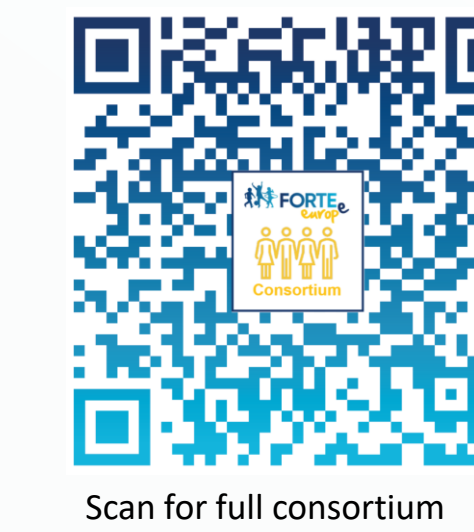


Physical Activity as a Treatment for Cancer-Related Fatigue in Children, Adolescents and Young Adults: A Systematic Review

Contact

Mareike Kühn, MA Sport Science

Center for Pediatric and Adolescent Medicine
Department of Pediatric Hematology/Oncology
University Medical Centre, Johannes Gutenberg-
University Mainz, Germany
Mareike.kuehn@unimedizin-mainz.de



Scan for full consortium

Mareike Kuehn^{1*}, Lena Wypyrsczyk^{1*}, Sandra Stoessel¹, Marie A. Neu¹, Lisa Ploch¹, Elias Dreismickenbecker¹, Perikles Simon² and Joerg Faber¹

¹ Center for Pediatric and Adolescent Medicine, Department of Pediatric Hematology/Oncology, University Medical Center of the Johannes Gutenberg-University Mainz, 55131 Mainz, Germany

² Institute of Sport Science, Department Sport Medicine, Rehabilitation and Disease Prevention, Johannes Gutenberg University, 55128 Mainz, Germany

* These authors contributed equally to this work.

BACKGROUND

- Cancer-related fatigue (CRF) is one of the most serious side effects of cancer and its treatment.¹⁻⁴
- CRF is characterised by severe exhaustion and fatigue that cannot be counteracted by rest and adequate sleep.^{5,6}
- In this context, CRF and its associated impairments mean an enormous reduction in overall quality of life, especially for children. Patients are no longer able to lead their usual lives and are severely restricted from participating in social activities.^{7,8}
- Based on a number of clinical trials, exercise and physical activity interventions have been shown to be effective in treating CRF in adult cancer patients.⁹
- Relatively few studies have investigated the effect of physical activity interventions in paediatric cancer patients.^{10,11}

AIM

- To investigate whether exercise interventions can reduce CRF in paediatric oncology patients.
- To summarise the current evidence on what exercise interventions (types of exercise, exercise norms) are already being used in paediatric oncology in the treatment of CRF.

METHODS

Search strategy

- Systematic literature search**
- In PubMed and SportDiscus in October 2021

Methodological quality

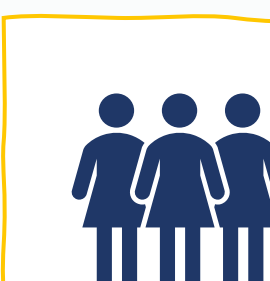
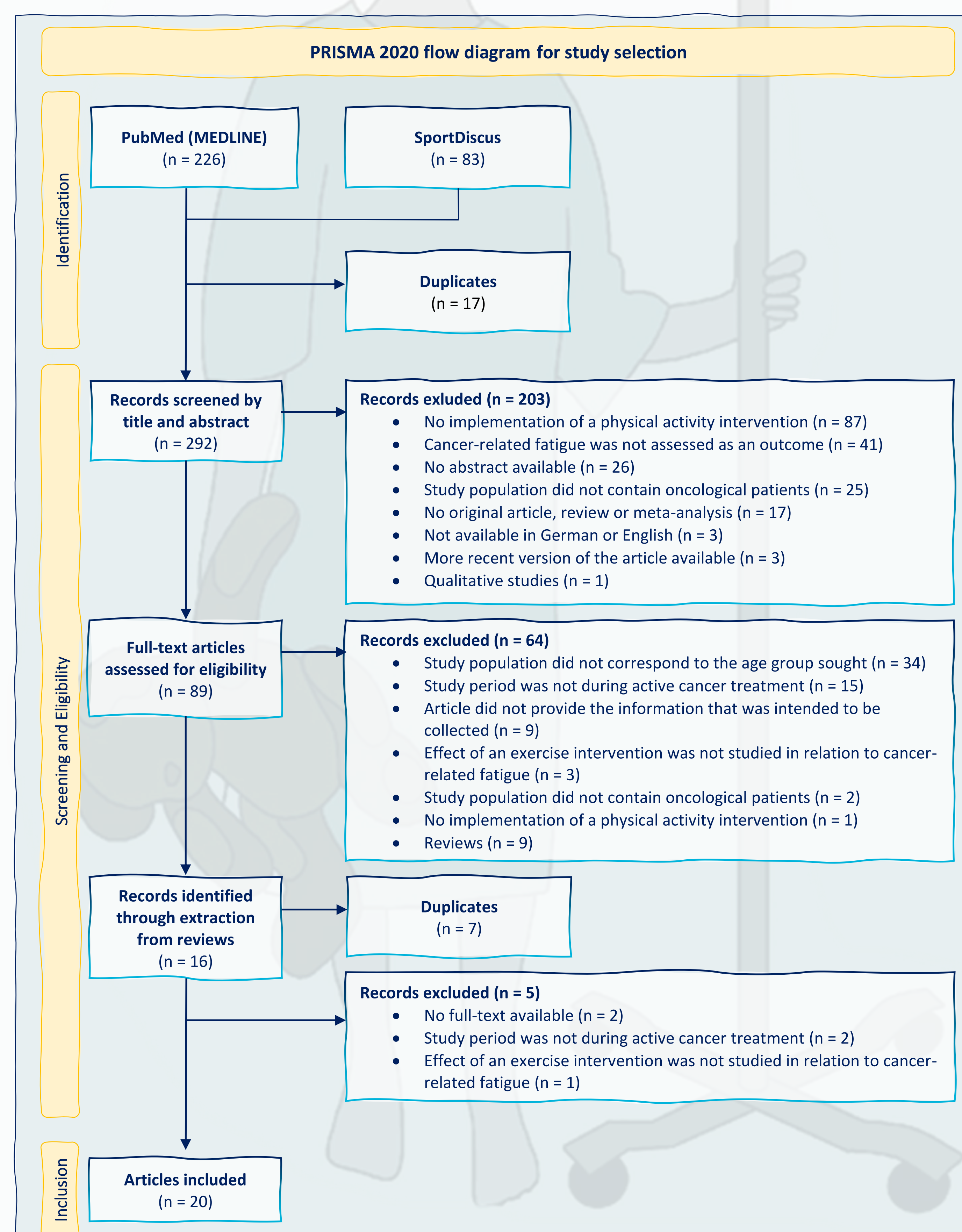
- Methodological quality**
- JBI Critical Appraisal Tool¹²

	RCTs	QETs
Item number	13 items	9 items
Low quality	0 – 4	0 – 3
Medium quality	5 – 9	4 – 6
High quality	10 – 13	10 – 13

Inclusion Criteria

- Study design**
 - Peer-reviewed original articles, reviews and meta-analyses
 - Abstracts and full texts in English or German
- Study population**
 - Childhood cancer patients ≤ 21 years of age
 - During anti-cancer treatment
- Intervention**
 - Physical activity interventions
 - No restrictions regarding control interventions
- Primary outcome**
 - Assessment of cancer-related fatigue
 - Relationship between exercise interventions and CRF

RESULTS



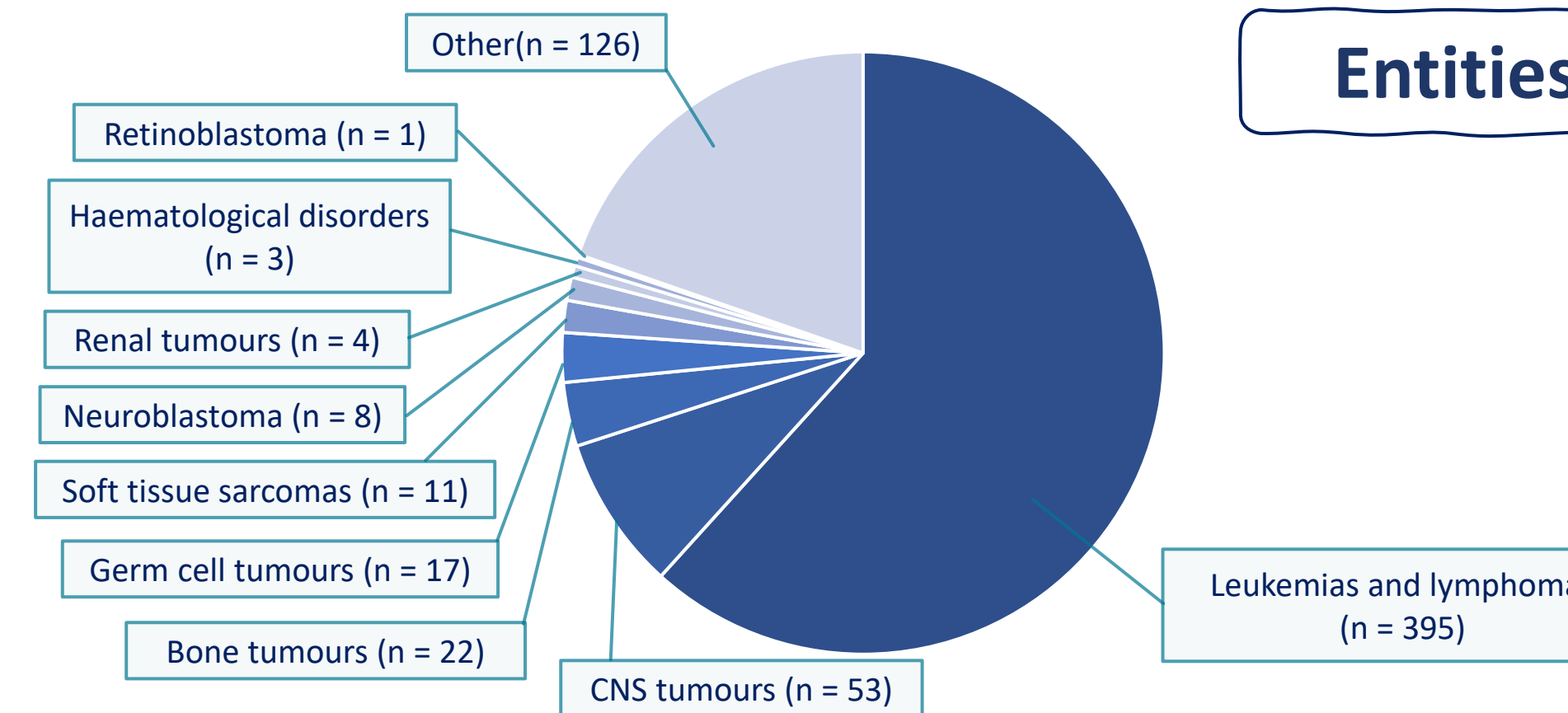
Study population

- 660 subjects
- Age: 3 - 25 years
- 41% female / 59% male

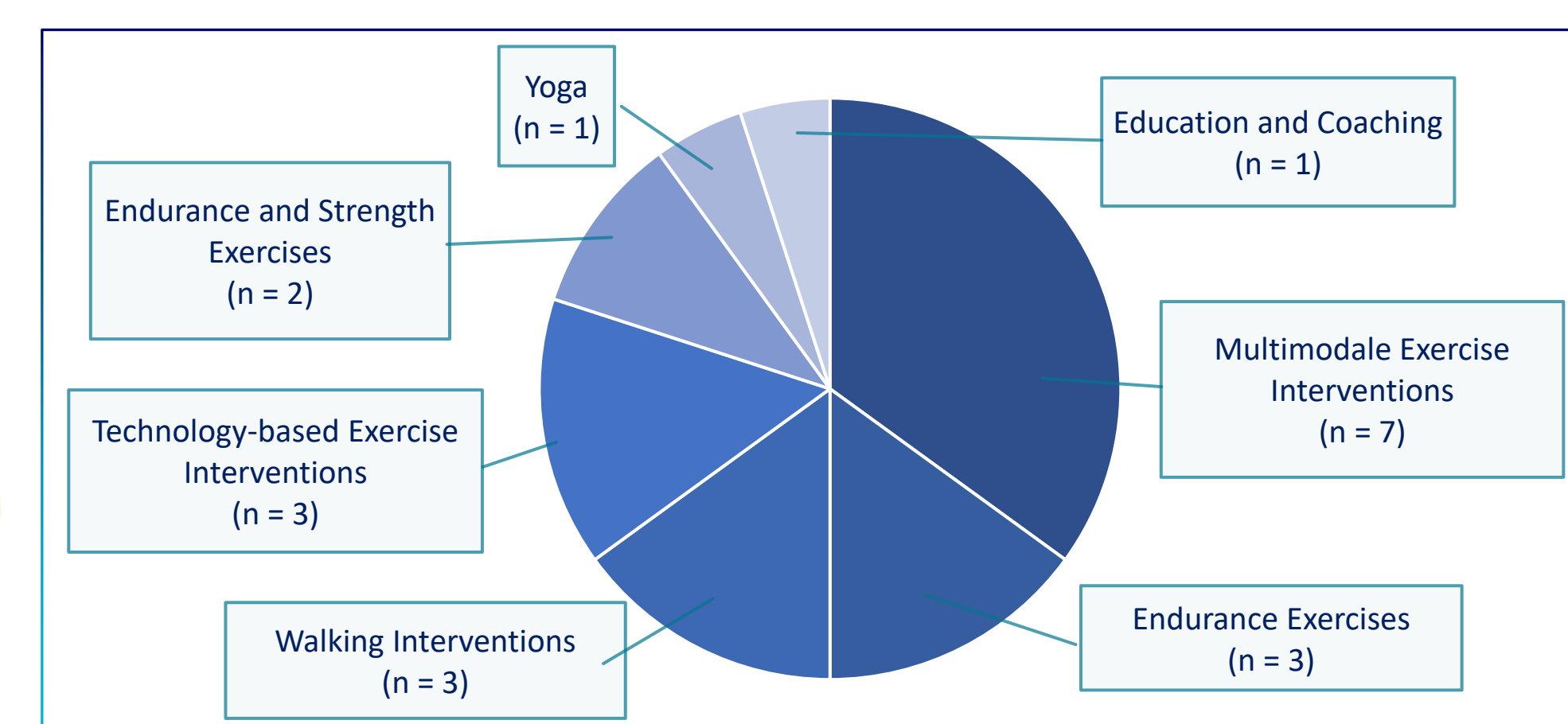
Control

- Standard care
- Exercise recommendations
- Healthy siblings
- Historical control group

High heterogeneity in study samples



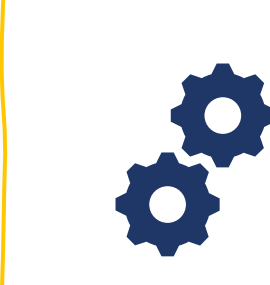
Physical activity interventions



Organisation and Dosage

Duration of intervention 2 days to 6 months	Frequency 1x/week – 10x/week
Duration of exercise session 10 – 90 min	Intensity Low - High
Supervision Non-supervised or supervised	Implementation Individual or Group training

High heterogeneity in organisation and implementation of interventions



Methodological quality was rated as moderate according to JBI Critical Appraisal Tools¹²

DISCUSSION

The relevance of promoting physical activity as a therapeutic measure in oncology has been demonstrated by the extensive discussion of physical activity in oncology and its presence in the current literature. Regardless of the type of exercise intervention offered, positive effects of physical activity on CRF and other health-related outcomes are evident. However, the study situation in the field of paediatric oncology is very heterogeneous and shows a wide range concerning quantitative data on exercise normative.

CONCLUSION

Physical activity as a therapeutic intervention in paediatric oncology may have the potential to reduce CRF in childhood cancer patients undergoing cancer treatment. Further high-quality studies with large samples are needed to verify these findings and to assess the interdependence of dose and response of physical activity interventions.

9 studies reported **significant positive effects** of physical activity interventions on CRF

11 trials reported **no significant changes** in CRF

in group comparison or within groups

In particular, trials that used **multimodal exercise interventions** found (significant) reductions in CRF.

Organizing the interventions as **supervised training** (as well as **group training**) tended to have **positive effects on CRF** in the included studies, compared with non-supervised training.

LITERATURE

- Chang C.-W., Mu P.-F., Jou S.-T., Wong T.-T., Chen Y.-C. Systematic review and meta-analysis of nonpharmacological interventions for fatigue in children and adolescents with cancer. *Worldviews Evid.-Based Nurs.* 2013;10:208–217. doi:10.1111/wvn.12007.
- Hockenberry-Eaton M., Hinds P.S., Alcoser P., O'Neill J.B., Euell K., Howard V., Gattuso J., Taylor J. Fatigue in children and adolescents with cancer. *J. Pediatr. Oncol. Nurs.* 1998;15:172–182. doi:10.1177/104345429801500306.
- Nowe E., Stöbel-Richter Y., Sender A., Leuteritz K., Friedrich M., Geue K. Cancer-related fatigue in adolescents and young adults: A systematic review of the literature. *Crit. Rev. Oncol./Hematol.* 2017;118:63–69. doi:10.1016/j.critrevonc.2017.08.004.
- Erickson J.M. Fatigue in adolescents with cancer: A review of the literature. *Clin. J. Oncol. Nurs.* 2004;8:139–145. doi:10.1188/04.CJON.139-145.
- Hooke M.C., Linder L.A. Symptoms in Children Receiving Treatment for Cancer-Part I: Fatigue, Sleep Disturbance, and Nausea/Vomiting. *J. Pediatr. Oncol. Nurs. Off. J. Assoc. Pediatr. Oncol. Nurses.* 2019;36:244–261. doi:10.1177/1043454219849576.
- Langeveld N.E., Grootenhuys M.A., Voûte P.A., Haan R.J., van den Bos C. No excess fatigue in young adult survivors of childhood cancer. *Eur. J. Cancer.* 2003;39:204–214. doi:10.1016/S0959-8049(02)00629-9.
- Eddy L., Cruz M. The relationship between fatigue and quality of life in children with chronic health problems: A systematic review. *J. Spec. Pediatr. Nurs. JSPN.* 2007;12:105–114. doi:10.1111/j.1744-6155.2007.00099.x.
- Tomlinson D., Zupanec S., Jones H., O'Sullivan C., Hesser T., Sung L. The lived experience of fatigue in children and adolescents with cancer: A systematic review. *Support. Care Cancer Off. J. Multinat. Assoc. Support. Care Cancer.* 2016;24:3623–3631. doi:10.1007/s00520-016-3253-8.
- Meneses-Echávarz J.F., González-Jiménez E., Ramírez-Vélez R. Effects of Supervised Multimodal Exercise Interventions on Cancer-Related Fatigue: Systematic Review and Meta-Analysis of Randomized Controlled Trials. *BioMed Res. Int.* 2015;2015:328636. doi:10.1155/2015/328636.
- Braam K.I., van der Torre P., Takken T., Veening M.A., van Dulmen-den Broeder E., Kaspers G.J.L. Physical exercise training interventions for children and young adults during and after treatment for childhood cancer. *Cochrane Database Syst. Rev.* 2016;3:CD008796. doi:10.1002/14651858.CD008796.pub3.
- Robinson P.D., Oberoi S., Tomlinson D., Duong N., Davis H., Cataudella D., Culos-Reed N., Gibson F., Götte M., Hinds P., et al. Management of fatigue in children and adolescents with cancer and in paediatric recipients of haemopoietic stem-cell transplants: A clinical practice guideline. *Lancet Child Adolesc. Health.* 2018;2:371–378. doi:10.1016/S2352-4642(18)30059-2.
- Tufanaru C., Munn Z., Aromataris E., Campbell J., Hopp L. Chapter 3: Systematic Reviews of Effectiveness. In: Aromataris E., Munn Z., editors. *JBI Manual for Evidence Synthesis*. JBI; North Adelaide, SA, Australia: 2020.
- Moher D., Liberati A., Tetzlaff J., Altman D.G. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Ann. Intern. Med.* 2009;151:264–269. doi:10.7326/0003-4819-151-4-200908180-00135.
- Kuehn M., Wypyrsczyk L., Stoessel S., Neu M. A., Ploch L., Dreismickenbecker E., Simon P., & Faber J. (2023). Physical Activity as a Treatment for Cancer-Related Fatigue in Children, Adolescents and Young Adults: A Systematic Review. *Children (Basel, Switzerland)*, 10(3), 572. <https://doi.org/10.3390/children10030572>

