

KEYNOTE



Plain language summary

Canadian Institute for Military and Veteran Health Research Forum 2024: Keynote Speakers Drs. Hans Christian Tingelstad and Eric Robitaille

BUILDING STRONGER SOLDIERS: THE GRIT PHYSICAL TRAINING PROGRAM

OVERVIEW

Implementing leadership-supported, evidence-based, modified physical training is an effective strategy to reduce musculoskeletal injuries among soldiers. In their CIMVHR Forum keynote address, Dr. Eric Robitaille and Dr. Hans Christian Tingelstad provided an overview of their research project entitled Generating Resilience to Injuries through Training or GRIT. They described their collaboration with civilian and military personnel to develop a standardized physical training program that, compared to traditional methods, led to lower injury rates and more training completions among Canadian Armed Forces (CAF) infantry candidates. Dr. Robitaille and Dr. Tingelstad were recognized in 2023 for their research with the prestigious Major Sir Frederick Banting Award.

WHY IT MATTERS

Musculoskeletal injuries (MSKI) are the leading cause of premature release from the CAF. In one survey, 42% of CAF members reported not deploying in the last year due to MSKI. Soldiers' inability to serve due to MSKI directly affects the strength of the armed forces and threatens their battle-ready state.

There is a clear need to reduce MSKI across the CAF and build stronger, more resilient soldiers. The GRIT program is yielding important results, minimizing the risk and burdens of MSKI, while contributing to soldiers' health in a holistic way and enhancing the CAF's operational readiness.

DEPLOYMENT STRESS EXPOSURE AND MENTAL HEALTH

Musculoskeletal injuries include damage to bones, joints, and/or muscles that limit a person's ability to be physically active.

- Acute MSKI occurs when a sudden and high amount of stress is placed on a body tissue over a short period of time, immediately exceeding the body's tolerance. An example is a soldier unexpectedly rolling their ankle during a weight-bearing march and experiencing a sprain.

The Canadian Institute for Military and Veteran Health Research (CIMVHR) works to engage academic and government researchers, facilitate new research, increase research capacity, and foster knowledge translation. CIMVHR hosts an annual Forum that brings together thought leaders to present new research, exchange ideas, share insights, learn, and collaborate with the shared objective of serving military and Veteran health needs.

- Overuse MSKI occurs when low but repeated amounts of stress are placed on body tissues, gradually weakening their tolerance over time. An example is a soldier running the same route three times per week over multiple weeks, gradually experiencing shin splint pain.

Both acute and overuse MSKI are frequently reported by soldiers during military exercises, training, organized sports, and competitions more often than during combat-related activities. It may be said that MSKI are primarily the result of soldiers physically preparing to do their job rather than actually doing their job.

MSKI impact military members in multiple ways. They may:

- Affect a person's ability to complete military tasks and participate in career courses
- Interrupt career progression
- Cause an early return from deployment
- Extend medical treatments
- Result in the early onset of arthritis and/or the development of mental health issues such as anxiety, depression, or post-traumatic stress disorder
- Impact the health and well-being of the entire military family

MANAGING THE RISK OF MSKI

Dr. Robitaille and Dr. Tingelstad argue that modified physical training can have a positive impact on MSKI outcomes. They investigated factors that are associated with MSKI risk using the Developmental Period 1 (DP1) Infantry course, which has an MSKI rate of 57% to 71%. The research team collected baseline data and injury rates using a representative sample of DP1 candidates.

Their results showed a previous history of MSKI, aerobic capacity, and strength and endurance were associated with the risk of sustaining an MSKI. The accuracy of predictions was 79%, with a key predictor being a previous history of self-reported MSKI. This highlights the importance of avoiding an initial injury as it drastically increases the risk of sustaining one in the future.

BRINGING RESEARCH AND PRACTICE TOGETHER

The GRIT research program aims to generate resilience to injuries through training. It considers MSKI prevention strategies, including modifying physical training to address injuries often associated with training errors. It also aims to determine the right amount of training that develops the body's activity tolerance without causing injury. The GRIT program:

- **Encourages local Defence Team members** to adopt the research on modified physical training to minimize MSKI on basic infantry courses.
- **Demonstrates that modifying physical training in military courses** is feasible and will not negatively affect military training.

Implementing change throughout the CAF, such as the implementation of modified physical training programs, requires combining the expertise of all Defence Team members: military staff who know a soldier's job requirements, fitness staff who know the most effective methods to build fitness, and physiotherapists who know how to prevent MSKI.

GRIT ON THE GROUND: RESEARCH IN ACTION

Recognizing that opinions on training methods to minimize injury may differ between civilian staff, military staff, and researchers, the GRIT project implemented a 5-step knowledge transfer strategy that deliberately promoted the co-creation of a standardized training program. The strategy reflected both the evidence in MSKI prevention and could be implemented during a basic infantry course. The 5 steps are:

1. Summarized the problem. They observed that the majority of MSKI experienced during basic infantry training were overuse in nature and happened during physical training, mostly during weight-bearing marches. Physical training on basic infantry courses was not standardized and consisted largely of body weight exercises, group-paced runs, and weight-bearing marches which increased quickly in distance and external load carried.
2. Described the evidence in MSKI prevention. They summarized the research evidence, noting that the most effective strategies to reduce MSKI were leadership-supported modifications to physical training that:
 - Limited overtraining by avoiding quick increases in distance or large increases in the load of weight-bearing marches
 - Used a balanced approach to the amount of regular individualized strength and aerobic training being done
3. Recommended forming a knowledge transfer group. To ensure that the recommendations from the research would be practical for a basic infantry course, they formed a group of Defence Team members comprised of civilian experts, military instructors, and leadership to co-create a standardized physical training program.
4. Designed the standardized physical training program. The co-created GRIT standardized physical training program included standardized progressions in load and distance of weight-bearing marches, running in ability groups with limited distances, and individualized strength training sessions.
5. Conducted a program evaluation. The Defence Team captured metrics of implementation feasibility, number of MSKI, limited duty days, and course attritions. They then compared the outcomes between basic infantry course members participating in GRIT standardized training and those who did not.

Defence Team members agreed that it was feasible to implement the co-created standardized physical training during basic infantry courses. Between 2019 and 2023, there were 22 fewer attritions, and soldiers participating in basic infantry courses with GRIT standardized training reported:

- 65% fewer MSKI
- 611 fewer limited duty days

ROADMAP: THE WAY AHEAD

The GRIT program has been implemented in three locations across Canada: CFB Meaford, CFB Gagetown, and CFB Borden. Based on its success, the goal is to expand the program to bases and units across Canada.

The research team is surveying the CAF leadership to understand the barriers and facilitators that may impact GRIT implementation. Preliminary results show that:

- The main causes of MSKI are widely perceived to be existing and/or unresolved injuries, followed by low levels of physical activity, and low muscular strength.
- A large number of surveyed CAF leadership members believe the individual service member is primarily

responsible for promoting and supporting injury prevention within their respective units, while 15% responded they were not sure who is primarily responsible for promoting and supporting injury prevention.

- To successfully implement an injury program, leaders believe that more time and personnel are needed, as well as more experience with injury prevention programs.

KEY MESSAGES FOR LEADERS AND RESEARCHERS

- **Musculoskeletal injuries are the leading cause of early release from the military.** MSKI directly affects the CAF's force strength and threatens its state of operational readiness.
- **Key predictors of sustaining injuries in infantry soldiers include a history of injury, followed by lower levels of strength and aerobic fitness.** Developing strength and aerobic fitness may reduce the risk of injuries, improve performance, and contribute to a soldier's general well-being.
- **Many injuries are associated with physical training.** Leadership-supported strategies that modify physical training, such as avoiding high training volumes through standardized progressions, are the most effective strategies to reduce MSKI.
- **Knowledge, expertise, equipment, and time are barriers for many military staff members who want to deliver effective physical training during the basic infantry course.** Training should draw from research evidence to feature individualized, externally loaded strength training sessions, limited distance running, and standardized progressions in loaded marches.
- **Implementing the GRIT standardized program on basic infantry courses is achievable and effective.** GRIT standardized training did not compromise military training, and demonstrated fewer overuse of MSKI, fewer limited duty days, and less attrition over a four-year period.
- **The GRIT standardized training does not require more time and personnel resources.** Interventions can be successfully implemented with leadership support and collaboration between existing military staff and civilian experts in fitness and health services.

This is a plain language summary of the plenary session, "Generating Resilience to Injuries through Training: GRIT," at the Canadian Institute for Military and Veteran Health Research (CIMVHR) Forum on October 21, 2024, in Winnipeg, Manitoba.

Speakers: **Eric Robitaille**, PhD, Defence Team Physiotherapist, Department of National Defence, and Assistant Professor, University of Toronto; and **Hans Christian Tingelstad**, PhD, Research Specialist, Canadian Forces Morale and Welfare Services, Personnel Support Program, Human Performance Research and Development

See the video: <https://youtu.be/fKuyVRcTpqs?si=YaZb7QqKmFySNJuH>