PHYSICAL ACTIVITY, EXERCISE AND CANCER

ORIGINAL ARTICLE

Promoting exercise in oncological aftercare: Evaluation of Outdoor Against Cancer's 4x4 training programme

Hannah Pfeifle . *Outdoor Against Cancer gGmbH. Munich, Germany.*
Tom Degenhardt. *Outdoor Against Cancer gGmbH. Munich, Germany.*
Petra Thaller. *Outdoor Against Cancer gGmbH. Munich, Germany.*

ABSTRACT

Physical exercise is a key non-pharmacological strategy in oncological aftercare, contributing to improvements in physical performance, quality of life, and symptom management. This study evaluates the 4x4 training programme developed by Outdoor Against Cancer (OAC), a supervised high-intensity interval training (HIIT) intervention based on the Norwegian 4x4 protocol, implemented over nine months in Munich. Participants, including individuals with active cancer, survivors in remission, relatives, and health-oriented individuals, completed a structured survey assessing feasibility, safety, adherence, and perceived effects. Results revealed high long-term commitment, with a substantial proportion attending more than sixteen sessions. Participants reported notable benefits, including reduced cancer-related fatigue, enhanced emotional well-being, improved strength and endurance, and increased quality of life. The programme was perceived as safe and well-structured, with individualized supervision playing a crucial role in motivation and adherence. These findings support the feasibility and positive impact of supervised HIIT programmes in oncological exercise therapy and highlight their potential integration into standard cancer aftercare.

Keywords: Oncology exercise, High-intensity interval training, Cancer-related fatigue, Quality of life, Exercise adherence.

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Corresponding author. *Outdoor Against Cancer gGmbH. Munich, Germany*.
E-mail: hannah.pfeifle@outdooragainstcancer.com
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INTRODUCTION

Physical activity is now considered a key non-pharmacological intervention in oncology, both during and after cancer treatment. Structured, supervised training programmes in particular can contribute to improving physical performance and quality of life, as well as reducing therapy-associated side effects. Against this backdrop, the 4x4 training programme by Outdoor Against Cancer (OAC) was established in Munich last year. After nine months of continuous implementation, participants were systematically surveyed about their experiences and perceived effects. This article summarises the results of this survey and places them in the context of current sports science and oncology research.

RECRUITMENT AND PARTICIPANT STRUCTURE

Participants are recruited through various channels that have been established over many years. Close cooperation with oncology clinics, in particular with the Comprehensive Cancer Centre at LMU Munich and its associated institutions, plays a central role. This is supplemented by the availability of information materials, recommendations from existing networks such as the Bavarian Cancer Society, and the participants' own initiatives via internet research and social media.

In the heterogeneous training group, more than half of the participants currently have cancer, and about one third are in remission. In addition, relatives and other people interested in health also participate. This mix is perceived as enriching by the participants and contributes to social support within the group.

COMMITMENT AND PARTICIPATION BEHAVIOUR

A key finding of the survey is the high level of long-term commitment. Around 25% of participants have attended more than 16 training sessions. This level of commitment is remarkable in the context of exercise therapy programmes in oncology and indicates a high level of acceptance and perceived relevance of the training programme.

TRAINING CONCEPT: 4X4 TRAINING

The 4x4 training is based on the established Norwegian 4x4 protocol, a specific form of high-intensity interval training (HIIT). The protocol comprises four intervals of four minutes each at an intensity of 85-95% of the maximum heart rate, interrupted by active recovery phases at low intensity. In sports science literature, this protocol is particularly highlighted for its effects on cardiorespiratory fitness. This is a key predictor of morbidity and mortality, even in oncology patients. Studies show that, compared to other HIIT formats, the 4x4 protocol can result in higher energy expenditure, greater metabolic stress and marked improvements in maximum oxygen uptake (Schlüter, K. et al. 2019, Herranz-Gómez A. et al. 2024).

Dr Tom Degenhardt, Medical Director of OAC, says:

> "*We are delighted that 4x4 training will bring significant medical and personal benefits to our cancer patients*."

FEASIBILITY, SAFETY AND SUPPORT

Safety is a key concern when using high-intensity training methods in oncology. Current evidence shows that the 4x4 HIIT protocol is feasible and safe for various groups of cancer survivors – including breast and

prostate cancer survivors – provided that it is adapted and monitored (Schlüter, K. et al. 2019). These findings are also reflected in the feedback from participants. Regardless of their disease status, they unanimously report a well-balanced training intensity, a clear and structured design of the units, and understandable and clear explanations by qualified trainers. Individual support is highlighted as a key factor for feeling safe and motivated.

One participant describes this as follows:

"*The trainers actively approach you and answer every question very competently*."

EFFECTS OF THE TRAINING

Among the most significant results of the survey are the reported positive effects of the training. Overall, 84% of participants say they benefit noticeably from participating. In particular, they mention:

- A reduction in cancer-related fatigue,
- An increased quality of life,
- Improved emotional balance, and
- Gains in strength and endurance.

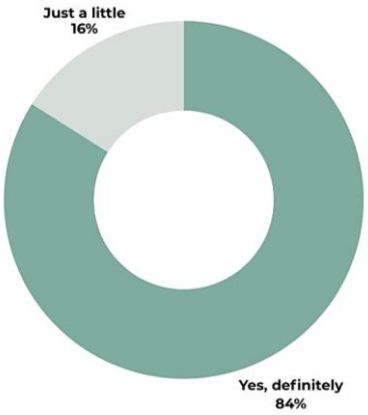

Figure 1. Amount of participants, who experienced positiva effects through 4x4 Trainning.

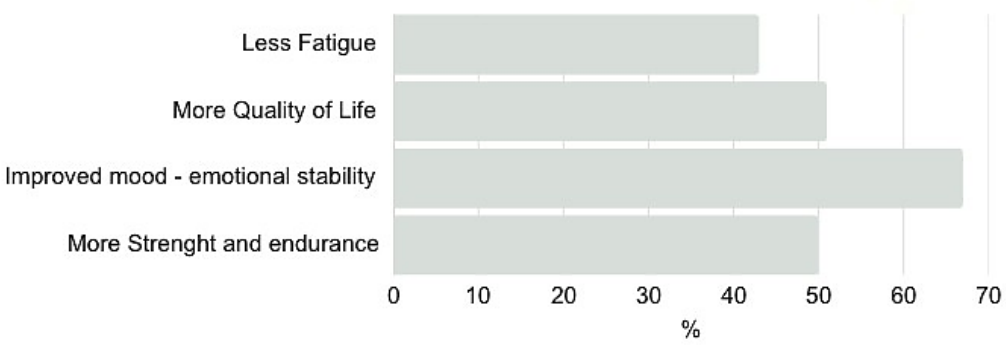

Figure 2. Positive effects through 4x4 Training.

These subjective assessments are consistent with current evidence that supervised, higher-intensity training interventions are associated with improvements in physical function and self-reported quality of life during

and after cancer treatment (Herranz-Gómez A. et al. 2024, Sweegers M. G et al. 2018, Chen Y. J et al. 2020). The reduction of fatigue, one of the most common and debilitating symptoms of oncological diseases, is also regularly described in the literature (Loughney L. A et al. 2018, Witlox L. et al. 2018).

JOY, MOTIVATION AND PERSEVERANCE

In addition to the physiological effects, the emotional component plays a decisive role in long-term training adherence. Participants report high levels of enjoyment and motivation, especially when training together outdoors. Statements such as "*It's much more fun than training alone*" or "*Even if I'm not feeling great that day, I always feel better afterwards*" underline the importance of social and motivational factors.

Tom Degenhardt sums it up:

> "*The advantages of 4x4 training are obvious: anyone can do it! I'm happy that we meet outside and are active together*."

CLASSIFICATION AND OUTLOOK

The results of the participant survey confirm both the international data and comparable feedback from other countries, including Latvia, where the 4x4 protocol is used in similar contexts (Thaller P. 2025). They emphasise that the Norwegian 4x4 training protocol is a safe, practical and effective HIIT format for cancer patients, especially when it is professionally instructed and supervised.

The findings will not only be incorporated into the further development of training programmes, but also into the training and continuing education of trainers in the field of oncological exercise therapy. The aim is to transfer evidence-based training concepts into practice in a sustainable manner and make them accessible to as many affected individuals as possible, for example through our continuing education programme on the 4x4 method or the OAC trainer training programme.

CONCLUSION

OAC's 4x4 training impressively demonstrates how evidence-based training protocols can be successfully integrated into a practical, supervised setting for oncology patients. The high level of participation, the positive subjective effects and the consistency with the current state of research speak for the potential of this approach to further establish exercise as an integral part of oncology care.

A quote from one participant sums it up:

> "*It's great that this training programme exists – it helps me put my cancer diagnosis aside for a while*."

AUTHOR CONTRIBUTIONS

H.P., led the conceptual development and drafted the manuscript. T.D., contributed medical expertise and reviewed the scientific content. P.T., contributed to the conceptual framework, strategic alignment, and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript.

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DISCLOSURE STATEMENT

No potential conflict of interest was reported by the authors.

REFERENCES

Chen, Y., Li, X., Ma, H., Zhang, X., Wang, B., Guo, T., Xiao, Y., Bing, Z., Ge, L., Yang, K., & Han, X. (2020). Exercise Training for Improving Patient-Reported Outcomes in Patients With Advanced-Stage Cancer: A Systematic Review and Meta-Analysis. Journal of Pain and Symptom Management, 59(3), 734-749.e10. https://doi.org/10.1016/j.jpainsymman.2019.09.010

Herranz-Gómez, A., Suso-Martí, L., Varangot-Reille, C., Barrachina-Gauchia, L., Casaña, J., López-Bueno, L., Calatayud, J., & Cuenca-Martínez, F. (2024). The Benefit of Exercise in Patients With Cancer Who Are Receiving Chemotherapy: A Systematic Review and Network Meta-Analysis. Physical Therapy, 104(2), pzad132. https://doi.org/10.1093/ptj/pzad132

Loughney LA, W. M. A. K. G. J. G. M. P. W., & Jack, S. (2018). Exercise interventions for people undergoing multimodal cancer treatment that includes surgery. Cochrane Database of Systematic Reviews, 12. https://doi.org/10.1002/14651858.CD012280.pub2

Schlüter, K., Schneider, J., Sprave, T., Wiskemann, J., & Rosenberger, F. (2019). Feasibility of Two High-Intensity Interval Training Protocols in Cancer Survivors. Medicine & Science in Sports & Exercise, 51(12). https://doi.org/10.1249/MSS.0000000000002081

Sweegers, M. G., Altenburg, T. M., Chinapaw, M. J., Kalter, J., Verdonck-de Leeuw, I. M., Courneya, K. S., Newton, R. U., Aaronson, N. K., Jacobsen, P. B., Brug, J., & Buffart, L. M. (2018). Which exercise prescriptions improve quality of life and physical function in patients with cancer during and following treatment? A systematic review and meta-analysis of randomised controlled trials. British Journal of Sports Medicine, 52(8), 505–513. https://doi.org/10.1136/bjsports-2017-097891

Thaller, P. (2025). Physical activity: A future standard in cancer therapy. Physical Activity, Exercise and Cancer, 2(1), 1–3. https://doi.org/10.55860/AOOB6106

Witlox, L., Hiensch, A. E., Velthuis, M. J., Steins Bisschop, C. N., Los, M., Erdkamp, F. L. G., Bloemendal, H. J., Verhaar, M., ten Bokkel Huinink, D., van der Wall, E., Peeters, P. H. M., & May, A. M. (2018). Four-year effects of exercise on fatigue and physical activity in patients with cancer. BMC Medicine, 16(1), 86. https://doi.org/10.1186/s12916-018-1075-x