated central arterial stiffness and vasoconstrictor outflow in COPD. Therefore, the aim of this study was to examine the effect of CC inhibition on MSNA, central arterial stiffness and CV function at rest in COPD patients.

METHODS: In a randomized single blind placebo controlled study, thirteen mild-moderate COPD patients (FEV1 predicted \pm SD: $83 \pm 19\%$) and thirteen age- and risk-matched controls completed resting CV function measurements with either intravenous saline or low-dose dopamine (2 mg/kg/min) while breathing normoxia or hyperoxia (100% O₂). Both dopamine and hyperoxia have been previously shown to inhibit the CC. On a separate day, a subset of 7 COPD patients and 7 risk-matched controls completed resting MSNA measurements while breathing normoxia or hyperoxia. Arterial stiffness was determined by pulse-wave velocity (PWV) and MSNA was measured by microneurography. Brachial blood flow was determined using Doppler ultrasound, cardiac output was estimated by impedance cardiography, and vascular conductance was calculated as flow/mean arterial pressure (MAP).

RESULTS: CC inhibition with dopamine decreased central and peripheral PWV, and MAP ($p < 0.05$) while increasing vascular conductance in COPD. No change in CV function was observed with dopamine in controls. CC inhibition with hyperoxia decreased peripheral PWV and MSNA ($p < 0.05$) in COPD, while no change was observed in controls.

CONCLUSION: CC inhibition decreased MSNA and PWV, and improved vascular conductance in COPD, suggesting that tonic CC activity is elevated at rest and contributes to CV dysfunction in COPD.

Chen Chen: Exploring Media Coverage of the 2017 World Indigenous Nations Games

This study examines how Indigenous voices were represented in Canadian mainstream media coverage of the two international Indigenous sporting events hosted in Canada in 2017. A critical discourse analysis guided by the concept of Settler Colonialism showed that mainstream media provided some opportunities for Indigenous stakeholders to bring issues facing their communities to the attention of the Canadian public. The tensions and challenges identified by Indigenous stakeholders included stereotypes of non-Indigenous people, the identity struggles within Indigenous communities, the lack of resources and opportunities for Indigenous youth, the vulnerability of Indigenous women, and the difficulty for Indigenous sporting achievements to be acknowledged. While these struggles were associated with issues such as the legacy of assimilation policies, the lack of education on relevant topics in school, and other socio-economical barriers within many Indigenous communities, land and sovereignty did not appear explicitly in the discourse as a fundamental issue of Indigenous struggles in the settler colonial society.



Colin Deal: Factors Contributing to Severe Discipline Incidents in Men's Soccer

Disciplinary incidents (i.e., verbal or physical abuses of officials) in men's soccer in Alberta have been increasing steadily over the past 5 years (Deal et al., 2016). We were asked by the provincial soccer association to conduct a study to better understand these disciplinary incidents. Hence, the purpose of this study was to examine the factors which contribute to severe disciplinary incidents in men's soccer. Semi-structured interviews (M = 50 minutes, SD = 21.3 minutes) were conducted with 22 participants who were members of three groups: disciplinary committee members (n = 3; M age= 54 years, SD = 6.51 years), referees (n = 9; M age= 47 years, SD = 12.75 years), and players (n = 10; M age= 22 years, SD = 1.90 years). Thematic analysis was used to identify nine factors that contributed to severe disciplinary incidents. These factors were broadly organized around an ecological framework, ranging from distal to more proximal issues. Sociocultural factors included themes of culture (influences of soccer and family culture) and discrimination. Organizational factors represented themes of organizational structure (PSO rules and policies) and procedural issues pertaining to disciplinary hearings. Contextual factors included the physical environment (indoor versus outdoor soccer) and game characteristics (close game, history between teams). Individual factors included the attitudes, behaviors, and knowledge of coaches, players, and referees. The next step in this research will involve working with the PSO to design ways to intervene at different ecological levels in order to ultimately reduce the number of disciplinary incidents in the future.

Kurtis Pankow: Provincial stakeholders' perceptions of barriers, opportunities, and communication strategies for using research evidence to inform youth sport delivery

The purposes of this study were to examine barriers, opportunities, and preferred communication strategies in the use of research evidence to inform the delivery of youth sport. Using qualitative description methodology (Mayan, 2009), data were collected via individual semi-structured interviews (M = 43 minutes, range 23-84 minutes) with 12 executive or technical directors (4 female, 8 male) of different Provincial Sport Organizations (PSOs). Interviews were transcribed verbatim and underwent thematic analysis (Braun & Clarke, 2006). The major barriers identified by participants were time and capacity (i.e., funding, being understaffed), knowing what research exists and where to find credible sources, and the lack of appropriate communication from researchers with stakeholders. The opportunities that the stakeholders saw were using research as a way to educate their constituents (i.e., coaches, parents, athletes), to increase athlete retention and recruitment, and to help inform organizational policies. Participants stated that single page research summaries, with links to full text articles, written in accessible language and clearly outlined practical implications would be their preferred method of receiving research information. Participants also expressed interest in receiving research updates via newsletters, so they remain up-to-date with current research. Overall, the results of this study showed that representatives of PSOs were interested in using research to inform their practice and policy and revealed information that may help researchers bridge the research-to-practice gap in youth sport.

Jay Gamma: Plasticity of the Calcineurin Signalling Pathway During Fast-to-Slow Muscle Fibre Type Transitions



Jay Gamma, Katharina Sommerhage, Melanie Manyet, Jessica Holzmann, Ian Maclean, Charles T. Putman

Keywords: Signalling Pathway, Fibre Type, Genetic Regulation

The Calcineurin-NFAT signalling pathway in skeletal muscle cells is a dominant regulator of fast-to-slow muscle fibre type transitions in response to chronic activity (Martins et al, 2012). The activation of the Calcineurin/Calmodulin enzyme complex in response to fibre contraction results in the dephosphorylation of Nuclear Factor of Activated T-Cells (NFAT) proteins, allowing them to enter the nucleus and modify the expression of Myosin Heavy Chain (MyHC) genes (Calabria et al, 2009). Chronic Low Frequency Electrical Stimulation (CLFS) is used as an exercise model where electrical stimulation is applied to innervating nerves to simulate activity (Putman et al, 2000). By assessing the expression levels of individual pathway components, the roles of each pathway component can be better understood and the extent to which genetic expression regulates the pathway identified.

Using CLFS and Real-time Polymerase Chain Reaction (qPCR) we examined the impact fast-to-slow fibre type transitions on expression levels of pathway components. Electrodes were implanted in the peroneal nerve of rats and treated with 10hr/day CLFS for 1.5, 5, 10, or 21 days. Once completed, *tibialis anterior* muscles were excised and extracted RNA used to synthesize Complementary DNA (cDNA). This cDNA was used in qPCR runs to determine the expression levels of each pathway component (MyHC, NFAT, Calcineurin, RCAN, DYRK, GSK3B, AKAP5, CABIN1, Calsarcin, Calmodulin, and Creatine Kinase genes) across the time course of treatment. The cycle threshold (Ct) data obtained from qPCR was used with the delta-delta-Ct algorithm (Livak & Schmittgen, 2001) to determine relative expression at each time point, and t-tests performed to assess the significance of the data.

Every pathway component except Calcineurin Alpha subunits and RCAN3 saw changes in expression levels during treatment – the lack of altered expression in these components suggests their primary regulation is through protein interactions. It is believed that the pattern of expression – and therefore activity - for each pathway component is responsible for controlling NFAT isoform nuclear concentrations, and ultimately the expression of Myosin Heavy Chain proteins.