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Doctoral Dissertation Defense of

Stacie M Humm

Degree of Doctor of Philosophy

Major: Exercise Physiology

**Relationship Between Heart Rate Variability and Heart Rate Complexity in
Recovery from a 100-Mile Ultra-Marathon- A Field Study**

Friday, March 15th

3:00 pm

MACC Annex 272

Kent State University

Microsoft TEAMS: https://nam11.safelinks.protection.outlook.com/ap/t-59584e83/?url=https%3A%2F%2Fteams.microsoft.com%2F1%2Fmeetup-join%2F19%253ameeting_ZW12ZmY4MDktNjAyNi00NmFILTgwOWYtMzA0NwY0M2JkYzZm%2540thread.v2%2F0%3Fcontext%3D%257b%2522Tid%2522%253a%2522e5a06f4a-1ec4-4d01-8f73-e7dd15f26134%2522%252c%2522Oid%2522%253a%25221e25b74c-59bc-4ff2-96ff-8afce75a0a49%2522%257d&data=05%7C02%7Cshumm2%40kent.edu%7C43f07e252c094fe3f21708dc330c9320%7Ce5a06f4a1ec44d018f73e7dd15f26134%7C1%7C0%7C638441376292235767%7CUnknown%7CTWFpbGZsb3d8eyJWIjojMC4wLjAwbMDAiLCJQIjojV2luMzliLCJBTiI6Ik1haWwiLCJXVCi6Mn0%3D%7C0%7C%7C%7C&sdata=Fc60gFuEapYbYoiz1NG3MOT5iplFjOSgkAMTVYSYtiU%3D&reserved=0

Stacie M Humm

Master of Science in Exercise Science

Northern Michigan University, 2004

Bachelor of Science Health and Fitness Management,

Northern Michigan University, 2002

Stacie is a long-time university recreation professional. In her current role as Recreation Director at the Stark campus, Stacie uses her education and experience in Exercise Physiology to guide faculty, staff, and students towards permanent, positive lifestyle changes surrounding health. She leads a breast cancer recovery exercise group called STRETCH for the community. Stacie also teaches the anatomy portion of Cadaver Anatomy and Applied Assessment for new athletic training students during summer session.

Stacie is a student researcher in the Cardiovascular Dynamics lab here at Kent State. She is an active student presenter at American College of Sports Medicine (ACSM) regional and national conferences. She has presented posters, oral presentations, and symposia for ACSM on topics such as caffeine and exercise, cannabis and exercise, as well as HRV and ultra-marathons.

Stacie is an avid ultra-endurance runner who is active in the northeast Ohio running community. She volunteers with the non-profits Run to Share and Running Forward Giving Back to put on ultra-marathons in and around the Cuyahoga Valley National Park. Stacie's next big race goal is to finish the Massanutten Mountain Trails 100-mile run in May 2024.

Stacie's future research goals include evaluating HRV between genders during recovery from an ultra-marathon and evaluating recovery from multiple 100-mile races per year. Stacie intends to use her research to help other ultra-endurance runners maximize their capabilities with smart recovery and training techniques using wearable devices and based on HRV.

Relationship Between Heart Rate Variability and Heart Rate Complexity in Recovery from a 100-Mile Ultra-Marathon- A Field Study

The purpose of this study is to evaluate autonomic modulation using parameters of heart rate variability (RMSSD) and heart rate complexity (SampEn) and to delineate a timeline to autonomic recovery following ultra-marathon.

Ten healthy participants recorded heart rate monitor (HRM) data in conjunction with the Canal Corridor 100 Mile Endurance run. Runners collected 2-minute 30-second readings before, during and after the race using Polar H-10 HRMs and the EliteHRV application on their phones.

The data demonstrated significant increases in max heart rate (MHR) at the race mid-point (MP) and immediately post-race (IP). Log transformed (ln) data for RMSSD (lnRMSSD) and LF:HF (lnLF:HF) were significantly decreased from BASE at all timepoints. A significantly increased mean heart rate (MHR) and significant decreases in lnRMSSD and lnLF:HF indicate an increase in parasympathetic activity for at least 96 hours following an ultra-marathon. These data demonstrate that an ultra-marathon can have profound effects on vagal modulation as measured by HRV. There were no significant changes in autonomic modulation as demonstrated by LF, HF, or SampEn across time indicating that measures of HRV (LF power, HF power) and HRC (SampEn) were not significantly affected by running an ultra-marathon.