



## **PARTICIPANT INFORMATION AND CONSENT FORM**

# **A Comparison of Objective vs. Subjective Measures to Quantify Proximity to Failure during Powerlifting**

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### **INTRODUCTION**

You are invited to take part in a research study because you are an adult aged  $\geq 18$  years old with resistance training experience.

Your participation is voluntary. It is up to you to decide whether or not you wish to take part. If you wish to participate, you will be asked to sign this form. If you do decide to take part in this study, you are still free to withdraw at any time and without giving any reasons for your decision.

Please take time to read the following information carefully. You can ask the researcher to explain any words or information that you do not clearly understand. You may ask as many questions as you need. Please feel free to discuss this with your family, friends, or family physician before you decide.

### **WHY IS THIS STUDY BEING DONE?**

This research study is comparing two methods to predict how close an individual is to muscular failure in the bench press exercise in resistance-trained males and females. The first method is barbell lifting velocities with a linear position transducer (a device that has a string that attaches to the barbell and provides a velocity value according to the velocity that the barbell is lifted, in which the barbell velocity slows as an individual fatigues). The second method is an individual's prediction on the number of

repetitions that they believe that they have remaining prior to failure. The information from this study will help the researchers compare and evaluate the accuracy of the two methods at quantifying proximity to muscular failure.

Powerlifting is a sport that involves performing 3 maximal lifting attempts (i.e., the heaviest weight possible that can be lifted for one repetition) in the squat, bench press, and deadlift, in which the winner of a powerlifting competition is the individual with the highest total (the highest total weight lifted summed in the squat, bench press, and deadlift). Autoregulated resistance training (i.e., adjusting the training prescription based on an individual's measured performance or perceived performance) has emerged as a resistance training paradigm to individualize a powerlifting resistance training program. Recent evidence has demonstrated that autoregulated resistance training provides a marginally greater benefit than traditional standardized resistance training on physiological adaptations (i.e., muscular strength and hypertrophy) and performance outcomes in resistance-trained individuals. Traditional resistance training involves prescription of intensity as a percentage of the maximal amount of weight an individual can lift (for example, a resistance of 70% of maximal strength is a weight equal to 70% of the maximal weight a person can lift one time. An individual with this prescription would lift this weight for a number of repetitions to failure; i.e. usually 8-10 repetitions). Autoregulation can be done two ways: "subjectively" or "objectively".

"Subjective" autoregulation involves implementing the repetitions in reserve-based rating of perceived exertion scale (RIR-based RPE scale) to quantify how close an individual is to muscular failure during an exercise. The RIR-based RPE scale ranges from 1 – 10, in which individuals provide subjective RIR-based RPE values upon their perception of how close they believe that they are to muscular failure. An RPE of 10 indicates that the individual believes that they have provided maximal effort and that no further repetitions could have been performed. An RPE of 9 indicates that the individual believes that they could have successfully performed 1 more repetition prior to failure. An RPE of 8 indicates that the individual believes that they could have successfully performed 2 more repetitions prior to failure. It has yet to be determined whether the RIR-based RPE scale is a valid scale to quantify proximity to failure in trained individuals in the bench press. Some researchers have suggested "objective" autoregulation, in which barbell lifting velocity may be used instead of the RIR-based RPE scale, since the lifting velocity decreases on each repetition as an individual approaches muscular failure during a set (i.e. the lifting movement becomes slower as a person becomes more fatigued). However, it also has yet to be determined whether lifting velocity is a valid method to quantify proximity to lifting failure in trained individuals in the bench press. Proximity to muscular failure is considered an important resistance training program design variable since training closer to failure appears to be optimal for muscular hypertrophy, whereas training further from failure appears to be optimal for muscular strength and power. Proximity to failure is also indicative of the time required to recover from a bout of exercise, which may have practical implications, such as prescribing training frequency or appropriately structuring resistance training prior to competitions.

### **WHO IS CONDUCTING THIS STUDY?**

This study is being conducted by Mr. Landyn Hickmott, a PhD student in the Health Sciences Program at the University of Saskatchewan, under the supervision of Dr. Scotty Butcher (School of Rehabilitation Science) and Dr. Phil Chilibeck (College of Kinesiology). The researcher and the University of Saskatchewan are not being paid to conduct this study and have no financial interests in its results.

### **WHO CAN PARTICIPATE IN THE STUDY?**

You are eligible to participate in this study if you meet the following inclusion criteria: 1)  $\geq 18$  years old; 2)  $\geq 2$  years of resistance training experience; 3) able to lift  $\geq 1.25x$  body mass bench press for males;  $\geq 0.75x$  body mass bench press for females; 4) free of injury and/or illness that may contraindicate participation. If you have a significant medical concern (heart disease, lung disease, diabetes, or bone or

joint problem) *that would limit your ability to perform the bench press*, you cannot participate in this research study.

## **WHAT DOES THE STUDY INVOLVE?**

You will be asked to attend four testing sessions at Williams Building, Room 108, University of Saskatchewan. The first testing session will last approximately 2 hours. The second testing session will be performed 48 hours after session 1 and will last approximately 1 hour. The third testing session will be performed 48 hours after session 2 and will last approximately 1 hour. The fourth testing session will be performed 48 hours after session 3 and will last approximately 1 hour. We ask that you refrain from doing any formal exercise for 48 hours prior to your scheduled testing sessions. Please bring appropriate exercise attire for the bench press. Lifting belts, wrist wraps, and elbow sleeves are appropriate; however, you must maintain the identical equipment for the entirety of the study.

### **1. Session 1: Screening and Testing**

- i) Screening – You will be asked to complete a Get Active Questionnaire, which is a screening form that determines whether exercise is safe for you. This will assist the researchers in determining your eligibility for the study. You may be asked some questions about your answers for clarification.
- ii) Initial measurements – Age, weight, height, biological sex, and training experience will be recorded.
- iii) Warm-up – You will be asked to warm up for your bench press by performing a standardized dynamic warm-up that will be lead and instructed to you by the researcher.
- iv) One-Repetition Maximum Testing – You will perform a bench press one-repetition maximum test in accordance with validated procedures. You will perform approximately 10, 5, 3, 2, 1, 1, and 1 repetition sets at approximately barbell (45 pounds), 20, 40, 60, 70, 80, and 85% of your predicted one-repetition maximum (1RM), respectively with appropriate rest periods allocated between each set. Your predicted 1RM is the predicted maximal amount of weight that you can lift at one time. The first attempt for your 1RM will be at 90% of your predicted 1RM. Thereafter, the loads will be appropriately adjusted on each subsequent 1RM attempt based on the researcher's discretion, the lifting velocity, your feedback, and your RIR-based RPE value (the researcher will assist you to become familiar with the RIR-based RPE scale). You will continue to perform appropriate incremental 1RM attempts until you are no longer able to successfully perform the lift (to momentary muscular failure).

### **2. Session 2: Testing**

- i) Warm-up – You will be asked to warm up for your bench press by performing a standardized dynamic warm-up that will be lead and instructed to you by the researcher.
- ii) Repetition-to-Failure Testing – You will perform a bench press repetition-to-failure test at a pre-specified percentage of 1RM as determined from the 1RM test. You will be blinded to the weight on the barbell with black trash bags. You will perform as many repetitions as possible with maximal intent until you are no longer able to successfully perform the lift (to momentary muscular failure). You will verbally indicate during the set when you believe that you have 4 and 2 repetitions remaining prior to failure.

### **3. Session 3: Testing**

- i) Warm-up – You will be asked to warm up for your bench press by performing a standardized dynamic warm-up that will be lead and instructed to you by the researcher.
- ii) Repetition-to-Failure Sets – You will perform 3 sets in the bench press at a pre-specified percentage of 1RM as determined from the 1RM test (on session 1) and corresponding lifting velocity. You will be blinded to the weight on the barbell with black trash bags. You will perform as many repetitions as possible with maximal intent until you are no longer able to successfully

perform the lift (to momentary muscular failure). You will verbally indicate during the sets when you believe that you have 4 and 2 repetitions remaining prior to failure.

#### 4. Session 4: Testing

- i) Warm-up – You will be asked to warm up for your bench press by performing a standardized dynamic warm-up that will be lead and instructed to you by the researcher.
- ii) Repetition-to-Failure Sets – You will perform 3 sets in the bench press at a pre-specified percentage of 1RM as determined from the 1RM test (on session 1) and corresponding lifting velocity. You will be blinded to the weight on the barbell with black trash bags. You will perform as many repetitions as possible with maximal intent until you are no longer able to successfully perform the lift (to momentary muscular failure). You will verbally indicate during the sets when you believe that you have 4 and 2 repetitions remaining prior to failure.

#### **WHAT ARE THE BENEFITS OF PARTICIPATING IN THIS STUDY?**

If you choose to participate in this study, there are no direct benefits to you, however, you will gain an understanding of the bench press and the concept of autoregulation. You will experience using a linear position transducer (velocity measuring device) that is utilized in research settings. It is hoped that the information gained from this study will allow strength and conditioning professionals to use an individualized and autoregulated method to accurately quantify proximity to failure to improve how training is prescribed. In addition, it is hoped that future research and autoregulated training methods will be more beneficially explored with an accurate quantification of proximity to failure.

#### **ARE THERE POSSIBLE RISKS AND DISCOMFORTS?**

If you choose to participate in this study, you will be exposed to risks associated with performing heavy resistance training. These risks include:

- Acute muscle and/or joint injury
- Cardiovascular risks associated with short-term elevations in blood pressure and heart rate
- Dizziness

To mitigate the risk of injury and soreness, progressive warm-ups are employed as in standard practice. In addition, all testing will be supervised by researchers trained in the methodology appropriate for the testing sessions.

#### **WHAT HAPPENS IF I DECIDE TO WITHDRAW?**

Your participation in this research is voluntary. You may withdraw from this study at any time. You do not have to provide a reason. There will be no penalty or loss of benefits if you choose to withdraw. Your future academic status and/or relationships with your Strength and Conditioning facility or the University of Saskatchewan will not be affected. If you choose to enter the study and then decide to withdraw later, all data collected about you during your enrolment will be retained for analysis.

#### **WILL I BE INFORMED OF THE RESULTS OF THE STUDY?**

The full study results will be provided to you via email or mailed to your postal address if you decide you would like to receive them (option at the bottom of this consent form).

#### **WHAT WILL THE STUDY COST ME?**

You will not be charged for any research-related procedures. You will not be paid for participating in this study.

#### **WHAT HAPPENS IF SOMETHING GOES WRONG?**

In the case of any medical emergency that may arise during testing, trained staff and emergency protocols will be in-place to ensure immediate professional response to the situation. Necessary medical treatment

will be made available at no cost to you. By signing this document, you do not waive any of your legal rights.

### **WILL MY TAKING PART IN THIS STUDY BE KEPT CONFIDENTIAL?**

Your confidentiality will be respected. No information that discloses your identity will be released or published without your specific consent to the disclosure. The data will be stored on the University of Saskatchewan OneDrive and backed-up on a password encrypted external hard drive. Participant data will be deidentified with a coding procedure. The data files will be stored containing file names of the participant number, rather than your name. However, research records identifying you (by your randomized participant number and not your name) may be inspected in the presence of the Investigator or his or her designate by representatives from the University of Saskatchewan Research Ethics Board for the purpose of monitoring the research. However, no records, which identify you by name or initials, will be allowed to leave the Investigators' offices. The results of this study may be presented in a scientific meeting or published, but your identity will not be disclosed. The study data will be stored securely (in a locked cabinet contained within a locked office under the supervision of the PI) by the study team for a minimum of 5 years after data collection is completed.

### **COVID-19 RISK**

- a. Research site is located Williams Building, Room 108, University of Saskatchewan, under the jurisdiction of Saskatchewan public health. We are taking appropriate safety precautions to reduce the risk of spread of COVID-19 and expect you to do the same.
- b. Researchers will keep you informed and up to date on COVID-related safety requirements and information that may affect your participation (for example, contact information and contact tracing, if applicable).

### **WHO DO I CONTACT IF I HAVE QUESTIONS ABOUT THE STUDY?**

If you have any questions or desire further information about this study before or during participation, you can contact *Landyn Hickmott* by email at [lmh896@usask.ca](mailto:lmh896@usask.ca) or *Dr. Scotty Butcher* by phone at 306-966-1771.

If you have any concerns about your rights as a research participant and/or your experiences while participating in this study, contact the Chair of the University of Saskatchewan Research Ethics Board, at 306-966-2975 (out of town calls 1-888-966-2975). The Research Ethics Board is a group of individuals (scientists, physicians, ethicists, lawyers and members of the community) that provide an independent review of human research studies. This study has been reviewed and approved on ethical grounds by the University of Saskatchewan Research Ethics Board.



**CONSENT TO PARTICIPATE**

**Study Title: A Comparison of Objective vs Subjective  
Measures to Quantify Proximity to Failure during Powerlifting**

- I have read the information in this consent form.
- I understand the purpose and procedures and the possible risks and benefits of the study.
- I was given sufficient time to think about it.
- I had the opportunity to ask questions and have received satisfactory answers.
- I understand that I am free to withdraw from this study at any time for any reason and the decision to stop taking part will not affect my future relationships.
- I give permission to the use and disclosure of my de-identified information collected for the research purposes described in this form.
- I understand that by signing this document I do not waive any of my legal rights.
- I will be given a signed copy of this consent form.
- I would like to receive the group aggregate data and a copy of the research paper for this study when it is available.

YES

NO

If Yes, please provide your email or mailing address where we can send results:

- I agree to be contacted for similar research studies in the future (circle one)

YES

NO

I agree to participate in this study:

Printed name of participant:

Signature

Date

Printed name of person obtaining consent:

Signature

Date