New submission from ARC Award Final Report

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To: Scholarly Activity <scholarlyactivity@langara.ca>

Name of Researcher

Andrew S. Perrotta

Department/Faculty

Kinesiology

Position in Department/Faculty

Intructor

Project Title

Cardiovascular function and its association with athletic performance measures in female college soccer players

Term of Project

October 2021 until June 2022.

Please introduce yourself – include pertinent background information relating to the topic of your research project.

Throughout my research, I have had the privilege of working with female athletes that allowed the data obtained to directly impact athletes within Canada's National Sporting Organizations. My research program concentrates on bridging the fields of cardiovascular and exercise physiology to better understand the body's response to exercise and stress, as well as how to enhance human performance. A major focus of my work involves examining the dose-response to exercise, heart rate variability, as well as alterations in cardiorespiratory performance in response to environmental stress. The purpose of my work is to conduct applied research that can relate to practitioners, to support evidence-based decisions to help their patients and athletes. As a postdoctoral fellow, I expanded upon my work in environmental physiology examining cardiorespiratory performance and cardiac function in both hot and cold environments. In particular, my research examining the utility of hot yoga to enhance blood volume and cardiorespiratory performance has gained international recognition for its innovation and focus on the female response to a novel form of heat stress.

Please discuss your educational background and your work experience that led you to taking on this research project. If possible, include a quote that helps define your interest in this project.

I completed my (hon) B.A.Sc in Kinesiology from the University of Guelph that strongly focused on physiology and nutrition metabolism. My graduate journey began in Calgary where I completed my M.Kin (applied exercise physiology) at the University of Calgary. I moved to Vancouver to complete my Ph.D. at UBC in the Faculty of Medicine, that focuses on cardiovascular and exercise physiology. I completed further training as a postdoctoral fellow at SFU in the department of Biomedical Physiology and Kinesiology, the focuses on the effect of the environment on cardiorespiratory function.

Throughout my tenure as PhD student, I was the Head Physiologist for the Canadian Women's National Field Hockey team. I was responsible for supervising graduate and undergraduate students at the University of British Columbia who were keen to learn about human performance and applied research. This position developed my passion for finding unique and sustainable avenues that allow kinesiology students to develop as young practitioners and researchers. I have continued to develop this model of integration as the Head of Sport Medicine and Sport

Science for the Langara College women's soccer program through connecting with the Department of Kinesiology. This has allowed me to supervise and train undergraduate students in conducting exercise assessments and applied research that were funding by the RSAF-1 Grant. Establishing this form of relationship between departments is an integral component of my research program, and one that is designed to work in a collegial environment that maximizes the development of our students, while also supporting the success of our coaches and student athletes.

Please explain the concept for your project in terms that others not in your field would understand, like an executive summary.

-This project will examine non-invasive indices of cardiac and vascular function and its association with athletic performance in healthy female college soccer players. Measures of athletic performance will be assessed during routine physical testing and during on-field training/competition.

Identify goals and objectives for the project, and how the results may be used, perhaps to solve a problem, or to inform further research in that field.

-This project will utilize non-invasive techniques involving equipment that is both affordable and readily available to coaches at Langara College, to better support themselves when monitoring the health and athletic development of their students athletes.

-The results from this study will support Langara College's Athletics Department by providing varsity coaches new techniques and analyses to monitor their athletes physiological and athletic development.

Briefly explain the steps taken to conduct the project research, and the results found.

This study examined resting cardiovascular function and its influence on maximal cardiorespiratory and musculoskeletal performance in female soccer players. 21 female soccer players training as part of a collegiate team were participants over a six-month period that included six-data collections separated by 30-day intervals. Indices of cardiovascular function included; cardiac output, stroke volume, systemic vascular resistance, heart rate variability (HRV) and blood pressure. Maximal cardiorespiratory and musculoskeletal performance measures included; vertical jump, lower body power, 5m and 10m running speed, and the YoYo intermittent recovery test level-1. Simple (r) and multivariable analysis (R2) was utilized to examine the association between cardiovascular function and physical performance measures. Body mass index and body fat(%) were included as co-variates. Significant associations using each analysis were observed between; HRV and YoYo performance ($r = 0.26$; $R2 = 0.21$, $p < 0.05$), 10m speed and mean arterial pressure ($r = -0.44$; $R2 = 0.30$, $p < 0.001$), 5m speed and systolic blood pressure ($r = -0.32$; $R2 = 0.18$, $p < 0.01$), as well as lower body power and stroke volume ($r = 0.50$; $R2 = 0.42$, $p < 0.001$). Routinely examining cardiovascular function can support practitioners in improving performance attributes in female soccer players

Who else was involved in this project? How did their involvement help? Ie: other faculty, students, community partners

Langara Kinesiology Faculty Member: Brent Day
Langara Kinesiology Student(s): Rachel Bark, Anika Scott, Kayla Seaborn, Athena Garedakis
Former Langara & current UBC Kinesiology Student(s): Camila Correa, Arif Khan

All research team members participated in data collection.
Kinesiology Students presented the data as posters at scientific conferences (ACSM 2022 - San Diego).

What were/are you hoping to get from conducting this research?

- The purpose of this investigation was to examine indices of cardiac and vascular function at rest, immediately before physical testing, and their association to maximal cardiorespiratory and musculoskeletal performance in female collegiate soccer players

- This project will provide novel and insightful information to the Langara College Athletics Program that will help coaches and training staff to better monitor the health and athletic development of their student athletes.

Can you share any personal stories that made this research experience memorable/valuable?

I am extremely pleased to have all four of my trainees present our work, and other components of this project at the 2022 ACSM conference. These students will have four published abstracts in a peer-review journal and experience presenting at a scientific conference. This will help tremendously when applying for undergraduate and graduate scholarships after transferring to the University of British Columbia.

Do you have any tips/suggestions/ideas for applying this research in your field? Or for others in their fields? Or for conducting future research of this kind?

We currently have a manuscript in a journal being peer reviewed for the hope of sharing our findings with other clinicians and practitioners.

Additionally, we presenting our research the 2022 American College for Sports Medicine conference in San Diego this May/June. This conference is the largest sport science & medicine conference in the world, acting as a fantastic platform to share our results with fellow researchers and students.

Any final comments? What are the “next steps” for this project? And for you?

I wish to thank you for awarding me this grant and the opportunity to financially and scientifically support four of our Langara Kinesiology students. They have enjoyed this experience and have found memories of presenting at this years 2022 Applied Research Day.

I will continue to apply for ARC grants to support my research focusing on health and athletic performance in our Langara Falcon's Women's Soccer program. My research program is designed to conduct work to support our students and coaches.

Please upload any images that will help to showcase your project.

- Athena-Poster-Final-Version.pdf
- Scott_Anika-_Research-Poster-DRAFT.pdf
- Rachel-Poster-DRAFT1.pdf
- Kayla-Poster-2.0.pdf

Langara Institutional Repository Consent

By submitting, I consent to uploading my ARC Fund final report to the Langara Institutional Repository (The LaIR).