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Research Protocol

Co-Production of A Culturally Tailored Sarcopenia Screening Programme for Older Adults in Luton, UK: A Mixed-Methods Feasibility Study Protocol

Oluwakemi Odufuwa[1], Ivelina Tsocheva[1], Gurch Randhawa[1], Nishani Jeyapalan[1], David Hewson[1]

[1]*University of Bedfordshire, Luton, United Kingdom*

Abstract

Sarcopenia is an age-related skeletal muscle disorder associated with frailty, falls, hospitalisation and mortality. Despite its clinical and public health importance, there is currently no structured sarcopenia screening programme in the United Kingdom, and uptake of preventive health interventions is often lower among ethnic minority populations. This study aims to co-produce a culturally tailored sarcopenia screening programme for community-dwelling older adults in a multi-ethnic UK setting. The study follows the Medical Research Council framework for complex interventions and comprises four phases: a mixed-methods systematic review to explore cultural attitudes toward screening; qualitative focus groups with older adults, stakeholders and healthcare professionals; co-production workshops using the Behaviour Change Wheel to design the intervention; and a small-scale feasibility study. Screening will be conducted using the SARC-Calf tool. Feasibility outcomes include recruitment, retention, completion rates and acceptability, while secondary outcomes include prevalence of probable sarcopenia and referral uptake to an existing community exercise programme. This study will provide evidence on the feasibility and acceptability of a culturally tailored sarcopenia screening programme and inform future large-scale evaluations.

Keywords: Sarcopenia, Screening, Co-production, Ethnic minorities, Health inequalities

Introduction

Population ageing is a major public health priority globally. In the United Kingdom, the proportion of individuals aged 65 years and over has risen steadily from 11% in 1950 to 17% in 2021, with projections indicating that 25% of the population will be aged 65 years or older by 2050[1]. Increasing longevity is accompanied by a growing burden of age-related conditions, many of which are associated with functional decline and reduced independence.

Sarcopenia is a progressive, generalised skeletal muscle disorder characterised by the loss of muscle mass, muscle strength and physical performance[2,3]. It is recognised as a disease entity (ICD-10-CM M62.84) and is associated with falls[4], reduced quality of life[5], institutionalisation[6], increased healthcare costs[7] and mortality[8]. Estimates suggest that approximately 10% of community-dwelling adults aged ≥60 years meet diagnostic criteria for sarcopenia, although prevalence varies depending on diagnostic thresholds and population characteristics[9-11]. In the UK, approximately 2.7 million adults are estimated to have sarcopenia, with prevalence increasing markedly with age[12].

Sarcopenia overlaps conceptually and clinically with physical frailty. According to Fried's phenotype model, weakness, slowness and unintentional weight loss are core components of frailty[13]. These features are also central to sarcopenia, highlighting the interrelationship between the two conditions. Early identification of sarcopenia therefore has potential to mitigate progression to frailty and associated adverse outcomes[14].

Despite established diagnostic algorithms such as the European Working Group on Sarcopenia in Older People

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Corresponding author: *Dr. Ivelina Tsocheva, University of Bedfordshire, Luton, United Kingdom*

E-mail: *ivelina.tsocheva@beds.ac.uk*

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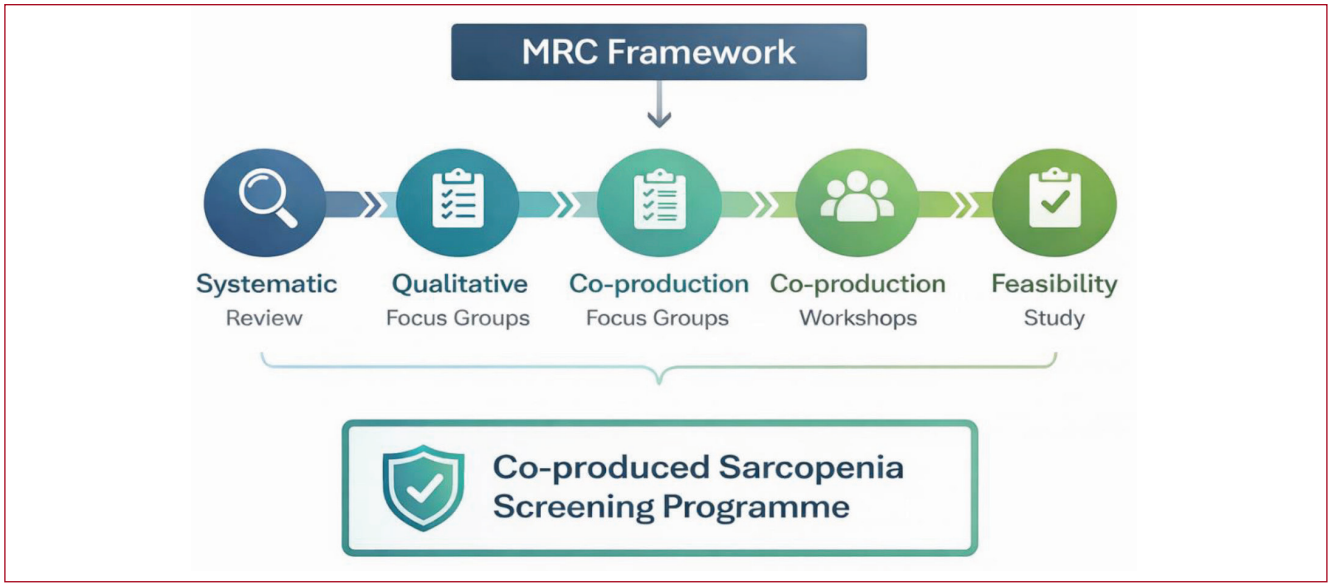

Figure 1. Overview of study design aligned with the Medical Research Council (MRC) framework for complex interventions.

(EWGSOP2) and the Asian Working Group for Sarcopenia (AWGS)[14,15], there is currently no organised screening programme for sarcopenia in the United Kingdom. Screening programmes are defined as systematic processes to identify individuals at risk within a target population prior to symptom presentation[16]. Although the NHS implements several national screening programmes, none target sarcopenia[17].

Physical inactivity is a recognised risk factor for sarcopenia and frailty[18,19]. Resistance and multicomponent exercise interventions have demonstrated improvements in muscle strength, balance and physical performance[20,21]. However, physical inactivity remains disproportionately high among ethnic minority groups in the UK, particularly South Asian populations[22,23]. South Asians also experience higher prevalence of chronic conditions and lower healthy life expectancy, reflecting broader social inequalities[24-26].

Evidence from cancer screening programmes consistently demonstrates lower uptake among Black, Asian and minority ethnic populations[27-29]. Cultural beliefs, language barriers and differing perceptions of preventive health are frequently cited as contributing factors[30,31]. Culturally tailored interventions improve screening participation, including when adapted educational components are incorporated[32,33].

Co-production, defined as collaborative design and delivery of services between professionals and service users[34], has emerged as a promising approach to enhance acceptability and engagement. Although co-production has been applied in cancer screening and other public health interventions, its use in culturally tailored sarcopenia screening has not been described[35,36].

Luton, UK, provides a relevant context for this work due to its ethnically diverse population and commitment to reducing health inequalities through the Marmot Town initiative[26]. A culturally tailored sarcopenia screening programme could help reduce inequalities in early identification of functional decline among older adults.

Therefore, the aim of this study is to co-produce and evaluate the feasibility and acceptability of a culturally tailored sarcopenia screening programme for community-dwelling older adults in a multi-ethnic UK setting. The study seeks to identify culturally relevant barriers and facilitators to screening participation and to inform the development of a future definitive evaluation.

Methods

Theoretical framework and rationale for a complex intervention

Sarcopenia screening in ethnically diverse populations represents a complex intervention involving multiple stakeholders, behavioural components, and context-dependent implementation. Guided by the MRC framework, Phases 1–3 focus on intervention development, with Phase 4 assessing feasibility[37,38]. Phase 4 constitutes a feasibility study, consistent with MRC recommendations to assess acceptability, recruitment, adherence, delivery and

progression criteria prior to large-scale evaluation[37,38].

An overview of the study design aligned with the MRC framework is presented in Figure 1.

The MRC framework emphasises that complex interventions must be grounded in theory to explain how and why change is expected to occur. For this reason, the Behaviour Change Wheel was selected as the underpinning theoretical model.

Behaviour Change Wheel (BCW) and COM-B Model

The Behaviour Change Wheel (BCW) provides a systematic method for designing behaviour change interventions[39]. At its core lies the COM-B model, which proposes that behaviour (B) is influenced by three interacting components:

- **Capability** (psychological and physical ability to engage in behaviour)
- **Opportunity** (social and environmental factors enabling behaviour)
- **Motivation** (reflective and automatic processes influencing decision-making)

Attendance for sarcopenia screening is conceptualised as the target behaviour. Lower screening uptake among ethnic minority populations has been linked to knowledge gaps, cultural perceptions, structural barriers and differing health priorities[27,31]. These factors map directly onto COM-B domains. Potential determinants include limited awareness of sarcopenia (capability), language or transport barriers (opportunity), and cultural beliefs about ageing or fatalism (motivation).

Qualitative findings from Phase 2 will be systematically mapped onto COM-B components to identify behavioural determinants specific to the target population. Intervention functions (e.g., education, enablement, persuasion, environmental restructuring) will then be selected using BCW guidance[39].

This structured theoretical approach ensures that the co-produced screening programme is not solely descriptive or culturally sensitive, but behaviourally informed and mechanism-driven.

Rationale for Co-production

Co-production was selected to ensure that the intervention is culturally appropriate, credible, and acceptable to the communities it intends to serve[34]. This is in line with the participatory public health paradigm. Evidence supports that it is an effective strategy in improving engagement with preventive public health activities[40].

Evidence that culturally tailored interventions improve screening uptake further supports the use of co-production in this study[32,33]. However, most studies that have been conducted on the subject have focused on cancer screening. There is little research on the use of the model in the context of musculoskeletal or geriatric screening activities.

By engaging with the wider community, religious leaders, healthcare workers, and other stakeholders in the design of the intervention programme, it is hoped that the following areas will be improved:

- Cultural appropriateness
- Trust and credibility
- Accessibility
- Community ownership

This is in keeping with the Marmot principles of reducing health inequalities by engaging with the wider community[26].

Justification for Selecting SARC-Calf as the Screening Tool

Screening tools must be practical for community implementation and demonstrate acceptable sensitivity and specificity. The SARC-F questionnaire is widely used and recommended in international guidelines[14]. However, its sensitivity is moderate, potentially limiting early detection[41].

The SARC-Calf, which combines SARC-F with calf circumference measurement, has demonstrated improved sensitivity while retaining feasibility for community use[15,42]. Calf circumference measurement requires minimal equipment and training, making it appropriate for non-clinical settings.

Given the aim of early case identification within community environments, SARC-Calf was selected as the most suitable screening instrument for this feasibility study.

Summary of Theoretical Integration

Overall, the study integrates evidence synthesis, qualitative inquiry, behavioural theory, co-production, and feasibility testing within the MRC framework. Together, these components provide a structured and theoretically grounded pathway from problem identification to intervention feasibility testing.

Phase 1: Systematic Review

The systematic review follows sequential stages including search strategy development, study screening, methodological quality appraisal using the Joanna Briggs Institute (JBI) checklist, and thematic synthesis. Findings inform development of qualitative focus groups and behavioural mapping within the COM-B framework.

Design

A mixed-methods systematic review will be conducted following the process outlined in Figure 2 to synthesise evidence about cultural attitudes toward preventive health checks and screening programmes among older adults experiencing functional decline. The review will follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines[43].

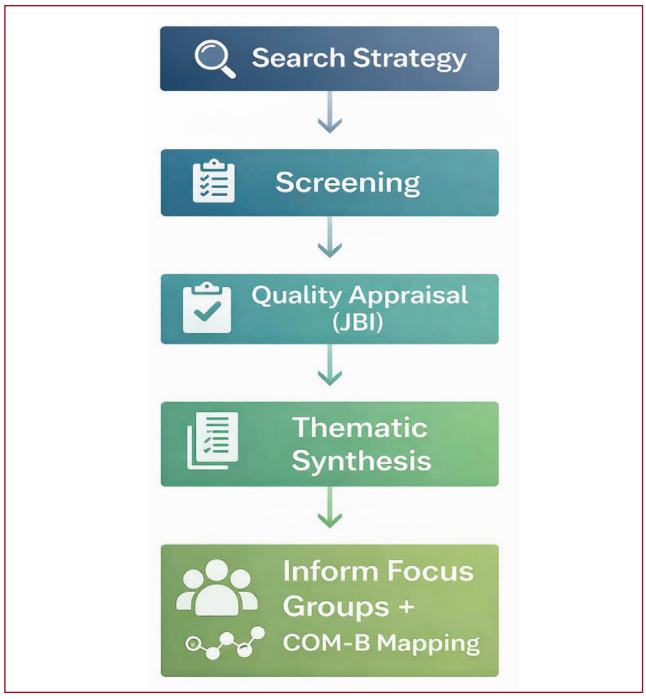

Figure 2. Conceptual process of the mixed-methods systematic review informing intervention development.

The methodological approach is informed by the eight-step process for conducting systematic reviews outlined by Uman[44], including formulation of the research question, development of eligibility criteria, systematic search, study selection, quality appraisal, data extraction, synthesis, and reporting.

The review protocol will be registered prospectively with PROSPERO to enhance transparency and methodological rigour.

Review Question

The review is guided by the following research question:

What is known about cultural attitudes toward preventive health checks and screening programmes among older adults experiencing functional decline?

The review addresses the lack of evidence synthesis on cultural perceptions of screening in the context of sarcopenia, frailty, and functional decline.

Eligibility Criteria

Eligibility criteria were developed using a modified PICoS framework (Population, Interest, Context, Study design), appropriate for qualitative and mixed-methods evidence synthesis[45].

Population

Inclusion:

- Adults aged ≥65 years
- Community-dwelling populations
- Individuals experiencing functional decline, including frailty, sarcopenia, or falls

Exclusion:

- Adults <65 years
- Institutionalised populations (e.g., care homes, hospitals)
- Studies not addressing age-related functional decline

The focus on community-dwelling populations reflects the intended setting of the proposed screening programme.

Interest

Inclusion:

- Preventive health checks
- Screening programmes
- Attitudes, beliefs, perceptions or experiences related to screening

Exclusion:

- Studies focusing solely on diagnostic processes
- Studies unrelated to screening or preventive health checks

Context

All geographical settings will be included to allow broad synthesis of cultural perspectives across populations.

Study Design

- Qualitative studies
- Mixed-methods studies

Quantitative-only studies will be excluded unless qualitative components are reported separately.

Information Sources and Search Strategy

Electronic searches will be conducted in the following databases:

- MEDLINE
- Web of Science Core Collection
- CINAHL
- Cochrane Library

A manual search of reference lists of included studies will also be undertaken to identify additional relevant articles.

Search terms will include a combination of Medical Subject Headings (MeSH) and free-text keywords related to:

- Older adults (e.g., “aged”, “elder*”, “geriatr*”)
- Functional decline (e.g., “frailty”, “sarcopenia”, “falls”)
- Screening (e.g., “screen*”, “preventive health checks”, “mass screening”)

- Cultural attitudes (e.g., "attitud*", "percept*", "belief*", "culture*")
- Qualitative research ("qualitative", "mixed methods")

Search strategies will be adapted to each database. The full search strategy will be reported in an appendix to ensure reproducibility.

Study Selection

All retrieved records will be imported into EndNote (v21, Clarivate Analytics). Duplicate records will be removed.

Study selection will occur in two stages:

1. Title and abstract screening
2. Full-text screening

Two independent reviewers will screen all records against eligibility criteria. Discrepancies will be resolved through discussion, with involvement of a third reviewer if required.

A PRISMA flow diagram will document the selection process.

Data Extraction

Data will be extracted into a pre-piloted Microsoft Excel spreadsheet. Extracted variables will include:

- Author(s), year and country
- Study design
- Population characteristics
- Screening context
- Cultural themes identified
- Key findings

Two reviewers will independently extract data to minimise bias.

Quality Appraisal

Methodological quality will be assessed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Qualitative Research[46].

The JBI tool evaluates congruity between research methodology, data collection, analysis and interpretation, as well as researcher reflexivity and ethical considerations.

Quality appraisal will not be used to exclude studies but will inform interpretation of findings.

Data Synthesis

Given anticipated heterogeneity in populations and screening contexts, a meta-analysis is not appropriate.

A thematic synthesis approach will be used. This will involve:

1. Line-by-line coding of findings
2. Development of descriptive themes
3. Generation of analytical themes

Themes will subsequently inform the development of focus group topic guides for Phase 2 and contribute to COM-B mapping within the Behaviour Change Wheel framework.

Contribution to Intervention Development

The systematic review represents the "evidence synthesis" stage of the MRC framework[38]. Findings will:

- Identify recurring cultural barriers and facilitators to screening
- Highlight effective culturally tailored strategies
- Inform behavioural determinants within COM-B
- Guide design of co-production workshops

This ensures that the subsequent intervention development phase is evidence-informed rather than exploratory alone.

Phase 2: Qualitative Exploration Of Perceptions And Attitudes

Study Design

A qualitative study design will be employed to explore perceptions, knowledge and attitudes toward functional decline and sarcopenia screening among older adults and key stakeholders in Luton, UK.

The study is informed by a pragmatic epistemological stance, recognising that participants' experiences are socially constructed yet situated within real-world health service contexts. Qualitative inquiry is appropriate where little is known about how cultural factors influence perceptions of sarcopenia screening and where understanding contextual nuance is essential for intervention development.

This phase corresponds to the "development" stage of the MRC framework[38], generating context-specific evidence to inform co-production.

Setting

The study will be conducted in Luton, a culturally diverse town in the United Kingdom with substantial South Asian representation and recognised socioeconomic inequalities[26].

Community venues such as community centres, faith-based settings and local health hubs will be used to facilitate accessibility and cultural comfort.

Participants

Participants will include:

- Community-dwelling adults aged ≥65 years
- Individuals from South Asian and other ethnic minority backgrounds
- Community leaders (e.g., faith leaders, voluntary sector representatives)
- Healthcare professionals
- Representatives from Bedfordshire, Luton and Milton Keynes Integrated Care Board (BLMK ICB)

Including multiple stakeholder groups enables triangulation of perspectives and strengthens ecological validity.

Sampling Strategy

Purposive sampling will be used to recruit individuals with relevant lived or professional experience[47]. This approach ensures inclusion of participants who can meaningfully contribute to understanding barriers and facilitators to screening uptake.

Maximum variation sampling will be employed where feasible to capture diversity in:

- Gender
- Ethnicity
- Language
- Socioeconomic background
- Prior engagement with screening programmes

Recruitment will continue until thematic saturation is reached, defined as the point at which no new analytical themes emerge.

Approximately five focus groups (6–12 participants per group) are planned, consistent with qualitative methodological guidance[48].

Data Collection

Focus groups were selected as the primary method because they facilitate discussion among individuals sharing similar experiences, allowing exploration of social norms, collective beliefs and cultural influences[48].

Separate focus groups will be conducted for:

- Older adults
- Community leaders
- Healthcare professionals

This separation aims to minimise power imbalances and encourage open discussion.

A semi-structured topic guide will be developed based on:

- Findings from Phase 1 systematic review
- COM-B domains (Capability, Opportunity, Motivation)
- Behaviour Change Wheel intervention functions

Key domains will include:

- Understanding of sarcopenia and ageing
- Attitudes toward preventive screening
- Cultural beliefs related to ageing and muscle loss
- Barriers and facilitators to participation
- Preferred communication and recruitment methods
- Acceptable screening locations and formats

Focus groups will be audio-recorded and transcribed verbatim.

Where required, interpreters will be available to support participants with limited English proficiency, ensuring inclusivity and cultural sensitivity.

Data Analysis

Data will be analysed using reflexive thematic analysis following the six-phase approach described by[49]:

1. Familiarisation with data
2. Initial coding
3. Generating themes
4. Reviewing themes
5. Defining and naming themes
6. Producing the report

NVivo software will be used to support systematic coding and data management.

After inductive theme generation, findings will be deductively mapped onto the COM-B framework to identify behavioural determinants relevant to screening uptake. This dual analytic strategy strengthens theoretical integration and ensures alignment with intervention development.

Trustworthiness and Rigour

Several strategies will be employed to enhance credibility, dependability and confirmability:

- Independent coding by at least two researchers
- Regular analytic meetings to discuss theme development
- Reflexive journaling by the lead researcher
- Transparent documentation of coding decisions
- Triangulation across participant groups

Member checking will be considered where feasible, particularly during co-production workshops, to validate interpretation of findings.

Researcher Reflexivity

Given that the primary researcher is embedded within the academic and healthcare system, reflexivity will be maintained throughout the research process. A reflexive diary will document assumptions, positionality and potential influences on data interpretation.

This is particularly important when working across cultural contexts to minimise imposition of biomedical assumptions on participants' lived experiences.

Contribution to Intervention Development

Findings from this phase will:

- Identify culturally specific barriers and facilitators
- Inform intervention functions within the BCW
- Shape recruitment strategies
- Guide communication materials
- Direct co-production workshop design

This ensures that intervention development is evidence-informed and culturally grounded.

Phase 3: Co-Production Of A Culturally Tailored Screening Programme

Rationale for Co-production

Co-production is defined as the collaborative design and delivery of services by professionals and service users working in equal partnership[34]. It aims to improve relevance, trust, engagement and sustainability of health interventions. Evidence from cancer screening research

demonstrates that culturally tailored, community-informed approaches increase participation among ethnic minority groups[32,33,36]. However, there is currently no published research describing the co-production of a sarcopenia screening programme. Given known disparities in screening uptake across ethnic groups[27,29], co-production represents a theoretically and empirically justified strategy to enhance acceptability.

This phase corresponds to the "intervention development" component of the MRC framework[38].

Objectives of the Co-production Phase

The co-production process aims to:

1. Design culturally appropriate recruitment strategies
2. Determine acceptable screening locations and delivery formats
3. Develop culturally sensitive communication materials
4. Establish referral pathways to existing physical activity interventions
5. Identify practical barriers to implementation

Participants in Co-production Workshops

Participants will include:

- Older adults from South Asian and other ethnic minority communities
- Community leaders (e.g., faith leaders, voluntary organisations)
- Healthcare professionals
- Representatives from BLMK Integrated Care Board
- Members of the research team

Involving diverse stakeholders ensures that the intervention reflects lived experience, service delivery constraints and policy priorities.

Structure of Co-production Workshops

Co-production will occur through structured workshops (approximately 2–3 sessions), each lasting 90–120 minutes, and should follow the structure outlined in Figure 3.

Co-production workshops are conducted in sequential stages involving problem framing, collaborative solution generation, and refinement of programme delivery. Findings from earlier study phases inform discussions, and outputs are iteratively developed into a culturally tailored sarcopenia screening pathway aligned with Behaviour Change Wheel principles.

Session 1 – Presentation and Problem Framing

- Presentation of Phase 1 and Phase 2 findings
- Discussion of identified barriers and facilitators
- COM-B mapping of behavioural determinants
- Group prioritisation of key issues

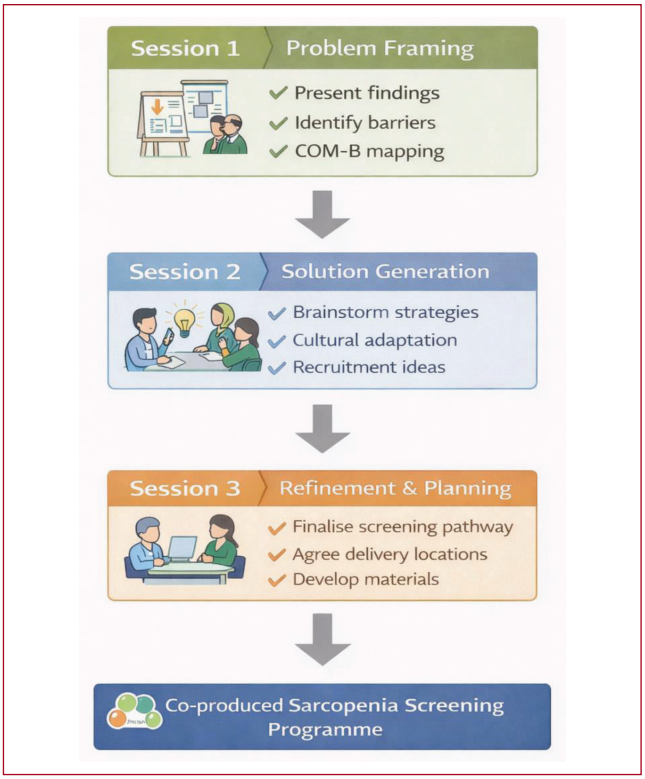

Figure 3. Structured co-production process used to develop the culturally tailored sarcopenia screening programme.

Session 2 – Solution Generation

- Small group brainstorming of culturally tailored strategies
- Discussion of preferred communication channels (e.g., faith centres, community groups, GP endorsement)
- Exploration of gender considerations, language needs, and stigma

Session 3 – Refinement and Practical Planning

- Review of draft screening pathway
- Agreement on screening locations
- Development of consent and communication procedures
- Identification of referral pathway to Healthy Ageing Programme

Facilitation will use participatory techniques to ensure balanced contribution and minimise dominance by professional stakeholders.

Development of the Screening Pathway

The co-produced screening programme will include:

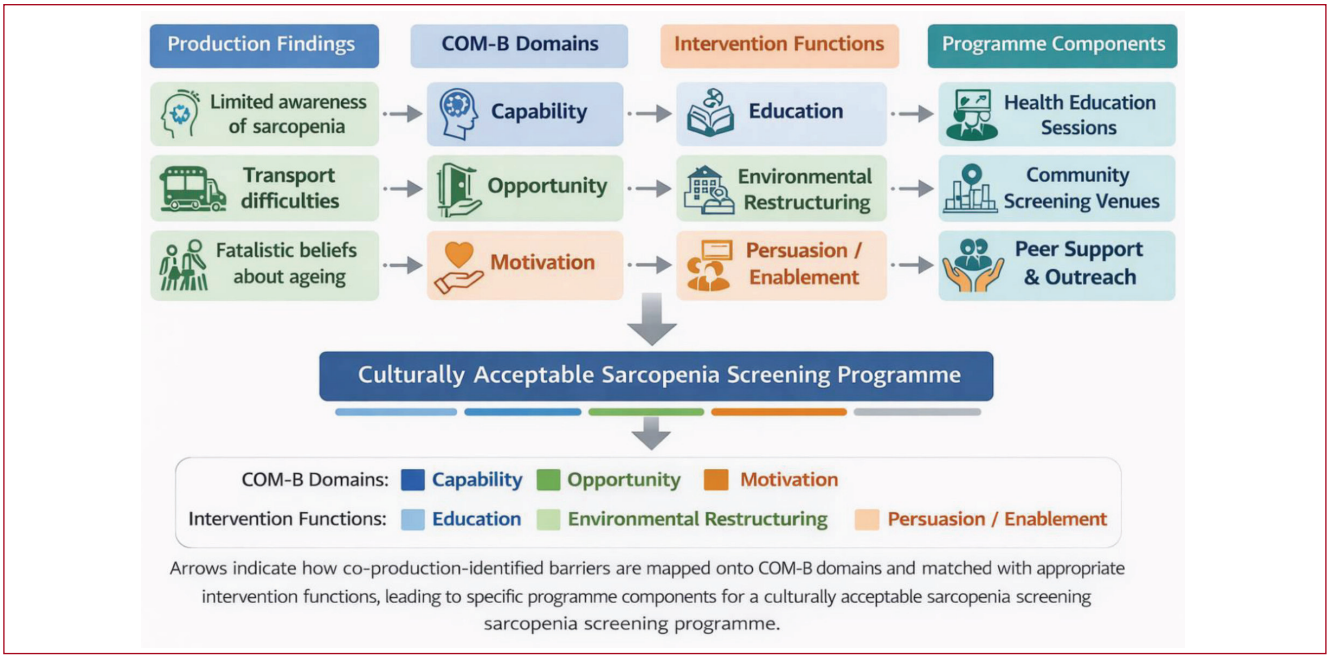

Figure 4. Integration of co-production findings within the Behaviour Change Wheel framework.

1. Recruitment Strategy

Potential strategies may include:

- Community ambassador approach
- Faith-based venue engagement
- GP-endorsed invitations
- Multilingual flyers
- Family-inclusive messaging

Strategies will be selected based on feasibility and cultural appropriateness.

2. Screening Tool and Procedure

The SARC-Calf tool will be used for case finding due to its improved sensitivity compared to SARC-F alone[15,42]. Screening procedure will include:

- Completion of SARC-F questionnaire
- Measurement of calf circumference using standardised protocol
- Immediate feedback of results
- Provision of educational materials

Clear explanation will be provided that screening is not diagnostic but identifies individuals at risk.

3. Referral Pathway

Individuals identified with probable sarcopenia (SARC-Calf ≥11) will be offered referral to the existing Healthy Ageing Programme (HAP), a resistance-based exercise intervention funded by BLMK ICB.

The integration of screening with an established intervention strengthens alignment with UK National Screening Committee principles, which require availability of effective treatment pathways prior to programme implementation[50].

4. Communication and Cultural Adaptation

Co-production will address:

- Language translation requirements
- Gender considerations (e.g., women-only groups if appropriate)
- Framing of sarcopenia (avoidance of stigmatising language)
- Visual materials reflecting community diversity
- Inclusion of family decision-making dynamics

Materials will be reviewed iteratively by workshop participants to ensure cultural resonance.

Integration with Behaviour Change Wheel

Co-production outputs will be systematically mapped onto BCW intervention functions as shown in Figure 4. This ensures theoretical coherence and transparency of the mechanism.

Documentation and Iteration

Workshops will be documented through:
- Field notes
- Audio recordings (where consented)
- Iterative summary documents

The intervention will be refined iteratively based on stakeholder feedback.

Where feasible, a second cycle of refinement will occur after initial feasibility testing (MRC iterative model).

Ensuring Equity and Power Balance

To minimise professional dominance:
- Community members will be invited to contribute first in discussions
- Visual facilitation techniques (e.g., post-it clustering) will be used
- Facilitators will ensure balanced participation

This approach aligns with principles of authentic co-production rather than tokenistic consultation.

Output of Phase 3

The primary output will be:

A documented, co-produced sarcopenia screening programme protocol, including:
- Recruitment materials
- Screening procedure manual
- Referral pathway
- Training materials
- Acceptability metrics

This will form the basis for Phase 4 feasibility testing.

Phase 4: Feasibility And Acceptability Study

Study Design

Phase 4 will consist of a single-arm mixed-methods feasibility study of the co-produced sarcopenia screening programme. The purpose is not to evaluate clinical effectiveness, but to assess feasibility, acceptability, and implementation parameters prior to a future definitive evaluation, consistent with MRC guidance[37,38].

Setting

Screening sessions will be conducted in community-based venues identified during Phase 3 (e.g., community centres, faith-based venues, local health hubs) in Luton, UK.

Venues will be selected based on accessibility, cultural appropriateness, and stakeholder agreement.

Participants

Inclusion criteria:

- Community-dwelling adults aged ≥65 years
- Resident in Luton
- Able to provide informed consent

Exclusion criteria:

- Acute illness preventing participation
- Known severe cognitive impairment limiting consent capacity
- Currently under specialist sarcopenia management

The study aims to prioritise engagement of South Asian communities while remaining inclusive of all ethnic groups.

Recruitment Strategy

Recruitment methods will reflect outputs from the co-production phase and may include:
- Community ambassador referral
- Faith-based outreach
- GP endorsement
- Community organisation partnerships
- Multilingual materials

Recruitment processes will be documented to assess practicality and reach.

Screening Procedure

Participants will undergo:
1. Completion of SARC-F questionnaire
2. Measurement of calf circumference
3. Calculation of SARC-Calf score

A score ≥11 will indicate probable sarcopenia[51].

Participants will receive verbal feedback and written educational materials. Those meeting criteria will be offered referral to the Healthy Ageing Programme (HAP).

Screening will be delivered by trained research staff following a standardised protocol.

Feasibility Outcomes

Feasibility outcomes are prioritised over clinical outcomes, consistent with recommendations for pilot studies.

Primary Feasibility Outcomes

1. Recruitment rate
   - Number recruited / number approached
   - Target ≥60%
2. Retention rate
   - Proportion completing full screening process
   - Target ≥75%
3. Screening completion rate
   - Proportion with complete SARC-Calf data
   - Target ≥80%
4. Acceptability
   - Assessed using brief post-screening questionnaire. It will be study-specific and will assess participant satisfaction, perceived appropriateness of the screening process, clarity of information provided, and willingness to recommend participation to others. As this is an early-stage feasibility study, the questionnaire

is intended to provide preliminary acceptability data rather than serve as a validated outcome measure.
- Supplemented by qualitative feedback

5. Referral uptake
   - Proportion accepting referral to HAP

Secondary Descriptive Outcomes

- Prevalence of probable sarcopenia (SARC-Calf ≥11)
- Participant demographic characteristics
- Ethnic distribution of participation
- Identified implementation barriers

Progression Criteria

Predefined progression criteria will inform decision-making regarding a future definitive trial.

The study will be considered feasible to progress if:

- Recruitment ≥60%
- Retention ≥75%
- No serious adverse events
- Positive acceptability feedback
- Stakeholder support maintained

If thresholds are not met, the intervention will be modified and reassessed.

Sample Size Justification

As a feasibility study, a formal power calculation is not required. Sample sizes for feasibility studies are typically determined by the need to estimate recruitment, retention and implementation parameters rather than intervention effectiveness. Recommendations suggest that approximately 24–50 participants are often sufficient for feasibility objectives, while larger samples may improve the precision of parameter estimates[52-54]. Therefore, a target sample of 40–60 participants was considered appropriate to estimate recruitment and retention rates, identify logistical barriers and generate preliminary prevalence estimates.

Data Collection

Quantitative data:

- Demographics (age, gender, ethnicity)
- SARC-Calf score
- Recruitment source
- Referral uptake
- Completion rates

Qualitative data:

- Open-ended acceptability feedback
- Field notes from screening sessions
- Stakeholder debrief discussions

Data Analysis

Quantitative Analysis

Descriptive statistics will be used to summarise:

- Recruitment and retention rates
- Referral uptake

Confidence intervals will be calculated where appropriate to estimate parameter precision.

No hypothesis testing will be conducted, consistent with feasibility study design.

Qualitative Analysis

Qualitative feedback will undergo thematic analysis[49]. Themes will focus on:

- Perceived acceptability
- Barriers to participation
- Cultural resonance
- Suggestions for improvement

Findings will inform iterative refinement of the programme.

Safety and Risk Management

Screening is low-risk. However:

- Participants reporting significant falls history or severe mobility limitation will be advised to consult their GP.
- Any adverse events during screening will be recorded and reported according to institutional policy.

The study does not involve diagnostic imaging or invasive procedures.

Implementation Evaluation

Implementation considerations will include:

- Fidelity to screening protocol
- Staff training requirements
- Time per screening session
- Venue suitability
- Cost considerations

These parameters will inform future scalability.

Integration with MRC Framework

This feasibility phase corresponds to the "Feasibility and Piloting" stage of the MRC framework[38], providing data necessary to determine whether progression to a larger controlled evaluation is warranted.

Ethics and Governance

Ethical approval for this study was obtained from the Institute for Health Research Ethics Committee, University of Bedfordshire (IHREC Application No: IHREC1067). The study was approved without amendments.

All participants will receive a Participant Information Sheet outlining the study purpose, procedures, and their rights, and written informed consent will be obtained prior to participation. The study will be conducted in accordance with the Declaration of Helsinki and relevant UK data protection regulations.

Data Management and Confidentiality

All data will be handled in accordance with the UK General Data Protection Regulation (UK GDPR) and the Data Protection Act (2018).

Data Storage

- Audio recordings will be stored on encrypted, password-protected University servers.
- Transcripts will be anonymised prior to analysis.
- Identifiable data will be stored separately from research data.
- Access will be restricted to authorised research team members only.

Data Retention

Data will be retained securely for a minimum of five years following publication, in line with institutional policy.

Anonymisation

Participants will be assigned unique identification codes.

Any potentially identifiable information will be removed during transcription.

Data Sharing

Due to the qualitative nature of the data and the involvement of identifiable community members, raw datasets will not be made publicly available. De-identified data may be shared upon reasonable request and subject to ethical approval.

Strengths and Limitations

Strengths

- To the team's knowledge, this is the first study to co-produce a culturally tailored sarcopenia screening programme in the UK.
- Integration of the MRC framework with Behaviour Change Wheel ensures theoretical coherence.
- Multi-phase design strengthens evidence-informed development.
- Strong community engagement enhances ecological validity.
- Alignment with Marmot principles addresses health inequalities.
- Embedded referral pathway increases practical relevance.

Limitations

- Conducted in a single geographic location, limiting generalisability.
- Feasibility design does not assess clinical effectiveness.
- Potential self-selection bias, as participants who volunteer may be more health-engaged.
- Focus group dynamics may influence expression of dissenting views.
- Cultural heterogeneity within "South Asian" populations may not be fully captured.

Discussion

Sarcopenia is increasingly recognised as a major contributor to frailty, disability, falls, hospitalisation and mortality among older adults[2-8]. Despite the availability of internationally recognised diagnostic criteria and evidence supporting exercise-based interventions[14,15,20,21], there is currently no organised sarcopenia screening programme within the United Kingdom[17]. Early identification of individuals at risk may provide an opportunity to implement preventative interventions before substantial functional decline occurs. This study addresses an important gap by developing and evaluating the feasibility of a culturally tailored sarcopenia screening programme for community-dwelling older adults in a multi-ethnic UK setting.

A key strength of the proposed study is its integration of evidence synthesis, qualitative inquiry, behavioural theory and co-production within the Medical Research Council (MRC) framework for complex interventions[37,38]. The use of the Behaviour Change Wheel and COM-B model provides a systematic approach to understanding behavioural determinants of screening participation and translating these into intervention components[39]. This theoretically informed approach may improve transparency and reproducibility while increasing the likelihood that the resulting intervention addresses barriers that are meaningful to the target population.

The emphasis on cultural tailoring is particularly important given persistent inequalities in participation in preventive health programmes. Evidence from breast, cervical and bowel cancer screening programmes consistently demonstrates lower uptake among ethnic minority populations, including South Asian communities in the UK[27-29]. Reported barriers include language difficulties, limited awareness, differing cultural beliefs, mistrust of healthcare systems and competing social priorities[30,31]. Previous studies have shown that culturally tailored educational materials, community engagement strategies and locally adapted recruitment approaches can improve screening participation among underserved populations[32,33]. However, most existing evidence originates from cancer screening programmes, and little is known about how these approaches might be applied to sarcopenia screening. The present study therefore extends the literature by exploring whether culturally tailored and co-produced approaches can be adapted to the context of age-related functional decline and musculoskeletal health.

Co-production has gained increasing recognition as an effective strategy for improving the relevance, acceptability and sustainability of health interventions[34]. Previous studies have successfully used co-design approaches to improve participation in lung cancer screening and other public health programmes[35,36]. By involving older

adults, community leaders, healthcare professionals and health system stakeholders throughout intervention development, this study aims to ensure that the screening programme reflects local priorities, addresses culturally specific concerns and is feasible to implement within existing community settings. Such an approach aligns with wider public health priorities that emphasise community engagement, health equity and the reduction of health inequalities[25,26].

The proposed screening programme also has potential clinical and public health implications. If found to be feasible and acceptable, it may provide a model for community-based identification of older adults at risk of sarcopenia and facilitate earlier referral to evidence-based interventions such as resistance exercise programmes[20,21]. Linking screening directly to an established Healthy Ageing Programme addresses an important principle of effective screening by ensuring that individuals identified as being at risk have access to an appropriate intervention pathway[50]. More broadly, the study may contribute to ongoing discussions regarding the role of proactive community-based approaches in healthy ageing, prevention of frailty and reduction of health inequalities among ethnically diverse populations.

Several strengths and limitations should be acknowledged. To our knowledge, this is the first study in the UK to develop a culturally tailored sarcopenia screening programme through a formal co-production process. The multi-phase design, incorporation of behavioural theory and engagement of diverse stakeholder groups strengthen the methodological rigour of the intervention development process[37-39]. However, the study is conducted within a single geographical area, which may limit transferability to other settings. The feasibility design is not intended to evaluate effectiveness, cost-effectiveness or long-term health outcomes. In addition, participants who choose to engage in screening activities may be more health-conscious than the wider population, introducing the possibility of self-selection bias. Finally, although particular attention is given to South Asian communities, substantial cultural diversity exists both within and between ethnic minority groups, and it may not be possible to fully capture all perspectives within a single intervention model.

Future research should build on the findings of this feasibility study through a larger-scale evaluation of effectiveness and implementation. Such work should assess the impact of the screening programme on screening uptake, referral engagement, physical function and health outcomes, as well as its cost-effectiveness and scalability across different populations and settings. Understanding how culturally tailored approaches can be embedded within routine community and primary care services will be important for informing future policy and practice.

In conclusion, this study addresses an important evidence gap by applying co-production and behavioural theory to the development of a culturally tailored sarcopenia screening programme for older adults. By focusing on feasibility and acceptability within a diverse community setting, the study will generate valuable evidence to inform future evaluation and implementation of sarcopenia screening initiatives aimed at reducing inequalities in healthy ageing.

Ethics Approval

Ethical approval was obtained from the Institute for Health Research Ethics Committee, University of Bedfordshire (IHREC1067).

Consent to Participate

Written informed consent will be obtained from all participants.

Authors' Contributions

OO: Conceptualisation, methodology, investigation, writing – original draft. IT: Conceptualisation, methodology, supervision, writing – review & editing. GR: Supervision, review & editing. NJ: Supervision, review & editing. DH: Supervision, review & editing. All authors read and approved the final version of the manuscript.

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