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Study protocol: A mixed-methods investigation of barriers and needs in mental healthcare of adults with autism and recommendations for future care (BarrierfreeASD)

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ABSTRACT

Introduction

Autism refers to an early-onset neurodevelopmental condition with characteristic impairments and difficulties in practical living skills, which persist across the lifespan such that autistic adults often require substantial support and comprehensive care. Yet adult healthcare services are frequently unavailable for autistic adults despite considerable individual, familial and socioeconomic burdens. This study seeks to (i) assess current healthcare needs, barriers and burdens related to the lack of servives for autistic adults, (ii) develop specific recommendations for a need-oriented model of care, and (iii) evaluate its future implementation.

Methods and analysis

A mixed-methods design with three phases will be conducted. In *Phase 1*, current mental healthcare of autistic adults will be assessed at three levels (individual, structural and professional) and from three perspectives (autistic adults, relatives and healthcare providers) using (i) focus groups/ interviews (qualitative data) and (ii) large-scale online surveys (quantitative data). Furthermore, service utilization patterns and related costs will be estimated. In *Phase 2*, recommendations for a future model of care for autistic adults will be derived based on Phase 1, considering the heterogeneous and complex needs within the autism spectrum and specifying indications for recommended services. In *Phase 3*, these will again be evaluated by the three stakeholder groups using mixed-methods and analyzed regarding feasibility of implementation and cost-effectiveness. Our study will, thus, contribute to a better translation of recommendations into practice to reduce disability, burden and costs related to ineffective healthcare and improve outcomes for autistic adults and those who support them.

Ethics and dissemination

This study was approved by the Local Psychological Ethics Commission of the Center for Psychosocial Medicine at the University Medical Center Hamburg-Eppendorf (LPEK-0227). Findings will be

disseminated via scientific meetings and peer-reviewed journals. Cooperating partners and associations will be informed about the study's course and findings by regular newsletters and meetings.

Registration

This study protocol was pre-registered at the Open Science Framework (OSF; osf.io/5x8pg).

Keywords

Autism spectrum disorder (ASD); autistic adults; transition; relatives; focus groups; mixed-methods; healthcare; health economics; participatory research; implementation research

ARTICLE SUMMARY

Strengths and limitations of this study

- Systematic analysis of current mental healthcare for autistic adults in Germany addressing the perspectives and needs of autists, relatives and healthcare providers. Mixed-methods and heath economic analyses to ensure a comprehensive picture and understanding of all perspectives.
- Threefold, systematic approach: (1) healthcare and needs analysis, (2) subsequent development of specific recommendations for all relevant stakeholders and of a need-oriented, personalized future model of care for autistic adults, (3) evaluation and analysis of future implementation
- Participatory research approach by (1) assessing the perspectives of those who are affected, (2) getting input and feedback from relevant stakeholders throughout all project phases, (3) engaging researchers with autism and clinical researchers, who also work in mental healthcare of autistic adults.
- No direct implementation of the developed model within the course of the study. Future funding will be necessary to test implementation, clinical effectiveness and sustainability, for example, within a randomized controlled trial.

INTRODUCTION

Autism spectrum disorder (ASD) or, simply, autism refers to an early-onset lifelong neurodevelopmental condition, which occurs at an estimated prevalence rate of about 1% up to 2%[1 2]. Autism is characterized by impairments in social interaction and communication as well as restrictive and repetitive behaviors, including abnormalities in sensory information processing and difficulties in practical living skills[3]. These impairments persist across adulthood such that adults with autism often require external, substantial support and comprehensive care across the lifespan. Yet, autism as a traditionally conceived childhood disorder is commonly underrepresented (i.e., not diagnosed or treated) in healthcare services for adults despite considerable healthcare needs of autistic adults, as shown by increased rates of comorbid medical conditions, premature mortality or risk of suicide[4-8]. In addition, deficits in effective and cost-efficient healthcare utilization have been reported for autistic adults, indicated by limited use of general preventive healthcare services such as vaccinations or checkups[7], higher outpatient and emergency room visits, and increased drug prescription claims and use[8 9]. Non-utilization correlates positively with co-morbidity rates, which correlate positively with chronification, long-term psychosocial impairment, healthcare expenditures and negatively with health-related quality of life in autistic adults[8 10-12]. In addition to this international evidence, a recent study also analyzed autism-related healthcare service use and attributable costs in Germany, and showed similar results and costs comparable to those of patients suffering from schizophrenia[13]. This highlights the complexity of needs associated with autism in adulthood and the pervasive need of a more efficient, extended healthcare system meeting those needs[14]. The latter notion is also reflected in the emergence of “autism strategies” all over Europe, which emphasize the development of extended healthcare structures.

Multiple difficulties and barriers prevent effective and efficient healthcare for adults with autism[15-18]. Barriers to healthcare have been discussed at different levels, nationally[16] as well as internationally[17-24]: at (i) an *individual* level due to autism-related social-communicative impairments, perceptual peculiarities or difficulties with practical skills of daily living (e.g., when making appointments), (ii) a *system-related* *or structural* level (e.g., lack of services or reduced service accessibility across healthcare sectors for autistic adults), and (iii) *professional* level (e.g., lack of training/ knowledge of healthcare providers such as general practitioners, diagnosticians and therapists about adult autism). Yet, factors that facilitate healthcare for adults with autism have also been suggested[17 25 26]. For example, at individual and professional levels, these include appointment coordination via e-mail, special stimulus-reduced waiting areas, autism-specific training for healthcare providers, shared decision making, cooperation with relatives/ partners or more individualized interventions. At the structural level, case managers, coordination through general practitioners, transition management, medical care centers or financial facilitations for healthcare services have been suggested.

Among the afore-mentioned barriers and facilitators, assistance to transition from a familiar and guided pediatric care system to a complex and self-managed care system for adults seems particularly important for autism as a neurodevelopmental condition with limited flexibility, rigidity and other stereotypical behavior[27-29]. Assistance with transition could foster self-management of young autistic adults and reduce potential burden of care for relatives. In fact, relatives typically compensate for the lack of assistance or services, thereby often facing extensive personal and financial burden[30 31] and reduced health-related quality of life[32-34]. The amount of evidence on the consequences of an insufficient healthcare system for relatives of autistic adults—not only children—is limited. In addition, support from relatives might not always be available considering the increased age of autistic adults, difficult familial relations or high family concordance rates[35]. With increasing prevalence rates of autism[36], however, a rising number of autistic individuals will be transitioning to adult healthcare and needing assistance to access the appropriate healthcare services. Interventions at several levels and assistance with respect to navigation within the healthcare system will also be required to reduce caregiver burden in autism[30 37].

Increased healthcare demands are also reflected in the recently growing number of German outpatient clinics and other services specifically tailored to adults with autism. These developments certainly represent major advancements. However, adults seeking autism diagnostics in Germany are often confronted with waiting times up to two years for diagnostic appointments and limited access to follow-up treatment despite increased demands for mental support[38-40], less desirable health outcomes and reduced quality of life[41]. Lipinski and colleagues[38] showed that autistic adults seeking psychotherapy reported that the main reason for not receiving any or insufficient treatment was an expressed lack of expertise with respect to autism. In fact, therapists do report challenges and frustrations due to limited training on autism despite high motivation for comprehensive care[42]. While there is evidence from therapists serving children with autism, there is hardly any evidence on the perspective and needs of adult mental healthcare service providers with respect to autism diagnosis and treatment, which indeed require specialized training and expertise[14].

In sum, autistic adults, their relatives as well as healthcare providers face barriers and are in need of extended services. Recognizing autism as a lifelong condition will be a fundamental first step. Yet, in order to increase access, capacity and quality of care for autistic adults, it will be necessary to (i) systematically understand the factors that lead to poorer health status and ineffective healthcare this should include perspectives of all people involved in healthcare access for autistic adults;[15], (ii) operationalize individual levels of support and define indications for specific services, (iii) to make these information easily accessible to all relevant stakeholders, and (iv), finally, implement evidence-based healthcare programs based on specific recommendations at professional and structural levels. Previous evidence was helpful in identifying barriers and pointing to future directions. Many suggestions, however, have yet to find their way into healthcare politics and services, much less being implemented in routine practice. In addition, recommendations often lacked specifics or operationalizations with respect to the selection of services or interventions depending on the individual level of disability and required support (compare to the recent Lancet commission on the future of care in autism: “Crucial factors include understanding what works for whom and when, and what are some of the predictable needs and variations that need to be considered to support autistic individuals”[43]).

Thus, with the current study we seek to, first, systematically analyze current barriers, facilitators and unmet needs—including their economic and personal consequences—in mental healthcare of adults with autism in Germany at three relevant levels (individual, structural and professional) and from three relevant perspectives (autistic adults, relatives and healthcare providers). Second, we seek to use these data to develop specific recommendations for a need-oriented, future model of healthcare for autistic adults, also considering the heterogeneity within the autism spectrum and individual indications for assisting services. Third, this model will be evaluated by the three stakeholder groups and analyzed with respect to implementation in healthcare routines and cost-effectiveness. During all phases, the study will strengthen a participatory research approach by engaging autism-trained clinicians and autistic adults in the scientific process and by collaborating with autism-, parental- and service-related associations. The long-term aim of the study is to contribute to more effective healthcare for autistic adults by providing specific recommendations for clinical practice and healthcare policies, also improving outcomes for autistic adults and those who support them.

METHODS AND ANALYSIS

This study protocol was written in adherence with the SPIRIT (Standardized Protocol Items for Randomized Trials) checklist for study protocols for items applicable to the present protocol of a non-interventional, observational study.

Study population

Three stakeholder perspectives will be assessed: (i) autistic adults with varying degrees of support, (ii) close relatives (first or second degree) or partners of autistic adults, (iii) healthcare service providers from all relevant professional backgrounds (e.g., primary care, pediatrics, adult and child psychiatry or psychotherapy, other medical directions, occupational therapy, speech therapy, physical therapy, social work, medical care etc.). Participants with autism must be adults (18+ yrs.) and must have a secured diagnosis of autism without intellectual disability (IQ > 70), sufficient ability to provide informed consent and sufficient language skills to answer the questions. Participants with intellectual disability (IQ < 70), insufficient German skills and ability to give informed consent will be excluded. Participants will be recruited throughout Germany using purposive, quota and snowball sampling via the study's collaborating network of cooperating partners, publicly available contacts from autism-related associations (incl. self-care and caregiver groups), healthcare associations (medical chambers, therapist associations, etc.), local and countrywide outpatient clinics as well as social media. Participants will be informed in detail about the study and data protection in accordance with the General Data Protection Regulation, and informed consent will be obtained prior to participation. No expense allowance will be paid (with the exception of possible travel expenses for participation in interviews/focus groups).

Study design and data collection

The study will evolve over a period of three years (Oct. 2020 - Sept.2023). A three-phase design will be implemented (Fig. 1).

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Phase 1: Healthcare and needs analysis

First, a systematic literature search of national and international evidence on mental healthcare in adults with autism will be conducted to identify previously published barriers, facilitators and needs. Results will be used to develop guideline questions for qualitative data collection. Second, these guideline questions will be administered by trained researchers in semi-structured one-on-one interviews with autistic adults (n=15) and structured focus groups with relatives/ partners of autistic adults (n=15) as well as healthcare providers (n=15). Based on these qualitative data, current healthcare barriers and facilitators for autistic adults will be assessed. All interviews and focus groups will be audio-recorded. An external, specifically transcription-qualified person will transcribe recordings verbatim. Because of the dynamics of the Covid-19 pandemic, interviews and focus-groups will be conducted online enabled by an online video communication provider. To meet individual difficulties in communication and flexibility, participants with autism will also be given the chance to answer interview questions in a written format, via chat or phone. Third, online surveys will be developed for each stakeholder group. Healthcare relevant close-ended and open-ended items will be generated through consented discussion in the research team based on the themes that emerged from interviews/ focus groups. Separate online surveys will be developed for each stakeholder group (autistic adults; relatives of autistic adults; healthcare providers) that will be used to collect quantitative data in larger samples and provide an overview of the situation in Germany. This mixed-methods approach aims to obtain a complete set of information to develop specific recommendations for a future healthcare model for autistic adults. In order to assess relevant outcomes, patient-related parameters, individual indications for healthcare service delivery and gather enough information for care model development, online surveys will be complemented by standardized, psychometric questionnaires and patient-reported outcomes. More specifically, autists and relatives will also be asked to complete questionnaires related to health-related quality of life (e.g., EQ-5D-5L)[44], disability/ functioning (e.g., WHODAS 2.0)[45] and a German version of the “barriers to healthcare” questionnaire[21]. Relatives will additionally be asked to rate their burden of care (e.g., iVICQ/CarerQoL)[46]. Furthermore, from both groups, variables related to disease/healthcare history, utilization of medical and non-medical services, and productivity losses will be collected (e.g., days spent on sick leave, hospital days, physician contacts, or informal care)[47 48]. Online surveys will be delivered countrywide by an online survey software in German and separate versions provided to autistic adults (n=250), relatives (n=125) and healthcare providers (n=125).

Phase 2: Development of recommendations for a future healthcare model for autistic adults

A systematic literature search on healthcare, treatment or implementation models for autism and related conditions will be conducted and –together with the results from the mixed-methods data in Phase 1—fed into developing recommendations for a future healthcare model for autistic adults. The model will include recommendations for actions/interventions at different levels (individual, structural and professional) and will be addressed to the stakeholder groups (autistic adults; relatives of autistic adults; healthcare providers and policy makers/ politics; Figure 2). Given the heterogeneity of symptom severity, functional impairments, rates of comorbidity and needed support within the autism spectrum, a multi-professional stepped or collaborative care approach as proposed for, e.g., psychosis or depression;[49] represents a promising framework for an alternative care model as opposed to current standard care for autistic adults (as also suggested by[43]). Stepped care for autism may range from low-level, evidence-based services (e.g., educational programs or information/ consulting about autism and available treatment options, e-mental health) over mid-level services (e.g., improved diagnostics, autism-informed psychotherapy, occupational or sociotherapy) to high-level services, which are often unavailable to adults with autism in Germany (e.g., case managers, integrated care, medical healthcare centers, inpatient care). Recommendations for possible individual steps, services offered within each step and indications for services will be specified (e.g., symptom severity or level of support according to DSM-5, health status or comorbidity rates, psychosocial functioning). Besides recommendations for the specific treatment of autistic adults, the future healthcare model will also provide recommendations for relatives of autistic adults, healthcare providers and healthcare policy makers/ politics (Fig. 2). For example, relatives or partners who support an autistic adult are often in need of support themselves. Thus, the model will also include recommendations for relatives. Conversely, for healthcare providers, recommendations could include suggestions to advance knowledge about specific needs of autistic adults and promote awareness for these needs in different mental healthcare sections. For policy makers like health insurances and politicians, recommendations will focus on extended services to reduce structural barriers. These will be underlined by the health-economic data collected within Phase 1 and 3.

---------------------------------- *please insert Figure 2 about here* ----------------------------------

Phase 3: Evaluation and implementation analysis

Methods will be analogous to Phase 1 (mixed-methods, qualitative interviews/ focus groups and quantitative online surveys with autistic adults, relatives of autistic adults and healthcare providers) with emphasis on evaluation and implementation of the developed recommendations for a future healthcare model. Based on the "Consolidated Framework for Implementation Research," an implementation of the model will be explored to improve the feasibility of a potential implementation[50]. The developed model and its components will be evaluated by all stakeholder groups in a structured evaluation process based on different dimensions such as acceptability, appropriateness, cost, feasibility and sustainability[51]. In addition to the three stakeholder groups, we will invite participants from healthcare politics and policies. Furthermore, participants will be, for example, asked to rate to what extent (i) barriers and needs identified during Phase 1 will be addressed by the model, (ii) suggested services are already implemented in standard German healthcare, (iii) which services might be easier to implement as opposed to others and (iv) give feedback about service requirements (e.g., training, time/ financial resources, personnel). The mixed-methods design (incl. open-ended questions during online surveys) will allow direct feedback and potential indications for modifications. In addition, standardized implementation-related questionnaires will be employed (e.g., [52]). As the model's actual implementation is not part of the study, we would like to use this phase to gather enough information, including positive and critical aspects, for a potential implementation. Finally, based on the results of Phase 3 the developed recommendations for improving healthcare for autistic adults will be reviewed and, if necessary, revised.

Sample sizes

Based on power calculation, a total of N=1000 participants will be aimed at for the quantitative online surveys. Sample sizes were chosen to allow for (sub)group comparisons with at least medium effect sizes (d=0.50) at a power of 80% and an alpha error of 5%. To compensate for dropouts, participants will be slightly over-recruited. Qualitative data will not be used for direct hypotheses testing so that sample size does not need to be based on power analyses. Here sample size (a total of N=-90) was chosen based on previously published recommendations[53].

Data analyses

Qualitative data from Phase 1 and 3 will be analyzed according to the thematic analysis approach[54] using the software MAXQDA. Deductive or theoretical categories based on previously published evidence relevant to each phase will drive the analyses. Because the study will focus on subjective experiences/ perspectives, data analyses will be complemented by an inductive approach. Data analyses will be conducted by two trained researchers. Emerging themes, subthemes and codes will be discussed by the two researchers and agreed upon by the research team. A third researcher will be consulted upon disagreement.

Quantitative data from online surveys in Phase 1 and 3 will be analyzed using the statistical software SPSS and R. For example, we will run descriptive statistics on sample and healthcare-related variables (e.g., waiting times until confirmed diagnosis or treatment). We will analyze frequencies for categorical data and perform statistical group comparisons between subsamples. To determine potential healthcare-related predictors, multiple regression analyses will be applied. Quantitative data will be tested statistically based on 95% confidence intervals.

Health-economic analyses in Phase 1 and 3 will be informed by a previously conducted systematic review of the literature on cost-of-illness and cost-effectiveness studies in autism. In Phase 1, service utilization and productivity losses in the last six months, as well as out-of-pocket payments will be assessed directly for autistic adults. In addition, relatives will also be asked about aspects that might be related to their autistic relative, like informal care provision or reduced working time. To estimate direct costs, service utilization will be evaluated in monetary terms using standardized unit costs[55 56]. Indirect costs due to productivity losses (e.g. due to incapacity to work) will be estimated with the human capital approach. The estimated costs for autistic adults and relatives will then be compared with the general German population[57]. Based on the skewed distribution of cost data, cost differences will be calculated using generalized linear models with gamma distribution and log-link function. In Phase 3, health-economic analyses will focus on the evaluation of the potential costs and effects of the developed future healthcare model using health-economic modelling. The cost-effectiveness analysis will assess the incremental cost-effectiveness ratio of the developed healthcare model compared to the status quo. This is calculated as the ratio of the difference in costs (between healthcare intervention and status quo) to the difference in health effects of both respective groups. The costs are to be determined from a societal perspective, i.e. in addition to purely medical costs, non-medical costs and monetarily assessed productivity losses will also be taken into account. As a measure of the health effects, i.e. health-related quality of life, quality-adjusted life years (QALYs) will be estimated based on the findings from the EQ-5D-5L[44].

Patient and public involvement

The stakeholders' perspectives are systematically included given the mixed-methods design. Research will be undertaken in close collaboration with federal and local patient, parental and healthcare or autism-related organizations, from which we obtained collaboration agreements prior to submission to the funding agency as well as during the initial course of the study. They will be continuously informed over the course of the study via regular newsletters and meetings and asked to provide feedback during each study phase. During Phase 1 and 3, for example, representatives will also be invited to participate in focus groups and qualitative interviews and asked to support further recruitment of study participants.

Information about the project and interim findings will also be made publicly available on a project website.

ETHICS AND DISSEMINATION

Ethics approval and consent to participate

The study will be carried out in accordance with the WMA Declaration of Helsinki and has been approved by the Local Psychological Ethics Commission of the Center for Psychosocial Medicine of the University Medical Center Hamburg-Eppendorf (ref.# LPEK-0227). Study participation is voluntary and no foreseeable risks for participants result from the participation. Participants will be fully informed about the aims of the study, data collection, handling and storage. Written informed consent will be obtained before participation. Preserving principles of data sensitivity, data protection and confidentiality requirements will be met.

Dissemination

Findings will be disseminated via national and international scientific meetings and peer-reviewed journals in the field of autism and healthcare reserach. Cooperating partners and associations will be informed about the study’s course and findings by regular newsletters and biannual meetings.

DISCUSSION

This study protocol outlines several urgent challenges related to mental healthcare for autistic adults in Germany. The study will provide a systematic analysis of the current state of healthcare for adults with autism, including barriers and requirements experienced by autistic persons themselves, but also their relatives and healthcare providers. The results will be used to facilitate a real-world, data-informed and evidence-based future model of healthcare for autistic adults, which seeks to overcome current barriers by developing specific practice recommendations at individual, structural and professional levels aiding all stakeholder groups. The model will provide suggestions for all involved stakeholders including policy makers.

Strengths and limitations

One strength of this study is that it aims to define individual characteristics that might be useful to assess a person's need of support and provide specific treatment suggestions and indications for services ("understanding what works for whom and when"[43]). Another strength is that this study will analyze the developed model conceptions for future care with respect to implementation chances, acceptability, feasibility, sustainability, cost-effectiveness and other dimensions and prepare for a future implementation of recommendations. As such, the current study goes beyond previously published analyses of current healthcare demands and generic suggestions for improvement of care for autistic individuals, adults in particular.

For a long time, research or healthcare politics have overlooked, neglected or ignored autistic individuals and their families in information and decision-making processes[58 59]. Here participatory reserach will be realized in a threefold fashion. First, results will be obtained by directly asking those who are affected (autistic adults, relatives, and healthcare providers) about real-world experiences and their attitude towards the developed research. Second, researchers serving mental healthcare of adults with autism, and researchers with autism will conduct the study. Third, the research will be undertaken in close collaboration with patient, parental and healthcare organizations, which will be continuously informed over the course of the study and asked to provide feedback during each study phase.

One limitation of the study is that the developed healthcare model for adults with autism will not be practically applied during the course of the study. Future funding will be necessary to test implementation, clinical effectiveness and sustainability of the developed recommendations and services, for example, within a randomized controlled trial. This will allow for further refinement and specifics to foster large-scale implementation. Yet, as the study is funded by the German Federal Joint Committee—the highest decision-making body of the joint self-government of practitioners, hospitals and health insurance funds—this study will likely have a direct and immediate impact on healthcare policies and contribute to improving outcomes in people and families with autism and reducing individual, familial and socioeconomic burdens associated with a lack of services for adults with autism.

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Author contributions

HS is the main PI for the study; DS, AK, KV, ND and JP are co-PIs. They all conceptualized and designed the study. SD, PG, HK, PR and FE are research staff. SD is also a graduate student. ND and JP mainly drafted this manuscript. All authors participated, reviewed and edited the manuscript; all authors approved the final version of the manuscript.

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Competing interests

DS received honoraria for lectures from or has been an advisor to Janssen GmbH, ROVI, Lundbeck GmbH, Otsuka Pharma GmbH and Takeda. The remaining authors do not declare other competing interests.

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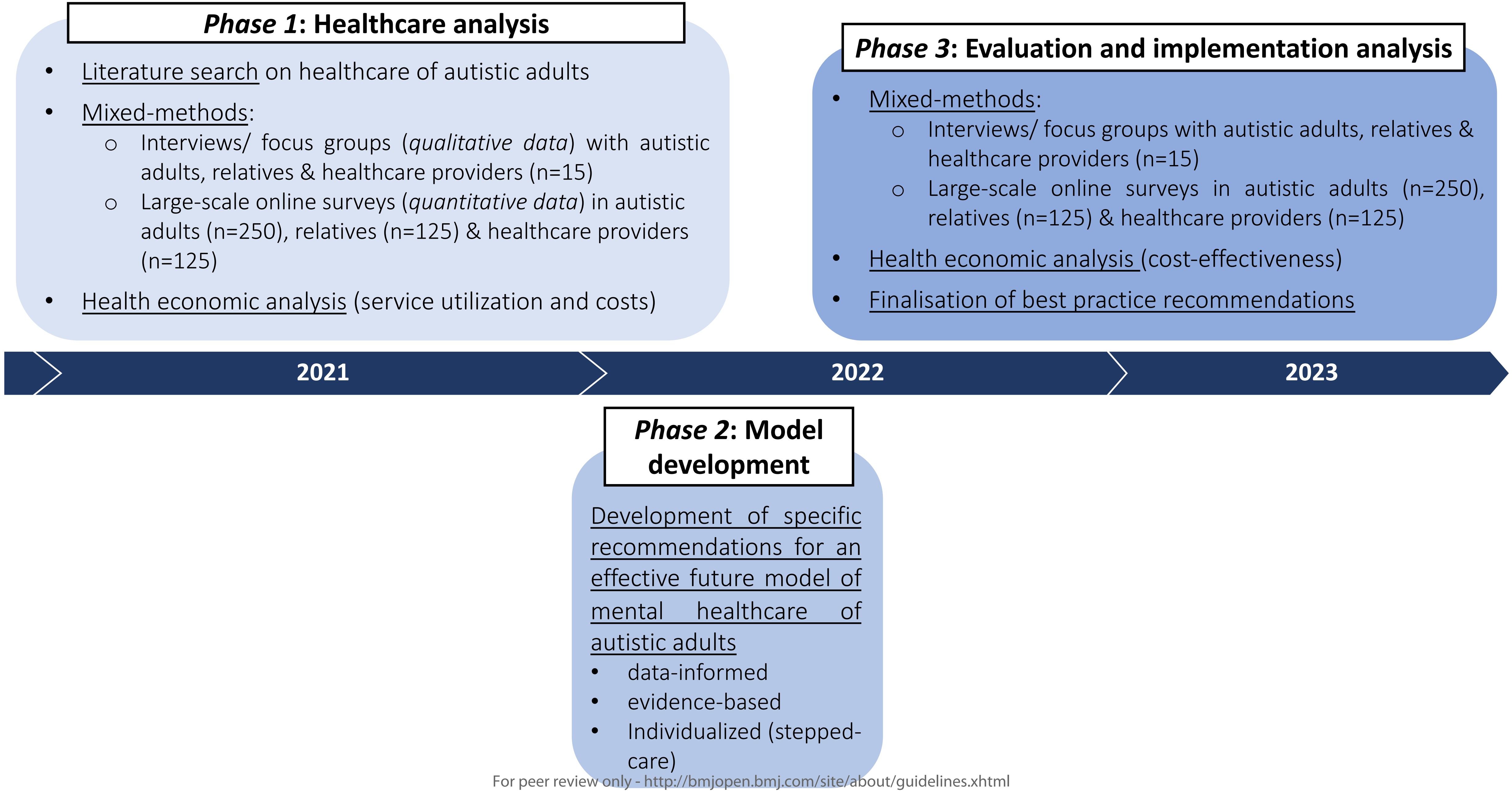
FIGURE TITLES

Figure 1

Timeline and three study phases.

Figure 2

Future model of mental healthcare for adults with autism: relevant stakeholders and target groups



Phase 1: Healthcare analysis

- Literature search on healthcare of autistic adults
- Mixed-methods:
  - Interviews/ focus groups (*qualitative data*) with autistic adults, relatives & healthcare providers (n=15)
  - Large-scale online surveys (*quantitative data*) in autistic adults (n=250), relatives (n=125) & healthcare providers (n=125)
- Health economic analysis (service utilization and costs)

Phase 3: Evaluation and implementation analysis

- Mixed-methods:
  - Interviews/ focus groups with autistic adults, relatives & healthcare providers (n=15)
  - Large-scale online surveys in autistic adults (n=250), relatives (n=125) & healthcare providers (n=125)
- Health economic analysis (cost-effectiveness)
- Finalisation of best practice recommendations

2021

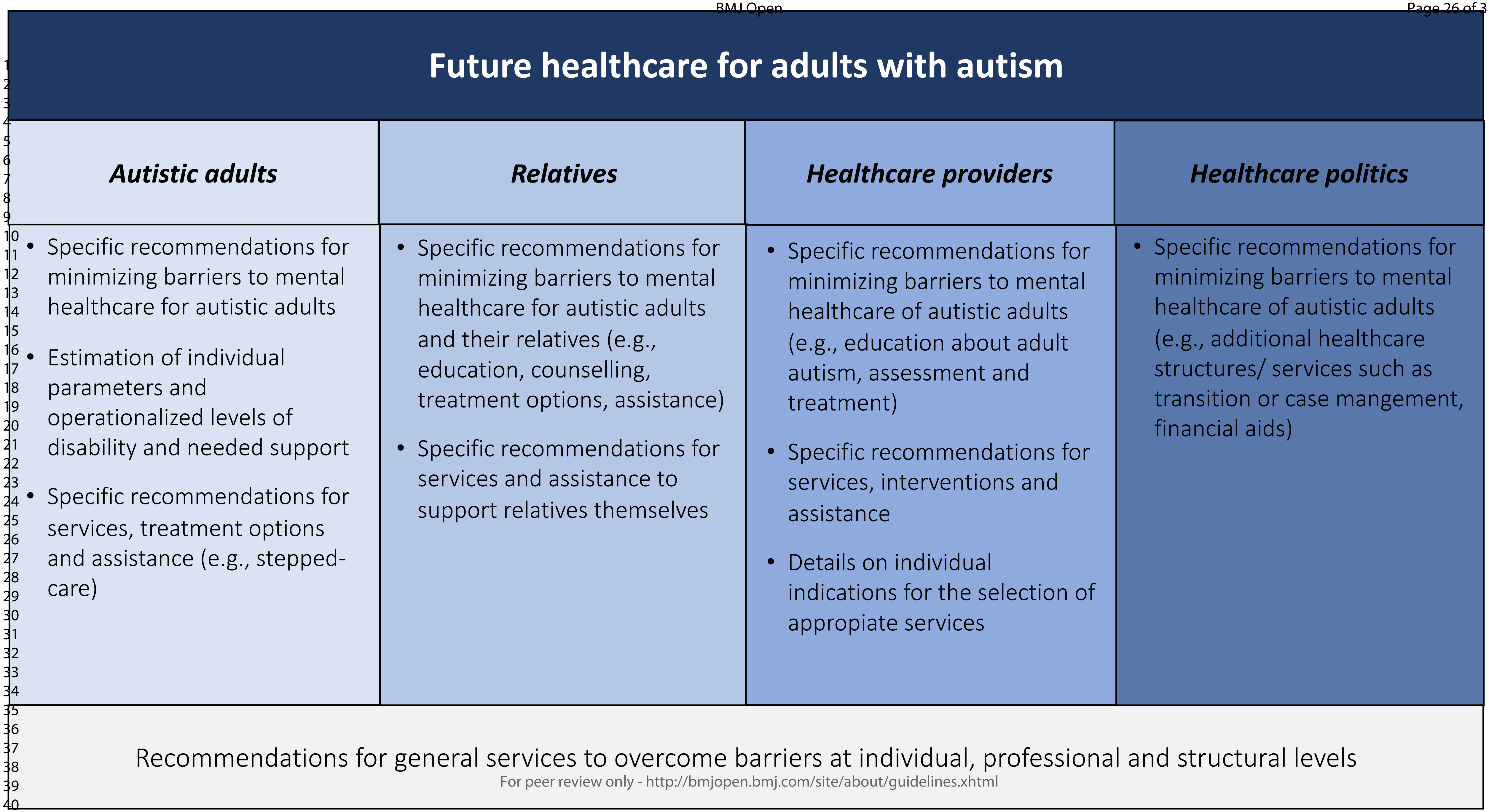
2022

2023

Phase 2: Model development

Development of specific recommendations for an effective future model of mental healthcare of autistic adults

- data-informed
- evidence-based
- Individualized (stepped-care)



Future healthcare for adults with autism

Autistic adults	***Relatives***	***Healthcare providers***	***Healthcare politics***
• Specific recommendations for minimizing barriers to mental healthcare for autistic adults • Estimation of individual parameters and operationalized levels of disability and needed support • Specific recommendations for services, treatment options and assistance (e.g., stepped-care)	• Specific recommendations for minimizing barriers to mental healthcare for autistic adults and their relatives (e.g., education, counselling, treatment options, assistance) • Specific recommendations for services and assistance to support relatives themselves	• Specific recommendations for minimizing barriers to mental healthcare of autistic adults (e.g., education about adult autism, assessment and treatment) • Specific recommendations for services, interventions and assistance • Details on individual indications for the selection of appropiate services	• Specific recommendations for minimizing barriers to mental healthcare of autistic adults (e.g., additional healthcare structures/ services such as transition or case mangement, financial aids)

Recommendations for general services to overcome barriers at individual, professional and structural levels

SPIRIT
STANDARD PROTOCOL ITEMS: RECOMMENDATIONS FOR INTERVENTIONAL TRIALS

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

Section/item	Item No	Description	Addressed on page number
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	_____1_______
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	_____3_______
	2b	All items from the World Health Organization Trial Registration Data Set	_______n/a____
Protocol version	3	Date and version identifier	_______n/a____
Funding	4	Sources and types of financial, material, and other support	_______16/17__
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	_____1, 16____
	5b	Name and contact information for the trial sponsor	_______n/a______
	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	____16/17______
	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)	________n/a_____

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	______4-7______
	6b	Explanation for choice of comparators	______n/a______
Objectives	7	Specific objectives or hypotheses	______6/7______
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)	______n/a______

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	______7/8______
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)	______7/8______
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	______n/a______
	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)	______n/a______
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	______n/a______
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	______n/a______
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	______n/a______
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)	_____ (Fig1)__

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	______11_______
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	_______7(11)____
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	______n/a______
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	_______n/a_____
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	_______n/a_____
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	______n/a______
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	_____n/a_______
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	_______8-11____
	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	______n/a______

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	_____n/a________
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	_______12/13____
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	_______12/13____
	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)	________n/a______
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	_______n/a______
	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	_______n/a______
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	_______n/a______
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	_______n/a______
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	_______2/3, 13/___
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)	________n/a___

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	_______(8,14)____
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	______n/a________
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	______n/a______
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	________16/17___ ___
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	_______n/a_______
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	______n/a________
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	______2/3, 13,14__
	31b	Authorship eligibility guidelines and any intended use of professional writers	_______n/a_______
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	_______n/a_______
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	_______n/a_______
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_______

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*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.

BMJ Open

Study protocol: A mixed-methods investigation of barriers and needs in mental healthcare of adults with autism and recommendations for future care (BarrierfreeASD)

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Primary Subject Heading:	Mental health
Secondary Subject Heading:	Health services research
Keywords:	Health economics < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Adult psychiatry < PSYCHIATRY, MENTAL HEALTH

Study protocol: A mixed-methods investigation of barriers and needs in mental healthcare of adults with autism and recommendations for future care (BarrierfreeASD)

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ABSTRACT

Introduction

Autism refers to an early-onset neurodevelopmental condition with characteristic impairments and difficulties in practical living skills, which persist across the lifespan such that autistic adults often require substantial support and comprehensive care. Yet, mental health and other services are frequently unavailable for autistic adults despite considerable need for mental healthcare and individual, familial and socioeconomic burdens. This study will (i) examine current needs, barriers and burdens related to ineffective healthcare of autistic adults in Germany, (ii) develop specific recommendations for a need-oriented mental healthcare model, and (iii) evaluate its future implementation.

Methods and analysis

A mixed-methods design with three phases will be conducted. In *Phase 1*, current mental healthcare for autistic adults will be assessed at three levels (individual, structural and professional) and from three perspectives (autistic adults, relatives and healthcare providers) using (i) focus groups/interviews (qualitative data) and (ii) large-scale online surveys (quantitative data). Furthermore, service utilization and related costs will be estimated. In *Phase 2*, recommendations for a future healthcare model will be derived based on Phase 1, considering the heterogeneous and complex needs within the autism spectrum and specifying indications for recommended services. In *Phase 3*, these will again be evaluated by the three stakeholder groups using mixed-methods and analyzed regarding feasibility of implementation and cost-effectiveness. Our study will, thus, contribute to a better translation of recommendations into practice to reduce disability, burden and costs related to ineffective healthcare and improve mental health outcomes for autistic adults and those who support them.

Ethics and dissemination

This study was approved by the Local Psychological Ethics Commission of the Center for Psychosocial Medicine at the University Medical Center Hamburg-Eppendorf (LPEK-0227). Findings will be

disseminated via scientific meetings and peer-reviewed journals. Cooperating partners and associations will be informed about the study's course and findings by regular newsletters and meetings.

Registration

This study protocol was pre-registered at the Open Science Framework (OSF; osf.io/5x8pg).

Keywords

Autism spectrum disorder (ASD); autistic adults; transition; relatives; focus groups; mixed-methods; mental healthcare; health economics; participatory research; implementation research

ARTICLE SUMMARY

Strengths and limitations of this study

- Systematic analysis of current mental healthcare for autistic adults in Germany addressing the perspectives and needs of autists, relatives and healthcare providers. Mixed-methods and health economic analyses to ensure a comprehensive picture and understanding of all perspectives.
- Threefold, systematic approach: (1) healthcare and needs analysis, (2) subsequent development of specific recommendations for all relevant stakeholders and of a need-oriented, personalized future model of care for autistic adults, (3) evaluation and analysis of future implementation.
- Participatory research approach by (1) assessing the perspectives of those who are affected, (2) getting input and feedback from relevant stakeholders throughout all project phases, (3) engaging researchers with autism and clinical researchers, who also work in mental healthcare of autistic adults.
- No direct implementation of the developed model within the course of the study. Future funding will be necessary to test implementation, clinical effectiveness and sustainability, for example, within a randomized controlled trial.

INTRODUCTION

Autism spectrum disorder (ASD) or, simply, autism refers to an early-onset lifelong neurodevelopmental condition, which occurs at an estimated prevalence rate of about 1% up to 2%[1 2]. Autism is characterized by impairments in social interaction and communication as well as restrictive and repetitive behaviors, including abnormalities in sensory information processing and difficulties in practical living skills[3]. These impairments persist across adulthood such that adults with autism often require external, substantial support and comprehensive care across the lifespan.

Yet, autism as a traditionally conceived childhood disorder is commonly underrepresented (i.e., not diagnosed or treated) in general and mental healthcare services for adults despite considerable healthcare needs of autistic adults, as shown by increased rates of comorbid medical and mental health conditions, premature mortality or risk of suicide[4-8]. Medically, autism has been associated with increased rates of various conditions including epilepsy, bowel or gastrointestinal disorders, diabetes, etc.[5 6 8]. In comparison, rates of mental health comorbidity were found to be particularly increased in adults with autism (i.e., more than 80% of patients showed psychiatric comorbidity)[8], including anxiety disorders and mood disorders but also sleep disturbances, ADHD, even psychosis[5]. These conditions were related to reduced quality of life in autistic adults[9 10], suggesting a particular need for mental health services. Despite this need, observations of ineffective or cost-inefficient healthcare utilization have been made for autistic adults with respect to primary or medical healthcare such as preventive services, gynecology, urgent care or emergency department visits [7 8 11 12] but also to mental health services such as psychiatric, therapeutical, counselling, psychopharmacological or other supporting services [12-18]. Medical and mental health comorbidities in adults with autism were associated with increased barriers to service use [18] as well as healthcare expenditures[8]. Analyses of autism-related mental healthcare expenditures using data from psychiatric outpatient clinics in Germany revealed costs comparable to those attributable to schizophrenia[19]. Largest cost components arose from inpatient care, pharmacotherapy and occupational therapy, and costs varied as a function of gender, IQ and diagnosis. Asperger syndrome despite being considered "high-functioning" was associated with higher costs[19] and higher unmet healthcare needs[18]. Together this evidence highlights the intensity and complexity of healthcare needs associated with autism in adulthood and the pervasive need of a more efficient, extended healthcare system meeting those needs[20], as also emphasized by several national and international "autism strategies" from all over Europe.

In Germany, increased mental healthcare demands are also reflected in the recently growing number of specialized psychiatric outpatient clinics and other services addressing adults with autism or adults seeking diagnostic clarification of potential autism. These developments certainly represent major advancements. However, adults seeking autism diagnostics, post-diagnostic treatment or counselling), psychotherapy and other specialized or supportive services in Germany can be confronted with waiting times up to two-three years[14 21 22]. Autistic adults seeking psychotherapy reported that the main reason for not receiving any or insufficient treatment was an expressed lack of professional expertise about autism[14 21]. Accordingly, therapists also reported barriers due to limited training, experience and low confidence with respect to treating autism despite high motivation for comprehensive care[23]. In fact, diagnosis and treatment of autism indeed require qualified training, can be time- and cost-intensive and often lack validated therapeutical manuals or instruments for use in autistic adults[20].

Thus, lack of professional knowledge or training can be considered a major barrier; yet, multiple other difficulties or barriers have been suggested, which prevent effective and efficient mental healthcare for adults with autism especially for those who struggle with comorbid mental or medical health problems [17]. Barriers have been discussed at different levels, nationally[24] as well as internationally[25-31], at (i) an *individual* level due to autism-related social-communicative impairments, perceptual peculiarities or difficulties with practical skills of daily living (e.g., when making appointments), (ii) a *system-related or structural* level (e.g., lack of services or reduced service accessibility across healthcare sectors for autistic adults), and (iii) *professional* level (e.g., lack of training/ knowledge or stigma about adult autism). Yet, factors that facilitate healthcare for adults with autism have also been suggested (e.g., appointment coordination via e-mail, special stimulus-reduced waiting areas, autism-specific training for healthcare providers, shared decision making, cooperation with relatives/ partners, case managers or coordination through general practitioners, transition management, medical care centers or financial facilitations for healthcare services)[17 26].

Amongst these facilitatory factors, transition management from a familiar and guided pediatric care system to a complex and self-managed care system for adults seems particularly important[12 32-34] , considering autism to be a neurodevelopmental condition with limited flexibility and resistance to change. Assistance with transition could not only foster self-management of young autistic adults but also reduce potential burden of care for relatives. In fact, relatives typically compensate for the lack of assistance or services, thereby often facing extensive personal and financial burden[35 36] and reduced health-related quality of life themselves[37 38]. The amount of evidence on the consequences of an insufficient healthcare system for relatives of autistic adults—not only children—is limited. In addition, support from relatives might not always be available considering the increased age of autistic adults, difficult familial relations or high family concordance rates[39]. With increasing prevalence rates of autism[40], however, a rising number of autistic individuals will be transitioning to adult healthcare and needing assistance to access the appropriate healthcare services. Interventions at several levels and assistance with respect to navigation within the healthcare system will also be required to reduce caregiver burden in autism[41].

In sum, autistic adults but also their relatives and healthcare providers face barriers and are in need of extended services. Recognizing autism as a lifelong condition will be a fundamental first step. Yet, in order to increase access, capacity and quality of care for autistic adults, it will be necessary to (i) systematically understand the factors that lead to poorer health status and ineffective healthcare by including the perspectives of all people involved in healthcare access for autistic adults[25], (ii) operationalize individual levels of support, define necessary services and their indications, (iii) make these information easily accessible to all relevant stakeholders, and (iv), finally, implement evidence-based healthcare programs for autistic adults. Previous evidence was helpful in identifying barriers and pointing to future directions. Many suggestions, however, have yet to find their way into healthcare politics and services, much less being implemented in routine practice. In addition, recommendations often lacked specifics or operationalizations with respect to the selection of services or interventions depending on the individual level of disability and required support (compare to the recent Lancet commission on the future of care in autism: "Crucial factors include understanding what works for whom and when, and what are some of the predictable needs and variations that need to be considered to support autistic individuals"[42]).

Thus, with the current study we seek to, first, systematically analyze current barriers, facilitators and unmet needs—including their economic and personal consequences—in mental healthcare of adults with autism in Germany at three relevant levels (individual, structural and professional) and from three relevant perspectives (autistic adults, relatives and healthcare providers). While the focus of the study is on mental healthcare (i.e., particularly, diagnosis, therapy and supportive services), the study will also examine all health-related services relevant for autistic adults given the afore-mentioned complexity of the condition. Second, we seek to use these data to develop specific recommendations for a need-oriented, future model of mental healthcare and supporting services for autistic adults, which will consider the heterogeneity within the autism spectrum, different service needs and individual indications for services. Third, this model will be evaluated by the three stakeholder groups and analyzed with respect to implementation in healthcare routines and cost-effectiveness. During all phases, the study will strengthen a participatory research approach by engaging autism-trained clinicians and autistic adults in the scientific process and by collaborating with autism-, parental- and service-related associations. The long-term aim of the study is to contribute to more effective mental healthcare for autistic adults by providing specific recommendations for clinical practice and healthcare policies, also improving mental health outcomes for autistic adults and those who support them.

METHODS AND ANALYSIS

This study protocol was written in adherence with the SPIRIT (Standardized Protocol Items for Randomized Trials) checklist for study protocols for items applicable to the present protocol of a non-interventional, observational study.

Study population

Three stakeholder perspectives will be assessed. We will recruit (i) autistic adults with varying degrees of needed support, (ii) close relatives (first or second degree) or partners of early- and late-diagnosed autistic adults, and (iii) healthcare service providers throughout Germany. For qualitative data collection (i.e., focus groups), we will primarily recruit providers of mental healthcare services with experience in treating patients or clients with autism in order to gain central information about the current state of mental healthcare, including barriers and needs, for autistic adults in Germany and to support coherent discussions. Primary care practitioners and pediatrists will also be recruited due to their particular role in transition and coordination of care. Given the often complex health status and broad service needs of autistic adults as well as supposed barriers throughout the care system (e.g., due to lack of knowledge about autism), the large-scale online surveys will also include data from healthcare providers with various professional backgrounds and levels of experience with autism (from working in autism-specific services to more general services or no expertise in autism) in order to gather a more comprehensive and representative picture on barriers and needs with respect to treating autistic adults and to examine whether qualitatively identified barriers and needs also apply to different healthcare settings. Inclusion of different professional backgrounds and levels of experience with autism along with other relevant criteria (e.g., geographic distribution, urban or countryside, etc.) will be ensured by pre-defined recruitment strategies and collection of corresponding sociodemographic data via questionnaire in the recruitment and data collection process.

Participants with autism must be adults (18+ yrs.) and must have a secured diagnosis of autism without intellectual disability (IQ > 70), sufficient ability to provide informed consent and sufficient language skills to answer the questions. Participants with intellectual disability (IQ < 70), insufficient German skills and ability to give informed consent will be excluded. Participants will be recruited throughout Germany using purposive, quota and snowball sampling via the study's collaborating network of cooperating partners, publicly available contacts from autism-related associations (incl. self-care and caregiver groups), healthcare associations (medical chambers, therapist associations, etc.), local and countrywide outpatient clinics as well as social media. Participants will be informed in detail about the study and data protection in accordance with the General Data Protection Regulation, and informed consent will be obtained prior to participation. No expense allowance will be paid (with the exception of possible travel expenses for participation in interviews/focus groups).

Study design and data collection

The study will evolve over a period of three years (Oct. 2020 - Sept.2023). A three-phase design will be implemented (Fig. 1).

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Phase 1: Healthcare and needs analysis

First, a literature search on national and international evidence will be conducted in PubMed to identify previously published barriers, facilitators and needs related to healthcare and mental healthcare of adults with autism. Results will be used to develop guideline questions for qualitative data collection. Three interview guides will be developed, tailored to each stakeholder group. Participants' experiences with healthcare or with provision of services/ treatment of autistic adults will be assessed. Barriers, facilitators, and needs in healthcare of autistic adults, especially with focus on mental healthcare (i.e., diagnostics, therapy and assisting services), at individual, professional, and structural levels and recommendations for improving mental healthcare for autistic adults will be discussed. Guideline questions will be administered by trained researchers in semi-structured one-on-one interviews with autistic adults (n=15) and structured focus groups with relatives/ partners of autistic adults (n=15) as well as healthcare providers (n=15). All interviews and focus groups will be audio-recorded. An external, specifically transcription-qualified and bound to secrecy person will transcribe recordings verbatim. Because of the dynamics of the Covid-19 pandemic, interviews and focus-groups will be conducted online enabled by an online video communication provider. To meet individual difficulties in communication and flexibility, participants with autism will also be given the chance to answer interview questions in a written format, via chat or phone. All qualitative data will be pseudonymized, i.e., personal identifying information (e.g., names) will be removed. Only pseudonymized data will be further analyzed. All data will be stored on secured servers of the University Medical Center Hamburg-Eppendorf.

Second, open-ended and close-ended items (e.g., implementing a five-point Likert scale) on barriers and needs in mental healthcare of autistic adults will be generated through consented discussion in the research team based on qualitative results, i.e., themes, that emerged from interviews/ focus groups. The mixed-methods approach aims to obtain a complete set of information to develop specific recommendations for a future healthcare model for autistic adults. These items will be similarly assessed across stakeholder groups. In addition, items specific to each group of participants will be included such as items related to service provision in professionals (e.g., waiting times), related to informal care in relatives, and to service utilization and comorbidities in autistic adults. Thus, separate online surveys will be developed for each stakeholder group (autistic adults; relatives of autistic adults; healthcare providers) that will be used to collect quantitative data in larger samples and provide an overview of the healthcare situation for adults with autism in Germany from multiple perspectives.

Online surveys, i.e., barrier- and needs-related items, will be explored with respect to psychometric properties, such as content and construct validity, discriminability and internal consistency, for example, via correlational or exploratory factor analyses. We will also examine floor and ceiling effects using descriptive analyses. As proxy for acceptability, we will examine patterns of missing data or low response rates. In addition, standardized, psychometric questionnaires and patient-reported outcomes will be employed in participants with autism and relatives. They will be asked to complete questionnaires related to health-related quality of life (e.g., EQ-5D-5L)[43], disability/ functioning (e.g., WHODAS 2.0)[44] and a German version of the "barriers to healthcare" questionnaire[29]. Relatives will additionally be asked to rate their burden of care (e.g., iVICQ/CarerQoL)[45]. These represent previously validated instruments with good overall validity and reliability[29 43-45]. Moreover, in both groups, variables related to disease/healthcare history, utilization of medical and non-medical services, and productivity losses will be collected (e.g., days spent on sick leave, hospital days, physician contacts, or informal care) through modified versions of the FIMA and FIMPsy questionnaires[46 47].

Person-identifying information will not be requested. Online surveys will be delivered countrywide by an online survey software in German based at protected servers. Separate survey versions will be provided to autistic adults (n=250), relatives (n=125) and healthcare providers (n=125). Participation will take place in a completely anonymized manner. Participants will be automatically assigned randomly generated IDs. Personal information entered in free text fields will be removed or anonymized. Data collection will be continuously monitored and managed by members of research team.

Phase 2: Development of recommendations for a future healthcare model for autistic adults

A literature search on possibly existing healthcare recommendations or implementation models for adults with autism and related conditions will be conducted in PubMed and Google and –together with the results from the mixed-methods data in Phase 1—fed into the development of an extended, need-oriented mental healthcare model for autistic adults. This model will include recommendations for actions/interventions at different levels (individual, structural and professional) and will be addressed to the stakeholder groups (autistic adults; relatives of autistic adults; healthcare providers and policy makers/ politics; Figure 2). Given the heterogeneity of symptom severity, functional impairments, rates of comorbidity and needed support within the autism spectrum, a multi-professional stepped or collaborative care approach as proposed for, e.g., psychosis or depression[48], might represent a possible framework for an alternative care model as opposed to current standard care for autistic adults (as also suggested by[42]). Stepped mental healthcare for autism may range from low-level, evidence-based services (e.g., educational programs or information/ consulting about autism and available treatment options, e-mental health) over mid-level (e.g., improved diagnostics, autism-informed psychotherapy, occupational therapy or sociotherapy) to high-level services, which are often unavailable to adults with autism in Germany (e.g., case managers, integrated care, medical healthcare centers, inpatient care). Recommendations for possible individual steps, services offered within each step and indications for services will be specified. Besides recommendations for autistic adults, the future healthcare model will also provide recommendations for relatives of autistic adults, healthcare providers and policy makers (Fig. 2). More specifically, relatives or partners who support an autistic adult are often in need of support themselves. Thus, the model will also include recommendations for relatives. Conversely, for healthcare providers, recommendations could include suggestions to advance knowledge about specific needs of autistic adults and promote awareness for these needs in different mental healthcare sections. For policy makers, recommendations will focus on extended services to reduce structural barriers. These will be underlined by the health-economic data collected within Phase 1 and 3.

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Phase 3: Evaluation and implementation analysis

Methods will be analogous to Phase 1 (mixed-methods, qualitative interviews/ focus groups and quantitative online surveys with autistic adults, relatives of autistic adults and healthcare providers) with emphasis on evaluation and implementation of the developed recommendations for a future healthcare model. Based on the "Consolidated Framework for Implementation Research," an implementation of the model will be explored to improve the feasibility of a potential implementation[49]. The developed model and its components will be evaluated by all stakeholder groups in a structured evaluation process based on different dimensions such as acceptability, appropriateness, cost, feasibility and sustainability[50]. In Phase 3, participants from Phase 1 will be re-recruited or, if this is not possible, comparable representatives will be invited. In addition, we will invite participants from other backgrounds such as healthcare politics/ policies. Furthermore, participants will be, for example, asked to rate to what extent (i) barriers and needs identified during Phase 1 will be addressed by the model, (ii) whether suggested services are already implemented in standard German healthcare, (iii) which services might be easier or more feasible to be implemented and (iv) give feedback about service requirements (e.g., indications, training, time/ financial resources, personnel). The mixed-methods design (incl. open-ended questions during online surveys) will allow direct feedback and potential indications for modifications. In addition, standardized implementation-related questionnaires will be employed[e.g., 51]. As the model's actual implementation is not part of the study, we would like to use this phase to gather enough information, including positive and critical aspects, for a potential implementation. Finally, based on the results of Phase 3 the developed recommendations and model for improving healthcare for autistic adults will be reviewed and, if necessary, revised.

Sample sizes

Based on power calculation, a minimum of n=500 participants will be aimed at for each quantitative online survey. This sample size represents the minimum number of participants needed for group comparisons with at least medium effect sizes (d=0.50) at a power of 80% and an alpha error of 5%.

Previously published related online surveys with autistic participants or caregivers have reported dropout rates of 15% to 35% due to reasons such as incomplete or duplicate responses, failure to consent or to meet inclusion criteria[52 53]. Thus, here to compensate for dropouts, participants will be over-recruited (i.e., a dropout rate of 15% would correspond to 75 additional participants). The motivation to participate in scientific studies can be considered high in the autism community, particularly regarding participation in online surveys and research with impact to their everyday life. Yet, if recruitment targets are not met, the following steps will be taken to achieve planned sample sizes: extension of the data collection time window, increased networking as well as enhanced promotion of our research via associations, social media and community outreach.

Qualitative data will not be used for direct hypotheses testing so that sample size does not need to be based on power analyses. Here sample size (a total of N=-90) was chosen based on previously published recommendations[54].

Data analyses

Qualitative data from Phase 1 and 3 will be analyzed according to the thematic analysis approach[55] using the software MAXQDA. Deductive or theoretical categories based on previously published evidence relevant to each phase will drive the analyses. Because the study will focus on subjective experiences/ perspectives, data analyses will be complemented by an inductive approach. Data analyses will be conducted by two trained researchers. Emerging themes, subthemes and codes related to barriers and needs in mental healthcare (Phase 1) and evaluation/ implementation of derived recommendations for extended care (Phase 3) will be discussed by the two researchers and agreed upon by the research team. A third researcher will be consulted upon disagreement.

Quantitative data from online surveys in Phase 1 and 3 will be exported to and analyzed using the statistical software SPSS and R. Before analyses, exported survey data will be manually checked by members of the research team. We will run descriptive statistical analyses and report frequencies/percentages, means/medians and standard deviations/interquartile ranges separate for each stakeholder group on, if applicable, (i) sociodemographic data (e.g., age, gender, education, employment status, profession), (ii) clinical data (e.g., diagnosis, comorbidities, service utilization), (iii) objective healthcare indicators (e.g., waiting times for or distances of services), (iv) subjective ratings on barriers and needs in mental healthcare (Phase 1) or evaluative ratings on implementation of the developed care model (Phase 3)[49 50], and (v) on implemented standardized questionnaires related to barriers to healthcare[29], health-related quality of life[43], disability and functioning[44], burden of care[45] and implementation[e.g. 51]. Primary outcome will be service utilization in the last six months as assessed in the online surveys and groups of autistic adults and relatives. In order to determine predictors of healthcare utilization of autistic adults in Germany and, thus, also inform the development of an extended care model in Phase 2 (e.g., indications for services[cf. 42]), multiple regression analyses will be conducted. The following variables will be tested as potential predictors, i.e., enabling or disabling healthcare utilization: sociodemographic variables (e.g., gender, age, education), autism diagnosis, symptom severity/ level of required support according to DSM-5[3], comorbidity, and experienced barriers to healthcare as operationalized by the score on the “barriers to healthcare” questionnaire[29] as well as by ratings from our own online survey. With respect to the latter, a factor analysis will be performed in order to identify underlying dimensions. Scores of factors with the highest variance will then be used as predictors for regression analyses. In secondary, more exploratory, analyses, we aim to test for mean differences between stakeholder groups on subjective ratings of barriers and needs in mental healthcare (Phase 1) and evaluation/ implementation of the developed need-oriented model (Phase 3), using stakeholder group as independent variable and ratings as dependent variable employing parametric or non-parametric statistical tests depending on scale level and data distribution. Quantitative data will be tested statistically based on 95% confidence intervals.

Health-economic analyses in Phase 1 and 3 will be informed by a previously conducted systematic review of the literature on cost-of-illness and cost-effectiveness studies in autism. The systematic review will be carried out in agreement with the PRISMA guidelines. Standard databases such as Medline/ PubMed and PsycInfo as well as reference lists will be searched for international studies in English or German. The search term will focus on “costs of illness”, “health expenditures”, “cost effectiveness” or “cost analysis”, “burden of illness”, “economic burden” and “autism spectrum disorders”, combined with Boolean operators. In Phase 1, in addition to service utilization, productivity losses in the last six months as well as out-of-pocket payments will be directly assessed in autistic adults. In addition, relatives will also be asked about aspects that might be related to their autistic relative, like informal care provision or reduced working time. To estimate direct costs, service utilization will be evaluated in monetary terms using standardized unit costs[56 57]. Indirect costs due to productivity losses (e.g., due to incapacity to work) will be estimated with the human capital approach. The estimated costs for autistic adults will then be compared to the general German population, and excess costs will be calculated[58]. Under the assumption that differences in sociodemographic covariates or comorbidities across groups are adjusted, the excess cost approach enables the analysis of all costs attributable to autism. Based on the skewed distribution of cost data, cost differences will be calculated using generalized linear models with gamma distribution and log-link function. Our findings will also be compared to other evidence on cost-of-illness in autism and other mental health conditions such as depression as common mental disorder, schizophrenia as disorder with similar prevalence, or ADHD as other developmental disorder. In Phase 3, health-economic analyses will focus on the evaluation of the potential costs and effects of the developed future healthcare model using health-economic modelling. The cost-effectiveness analysis will assess the incremental cost-effectiveness ratio of the developed healthcare model compared to the status quo. This is calculated as the ratio of the difference in costs (between healthcare intervention and status quo) to the difference in health effects of both respective groups. The costs are to be determined from a societal perspective, i.e., in addition to purely medical costs, non-medical costs and monetarily assessed productivity losses will also be taken into account. As a measure of the health effects, i.e., health-related quality of life, quality-adjusted life years (QALYs) will be estimated based on the findings from the EQ-5D-5L[43].

Patient and public involvement

The stakeholders' perspectives are systematically included given the mixed-methods design. Research will be undertaken in close collaboration with federal and local patient, parental and healthcare or autism-related organizations, from which we obtained collaboration agreements prior to submission to the funding agency as well as during the initial course of the study. Representatives of these organizations will be continuously informed over the course of the study via regular meetings and asked to provide feedback during each study phase. They will also be invited to participate in focus groups and qualitative interviews and asked to support further recruitment of study participants. Cooperation partners and all other study participants from focus groups and interviews will be offered to receive quarterly newsletters about the course and interim findings of the study. For all other participants (e.g., who anonymously took part in the online surveys), information will be made publicly available on a project website. Participants will be given the possibility to express feedback or concerns via the project's email-address or direct contact to one of our (peer) researchers.

ETHICS AND DISSEMINATION

Ethics approval and consent to participate

The study will be carried out in accordance with the WMA Declaration of Helsinki and has been approved by the Local Psychological Ethics Commission of the Center for Psychosocial Medicine of the University Medical Center Hamburg-Eppendorf (ref.# LPEK-0227). Study participation is voluntary and no foreseeable risks for participants result from the participation. Participants will be fully informed about the aims of the study, data collection, handling and storage. Written informed consent will be obtained before participation. Preserving principles of data sensitivity, data protection and confidentiality requirements will be met.

Dissemination

Findings will be disseminated via national and international scientific meetings and peer-reviewed journals in the field of autism and healthcare research. Cooperating partners and associations will be informed about the study's course and findings by quarterly newsletters and biannual meetings. Study participants from focus groups and interviews will also receive quarterly newsletters about the progression and outcomes of the study. Information, including study information, posters and presentations, will also be disseminated via the project's webpage.

DISCUSSION

This study protocol outlines several urgent challenges related to mental healthcare for autistic adults in Germany. The study will provide a systematic analysis of the current state of healthcare for adults with autism, including barriers and requirements experienced by autistic persons themselves, but also their relatives and healthcare providers. The results will be used to facilitate a real-world, data-informed and evidence-based future model of mental healthcare for autistic adults, which seeks to overcome current barriers by developing specific practice recommendations at individual, structural and professional levels aiding all stakeholder groups. The model will provide suggestions for all involved stakeholders including policy makers.

Strengths and limitations

One strength of this study is that it aims to define individual characteristics that might be useful to assess a person's need of support and provide specific treatment suggestions and indications for mental healthcare and other related services that are relevant for autistic adults ("understanding what works for whom and when"[42]). Another strength is that this study will evaluate the developed recommendations and model conceptions for future care with respect to implementation chances, acceptability, feasibility, sustainability, cost-effectiveness and other dimensions and prepare for a future implementation. As such, the current study goes beyond previously published analyses of healthcare and published suggestions for improvement of care for autistic individuals, adults in particular.

For a long time, research or healthcare politics have overlooked, neglected or ignored autistic individuals and their families in information and decision-making processes[52 59]. Here, participatory research will be realized in a threefold fashion. First, results will be obtained by directly asking those who are affected (autistic adults, relatives, and healthcare providers) about real-world experiences and their attitude towards the developed research. Second, researchers serving mental healthcare of adults with autism, and researchers with autism will conduct the study. Third, the research will be undertaken in close collaboration with patient, parental and healthcare organizations, which will be continuously informed over the course of the study and asked to provide feedback during each study phase.

One limitation of the study is that the developed mental healthcare model for adults with autism will not be practically applied during the course of the study. Future funding will be necessary to test implementation, clinical effectiveness and sustainability of the developed recommendations and services, for example, within a randomized controlled trial. This will allow for further refinement and specifics to foster large-scale implementation. Yet, as the study is funded by the German Federal Joint Committee—the highest decision-making body of the joint self-government of practitioners, hospitals and health insurance funds in Germany—this study will likely have a direct and immediate impact on healthcare policies and contribute to improving outcomes in people and families with autism and reducing individual, familial and socioeconomic burdens associated with a lack of services for adults with autism.

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Author contributions

HS is the main PI for the study; DS, AK, KV, ND and JP are co-PIs. They all conceptualized and designed the study. SD, PG, HK, PR and FE are research staff. SD is also a graduate student. ND and JP mainly drafted this manuscript. All authors participated, reviewed and edited the manuscript; all authors approved the final version of the manuscript.

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Competing interests

DS received honoraria for lectures from or has been an advisor to Janssen GmbH, ROVI, Lundbeck GmbH, Otsuka Pharma GmbH and Takeda. The remaining authors do not declare other competing interests.

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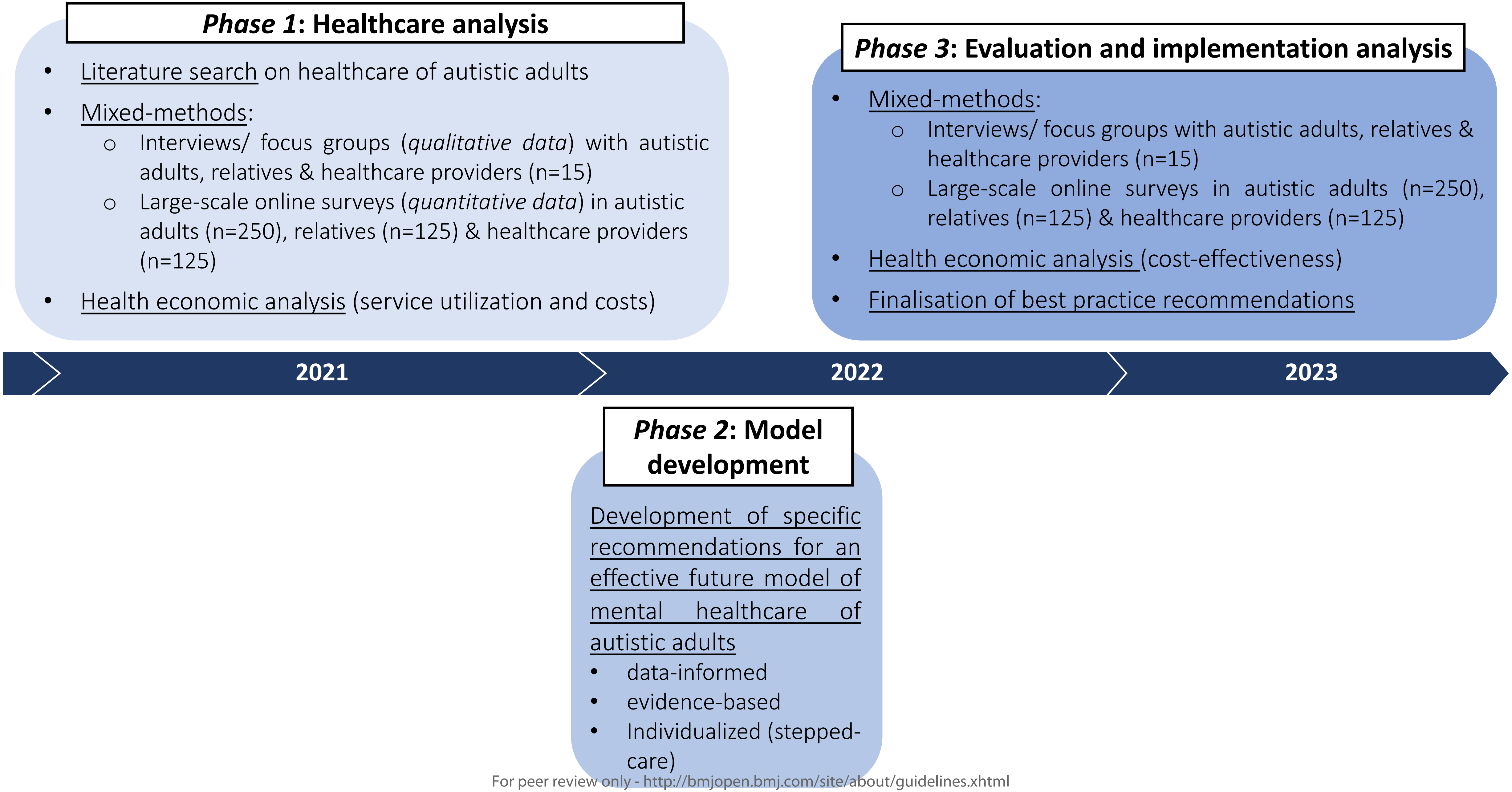
FIGURE TITLES

Figure 1

Timeline and three study phases.

Figure 2

Future model of mental healthcare for adults with autism: relevant stakeholders and target groups



Phase 1: Healthcare analysis

- Literature search on healthcare of autistic adults
- Mixed-methods:
    - Interviews/ focus groups (*qualitative data*) with autistic adults, relatives & healthcare providers (n=15)
    - Large-scale online surveys (*quantitative data*) in autistic adults (n=250), relatives (n=125) & healthcare providers (n=125)
- Health economic analysis (service utilization and costs)

Phase 3: Evaluation and implementation analysis

- Mixed-methods:
    - Interviews/ focus groups with autistic adults, relatives & healthcare providers (n=15)
    - Large-scale online surveys in autistic adults (n=250), relatives (n=125) & healthcare providers (n=125)
- Health economic analysis (cost-effectiveness)
- Finalisation of best practice recommendations

Phase 2: Model development

Development of specific recommendations for an effective future model of mental healthcare of autistic adults

- data-informed
- evidence-based
- Individualized (stepped-care)

Future healthcare for adults with autism

Autistic adults	***Relatives***	***Healthcare providers***	***Healthcare politics***
• Specific recommendations for minimizing barriers to mental healthcare for autistic adults • Estimation of individual parameters and operationalized levels of disability and needed support • Specific recommendations for services, treatment options and assistance (e.g., stepped-care)	• Specific recommendations for minimizing barriers to mental healthcare for autistic adults and their relatives (e.g., education, counselling, treatment options, assistance) • Specific recommendations for services and assistance to support relatives themselves	• Specific recommendations for minimizing barriers to mental healthcare of autistic adults (e.g., education about adult autism, assessment and treatment) • Specific recommendations for services, interventions and assistance • Details on individual indications for the selection of appropiate services	• Specific recommendations for minimizing barriers to mental healthcare of autistic adults (e.g., additional healthcare structures/ services such as transition or case mangement, financial aids)

Recommendations for general services to overcome barriers at individual, professional and structural levels

STANDARD PROTOCOL ITEMS: RECOMMENDATIONS FOR INTERVENTIONAL TRIALS

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

Section/item	Item No	Description	Addressed on page number
Administrative information			
Title	1	Descriptive title identifying the study design, population, interventions, and, if applicable, trial acronym	1
Trial registration	2a	Trial identifier and registry name. If not yet registered, name of intended registry	3
	2b	All items from the World Health Organization Trial Registration Data Set	n/a
Protocol version	3	Date and version identifier	n/a
Funding	4	Sources and types of financial, material, and other support	20
Roles and responsibilities	5a	Names, affiliations, and roles of protocol contributors	1, 20
	5b	Name and contact information for the trial sponsor	n/a
	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	20
	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)	n/a

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	______4-8______
	6b	Explanation for choice of comparators	______n/a______
Objectives	7	Specific objectives or hypotheses	______7/8______
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)	______n/a______

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	______ 8______
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)	______8/9_____
Interventions	11a	Interventions for each group with sufficient detail to allow replication, including how and when they will be administered	______n/a______
	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)	______n/a______
	11c	Strategies to improve adherence to intervention protocols, and any procedures for monitoring adherence (eg, drug tablet return, laboratory tests)	______n/a______
	11d	Relevant concomitant care and interventions that are permitted or prohibited during the trial	______n/a______
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	______15-17____
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)	_____ (Fig1)____

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	______14_______
Recruitment	15	Strategies for achieving adequate participant enrolment to reach target sample size	______9, 14_____

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	______n/a______
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	________n/a_____
Implementation	16c	Who will generate the allocation sequence, who will enrol participants, and who will assign participants to interventions	________n/a_____
Blinding (masking)	17a	Who will be blinded after assignment to interventions (eg, trial participants, care providers, outcome assessors, data analysts), and how	______n/a______
	17b	If blinded, circumstances under which unblinding is permissible, and procedure for revealing a participant's allocated intervention during the trial	_____n/a_______

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	______10-13____
	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	______n/a______

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	_____10, 11,15__
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	_______15-17____
	20b	Methods for any additional analyses (eg, subgroup and adjusted analyses)	_______15-16____
	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)	________n/a_____
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	_______n/a______
	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	_______n/a______
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	_______n/a______
Auditing	23	Frequency and procedures for auditing trial conduct, if any, and whether the process will be independent from investigators and the sponsor	_______n/a______
Ethics and dissemination			
Research ethics approval	24	Plans for seeking research ethics committee/institutional review board (REC/IRB) approval	______3, 17/ 18___
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)	________n/a___

Consent or assent	26a	Who will obtain informed consent or assent from potential trial participants or authorised surrogates, and how (see Item 32)	______9, 18____
	26b	Additional consent provisions for collection and use of participant data and biological specimens in ancillary studies, if applicable	______n/a_______
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	______ 10/ 11____
Declaration of interests	28	Financial and other competing interests for principal investigators for the overall trial and each study site	_______20/ 21____
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	_______n/a______
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	______n/a_______
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	____3, 18______
	31b	Authorship eligibility guidelines and any intended use of professional writers	_______n/a______
	31c	Plans, if any, for granting public access to the full protocol, participant-level dataset, and statistical code	_______n/a______
Appendices			
Informed consent materials	32	Model consent form and other related documentation given to participants and authorised surrogates	_______n/a______
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______

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*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.