

Expeditionary Resilience in Extreme Conditions*

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Abstract

The planned research project “Expeditionary Resilience in Extreme Conditions” aims to develop an interdisciplinary model of human and team resilience by integrating scientific research, mountaineering experience, and academic education. The study will focus on individuals and groups operating in high-risk, high-stress environments – such as mountaineering expeditions – where adaptation, decision-making, and teamwork are challenged under extreme conditions. Building on prior research conceptualizing resilience as a dynamic, multifactorial construct, the research will combine qualitative and quantitative methodologies to explore psychological coping strategies, physiological responses, and logistical management processes. It will extend existing findings on mountain resilience and human adaptation. The researcher’s dual expertise – as both a logistics scholar and experienced alpinist – enables a unique synthesis of theoretical knowledge and real-world practice. The outcomes will inform training tools, educational programs, and operational strategies for athletes, rescuers, and expedition teams, with broader implications for resilience in disaster response, military, and space missions.

Keywords: Expeditionary Resilience, Human Adaptability, Mountaineering, Human Performance,

Introduction

Understanding resilience in extreme environments demands a synthesis of diverse disciplinary perspectives. Mountainous and expeditionary contexts provide a particularly rich arena for studying resilience, as individuals and teams are exposed to physical, psychological, and social stressors that push human limits (Wyss et al., 2022). Previous studies in isolated, confined, and extreme (ICE) environments demonstrate that successful adaptation relies on the interplay between individual coping mechanisms and collective team processes (Vanhove et al., 2015; Maynard et al., 2020).

Resilience research has evolved beyond purely psychological interpretations to encompass physiological, logistical, and organizational dimensions (Fletcher & Sarkar, 2013; Southwick et al., 2014). Scholars emphasize that in extreme environments, cognitive performance and physiological endurance are tightly interconnected (Palinkas & Suedfeld, 2008). Moreover, the motivation and psychological profiles of mountaineers – driven by intrinsic and extrinsic motives – have been recognized as key determinants of expedition outcomes (Ewert, 1985; Cashel, 1994; Heil, 2019).

Planned research will leverage both scientific and experiential knowledge to bridge theoretical models of resilience with empirical observations from mountaineering expeditions (Michalski, 2021). Such integration aligns with calls for more holistic, applied approaches to mountain and expeditionary research (Hessels & Shine, 2021). The researcher’s extensive expeditionary experience, including multiple Himalayan and Karakoram climbs, provides unique field data for testing and refining resilience frameworks.

Primary Objectives

The primary goal of proposed research is to develop an interdisciplinary model of expeditionary resilience that reflects complex interactions between psychological, physiological, and organizational dimensions (Wiig, 2018). This work will be built upon Michalski's earlier monograph *The Expedition Project – A Logistical Approach* (Michalski, 2021) and related research (Michalski & Szoltysek, 2023), extending its analytical scope into behavioral and adaptive processes. This publications integrated knowledge from project management, logistics management, and strategic analysis methodologies, setting a new direction for research in expeditionary projects. Planned research will allow to delve deeper into specific research areas.

Key research areas will include:

- **Adaptability and Coping Strategies:** Investigating stress responses, isolation, and risk aligns with psychological resilience models emphasizing recovery and proactive adaptation (Bonanno, 2004; Galli & Vealey, 2008; Harrison et al., 2021).
- **Team Organization and Management:** Research in extreme environments confirms that leadership and cohesion are critical to success (Bishop, 2004; Salas et al., 2017). This research will analyze team structures and develops decision-support systems applicable to expeditions.
- **Leadership and Communication:** Building on studies of leadership under duress (Lièvre, 2017), the research will assess effective communication and conflict management strategies in expeditionary contexts.
- **Training and Field Tools:** Field-ready methods and technologies will be co-developed for athletes, mountaineers, and responders, expanding on resilience-based training frameworks (Hamilton, 2018).
- **Logistics and Risk Management:** Incorporating principles from expedition planning and risk optimization (Soles & Powers, 2003; Michalski, 2021), this component focuses on enhancing crisis management and safety planning.

Methodology and Feasibility

The methodological framework for study will employ a mixed-methods design, combining qualitative and quantitative techniques to comprehensively investigate human resilience (Reid & Kampman, 2020). This comprehensive strategy will be vital for capturing the inherent complexity of resilience in extreme environments, enabling both an in-depth understanding of individual and team experiences (qualitative insights) and the precise measurement of performance, physiological responses, and psychological states (quantitative data). This sophisticated research design aims to bridge the gap between controlled laboratory studies and the unpredictable reality of extreme environments, addressing the external validity challenges of purely lab-based studies and the internal validity challenges of purely observational field studies. Such approach has the potential to establish new standards for research in extreme human performance.

Qualitative methods – including field observation (direct observation of individuals and teams during simulated or actual expeditionary activities, such as training exercises or lower-altitude climbs), in-depth interviews (structured and semi-structured interviews will be conducted with experienced mountaineers, expedition leaders, rescue personnel, and athletes), and case studies (detailed analyses of specific expedition successes and failures) – follow best practices in expeditionary psychology and adventure education (Cashel, 1994; Reid & Kampman, 2020). Focus groups with mountaineers and rescue experts will refine theoretical constructs and support collaborative model validation.

Quantitative methods include physiological monitoring (objective measurement of physiological stress markers, such as heart rate variability, cortisol levels, and sleep patterns) and psychometric tools to measure resilience, coping, personality traits and leadership (Fletcher & Sarkar, 2013) using various types of questionnaires. Simulated high-altitude and virtual environments will enable controlled data collection (Hessels & Shine, 2021). Data analysis will integrate thematic and grounded theory techniques for qualitative data and regression, ANOVA, and correlation analyses for quantitative data (Jackman et al., 2020; Maynard et al., 2020). The mixed-methods

approach (triangulation, sequential, and convergent designs) ensures that insights are both empirically grounded and theoretically robust.

The research's design will follow Lièvre (2017) and Vanhove et al. (2015) in establishing feedback loops between observation, theory, and practical implementation. Mountain experience serves as a "living laboratory" (Palinkas & Suedfeld, 2008), linking academic inquiry with field application.

Anticipated Benefits and Dissemination

This research is expected to yield significant contributions:

- For Researchers: Expanding interdisciplinary understanding of resilience and adaptation in extreme environments (Jackman et al., 2020; Wiig, 2018).
- For Athletes and Mountaineers: Providing evidence-based tools for preparation and safety (Hamilton, 2018; Harrison et al., 2021).
- For Science and Practice: Establishing an integrated expeditionary resilience model combining logistics, psychology, and physiology (Michalski & Szotysek, 2023).
- For Education: Informing curricula in expedition leadership and performance psychology (Reid & Kampman, 2020).

The results of this research will be disseminated through publications – aiming for articles in peer-reviewed international journals and potentially a new monograph based on the developed resilience model. Additionally presenting findings at international conferences, including relevant logistics, management, and sports science gatherings. It will also be possible to use the results at presentations and workshops for academic, professional, and mountaineering communities. Finally there is a chance to develop innovative training tools, as specified in the research objectives, which can be directly utilized by athletes, rescuers, and expedition members

Conclusion

Research on Expeditionary Resilience in Extreme Conditions will represent an innovative effort to integrate management, psychology, and physiological science into a unified resilience framework (Fletcher & Sarkar, 2013; Southwick et al., 2014). By combining rigorous analysis with mountaineering practice, the project advances understanding of how individuals and teams adapt under extreme stress (Jackman et al., 2020; Palinkas & Suedfeld, 2008).

This holistic, mixed-methods approach will provide a foundation for developing training tools and decision-support systems relevant to expeditionary, military, and space contexts (Vanhove et al., 2015). Ultimately, this research will underscore that resilience is not merely an individual trait but a dynamic, systemic process shaped by psychological, physiological, organizational, and environmental factors (Wiig, 2018). The study's interdisciplinary approach and commitment to practical application position it as a significant contribution to contemporary resilience research. It lays the foundation for continued exploration of how humans and teams can prepare for, endure, and grow through the challenges of extreme environments – translating the lessons of the mountains into strategies for resilience in all domains of human endeavor.

References

- Bishop, S.L. (2004). Evaluating Teams in Extreme Environments: From Issues to Answers. *Journal of Aviation, Space and Environmental Medicine*, 75(sup.1), C14-21
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: Have we underestimated the human capacity to thrive after extremely aversive events? *American Psychologist*, 59(1), 20–28.
- Cashel, C. M. (1994). Group dynamics: Implications for successful expeditions. *Journal of Wilderness Medicine*, 5(2), 163-170

- Ewert, A. (1985). Why people climb: The relationship of participant motives and experience level to mountaineering. *Journal of Leisure Research*, 17(3), 241–250
- Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts, and theory. *European Psychologist*, 18(1), 12–23.
- Galli, N., & Vealey, R. S. (2008). Bouncing back from adversity: Athletes' experiences of resilience. *The Sport Psychologist*, 22, 316–335.
- Hessels, S., & Shine, L. (2021). Extreme environments: An educational framework for arts-based field research. *Social Science Information*, 60(4), 650–669.
- Jackman, C. P., Hawkins, R. M., Burke, S. M., et al. (2020). The psychology of mountaineering: A systematic review. *International Review of Sport and Exercise Psychology*, 16(5), 27–65.
- Lièvre, P., Aubry, M. (2017). *Project management in extreme situations: Lessons from polar expeditions, military and rescue operations and wilderness*. CRC Press.
- Maynard, M. T., Kennedy, D. M., Tannenbaum, S. I., Mathieu, J. E., & Levy, J. (2020). Team adaptation and resilience. In L. B. Landon, K. J. Slack, & E. Salas (Eds.), *Psychology and human performance in space programs*, 151 – 169. CRC Press.
- Michalski, P. B. (2021). *The expedition project: A logistical approach*. Polskie Wydawnictwo Ekonomiczne.
- Michalski, P. B., & Szoltysek, J. (2023). Searching for resilience in expeditionary projects. *Material Economy and Logistics Journal*, 4, 57–72.
- Harrison, D., Sarkar, M., Saward, C., Sunderland, C. (2021). Exploration of psychological resilience during a 25-day endurance challenge in an extreme environment. *Healthcare*, 18(23), 12707.
- Palinkas, L. A., & Suedfeld, P. (2008). Psychological effects of polar expeditions. *The Lancet*, 371(9607), 153–163.
- Reid, P., & Kampman, H. (2020). Exploring the psychology of extended-period expeditionary adventurers. *Psychology of Sport and Exercise*, 46, 101608.
- Salas, E., Rico, R., & Passmore, J. (Eds.). (2017). *The psychology of team working and collaborative processes*. John Wiley & Sons.
- Soles, C., & Powers, P. (2003). *Climbing: Expedition planning*. The Mountaineers Books.
- Southwick, S. M., Bonanno, G. A., Masten, A. S., Panter-Brick, C., & Yehuda, R. (2014). Resilience definitions, theory, and challenges: Interdisciplinary perspectives. *European Journal of Psychotraumatology*, 5(1), 25338.
- Vanhove, A. J., Herian, M. N., Harms, P. D., Luthans, F. (2015). Resilience and growth in long-duration isolated, confined and extreme (ICE) missions: A literature review and recommendations. NASA
- Wiig, S., (2018). *Exploring resilience: A scientific journey from practice to theory*. Springer
- Wyss, R., Luthe, T., Pedoth, L., Schneiderbauer, et al. (2022). Mountain resilience: A systematic literature review and paths to the future. *Mountain Research and Development*, 42(2), A23–A36.