SPIRIT 2013 Checklist: Recommended items to address in a clinical trial protocol and related documents*

Section/item	Item No	Description
Administrative information		
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym **Short-term aerobic exercise for depression in acute geriatric psychiatry: study protocol for a randomized controlled trial (p.1)**
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry **German clinical trials register DRKS00026117 (p.2)**
	2b	All items from the World Health Organization Trial Registration Data Set **were all considered**
Protocol version	3	Date and version identifier **23.02.2022, 1st protocol version**
Funding	4	Sources and types of financial, material, and other support **The trial is funded by the authors' institutional budgets (p.10)**
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors **Laura Elani Schulte [a,b,*], Tim Fleiner [a,b], *, Rieke Trumpf [a,b], Daria Wirtz [b] , Thiemo Schnorr [a,b], Wiebren Zijlstraa & Peter Haussermann [b]** **[a] Institute of Movement and Sport Gerontology, German Sport University Cologne, Cologne, Germany** **[b] LVR Hospital Cologne, Department of Geriatric Psychiatry & Psychotherapy, Cologne, Germany** *** Laura Elani Schulte & Tim Fleiner contributed equally**
	5b	Name and contact information for the trial sponsor **LVR-Hospital Cologne, Department of Geriatric Psychiatry & Psychotherapy, Cologne Germany**

	5c	Role of study sponsor and funders, if any, in study design; collection, management, analysis, and interpretation of data; writing of the report; and the decision to submit the report for publication, including whether they will have ultimate authority over any of these activities **No study sponsors and donors available**
	5d	Composition, roles, and responsibilities of the coordinating centre, steering committee, endpoint adjudication committee, data management team, and other individuals or groups overseeing the trial, if applicable (see Item 21a for data monitoring committee) **p. 10**

Introduction

Background and rationale	6a	Description of research question and justification for undertaking the trial, including summary of relevant studies (published and unpublished) examining benefits and harms for each intervention **Major depression is one of the main mental illnesses in old age, with acute exacerbated episodes requiring treatment in geriatric psychiatry. A meta-analysis showed that aerobic exercise in moderate intensity has large effects in older adults with major depression, but there is no evidence of aerobic exercise in geriatric psychiatry. Therefore, this study aims to analyze the feasibility and effects of an ergometer-based aerobic exercise on depressive symptoms. (p.1)**
	6b	Explanation for choice of comparators
Objectives	7	Specific objectives or hypotheses **The primary objective in this trial is to analyze the effects of aerobic training in inpatient hospital depression care. We hypothesize that, the intervention group, carrying out a 2-week-aerobic exercise in addition to treatment as usal show effects on depression symptoms and physical activity at post-intervention as compared to the control group. (p.2)**
Trial design	8	Description of trial design including type of trial (eg, parallel group, crossover, factorial, single group), allocation ratio, and framework (eg, superiority, equivalence, noninferiority, exploratory) **A monocentric randomised controlled trial with pre- and post-intervention assessment will be conducted. (p.2)**

Methods: Participants, interventions, and outcomes

Study setting	9	Description of study settings (eg, community clinic, academic hospital) and list of countries where data will be collected. Reference to where list of study sites can be obtained **Two wards of the LVR hospital of Geriatric Psychiatry (p.3)**

Eligibility criteria	10	Inclusion and exclusion criteria for participants. If applicable, eligibility criteria for study centres and individuals who will perform the interventions (eg, surgeons, psychotherapists) **Inclusion criteria:** - **diagnosis of depression according to ICD-10 (F31.3 – F34)** - **minimum length of stay of three days before enrollment in the study** - **MMSE < 19 points (carried out by the institutional psychologist) and the ability to explain the content of the study in the patients own words** - **prescription for exercise therapy (this includes cardiovascular resilience) by the attending physician** **Exclusion criteria:** - **Clinical exclusion of delirium (based on CAM); combined diagnosis of depression and an alcohol-induced neurodegenerative disease** - **Acute and/or severe cardiac disorder, neurological disease, and/or chronic orthopedic disorder** - **MMSE ≤ 19 points (carried out by the institutional psychologist)** **(p.4; Table 1)**
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered **Participants assigned to the intervention group receive a two-week ergometer-based aerobic exercise with a frequency of three times per week and a duration of 20 minutes, twice per day. The intervention is actively controlled using seated flexibility exercise in addition to usual care. This control intervention is assumed to be an appropriate exercise placebo intervention with very low-intensity exercise, requiring only minimal muscular strength and aerobic capacity. (p. 6; Methods, Intervention)**
	11b	Criteria for discontinuing or modifying allocated interventions for a given trial participant (eg, drug dose change in response to harms, participant request, or improving/worsening disease) **(p. 6; Methods, Intervention)**
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests) **We expect a corresponding adherence to the training intervention, due to exercise sessions conducted on the wards and multiple supervised exercise sessions within an exercise day. From our clinical experience, the variety of ergometers should increase the patients' willingness for participation. (p.9)**

	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial **Throughout the study, all participants will receive TAU, such as antidepressants or physiotherapy. It will also include exercise therapy for 45 minutes twice a week as part of the routine care. (p.7)**
Outcomes	12	Primary, secondary, and other outcomes, including the specific measurement variable (eg, systolic blood pressure), analysis metric (eg, change from baseline, final value, time to event), method of aggregation (eg, median, proportion), and time point for each outcome. Explanation of the clinical relevance of chosen efficacy and harm outcomes is strongly recommended **(p.4; Methods, Outcome measures)**
Participant timeline	13	Time schedule of enrolment, interventions (including any run-ins and washouts), assessments, and visits for participants. A schematic diagram is highly recommended (see Figure) **(p.3; Figure 1 Study flow-chart; Methods)**
Sample size	14	Estimated number of participants needed to achieve study objectives and how it was determined, including clinical and statistical assumptions supporting any sample size calculations **(p.3; Methods, Sample)**
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size **Patients from two hospital wards will be screened for eligibility by a psychiatrist, not involved in the study team. Patients are educated in detail about the health-promoting effects of physical activity. Written consent of the patient is required. (p.3)**

Methods: Assignment of interventions (for controlled trials)

Allocation:

Sequence generation	16a	Method of generating the allocation sequence (eg, computer-generated random numbers), and list of any factors for stratification. To reduce predictability of a random sequence, details of any planned restriction (eg, blocking) should be provided in a separate document that is unavailable to those who enrol participants or assign interventions **With an informed consent and pre-assessment, randomization will be performed via stratified randomization. An organizational staff member, who is not part of the study team, will perform the group allocation. In order to achieve the best possible balance between the two study groups, the factors, sex, age and MMSE score (Folstein, 1975) will be weighted 1:1 in the program. (p.4)**

Allocation concealment mechanism	16b	Mechanism of implementing the allocation sequence (eg, central telephone; sequentially numbered, opaque, sealed envelopes), describing any steps to conceal the sequence until interventions are assigned **Patients are sequentially numbered, no conclusion can be drawn about the patients, with the exception of the study director who takes the patient's informed consent (p.4)**
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions **An organizational staff member, who is not part of the study team, performs the group allocation. The authors, LES, RT and TS are responsible for the implementation and performance of the exercise intervention; LES, TF, RT, WZ are responsible for the implementation and analysis of motion sensors; DW is responsible for psychopathology and the dose of antidepressant medication and is blinded to group allocation; and PH and DW are responsible for adequate in- and exclusion of patients and are blinded to group allocation. (p.10; Declarations)**
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how **Data collectors, outcome adjudicators and data analysts are blinded to group allocation, the groups will be labled with nonidentifying terms, such and A and B; patients will be not informed about their treatment allocation; for psychopathology and the dose of antidepressant medication the researcher will not be informed about the patients treatment allocation (p.4; outcome measures)**
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant’s allocated intervention during the trial **In cases of accident or injury during the interventions, unblinding is permissible**

Methods: Data collection, management, and analysis

Data collection methods	18a	Plans for assessment and collection of outcome, baseline, and other trial data, including any related processes to promote data quality (eg, duplicate measurements, training of assessors) and a description of study instruments (eg, questionnaires, laboratory tests) along with their reliability and validity, if known. Reference to where data collection forms can be found, if not in the protocol **All outcomes will be measured by trained and experienced assessors from nursing and medical staff members, blinded to group allocation. Adherence to intervention will be collected descriptive at each training session with a structured protocol for each training session. (p.4)**
	18b	Plans to promote participant retention and complete follow-up, including list of any outcome data to be collected for participants who discontinue or deviate from intervention protocols **Participation takes place within the context of inpatient treatment and the patients receive an additional movement therapy offer in addition to the treatment as usual. Through the training on the wards and the selection of different ergometers, the access is easy and from our clinical perspective is thereby motivating for patients. All data, including that of patients who drop out or terminate participation early, is collected and stored (p. 7; p. 9)**
Data management	19	Plans for data entry, coding, security, and storage, including any related processes to promote data quality (eg, double data entry; range checks for data values). Reference to where details of data management procedures can be found, if not in the protocol **The trial will be analyzed by using the intention-to-treat principles, in which all patients with baseline data were included in analysis. Adherence to intervention will be collected descriptive at each training session. The data are stored on the clinic's own servers, which comply with a heightened security system (p. 7)**
Statistical methods	20a	Statistical methods for analysing primary and secondary outcomes. Reference to where other details of the statistical analysis plan can be found, if not in the protocol **(p.7; Analysis)**
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses) **no additional analyses planned**
	20c	Definition of analysis population relating to protocol non-adherence (eg, as randomised analysis), and any statistical methods to handle missing data (eg, multiple imputation) **Missing data that are not directly related to adherence will be imputed, in order to include all participants. (p.7)**

Methods: Monitoring

Data monitoring	21a	Composition of data monitoring committee (DMC); summary of its role and reporting structure; statement of whether it is independent from the sponsor and competing interests; and reference to where further details about its charter can be found, if not in the protocol. Alternatively, an explanation of why a DMC is not needed **A DMC is not required in this study because the study interventions take place in a protected hospital setting and patients are under constant medical supervision**
	21b	Description of any interim analyses and stopping guidelines, including who will have access to these interim results and make the final decision to terminate the trial **The final decision on the termination of the trial is decided by the chief PH when the desired number of patients has been included; No interim analyses are planned**
Harms	22	Plans for collecting, assessing, reporting, and managing solicited and spontaneously reported adverse events and other unintended effects of trial interventions or trial conduct **The adherence to intervention and the documentation of adverse events will be recorded to investigate the feasibility of the exercise intervention. A potential relation of adverse events to the intervention will be evaluated by a senior old age psychiatrist, who is not part of the study team. (p.4; Methods, Outcome measures)**
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor **A written audit plan The process will be independent from investigators and the sponsor**

Ethics and dissemination

Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval **Ethical approval was obtained by the Ethics Commission of North-Rhine Medical Chamber (reference number: AZ 2018192). PDF-File is attached, named 'Erweiterung des Projektes Gerontopsychiatrie in Bewegung (AZ 2018192)' 1.2.2 Ausdauertraining bei Depression, p.5** **This trial is registered in the German National Register of Clinical Trials DRKS00026117 (p. 2, Methods, study design)**
Protocol amendments	25	Plans for communicating important protocol modifications (eg, changes to eligibility criteria, outcomes, analyses) to relevant parties (eg, investigators, REC/IRBs, trial participants, trial registries, journals, regulators) **Update of the study registration DRKS00026117 (p.2)**

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32) **A paper consent form will be provided for all eligible patients by the study team. (p.4)**
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable **N/A no biological specimens were collected as part of this trial**
Confidentiality	27	How personal information about potential and enrolled participants will be collected, shared, and maintained in order to protect confidentiality before, during, and after the trial **With written consent to participate, patients were assigned an identification number (ID). The consent forms are kept in a locked cabinet for 10 years. All other data is stored via the hospital information system.**
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site **The authors declare that they have no competing interests. (p.10; Declaration)**
Access to data	29	Statement of who will have access to the final trial dataset, and disclosure of contractual agreements that limit such access for investigators **The data that support the findings of this study are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions. (p.10; Declaration)**
Ancillary and post-trial care	30	Provisions, if any, for ancillary and post-trial care, and for compensation to those who suffer harm from trial participation **For participants who suffer harm from trial participation receive medical care**
Dissemination policy	31a	Plans for investigators and sponsor to communicate trial results to participants, healthcare professionals, the public, and other relevant groups (eg, via publication, reporting in results databases, or other data sharing arrangements), including any publication restrictions **Puplication planned, The study results will be released to the participating physicians, referring physicians, patients and the general medical community**
	31b	Authorship eligibility guidelines and any intended use of professional writers **All participating authors or those who gave substantive contributions to the design, conduct, interpretation and reporting of the clinical trial are recognised through the granting of authorship on the final trial report.**

	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code
Appendices		**After postrandomization, we will provide a fully anonymized data set upon request**
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates **Extra file in pdf- Format named ‚InformedConsent', Ethics**
Biological specimens	33	Plans for collection, laboratory evaluation, and storage of biological specimens for genetic or molecular analysis in the current trial and for future use in ancillary studies, if applicable **N/A no biological specimens were collected as part of this trial**

*It is strongly recommended that this checklist be read in conjunction with the SPIRIT 2013 Explanation & Elaboration for important clarification on the items. Amendments to the protocol should be tracked and dated. The SPIRIT checklist is copyrighted by the SPIRIT Group under the Creative Commons "Attribution-NonCommercial-NoDerivs 3.0 Unported" license.