

Position Title: Project Assistant

Job Description & Duties:

Assist in running a project whose focus is on examination of muscle function in children and the effect that growth and sports participation has on muscle function. The project is a three year mixed-longitudinal study of muscle strength and activation in children from the age of 8 to 16 years. That is, children of different age cohorts are followed over a period of three years. The purpose of the study is to examine the mechanism explaining the increase in muscle strength with growth (in addition to the increase in size). We hypothesize that strength (and other functional performance) is enhanced due to a change in the way muscles are activated. Further, we hypothesize that this change is developmental in nature and that it can be influenced by physical training.

Therefore, are recruiting about 250 subjects (100 have already been recruited and we are aiming to recruit 75 more this Spring and 75 more next Spring) and are examining muscle function (isometric and dynamic maximal strength and explosive strength), along with muscle size and the pattern of muscle activation. Muscle size is examined using ultrasound and muscle activation pattern is examined using surface EMG.

The student will be part of a team (including faculty members and graduate students at the Masters and PhD level) and will be involved in all types of measurements: strength evaluation, muscle ultrasound, and EMG analysis. Their role in strength evaluation and muscle ultrasound will be dominant, while their role in EMG data acquisition and analysis will be assistive in nature.

Duties will involve:

1. Interpersonal communication: dealing with children (age 8-16 years) and their parents (one on one or in small groups): explanation about purpose and procedures of project, directing children during different stages of measurement, helping children and their parents fill out appropriate forms.
2. Assisting in some measurements and equipment handling.
 - a) Anthropometrics and body composition: The student's role will be to record anthropometric measurements (height, mass, limb length, limb circumference) and body composition, using skinfold measurements and bio-impedance electrical analysis. The skills required to perform these measurements are relatively simple to learn and perform but must be carried out with high reliability. These skills comprise the basic skill set in many paramedical or medical settings, as well as in all fitness assessment settings.
 - b) Muscle ultrasound measurements: The student's role will be to measure muscle size (of various muscles), using ultrasound. This measurement requires setting up the equipment and being fully familiarized with its operation. Performing this measurement also requires an understanding of musculoskeletal anatomy. The accuracy of performing this measurement is a function of experience. The aim is to provide the student with ample experience and practice so that he/she can perform this measurement skillfully and reliably. This skill would prove very useful in physical medicine settings.
 - c) Muscle strength assessment: The student's role will be to set up the dynamometer settings for each subject (in accordance with the anthropometric measurements described above), and perform various strength assessments. These include isometric strength (contracting the muscle without any apparent movement of the limbs), as well as dynamic contractions of different velocities. In order to perform these measurements, the student will need to be familiar with the dynamometer and its operation modes. More importantly, since the subjects are children, the student will need to familiarize him/herself with the equipment to a very high degree. This skill would be very useful in fitness assessment settings, as well as in physiotherapy and occupational therapy settings.

- d) EMG data acquisition and analysis: These measurements will take place concurrent with the strength assessment. Thus, the student's role will be to help in setting up the equipment (thus familiarizing him/herself with the equipment) and assisting mainly in the analysis of the data. The student role in the EMG acquisition process will be secondary (as he/she will be concurrently involved in strength testing), but he/she will acquire some skills involved in EMG analysis and interpretation. These skills would be useful in physiotherapy and physical medicine settings.
3. Data management (limited): assistance in organizing, reducing and managing data using different software. The student will be involved to a limited degree in data management (after acquisition). This involves organization of files and data, data reduction and preliminary analysis using software such as EMGWorks, excel, Matlab and SPSS. The EMGWorks software is specific to the acquisition and (limited) analysis of EMG. It may be used in various research or clinical settings. The other programs are multipurpose. While most students are quite familiar with Excel, few are familiar with software programs such as Matlab and SPSS, which are more complex and advanced. Realistically, the student cannot be expected to learn these software programs during this experience. However, it is expected that he/she will become familiar with the programs, what they require, what they can offer and what are their limitations. This type of knowledge can easily be cross-applied to other computational or statistical programs which the student may encounter in their future studies or career.

Training & Skills:

1. Anthropometric measurements and body composition. These skills comprise the basic skill set in many paramedical or medical settings, as well as in all fitness assessment settings.
2. Muscle ultrasound - measurement of muscle size. This skill would prove very useful in physical medicine settings.
3. Muscle strength assessment, using an isokinetic dynamometer. This skill would be very useful in fitness assessment settings, as well as in physiotherapy and occupational therapy settings.
4. EMG acquisition, analysis and interpretation. These skills would be useful in physiotherapy and physical medicine settings.
5. Data management and analysis using the following software: EMGWorks, Excel, Matlab and SPSS. This type of knowledge can easily be cross-applied to other computational or statistical programs which the student may encounter in their future studies or career.

Note that in addition to the skills outlined above, this is a wonderful opportunity for the student to develop team-work skills and communication skills with adult and child population. While the study is not clinical in nature, it does require many of the personal and communication skills involved in clinical settings, especially pediatric settings. Furthermore, the student will be part of a team of researchers and students at different academic levels, thus providing the student with an excellent exposure and opportunity to explore some of the requirements for potential graduate studies and related professions.

Students hired through past Experience Works grants have had great success. One of the students continued with us to pursue graduate studies, while the other student received a CIHR award and was part of the research team in the Fall. We are looking to continue the positive experience this year.