

BMJ Open Preliminary effectiveness of social prescription and virtual patient information in increasing tertiary prevention among cancer patients (ESPRIT): protocol for a single-centre, randomised controlled pilot trial

Lisa Boyer ^{1,2}, Christine Bernardi,¹ Michael Leitzmann,³ Michael Koller,⁴ Tobias Pukrop,^{2,5} Sabine Einhell,² Daniel Heudobler,² Karen Steindorf,⁶ Wolfgang Herr,² Anne Herrmann^{1,2,5}

To cite: Boyer L, Bernardi C, Leitzmann M, *et al.* Preliminary effectiveness of social prescription and virtual patient information in increasing tertiary prevention among cancer patients (ESPRIT): protocol for a single-centre, randomised controlled pilot trial. *BMJ Open* 2025;**15**:e087177. doi:10.1136/bmjopen-2024-087177

► Prepublication history and additional supplemental material for this paper are available online. To view these files, please visit the journal online (<https://doi.org/10.1136/bmjopen-2024-087177>).

Received 02 April 2024

Accepted 18 December 2024



© Author(s) (or their employer(s)) 2025. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ Group.

For numbered affiliations see end of article.

Correspondence to

Lisa Boyer; lisa.boyer@ukr.de

ABSTRACT

Introduction Tertiary prevention through physical activity and psychosocial support can positively impact patient outcomes, such as physical function and quality of life (QoL). However, more research is required on the effectiveness of strategies designed to increase the uptake of tertiary prevention programmes among cancer patients. Here, we present the protocol for a single-centre, randomised controlled pilot trial testing the preliminary effectiveness of social prescription and virtual patient information in increasing tertiary prevention among cancer patients and support persons (SPs) (ESPRIT “Effectiveness of a social prescription and virtual patient information in increasing tertiary prevention” pilot trial).

Methods and analysis Cancer patients attending medical oncology units at a university hospital in southern Germany and their SPs will be randomly allocated as a dyad to group A (social prescription (n=36)), group B (virtual patient information (n=36)) or group C (usual care (n=36)). The hospital is part of a Comprehensive Cancer Centre mainly treating patients living in rural areas. Primary outcomes are the uptake of physical activity, participation in social activities and psychosocial support. Secondary outcomes are overall QoL, knowledge of the health benefits of physical activity and psychosocial support and self-efficacy of patients. The outcomes will be assessed at baseline and after 3, 6 and 12 months of follow-up. Physical activity will be assessed using accelerometers and measured by average steps per day within the last 2 weeks after recruitment and at follow-up visits (3, 6 and 12 months). Cost-effectiveness and the time spent in the consultation, as well as potential implementation barriers and facilitators, will also be explored as part of a mixed-methods hybrid design. All data will be summarised descriptively. Regarding the analysis of primary endpoints, the average number of steps per day, as well as the summary score of the social activity log and self-report on the use of psychosocial support, will be compared between the groups (A, B and C) using analysis of variance, followed by Dunnett’s test for pairwise

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This pilot trial employs innovative methodology by using an effectiveness-implementation hybrid design.
- ⇒ Levels of physical activity will be measured using accelerometers rather than self-report.
- ⇒ A mixed-methods approach allows for comprehensively assessing the care experiences and preferences of cancer patients and support persons.
- ⇒ This project is conducted in close collaboration with a comprehensive cancer centre, mainly treating patients from rural areas, to assess potential barriers to care access.
- ⇒ Given that this is a single-centre pilot trial, further exploration of the generalisability of findings will be required.

comparisons of the intervention groups against the control group. Mean differences and 95% CIs will be presented as effect estimates. The analysis of secondary endpoints will include appropriate statistical methods such as the χ^2 test of independence or linear regression models, which will be used to analyse secondary endpoints and to investigate factors influencing preliminary effectiveness.

Ethics and dissemination This trial has been approved by the ethics committee of the University of Regensburg (reference: 23-3317-101). Signed written informed consent is required from all study participants. The results of the study will be used to inform the power calculation for future confirmatory trials and will be submitted for publication.

Trial registration number DRKS00033771.

INTRODUCTION

Tertiary prevention involves minimising the effects of cancer and its treatment, improving patients’ quality of life (QoL)

and preventing disease progression. Through physical activity and psychosocial support during and after cancer treatment, various patient outcomes can be improved, for example, increased fitness and physical functioning or reduced fatigue.^{1–3} Also, a number of studies found that the use of tertiary prevention programmes can decrease anxiety and depression among cancer patients.⁴ This may result in long-term healthcare cost savings.^{5–7} There is evidence that cancer patients are interested in becoming more physically active and receiving further supportive care.^{8–10} Numerous programmes have been designed to meet patients' need for improved tertiary prevention, including strength and resistance training or yoga.^{11 12} Such programmes have been shown to be acceptable to patients and effective in improving patient outcomes, such as increased overall QoL or reduced fatigue.^{9 12} However, adoption rates of tertiary prevention programmes remain low.¹³ For example, a German multi-centre study involving 4020 cancer patients diagnosed with a mental disorder found that less than half reported having taken up psychological support offers.¹⁴ Various barriers to the uptake of tertiary prevention programmes have been identified, including patients' and clinicians' lack of knowledge about the potential benefits of physical activity and psychosocial support as well as limited access to appropriate offers.^{15 16}

A number of strategies have been developed to increase the uptake of tertiary prevention programmes, including the use of personal counselling and wearable device-based interventions.^{5 6 17} Despite this, little is known about which strategies are most effective in improving patient outcomes and should thus be implemented into clinical practice.¹³ Reviews suggest that multidisciplinary strategies tailored to the individual needs of patients may be most effective, but current evidence remains inconclusive.^{18–20} There is also a lack of evidence on the cost-effectiveness of interventions designed to increase tertiary prevention among cancer patients.²¹

It has been suggested that the involvement of patients and their support persons (SPs) as dyads may enhance the uptake of physical activity and psychosocial support, as SPs can positively impact patients' preventive health behaviour.²² However, only a few studies have explored how to best use the bond between patients and SPs to increase the uptake of tertiary prevention programmes.^{23 24}

One novel and promising strategy to facilitate the use of tertiary prevention among cancer patients is social prescribing. Social prescribing involves interactions between physicians and patients resulting in written referrals to non-clinical support programmes to meet patients' physical and mental health needs.²² This referral process involves various healthcare services and is tailored to the individual needs of each patient.²⁵ Social prescribing has been shown to improve patients' self-perceived health status and to reduce social isolation.^{26 27} It may also enhance multidisciplinary care and, at the same time, reduce the workload for healthcare professionals.^{28 29}

The current pilot trial uses an effectiveness-implementation hybrid design³⁰ to explore the preliminary effectiveness and implementability of social prescription and virtual patient information concerning physical and social activity, as well as psychosocial support services, in increasing tertiary prevention among cancer patients.

METHODS AND ANALYSIS

Study design and setting

This is a single-centre pilot randomised controlled trial (RCT) in the context of a Comprehensive Cancer Centre (CCC) at a university hospital in southern Germany, mainly treating patients living in rural areas. The study will investigate the preliminary effectiveness of social prescription (group A) and virtual patient information (group B) compared with usual care (group C) in increasing the uptake of (1) physical activity among cancer patients measured by average steps per day over 2 weeks after recruitment and follow-up visits (3, 6 and 12 months) and (2) participation in social activities and psychosocial support among cancer patients and SPs (see figure 1). The nature of this study is explorative, rather than confirming a priori hypothesis.

Participants

The study includes German-speaking adult patients (aged ≥18 years) attending medical oncology units at the participating hospital, diagnosed with early-stage or advanced cancer (ie, cancer stages I–IV) no more than 12 months ago, who have an expected survival of at least 2 years and will have provided written informed consent (see online supplemental material for an example of the consent form). SPs are also included if they are German-speaking, aged ≥18 years, nominated by the patient as someone helping them cope with their cancer through support, encouragement and communication, and have provided written informed consent. Key exclusion criteria involve an inability to complete surveys or interviews independently (eg, speech and vigilance). Corresponding clinicians (eg, physicians) working at the participating clinic will be invited to take part in interviews exploring barriers and facilitators to the implementation of the interventions.

Recruitment

Patients are identified systematically from clinic lists prior to their appointment through a member of the study team. The treating physician informs patients about the ESPRIT pilot trial during an outpatient clinic visit and asks for consent to be contacted by a member of the research team, who will provide them with further verbal and written study information and obtain informed consent. If SPs are not present in the clinic, patients are asked to hand a study information package to their SPs. Patients only participate if SPs participate, and vice versa, to allow for the examination of changes in the outcomes

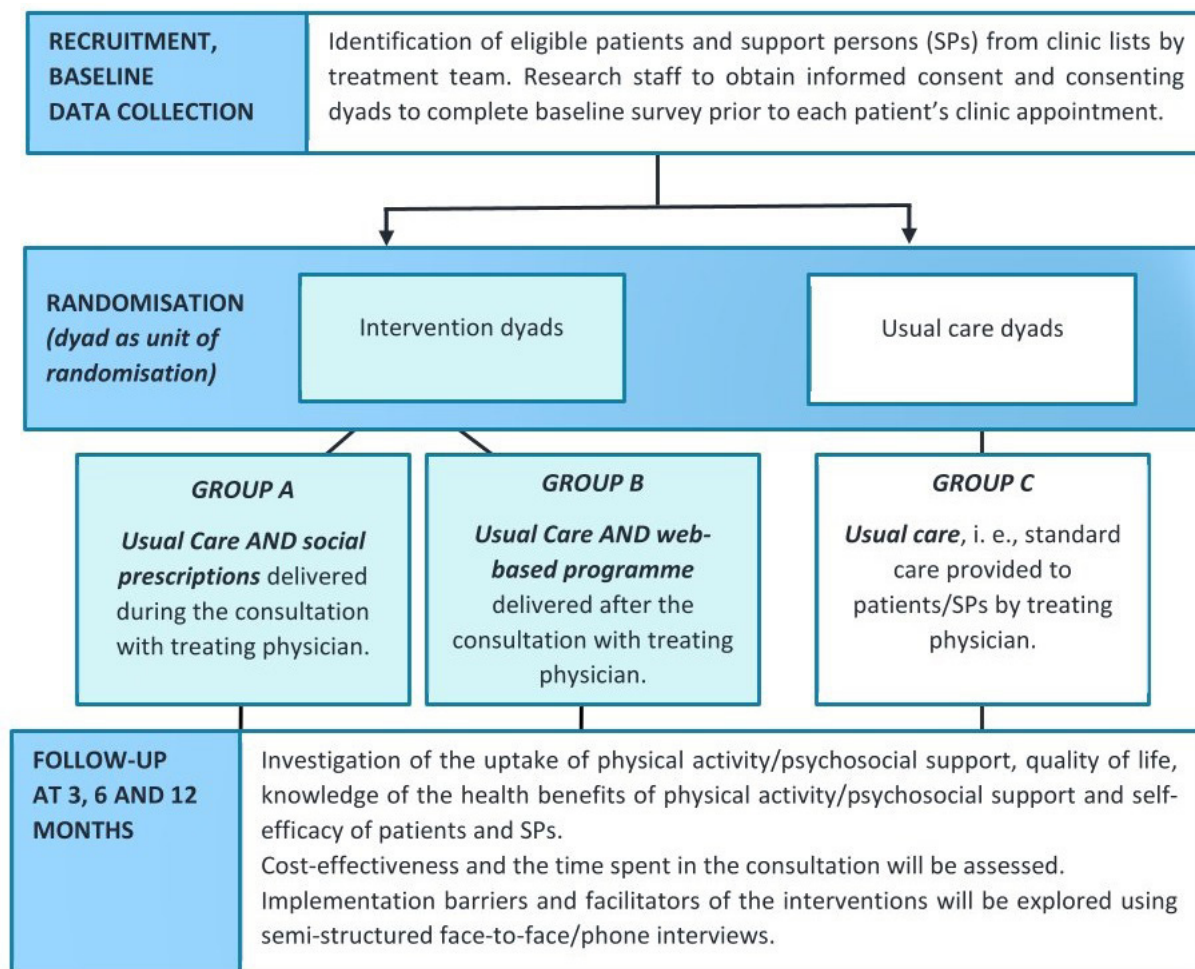


Figure 1 Study workflow.

of patient-SP dyads. A subsample of patients, SPs and clinicians will be recruited for a qualitative substudy assessing implementation barriers and facilitators. Recruitment started in July 2024 and is currently ongoing.

Randomisation

Patients and SPs are randomised as a dyad and allocated to receive either intervention A or intervention B or usual care only (group C). Block randomisation is used to achieve an equal distribution of treatment options (A, B and C).

Development and description of the interventions

This project involves a comparison of two innovative interventions to help determine the most effective strategy and investigate factors influencing preliminary effectiveness and implementation. The aim of the interventions is to increase the uptake of physical activity and psychosocial support among cancer patients and SPs. The interventions will be delivered during (group A) or after (group B) the consultation with the treating physician (see figure 1). The interventions are based on a literature review and currently available guidelines and were developed by a multidisciplinary team involving experts in the areas of oncology, physiotherapy, behavioural science

and communication science, as well as representatives of patients and SPs.

Group A—social prescription: intervention A includes individualised care plans that are tailored to each patient's medical condition to suit their particular needs and allow for the application of the social prescription to a wide range of cancer patients. The social prescription conveys information on the benefits of an active lifestyle, participating in social groups and available programmes to become physically active and receive psychosocial support for patients and SPs. The social prescription is initially delivered by the treating physician during the consultation with the patient and their SP. The social prescription is programmed with the help of REDCap, which is a versatile open-source software. The one-page prescription is generated using patient-reported outcome data on participants' health and well-being. These data are gathered with the help of the baseline questionnaire. Algorithms were designed to help provide individually tailored recommendations based on patients' responses. For instance, the distress thermometer is used, and in line with internationally agreed-upon guidance, patients are referred to a psycho-oncologist if they score five or above.³¹

Group B—virtual patient information: intervention B involves a web-based programme presenting video information about the health benefits of physical activity and psychosocial support as well as available programmes to become physically active and seek further psychosocial support. This virtual patient information is developed by the research team. The treating physician provides participants with access to the virtual patient information during the consultation, which participants can then access after the consultation.

Group C—control group usual care: the usual care group receives standard care from their cancer care providers. Usual care does not include individualised prescriptions.

Outcomes

Primary outcomes are the uptake of physical activity, participation in social activities and psychosocial support. Secondary outcomes are overall QoL, knowledge of the health benefits of physical activity and psychosocial support and self-efficacy of patients. Potential implementation barriers and facilitators and cost-effectiveness will also be explored. The outcomes will be assessed at baseline and 3, 6 and 12 months follow-up.

Primary outcomes

Uptake of physical activity is measured by average steps over 2 weeks after recruitment and follow-up visits (3, 6 and 12 months), using wearable accelerometers (Acti-Graph wGT3X-BT).^{21 32} For the current study, wearable accelerometers are deemed the most appropriate means of measuring physical activity as they may provide a more objective method than participant self-report, which may lack accuracy.³³ Accelerometers are also considered superior to pedometers since they provide additional data about the frequency, intensity, type and duration of physical activity, rather than reporting on step count only.³³ This additional information will help inform the interpretation of the study results. The uptake of participation in social activities and psychosocial support will be assessed using a summary score involving the social activity log (SAL)^{34 34} and participant self-report on the use of psychosocial support services. The SAL was designed to capture the frequency and diversity of social activities outside of daily responsibilities and has been previously used to provide an understanding of cancer patients' social behaviour.³⁴ It was refined and adapted to the German context using forward-backward translation.

Secondary outcomes

QoL will be assessed using the EORTC QLQ-C15-PAL, which is a widely used, coherent and easily administered quality-of-life measure using patient self-report.^{35 36} It consists of 15 questions assessing key aspects of QoL, such as physical, cognitive, social and emotional functioning. The QLQ-C15 PAL is a shortened version of the QLQ-C30³⁷ and is supposed to reduce the research-related burden on the patients.

Knowledge of the benefits of physical activity and psychosocial support is examined based on additional information provided as part of the interventions and will be assessed with a self-designed questionnaire that consists of 14 items. The proportion of accurate responses will be transformed to a percentage scale ranging from 0% (no correct responses) to 100% (perfectly accurate responses).³⁸

Self-efficacy, that is, the individual's capacity to produce the desired effects,³⁹ is assessed using the Cancer Behaviour Inventory (CBI-B-D)—Brief Version.⁴⁰ The CBI-B-D is a valid, brief measure of self-efficacy strategies for coping with cancer, which can be easily integrated into clinical oncology research and practice.⁴⁰

To investigate explanatory variables, date of birth, gender, residential postal code, occupation and highest level of education will be assessed. Furthermore, cancer type, time since diagnosis, grade and stage of cancer at diagnosis are identified using medical records to reduce the research-related burden on patients and to ensure the validity of the data.

Participants' level of cancer literacy is assessed using the German version of Cancer Health Literacy Test-6, which is a validated brief measure to assess individuals' ability to locate, understand, evaluate and apply health information to make informed decisions about their health.^{41 42}

To examine the potential implementation barriers and facilitators, qualitative semistructured interviews will be conducted with a purposeful subsample of patients, SPs and clinicians. This approach has been widely used to assess the intervention process and has been shown to be able to shed light on novel phenomena relevant to interventions.⁴³ Relatively little is known about how to implement strategies shown to be most effective in increasing tertiary prevention among cancer patients in order to help translate findings from research into clinical practice.¹⁴ Longitudinal qualitative data will be used to help fill this gap by exploring implementation barriers and facilitators over time and assessing how the most effective intervention could be best used in routine cancer care. Cancer patients and SPs will be asked semistructured open-ended questions about their perceptions of barriers and facilitators, including the acceptability of the intervention, ease of use and practicability, agreement with specific components of the intervention, motivation to use the intervention and self-efficacy (ie, belief that one can interpret and use the intervention). In addition, qualitative interviews with clinicians will be conducted to explore their views on the perceived complexity of the intervention and environmental factors that could impede the use of the interventions, such as time constraints and costs associated with supportive care.

The time spent in the consultation will be assessed to help ensure that providing the intervention will not require physicians to spend more time in the consultation and will cause minimal, if any, disruption to the clinical workflow.

Engagement with the virtual patient information will be collected by recording user activity across the intervention period.

Data collection, management, analysis and monitoring

Regarding non-consenters, the year of birth and gender are collected. The outcome data from those who do not use the intervention is collected. The data management and data protection concepts were part of the ethics application. The description of any interim analyses and guidelines for study termination will be decided by the research team.

Sample size

The primary aim of this pilot trial is an assessment of the intervention regarding its preliminary effectiveness measured by the two primary endpoints, physical activity and social participation/psychosocial support. Further, effect estimates of this study should be used as preliminary information for justification of the sample size for a large confirmatory trial.^{44–46} To estimate the therapeutic effects with sufficient accuracy, a total of $n=36$ patient-SP dyads per group are planned, as proposed by Hertzog.⁴⁶ Hertzog explicitly recommends sample sizes of 30–40 participants per group if direct estimation of a between-group effect size is desired in order to yield CIs that can help define the range of plausible values for a subsequent power analysis.⁴⁶ Assuming a drop-out rate of ~20%, we plan to include 36 dyads per arm, and 30 dyads per arm will be analysed.

For the qualitative analysis, data collection will be discontinued when data saturation in each group is perceived to be reached and further data gathering is not likely to reveal additional findings to answer the research question.^{47–48} In line with previous studies, we anticipate that conducting 30 interviews with patient-SP dyads in each study and control arm and at different points in time (ie, at baseline, 3, 6 and 12 months follow-up) provides a feasible approach to reach data saturation.^{49–51}

Statistical analysis

All data will be summarised descriptively by presenting numbers of observations, means, quartiles/IQR, SD, medians, minimums and maximums for continuous data, and absolute and relative frequencies for categorical data, both overall and for each treatment group. For the analysis of primary endpoints, the average number of steps per day, summary score of SAL and self-report on the use of psychosocial support will be compared between the groups (interventions A, B and control) using analysis of variance, followed by Dunnett's test for pairwise comparisons of the intervention groups A and B against the control group C. Mean differences and 95% CIs will be presented as effect estimates. Regarding the analysis of secondary endpoints, we use appropriate statistical methods depending on the scale level of the variables and the exact research question that will be applied, for example, to study factors influencing preliminary

effectiveness such as self-reported independent measures or disease-related characteristics. For both primary and secondary analyses, a p value of <0.05 will be considered statistically significant without adjustment for multiple testing, given the explorative and hypothesis-generating nature of the study. A statistician/biometrician will supervise the data management and data analysis and work out a detailed statistical analysis plan prior to analysis.

Qualitative data analysis

Interviews will be transcribed verbatim. Transcripts will be checked for accuracy by one researcher and analysed using framework analysis.⁵² This approach is part of a broad family of qualitative data analysis methods often referred to as 'thematic analysis' or 'qualitative content analysis'.⁸ As suggested by these approaches, both descriptive and explanatory conclusions will be drawn from the data. This method of qualitative data analysis will provide a systematic model for mapping and interpreting the data and is thus considered appropriate to develop a profound in-depth understanding of participants' experiences and views.⁵³

Patient and public involvement

Representatives of patients, SPs and clinicians were involved in the conceptualisation of this study, as well as in the development of the study-specific patient information and interventions. They will also provide ongoing advice and support during data collection, data analysis and report writing.

Study timeline

The study is planned to be completed in early 2026. Baseline recruitment is planned to finish in April 2025.

ETHICS AND DISSEMINATION

This trial has been approved by the ethics committee of the University of Regensburg (reference: 23-3317-101). Signed written informed consent is required from all study participants. The requirements for the consent documents include, among other things, that they: (a) must be written in layman's terms, (b) must be comprehensive, (c) the risk must be objectively assessable and must be referred to in particular, (d) side effects must be clearly stated and (e) both information about the study and consent must be separate documents. The results of the study will be used to inform the power calculation for future confirmatory trials. Furthermore, the results will be submitted for publication in peer-reviewed journals as well as disseminated in lay language in newspapers/public science magazines.

The study was registered at Deutsches Register Klinischer Studien (DRKS, DRKS00033771) on 3 March 2024.

DISCUSSION

This article presents the rationale and design of the ESPRIT pilot trial and the process of tailoring

information about physical activity and psychosocial support through social prescription to cancer patients and their SPs. The ESPRIT trial is a single-centre, randomised controlled pilot trial designed to test the preliminary effectiveness of social prescribing and virtual patient information in increasing tertiary prevention among cancer patients and SPs. Further analyses will be carried out to examine preliminary cost-effectiveness and implementation barriers and facilitators. A strength of this study is its randomised controlled design and the interdisciplinary development of interventions to ensure appropriate tailoring of care recommendations. This pilot RCT uses an innovative methodology by employing a hybrid effectiveness-implementation design. To maximise the accuracy of measuring patients' physical activity, we use accelerometers rather than relying on patient self-report. Another strength is that a mixed-method approach will allow a comprehensive assessment of the care experiences and preferences of cancer patients and SPs as well as clinicians' views on acceptability and usability of the interventions. With this information, interventions could be improved before further recommendations for clinical practice can be considered.

When it comes to the limitations of the study, it should be mentioned that this project is conducted in close collaboration with a CCC mainly treating patients from rural areas to assess potential barriers to care access. The results cannot be directly transferred to other centres as clinical contexts may differ. However, the results can serve as a blueprint and provide initial insights for centres considering introducing patient-centred care concepts such as social prescribing. Given that this is a single-centre pilot trial, further exploration of the generalisability of findings will be required.

This study will contribute to the evidence base on how to increase physical activity and psychosocial support among cancer patients during and following treatment. If preliminary effectiveness is demonstrated, the implementation of the developed intervention in clinical practice may be supported to help create meaningful benefits for patients and their SPs.

Author affiliations

¹Department of Epidemiology and Preventive Medicine, Medical Sociology, University of Regensburg, Regensburg, Bavaria, Germany

²Department for Internal Medicine III, University Hospital Regensburg, Regensburg, Bavaria, Germany

³Department of Epidemiology and Preventive Medicine, University of Regensburg, Regensburg, Bavaria, Germany

⁴Center for Clinical Studies, University Hospital Regensburg, Regensburg, Bavaria, Germany

⁵Bavarian Cancer Research Center, Erlangen, Bavaria, Germany

⁶Division of Physical Activity, Prevention and Cancer, German Cancer Research Center, Heidelberg, Baden-Wuerttemberg, Germany

Contributors All authors made substantial contributions to the conception of the work. All authors carried out critical revision of the manuscript for important

intellectual content. All authors read and approved the final manuscript to be published and agreed to be accountable for all aspects of the work. LB is the guarantor.

Funding This work was supported by the German Cancer Aid grant number: 70114739 as part of the Cancer Prevention Graduate School (German Cancer Research Center DKFZ).

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, conduct, reporting or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Provenance and peer review Not commissioned; externally peer reviewed.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Lisa Boyer <http://orcid.org/0009-0000-0256-0800>

REFERENCES

- 1 Lahart IM, Metsios GS, Nevill AM, *et al*. Physical activity for women with breast cancer after adjuvant therapy. *Cochrane Database Syst Rev* 2018;1:CD011292.
- 2 McTiernan A. Physical activity after cancer: physiologic outcomes. *Cancer Invest* 2004;22:68–81.
- 3 Leitzmann M, Powers H, Anderson AS, *et al*. European Code against Cancer 4th Edition: Physical activity and cancer. *Cancer Epidemiol* 2015;39:S46–55.
- 4 Dubocq JE. Using physical exercise interventions to reduce depression and anxiety in people with lung cancer. 2021.
- 5 Rogers LQ, Carter SJ, Williams G, *et al*. Physical activity. In: *Handbook of cancer survivorship: springer*. 2018: 287–307.
- 6 Irwin ML. Physical activity interventions for cancer survivors. *Br J Sports Med* 2009;43:32–8.
- 7 Arving C, Brandberg Y, Feldman I, *et al*. Cost-utility analysis of individual psychosocial support interventions for breast cancer patients in a randomized controlled study. *Psychooncol* 2014;23:251–8.
- 8 Molassiotis A, Charalambous A, Taylor P, *et al*. The effect of resistance inspiratory muscle training in the management of breathlessness in patients with thoracic malignancies: a feasibility randomised trial. *Supp Care Cancer* 2015;23:1637–45.
- 9 Chen H-M, Tsai C-M, Wu Y-C, *et al*. Randomised controlled trial on the effectiveness of home-based walking exercise on anxiety, depression and cancer-related symptoms in patients with lung cancer. *Br J Cancer* 2015;112:438–45.
- 10 Merckaert I, Libert Y, Messin S, *et al*. Cancer patients' desire for psychological support: prevalence and implications for screening patients' psychological needs. *Psychooncol* 2010;19:141–9.
- 11 Mishra SI, Scherer RW, Snyder C, *et al*. Exercise interventions on health-related quality of life for people with cancer during active treatment. *Cochrane Database Syst Rev* 2012;2012:CD008465.
- 12 Cramer H, Lauche R, Klose P, *et al*. Yoga for improving health-related quality of life, mental health and cancer-related symptoms in women diagnosed with breast cancer. *Cochrane Database Syst Rev* 2017;1:CD010802.
- 13 Koorts H, Eakin E, Estabrooks P, *et al*. Implementation and scale up of population physical activity interventions for clinical and community settings: the PRACTIS guide. *Int J Behav Nutr Phys Act* 2018;15:51.

- 14 Faller H, Weis J, Koch U, *et al.* Utilization of professional psychological care in a large German sample of cancer patients. *Psychooncol* 2017;26:537–43.
- 15 Ijsbrandy C, Hermens RMPG, Boerboom LWM, *et al.* Implementing physical activity programs for patients with cancer in current practice: patients' experienced barriers and facilitators. *J Cancer Surviv* 2019;13:703–12.
- 16 Botti M, Endacott R, Watts R, *et al.* Barriers in providing psychosocial support for patients with cancer. *Cancer Nurs* 2006;29:309–16.
- 17 Kiss N, Baguley BJ, Ball K, *et al.* Technology-Supported Self-Guided Nutrition and Physical Activity Interventions for Adults With Cancer: Systematic Review. *JMIR Mhealth Uhealth* 2019;7:e12281.
- 18 Ijsbrandy C, Ottevanger PB, Tsekou Diogeni M, *et al.* Review: Effectiveness of implementation strategies to increase physical activity uptake during and after cancer treatment. *Crit Rev Oncol Hematol* 2018;122:157–63.
- 19 Sumner LA, IsHak WW, Dang J, *et al.* Psychological interventions in inpatient medical settings: A brief review. *Int J Healthc Med Sci* 2018;4:73–83.
- 20 Ferrari F, Giannini A. Approaches to prevention of gynecological malignancies. *BMC Womens Health* 2024;24:254.
- 21 U.S. Department of Health and Human Services FDA Center for Drug Evaluation and Research. U.S. Department of Health and Human Services FDA Center for Biologics Evaluation and Research. U.S. Department of Health and Human Services FDA Center for Devices and Radiological Health. Guidance for industry: patient-reported outcome measures: use in medical product development to support labeling claims: draft guidance. *Health Qual Life Outcomes* 2006;4:79.
- 22 Husk K, Elston J, Grading F, *et al.* Social prescribing: where is the evidence? *Br J Gen Pract* 2019;69:6–7.
- 23 House JS, Landis KR, Umberson D. Social relationships and health. *Science* 1988;241:540–5.
- 24 Berkman LF. The role of social relations in health promotion. *Psychosom Med* 1995;57:245–54.
- 25 Islam MM. Social Prescribing-An Effort to Apply a Common Knowledge: Impelling Forces and Challenges. *Front Public Health* 2020;8:515469.
- 26 Aggar C, Thomas T, Gordon C, *et al.* Social Prescribing for Individuals Living with Mental Illness in an Australian Community Setting: A Pilot Study. *Commun Ment Health J* 2021;57:189–95.
- 27 Moffatt S, Steer M, Lawson S, *et al.* Link Worker social prescribing to improve health and well-being for people with long-term conditions: qualitative study of service user perceptions. *BMJ Open* 2017;7:e015203.
- 28 Chatterjee HJ, Camic PM, Lockyer B, *et al.* Non-clinical community interventions: a systematised review of social prescribing schemes. *Arts Health* 2018;10:97–123.
- 29 Drinkwater C, Wildman J, Moffatt S. Social prescribing. *BMJ* 2019;364:11285.
- 30 Landes SJ, McBain SA, Curran GM. An introduction to effectiveness-implementation hybrid designs. *Psychiatry Res* 2019;280:112513.
- 31 Die Deutsche Version Des Nccn Distress-Thermometers: Empirische Prüfung Eines Screening-Instruments Zur Erfassung Psychosozialer Belastung Bei Krebspatienten Die Deutsche Version Des Nccn Distress-Thermometers: Empirische Prüfung Eines Screening-Instruments Zur Erfassung Psychosozialer Belastung Bei Krebspatienten. 10th edn. Hogrefe AG, 2006.
- 32 Murphy J, Uttamli T, Schmidtke KA, *et al.* Tracking physical activity using smart phone apps: assessing the ability of a current app and systematically collecting patient recommendations for future development. *BMC Med Inform Decis Mak* 2020;20:17.
- 33 Broderick JM, Ryan J, O'Donnell DM, *et al.* A guide to assessing physical activity using accelerometry in cancer patients. *Supp Care Cancer* 2014;22:1121–30.
- 34 Syrjala KL, Stover AC, Yi JC, *et al.* Measuring social activities and social function in long-term cancer survivors who received hematopoietic stem cell transplantation. *Psychooncol* 2010;19:462–71.
- 35 Koller M, Neugebauer EAM, Augustin M, *et al.* Die Erfassung von Lebensqualität in der Versorgungsforschung – konzeptuelle, methodische und strukturelle Voraussetzungen. *Gesundhswes* 2009;71:864–72.
- 36 Groenvold M, Petersen MA, Aaronson NK, *et al.* The development of the EORTC QLQ-C15-PAL: a shortened questionnaire for cancer patients in palliative care. *Eur J Cancer* 2006;42:55–64.
- 37 Aaronson NK, Ahmedzai S, Bergman B, *et al.* The European Organization for Research and Treatment of Cancer QLQ-C30: A Quality-of-Life Instrument for Use in International Clinical Trials in Oncology. *JNCI Journal of the National Cancer Institute* 1993;85:365–76.
- 38 O'Connor AM, Stacey D, Rovner D, *et al.* Decision aids for people facing health treatment or screening decisions. *Cochrane Database Syst Rev* 2001;2017:CD001431.
- 39 Flammer A. Self-efficacy. In: Smelser NJ, Baltes PB, eds. *International encyclopedia of the social & behavioral sciences*. Oxford: Pergamon, 2001: 13812–5.
- 40 Heitzmann CA, Merluzzi TV, Jean-Pierre P, *et al.* Assessing self-efficacy for coping with cancer: development and psychometric analysis of the brief version of the Cancer Behavior Inventory (CBI-B). *Psychooncol* 2011;20:302–12.
- 41 Dumenci L, Matsuyama R, Riddle DL, *et al.* Measurement of cancer health literacy and identification of patients with limited cancer health literacy. *J Health Commun* 2014;19:205–24.
- 42 Sørensen K, Van den Broucke S, Fullam J, *et al.* Health literacy and public health: a systematic review and integration of definitions and models. *BMC Public Health* 2012;12:80.
- 43 Abildgaard JS, Saksvik PØ, Nielsen K. How to Measure the Intervention Process? An Assessment of Qualitative and Quantitative Approaches to Data Collection in the Process Evaluation of Organizational Interventions. *Front Psychol* 2016;7:1380.
- 44 Hill R. What sample size is “enough” in internet survey research. In: *Interpersonal Computing and Technology: An electronic journal for the 21st century*. . 1998: 6. 1–12.
- 45 Isaac S MWB. *Handbook in research and evaluation*. San Diego, CA: Educational and Industrial Testing Services, 1995.
- 46 Hertzog MA. Considerations in determining sample size for pilot studies. *Res Nurs Health* 2008;31:180–91.
- 47 Coyne IT. Sampling in qualitative research. Purposeful and theoretical sampling; merging or clear boundaries? *J Adv Nurs* 1997;26:623–30.
- 48 Draucker CB, Martsof DS, Ross R, *et al.* Theoretical sampling and category development in grounded theory. *Qual Health Res* 2007;17:1137–48.
- 49 Herrmann A, Mansfield E, Tzelepis F, *et al.* Use of the supportive care framework to explore haematological cancer survivors' unmet needs: a qualitative study. *BMC Health Serv Res* 2020;20:1062.
- 50 Francis JJ, Johnston M, Robertson C, *et al.* What is an adequate sample size? Operationalising data saturation for theory-based interview studies. *Psychol Health* 2010;25:1229–45.
- 51 Hennink MM, Kaiser BN, Marconi VC. Code Saturation Versus Meaning Saturation: How Many Interviews Are Enough? *Qual Health Res* 2017;27:591–608.
- 52 Gale NK, Heath G, Cameron E, *et al.* Using the framework method for the analysis of qualitative data in multi-disciplinary health research. *BMC Med Res Methodol* 2013;13:117.
- 53 Przyborski A, Wohlrab-Sahr M. *Qualitative Sozialforschung: Ein Arbeitsbuch*. De Gruyter, 2014.