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Health Psychology and Behavioral Medicine
An Open Access Journal

ISSN: 2164-2850 (Online) Journal homepage: www.tandfonline.com/journals/rhpb20

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To cite this article: Itse Olaoye, Nicola Brown, Fotini Tsofliou, Eirini Kelaiditi & Kyriaki Myrissa (2026) Developing a theory and evidence-based intervention for black African women using the COM-B model and behaviour change wheel: BALANCED programme, Health Psychology and Behavioral Medicine, 14:1, 2616929, DOI: 10.1080/21642850.2026.2616929

To link to this article: https://doi.org/10.1080/21642850.2026.2616929

Published online: 20 Jan 2026.

HEALTH PSYCHOLOGY AND BEHAVIORAL MEDICINE
2026, VOL. 14, NO. 1, 2616929
https://doi.org/10.1080/21642850.2026.2616929

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RESEARCH ARTICLE

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Developing a theory and evidence-based intervention for black African women using the COM-B model and behaviour change wheel: BALANCED programme

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ABSTRACT

Background: Obesity is a major global health issue, increasing morbidity and mortality through its association with non communicable diseases. Black African women experience disproportionately high obesity rates, reaching 37 percent in the UK. They face cultural, social, and systemic barriers to achieving sustainable lifestyle changes. To address these disparities, the Black African Lifestyle and Nutrition Change for Empowerment and Development (BALANCED) intervention was developed. This paper describes the development of the BALANCED intervention and the evidence, theory, and community informed processes that shaped its design.

Methods: A stepwise approach guided by the Behaviour Change Wheel and COM B model (Capability, Opportunity, Motivation Behaviour) was used. Formative research, including a systematic review, dietary pattern analysis, and qualitative interviews, identified key behavioural determinants and barriers to healthy eating among Black African women with overweight and obesity in the UK. These insights informed the selection of intervention functions and behaviour change techniques (BCTs). Intervention components were co designed with key stakeholders to support acceptability and feasibility.

Results: Formative research showed that Black African women face barriers to adopting healthy behaviours, including limited access to culturally appropriate dietary guidance, time constraints, and systematic healthcare challenges. In response, the intervention addressed these barriers through educational and training modules, culturally tailored counselling, and structured peer support, focusing on dietary and physical activity behaviours. Seven Behaviour Change Wheel intervention functions were applied, incorporating BCTs aligned with identified determinants.

Conclusion: The BALANCED intervention offers an innovative, culturally tailored approach to supporting sustainable behaviour change among Black African women living with overweight and obesity. Grounded in behavioural theory and informed by empirical evidence, it addresses multidimensional barriers and supports engagement. Future research will pilot the intervention and evaluate its effectiveness and scalability to inform public health strategies to reduce health disparities in this population.

ARTICLE HISTORY
Received 3 October 2025
Accepted 6 January 2026

KEYWORDS
Migration health; health inequalities; nutrition intervention; black African women; health promotion

1 Introduction

Obesity is a major global health challenge, contributing to increased morbidity and mortality through its association with chronic diseases such as cardiovascular disease, type 2 diabetes, and certain cancers (Ataey et al., 2020; Dee et al., 2014). In the UK, approximately 64% of adults are living with overweight or obesity (HSE, 2022). The burden is even greater among Black adults, where prevalence reaches 72%, with Black African women experiencing an obesity rate of 37% (HSE, 2022). These disparities reflect the interplay of genetic, socio-cultural, and environmental factors, with migration shaping dietary behaviours and lifestyle patterns. In this study, 'Black African women' refers to women of sub-Saharan African heritage residing in the UK, including first-generation immigrants and UK-born women of Black African descent. This distinction recognises the influence of migration and generational factors in shaping dietary behaviours,

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while differentiating this group from other Black populations such as Black Caribbean or Black British women of non-African descent.

Weight management services for UK adults with overweight or obesity, known as Tier 2 services, typically involve multi-component interventions incorporating dietary change, physical activity, and behavioural support. These multicomponent approaches are recommended because evidence shows that combining components leads to more effective and sustainable weight loss than any single component alone (National Institute for Health and Care Excellence (NICE), 2025). Dietary changes facilitate energy balance, physical activity improves metabolic health, and behavioural support enables the initiation and maintenance of new habits. These programmes are commissioned by local authorities and funded by the NHS for those with co-morbidities, while some require direct payment. However, there is no published evidence on whether such interventions are effective or culturally relevant for ethnic minority groups, including Black African and Black Caribbean populations. This highlights the persistent need for tailored interventions that address modifiable risk factors within existing socioeconomic inequalities (Jebb et al., 2004). Research also emphasises the importance of assessing how programme effectiveness varies by ethnicity, gender, age, and socio-economic status (Jebb et al., 2004).

Locally tailored initiatives such as UP!UP! in London have begun to respond to these gaps (Lewisham Council, n.d.). UP!UP! is a community-based lifestyle programme designed for Black adults, providing culturally adapted nutrition messaging, physical activity sessions, and peer-led behavioural support. However, such programmes have not undergone comprehensive, evidence-based development and evaluation processes and are not fully integrated into formal evidence-based healthcare systems (Maynard et al., 2023). There remains no widely implemented, culturally tailored weight management programme specifically designed for Black African populations in the UK.

To address this gap, this study presents the design of the Black African Lifestyle and Nutrition Change for Empowerment and Development (BALANCED) intervention, a collaboratively developed, theory- and evidence-based programme addressing overweight and obesity in Black African women in the UK. Developed in accordance with the UK Medical Research Council (MRC) framework for complex health interventions (Craig et al., 2008), the BALANCED programme was designed similarly to the IINDIAGO programme for women with gestational diabetes in South Africa (Murphy et al., 2023). While the MRC framework emphasises theoretically informed approaches for understanding behaviours and pathways to change, it offers limited guidance for intervention development. Therefore, the Behaviour Change Wheel (BCW) (Michie et al., 2014) was employed, providing a structured method for designing behaviour change strategies grounded in theory, evidence, and lived experiences.

The BALANCED intervention integrates behaviour change theory with co-design principles to ensure cultural relevance and contextual appropriateness. Co-design involved active participation of Black African women, healthcare practitioners, commissioners, and other stakeholders through interviews, webinars, and feedback sessions. Embedding these perspectives ensured that the intervention aligns with cultural values, addresses real-world barriers, and enhances feasibility and acceptability.

The BCW provided the theoretical foundation for development, linking constructs from 19 behaviour change frameworks to the COM-B (Capability, Opportunity, Motivation- Behaviour) model (Michie et al., 2014) (Figure 1). COM-B proposes that behaviour is shaped by capability, opportunity, and motivation. Capability includes physical and psychological abilities; opportunity refers to social and physical environmental factors; and motivation encompasses reflective and automatic processes that drive behaviour (Michie et al., 2014). These factors are especially relevant given the complex cultural, social, and environmental influences on dietary and physical activity behaviours among Black African women in the UK (Olaoye et al., 2025). This paper outlines the development process of this theory-based behaviour change intervention prior to its preliminary feasibility and efficacy testing.

2 Methods

2.1 Study design

This intervention development study drew on, quantitative and qualitative findings alongside evidence synthesis to inform the design of the behavioural intervention.

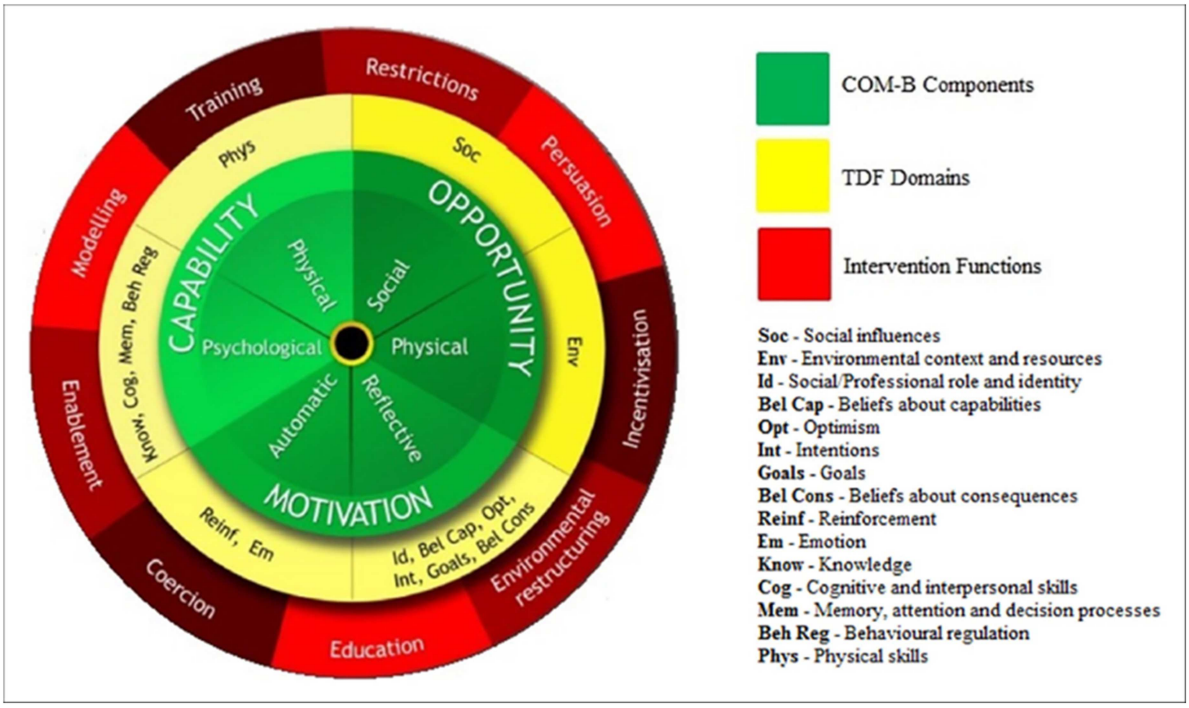

Figure 1. Behaviour change Wheel (Michie et al., 2014). Note. This figure depicts the three layers of the Behaviour Change Wheel.

Table 1. Stakeholders details on webinar assessing intervention feasibility and practicality ($n = 13$).

Characteristic	Details
Professional Background	GP ($n = 3$), Public Health Specialist/Practitioner ($n = 4$), Consultant in Public Health ($n = 1$), Nutritionist ($n = 1$), Dietitian ($n = 1$), Pharmacist specialising in public health ($n = 2$), Public Health Trainee ($n = 1$)
Years of Experience	Ranged from 3 to 22 years, with most (77%) participants having over 15 years of professional experience.
Work Settings	NHS, Local Authorities, Community Health Organisations, and Private Practice
Service Areas	Southeast London, Kent, Bromley, West Sussex, Middlesbrough
Ethnicity	Predominantly Black African participants ($n = 12$), White British ($n = 1$).
Experience with Target Population	Direct experience working with the target population ($n = 12$), indirect experience ($n = 1$)

2.2 Application of the behaviour change wheel and foundational research in intervention development

The development of the BALANCED intervention followed the Behaviour Change Wheel systematic step by step approach, beginning with a behavioural analysis of the issue and diagnosing necessary changes. This analysis was informed by a structured programme of formative research, including secondary and primary evidence, as well as in depth interviews with the target group on the proposed intervention.

A systematic review of 22 experimental studies evaluating the effectiveness of client centred counselling on weight management among Black African women with overweight and obesity identified key behaviour change techniques, cultural adaptations, and delivery modes important for enhancing engagement (Olaoye et al., 2025). A series of primary studies further informed the intervention design. A quantitative dietary pattern study (currently under review) recruited 112 Black African women to explore dietary patterns and the influence of acculturation on food choices, demonstrating the need for culturally tailored interventions. Qualitative in depth interviews involving 15 Black African women (Olaoye et al., 2025), examined individual, cultural, and environmental factors shaping dietary behaviours and the feasibility of the proposed intervention. Ethical approval was obtained and informed consent was secured from all participants.

To support real world applicability, findings from these studies were presented at a webinar attended by key stakeholders (Table 1), including general practitioners, dietitians, clinicians, nutritionists, commissioners, and NHS representatives. The webinar provided an opportunity for discussion which contributed

Table 2. Programme of primary and secondary data collection to assess context and target population.

Systematic review	A systematic review of existing studies ($n = 22$) on the client-centred counselling interventions for weight management among Black African women with overweight and obesity to assess their effectiveness (12)
Quantitative study	A cross-sectional study on the dietary patterns of Black African women ($n = 112$) with overweight and obesity
Qualitative study	In-depth individual qualitative interviews with Black African women with overweight and obese women in UK ($n = 15$) to explore factors influencing dietary choices and determine the practicality and delivery of intervention (11)
Expert review webinar	Webinar with stakeholders ($n = 13$) including GPs, Clinicians, public health practitioners/managers, nutritionist/dieticians, commissioners and NHS representatives on the feasibility and practicability of the intervention

to the refinement of the intervention protocol. Stakeholder views obtained during the webinar, combined with the programme of foundational research, informed subsequent phases of development (Table 2).

2.3 Step by step development of the intervention

2.3.1 Stage 1: understand the problem and behaviour

Following Michie and colleagues (Michie et al., 2014), the first step required defining the problem in behavioural terms by identifying relevant behaviours among the target population and determining which behaviours are most likely to influence overweight and obesity. Step 2 required selecting the target behaviours. The broad target behaviours were diet and physical activity, which represent the main modifiable risk behaviours. Steps 1 and 2 were carried out by the research team, led by the lead researcher, with inputs from co-investigators. Stakeholder involvement was indirect at this stage, as the behavioural analysis was informed by earlier quantitative dietary pattern analyses and qualitative in depth interviews with Black African women.

In Step 3, qualitative in depth interview data were systematically coded against the COM-B categories to identify barriers and facilitators (Olaoye et al., 2025). A combined deductive inductive approach was used. Deductive coding applied the predefined categories of the model, while inductive coding allowed themes to emerge from the data. Initial coding was completed by the lead researcher and checked independently by two other researchers, with discrepancies resolved collaboratively. In Step 4, themes were mapped to the 12 domains of the Theoretical Domains Framework (TDF), creating a structured behavioural diagnosis. This mapping was undertaken independently by two researchers and refined through discussion to ensure rigour and consistency.

2.3.2 Stage 2: identify intervention options likely to achieve desired behaviour change

In Step 5, intervention functions were selected for each TDF domain, drawing on the nine options in the BCW. The research team mapped functions to each domain, then assessed practicality and feasibility during a structured stakeholder webinar, which included clinicians, dietitians, commissioners, and NHS representatives. The webinar was audio recorded, and contributions were systematically reviewed in real time to identify key points. Stakeholders subsequently completed open ended surveys. Survey responses were analysed qualitatively to refine and finalise intervention functions. Step 6 involved reviewing potential policy options that could support the intervention in real world settings. Policy categories included guidelines, environmental and social planning, communication and marketing, legislation, service provision, regulation, and fiscal measures.

2.3.3 Stage 3: identify content and implementation options

In Step 7, intervention content development was guided by BCTs from Michie's taxonomy (Murphy et al., 2023). Findings from the systematic review helped identify which BCTs were most effective for relevant behaviour changes, ensuring that decisions were grounded in evidence.

In Step 8, decisions regarding delivery modes were informed by feasibility, accessibility, and relevance. The systematic review provided guidance on effective delivery practices, while in depth interviews highlighted participant preferences, including views on group versus one to one formats, the use of culturally relevant examples and recipes, and challenges with digital delivery such as limited confidence with online platforms (Olaoye et al., 2025). Stakeholder feedback from the webinar supported refinement of delivery methods. These insights were integrated to ensure that delivery reflected lived experiences rather than researcher assumptions. See Figure 2: Flow diagram for the design process.

Stages and steps in BCW design process		Development of BALANCED intervention for Black African women with overweight and obesity
Stage 1	**Understand the problem and behaviour(s)**	**Activities for stage 1**
Step 1	Define the problem in behaviour terms	Presentation of evidence from systematic review, quantitative dietary analyses, and qualitative interviews with Black African women. (see Table 2)
Step 2	Select the target behaviour	
Step 3	Specify the target behaviour	Behavioural diagnosis and mapping of findings to COM-B and 12 TDF domains using matrix toll (see Columns 1, 2 and 3 in Table 3)
Step 4	Identify what needs to change	
Stage 2	**Identify intervention options**	**Activities for stage 2**
Step 5	Identify intervention functions (BCW)	Selection of intervention functions likely to be practical, feasible and effective (see column 4 of matrix in table 3)
Step 6	Identify policy categories (BCW)	Review of relevant policies and guidelines
Stage 3	**Identify content and implementation Options**	**Activities for stage 2**
Step 7	Identify behaviour change techniques (BCW)	Selection of BCTs for each intervention function within TDF domain (see column 5 of matrix in Table 3)
Step 8	Identify mode of delivery by intervention functions and BCTs	Design of practical activities and tools; identification of providers and settings; specification of intensity and duration (see column 6 of matrix in Table 3)
Design of the BALANCED intervention program (see figure 3: Logic Model and Table 3)		

Figure 2. Flow diagram for design process.

Ethics statement

This study, including all formative studies, received approval from the St Mary's University Research Ethics Committee (SMU_ETHICS_2024-25_861). Participation was voluntary, informed consent was obtained, and confidentiality and anonymity were maintained throughout.

3 Results

Findings from formative studies, including a systematic review (Olaoye et al., 2025), dietary pattern analyses (under review), qualitative in depth interviews (Olaoye et al., 2025), and a stakeholder webinar,

Table 3. BALANCED matrix: COM-B: TDF domains, theoretical constructs and relevance Black women with overweight and obesity.

CAPABILITY

TDF Domain[a]	The problem identified from formative programme of research[b]	For behaviour change to occur, Black African women with overweight and obesity would need to:[c]	Intervention Function: What needs to be done to change behaviour[d]	Behaviour change techniques[e]	Resources, tools, activities/delivery[f]
Psychological Capability					
Knowledge **Evidence Sources:**[g] - Qualitative in depth interviews	• Foundational understanding of healthy eating • Concerns on health diets for children • Low awareness of nutrition-related information available at GP centres • Concerns about absence of person-centred approaches to weight-related issues. • Unawareness of where to seek help for weight-related problems. • Lack of culturally appropriate nutrition info from general UK nutrition services including healthy eating guide. • Challenges using digital resources for nutrition information due to unfamiliarity with technology	**Increase knowledge of:** • Overweight and obesity and associated chronic conditions, potential for prevention through lifestyle changes • What constitutes a healthy diet for self and children • Role of portion control • How to sustain a healthy diet under pressure and hard environmental pressures	**Education:** • About obesity related health risks • Define a healthy diet that is culturally relevant for themselves and their families • Incorporate portion control tips into meal planning resources and guidebooks that resonate with the cultural context	**5.1** Information about health consequences	• Module on Diet • Leaflet on obesity • Individual or group counselling, peer support, including accountability partners and peer group discussion • Visual aids for raising awareness of sugar, fat, salt content etc.
Cognitive Skills **Evidence Sources:**[g] - Qualitative in depth interviews	• Lack skills in purchasing healthy foods • Unfamiliar with portion control techniques • Desire for cooking classes that respect and incorporate African culinary practices. • Limited skills in negotiating or challenging social and family norms	**Acquire skills:** • Learning to select nutritious, affordable foods and read labels effectively. • Mastering portion sizing techniques and understanding balanced servings. • Preparing healthier versions of traditional African dishes.	**Training:** • Workshops on purchasing healthy foods with budgeting and label-reading skills • Portion control demonstrations with visual aids; culturally relevant cooking classes for healthier traditional dishes	**4.1** Instruction how to perform Behaviour **15.2** Mental rehearsal of successful performance	• Diet module (food label graphics and portioned plate graphics • Recipe book • Peer group workshop • Activity: role-play, problem solving strategies for negotiating change

Table 3. (*Continued*)

CAPABILITY					
TDF Domain[a]	The problem identified from formative programme of research[b]	For behaviour change to occur, Black African women with overweight and obesity would need to:[c]	Intervention Function: What needs to be done to change behaviour[d]	Behaviour change techniques[e]	Resources, tools, activities/delivery[f]
		• Setting dietary boundaries and communicating choices respectfully in family and social and settings.	• Role-play exercises to build confidence in setting dietary boundaries and navigating social pressures.		• Meal planning tips
Memory, Attention, decision, Processes **Evidence Sources:**[g] - Qualitative in depth interviews	• Need strategies to reinforce dietary knowledge and facilitate healthier food choices in real-life situations. • Need tools to enhance focus and support quick, informed decision-making regarding food selections.	• Pay more attention to dietary knowledge and apply it consistently in daily food choices. • Utilise decision-making tools to quickly assess and choose healthier food options in various situations.	**Training:** • Identify opportunities for participants to practice applying dietary knowledge in various settings such as restaurants, supermarkets, workplaces, and home environment. • Reflection Sessions: facilitate periodic group meetings for participants to share experiences, reflect on their dietary choices, and discuss challenges. • Training on using tools such as food diaries, apps, or decision matrices to evaluate food options quickly. • Providing structured opportunities for participants to receive feedback on their decision-making processes and food choices from peers and counsellors	**6.1** Demonstration of the Behaviour **2.2** Feedback on behaviour **3.2** Social support **8.2** Behaviour substitution	• Module on Diet • Recipe cards and guides featuring healthy, culturally relevant dishes that emphasise nutritious ingredient substitutions. • Access to mobile apps and food diary templates that facilitate tracking dietary choices and assessing nutritional value. • Personal notebooks for participants to document their thoughts, dietary choices, and reflections on their eating habits. • Simulated environments where participants practice making food choices in various settings (e.g. eating out, family gatherings) to enhance decision-making skills.
Behavioural regulation **Evidence Sources:**[g] - Systematic Review	• Need for self-monitoring tools for dietary change and weight	• Need to consistently track their dietary intake and weight to identify patterns and areas for improvement. • Establish personal goals for dietary changes and weight management that are realistic and achievable.	**Enablement:** • Provide accessible tools such as food diaries, apps, or online platforms to facilitate easy tracking of dietary intake and weight. • Provide counselling to help women set achievable goals and reflect on their progress	**2.3** Self-monitoring of behaviour **2.4** Self-monitoring of outcomes (Method to record outcome) **2.1** Feedback on behaviour **1.1** Goal setting (behaviour)	• Printable or digital templates that can be used to log daily food intake and exercise. • Wearable devices that track physical activity and provide feedback on health metrics. • Counselling Sessions: Regular one-on-one or group sessions to assist in setting achievable goals and reflecting on their progress.

(*Continued*)

Table 3. (*Continued*)

TDF Domain[a]	The problem identified from formative programme of research[b]	For behaviour change to occur, Black African women with overweight and obesity would need to:[c]	Intervention Function: What needs to be done to change behaviour[d]	Behaviour change techniques[e]	Resources, tools, activities/delivery[f]
CAPABILITY					
				1.5 Review of behaviour goals (jointly with counsellor)	• Weighing scales available at counselling sessions
Physiological Capability **Physical Skills** **Evidence Sources:**[g] - Qualitative in depth interviews	• Lack adequate cooking skills for healthy foods	• Acquire the physical skills to prepare foods using healthier ingredients and methods	**Training:** • Provide guidelines and recipes **Modelling:** • Provide hands-on classes focused on healthy African recipes. • Practice healthy techniques at home to gain confidence in preparing nutritious meals.	**4.1** Instruction on how to perform behaviour **6.1** Demo of behaviour	• Culturally relevant cookbooks featuring healthy African recipes with nutritional information. • Cooking Demonstrations: Live or recorded sessions showcasing healthy cooking techniques and ingredient substitutions.
OPPORTUNITY					
Physical Environmental Context and resources **Evidence Sources:**[g] - Qualitative in depth interviews	• Adaptation to new food environments • Exploration of British cuisines • Time is perceived as a barrier • High cost of African foods, and limited availability • reduced feeling of satisfaction (fullness) from British foods • high exposure to unhealthy • choices and relatively little exposure to healthy eating messages	• Learn and practice how to prepare healthy recipes quickly and efficiently • Learn how to eat healthily on a budget by reallocating money spent on take-away • Have critical understanding of the obesogenic environment • Have access to information and resources that promote healthy eating	**Training:** • Strategies to eat healthily on a budget **Enablement:** • Increase critical awareness of ads marketing unhealthy foods • Provide resources and information that can serve as cues/reminders for healthy choices	**6.1** Demonstration of the behaviour **4.1** Instruction on how to perform the behaviour **13.2** Reframing **12.5** Adding objects to environment	• Budget-Friendly Recipe featuring healthy, affordable recipes with tips on cooking African-inspired meals quickly. • Visual Cues/Reminders: Posters, fridge magnets, or app notifications with healthy eating reminders and tips for resisting marketing of unhealthy foods. • Practical cooking sessions where participants learn time-saving techniques and meal-prep strategies for healthy eating. • Training on allocating food budgets effectively, with practical exercises on choosing healthy yet affordable ingredients.

Table 3. (*Continued*)

TDF Domain[a]	The problem identified from formative programme of research[b]	For behaviour change to occur, Black African women with overweight and obesity would need to:[c]	Intervention Function: What needs to be done to change behaviour[d]	Behaviour change techniques[e]	Resources, tools, activities/delivery[f]
CAPABILITY					
Social Influence **Evidence Sources:**[g] - Qualitative in depth interviews	• Children as motors of change at home, • Lack of help • Partners' limited involvement	• Leverage children's influence by involving them in healthy eating and lifestyle practices • Seek additional support networks outside the family • Encourage partner engagement by promoting shared goals and activities	**Modelling**: • Encourage family members, especially children and partners, to adopt healthy behaviours, making healthy choices more routine at home. **Enablement**: • Family and friend invited to peer group and counselling sessions **Environmental Restructuring**: • Organise family-centred health activities to engage partners and children, building collective commitment to healthier lifestyles.	**3.2** Social support (practical) **3.3** Social support (emotional) **6.1** Demonstration of the Behaviour **1.4** Action Planning	• Peer group and home visits establish continuity of care • Group sharing of recipes, cooking methods can promote • Feelings of social support • Choose recipes for a week. Everyone gives feedback on experience
MOTIVATION **Motivation (reflective)**					
Beliefs about Consequences **Evidence Sources:**[g] - Systematic review - Qualitative in depth interviews	• Believe consequences of obesity related to chronic conditions • Underestimation of personal dietary risk and associated chronic illnesses • Negative beliefs about healthy foods (food is tasteless or that health eating will leave them hungry)	• Make clear link between behaviour and health outcomes • Believe in benefits of healthy diet for self and family • Believe healthy eating can be sustainable, palatable and affordable	**Education:** • Provide information on risk of obesity **Persuasion:** • Reframe what obesity signifies for self and family **Modelling:** • Provide strategies to deal with potentially negative consequences of eating healthily	**5.1** Information about health consequences **13.2** Reframing **6.1** Demonstration of the behaviour **8.1** Behaviour practice/ rehearsal	• Module on the health risks of obesity and benefits of a healthy diet • Visual aids that clearly link specific dietary behaviours with health outcomes • Food quiz in module to • assess diet of self and family • Address beliefs/attitudes about healthy eating • Cooking demo with emphasis on attractive presentation
Intentions **Evidence Sources:**[g]	• Lack of childcare support as a barrier to participate in intervention programmes	• Need access to affordable or onsite childcare options to participate in health interventions	**Environmental Restructuring:**	**3.1** Social Support (Practical)	• Assessing readiness to

(*Continued*)

Table 3. (*Continued*)

CAPABILITY					
TDF Domain[a]	The problem identified from formative programme of research[b]	For behaviour change to occur, Black African women with overweight and obesity would need to:[c]	Intervention Function: What needs to be done to change behaviour[d]	Behaviour change techniques[e]	Resources, tools, activities/delivery[f]
- Qualitative in depth interviews	• Time as a valuable resource	• Need flexible, time-efficient programme structures that fit within their schedules	• Offer onsite or subsidised childcare during sessions to remove childcare as a barrier to participation. **Enablement**: • Provide flexible scheduling options (e.g. evening/weekend sessions) to fit interventions into busy routines. **Persuasion**: • Highlight the long-term health benefits and time-saving aspects of participation, encouraging prioritisation of self-care.	**12.5** Adding Objects to the Environment **1.4** Action Planning **9.3** comparative imagining of future outcomes **7.1** Prompts/Cues **9.2** Pros and Cons	• change. (use 1–10 Motivational Interviewing scale in individual counselling) • Childcare Facilities • Flexible programme delivery, use of online delivery • Shorter programme durations with concise, actionable content would help maintain interest and engagement.
Beliefs about capabilities **Evidence Sources:**[g] - Qualitative in depth interviews	• Women feel insufficient sense of agency about food choices • Not confident about ability to meet lifestyle goals	• Believe they are capable of change despite constraints • Feel able to make healthier choices for themselves and • family (greater agency and locus of control) • Believe that healthier eating can be a sustainable lifestyle	**Persuasion:** • To enhance self-efficacy and self-monitoring **Enablement:** • Assist problem solving to address overcoming context specific barriers • Facilitate activities that promote self-efficacy	**3.2** Social support (practical) **6.1** Modelling **1.2** Problem solving **15.3** Focus on past success	• Motivation interviewing (individualised) to enhance self-esteem, confidence and self-autonomy • Peer group sessions on overcoming barriers
Motivation (automatic) Reinforcement **Evidence Sources:**[g] - Qualitative in depth interviews	• Interventionists from the target population • Cultural beliefs about body size • Financial Incentives	• Need for role models and interventionists who understand and share their cultural background • Need support in reconciling cultural beliefs about body size with health-focused goals	**Modelling:** • Use interventionists from the target population who can provide relatable examples and inspire participants through shared experiences. **Incentivisation:**	**6.1** Demonstration of the Behaviour **10.1** Material Incentive (Behaviour) **13.2** Framing/Reframing	• Train health coaches Tr interventionists from the target community • Budget for gift cards, vouchers, or discounts for consistent participation

Table 3. (*Continued*)

CAPABILITY					
TDF Domain[a]	The problem identified from formative programme of research[b]	For behaviour change to occur, Black African women with overweight and obesity would need to:[c]	Intervention Function: What needs to be done to change behaviour[d]	Behaviour change techniques[e]	Resources, tools, activities/delivery[f]
		• Need motivational support, such as financial incentives, to reduce perceived barriers and encourage engagement	• Offer financial incentives, such as vouchers or discounts, to motivate regular participation and increase commitment. **Persuasion:** • Frame healthy body size and weight loss in terms that align with cultural values, emphasising well-being over appearance to foster intrinsic motivation.	**5.3** Information about Social and Environmental Consequences	• Culturally tailored educational materials focusing on well-being and family health rather than appearance. • Testimonial Videos
Emotion **Evidence Sources:**[g] Qualitative in depth interviews	• Experience of negative reactions to traditional foods • Feelings of stress can result in unhealthy eating patterns	• Need tools and support to manage stress and emotional triggers that lead to unhealthy eating patterns. • Need encouragement to maintain pride and confidence in their cultural dietary practices	**Training:** • Provide techniques to help manage stress and emotional triggers. **Persuasion:** • Reinforce pride in cultural heritage and dietary practices through group discussions, supportive messaging **Education:** • Reframe the narrative around traditional foods to emphasise their cultural and nutritional value	**3.3** Social support (emotional) **15.2** Identity Support: Cultural Identity Workshops **14.1** Emotion Regulation: Cognitive Reappraisal **14.2** Emotion Regulation: Mindfulness **13.2** Persuasion: Reframing	• Educational materials on stress management strategies. • Stress management assessment tools (like the Perceived Stress Scale). • Peer-support • Training counsellors to be aware of emotionally charged language related to diet and weight.

[a] TDF domains are mapped to the COM B model components of Capability, Opportunity, and Motivation.
[b]Problems reflect barriers and facilitators identified from the systematic review, dietary pattern analyses and qualitative interviews with Black African women with overweight and obesity.
[c]This column specifies the individual and environmental changes required to support behaviour change.
[d]Intervention functions were selected using the Behaviour Change Wheel.
[e]Behaviour change techniques were selected from the Behaviour Change Technique Taxonomy.
[f]Resources and activities describe the practical delivery of intervention components, including materials, format, and indicative intensity or duration.
[g]Evidence sources comprise a systematic review, quantitative dietary analyses, and qualitative interviews with Black African women. Stakeholder input was used to refine feasibility and implementation and did not constitute primary data.

supported by relevant literature, are presented together with their influence on the intervention design to demonstrate how evidence directly informed the BALANCED intervention.

3.1 Stage 1: understand the problem and the behaviours

3.1.1 The problem

Formative studies identified several dimensions of the problem (Table 3). Dietary pattern analyses ($n = 112$) showed that many Black African immigrant women did not meet UK dietary recommendations, particularly regarding fruit and vegetable intake, leading to a reliance on energy dense, nutrient poor foods (under review). This pattern increases the risk of chronic diseases (Shi et al., 2023) and highlights the need for interventions that address the root causes of these dietary practices.

Qualitative in depth interviews ($n = 15$) revealed systemic challenges that shaped food choices and access. Women described the limited availability and high cost of traditional African foods as major barriers. Many expressed that mainstream supermarkets lacked culturally familiar ingredients, which often led them to purchase more accessible processed foods.

Another problem was cultural insensitivity in existing health services. Standard UK dietary advice often overlooked African foods, their nutritional value, and traditional preparation methods. This created a sense of exclusion. As one woman explained:*"If you are not taking into consideration my cultural food and teaching me how to eat it healthily, the programme will not work."*

Another noted the importance of gradual and realistic adaptation of cultural foods:*"Substituting African staples like yam with sweet potatoes or cooking beans without palm oil is a start. But cultural familiarity and gradual adaptation are key to acceptance."*

Women also described frustration with the lack of accessible resources:*"I asked a very simple question: 'Where are the resources?' Even when you try, something always stops you. It feels performative. like there's no real accessibility for Black women like me."*

Digital literacy challenges further limited access to online nutrition information, although some women attempted to use available tools such as meal plans or tracking apps. Healthcare system barriers included language differences, cultural misunderstandings, and experiences of discrimination. These contributed to mistrust and limited engagement. Women also noted that most nutrition information was available only during GP appointments. Popular weight management programmes rarely considered African foods, making them feel irrelevant.

Participants emphasised the need for evidence based, culturally appropriate guidance:

> *"I would participate if the programme had proper physical activity and nutrition counselling and diagnostic tests. I need guidance that is evidence based, not a one size fits all approach."*

Practical constraints such as busy schedules and family responsibilities were also highlighted:

> **"***Time and busy schedules are barriers. Programmes must adapt to flexible timings and involve family support to make participation feasible, especially for those juggling multiple responsibilities."*

Ultimately, these findings demonstrate the multifaceted socio cultural and systemic barriers facing Black African immigrant women as they attempt to adopt healthier dietary behaviours.

3.1.2 The behaviours

The intervention targeted diet and elements of physical activity as the primary modifiable risk behaviours associated with overweight and obesity. An in-depth analysis of these target behaviours, guided by Steps 3 and 4 of the BCW and using the COM-B model and TDF, is detailed in Table 3. Likewise, Table 3 presents a structured analysis of the 12 TDF domains, organised under the COM-B model categories: Capability, Opportunity, and Motivation. Column 2 captures findings from one-on-one interviews conducted with Black African women with overweight and obesity, providing insight into the behavioural challenges they encounter within each TDF domain. These findings underscore the barriers these women face in attempting behaviour change. Column 3 identifies the necessary changes in both the women and their

social and physical environments that could facilitate behaviour change, highlighting key targets for intervention.

3.2 Stage 2: identify intervention functions

The BCW identifies nine intervention functions that support behaviour change: education, persuasion, incentivisation, coercion, training, restriction, environmental restructuring, modelling, and enablement. Seven of these were selected as suitable for this intervention. Table 3 shows how each chosen function maps onto the COM B components and TDF domains. Several domains required more than one intervention strategy, reflecting the complex influences on behaviour. For example, in the TDF domain 'Physical Environmental Context and Resources', both Training and Enablement were selected to address skill related and environmental barriers that restrict healthier dietary practices and engagement in physical activity.

3.2.1 Stage 3: identify content and implementation options

Column 5 of Table 3 identifies the BCTs selected for each intervention function, while Column 6 outlines the activities, tools, and resources through which they can be implemented. These include structured education, counsellor led sessions, peer support groups, behavioural demonstration, social support, reframing, and verbal persuasion regarding capability. Practical tools include culturally tailored meal planning guides, cooking demonstrations based on traditional African recipes, peer led group manuals, and educational leaflets. These resources have been conceptually designed and will be refined during the pilot.

The logic model in Figure 3 and Table 4 outlines the intervention inputs, activities, mechanisms of change, and expected outcomes. Delivery will be by counsellors, including psychologists, clinicians, or trained community members. A client centred counselling approach is emphasised, replacing prescriptive advice with facilitation, empathy, and support for autonomy (Bechthold et al., 2018). The qualitative

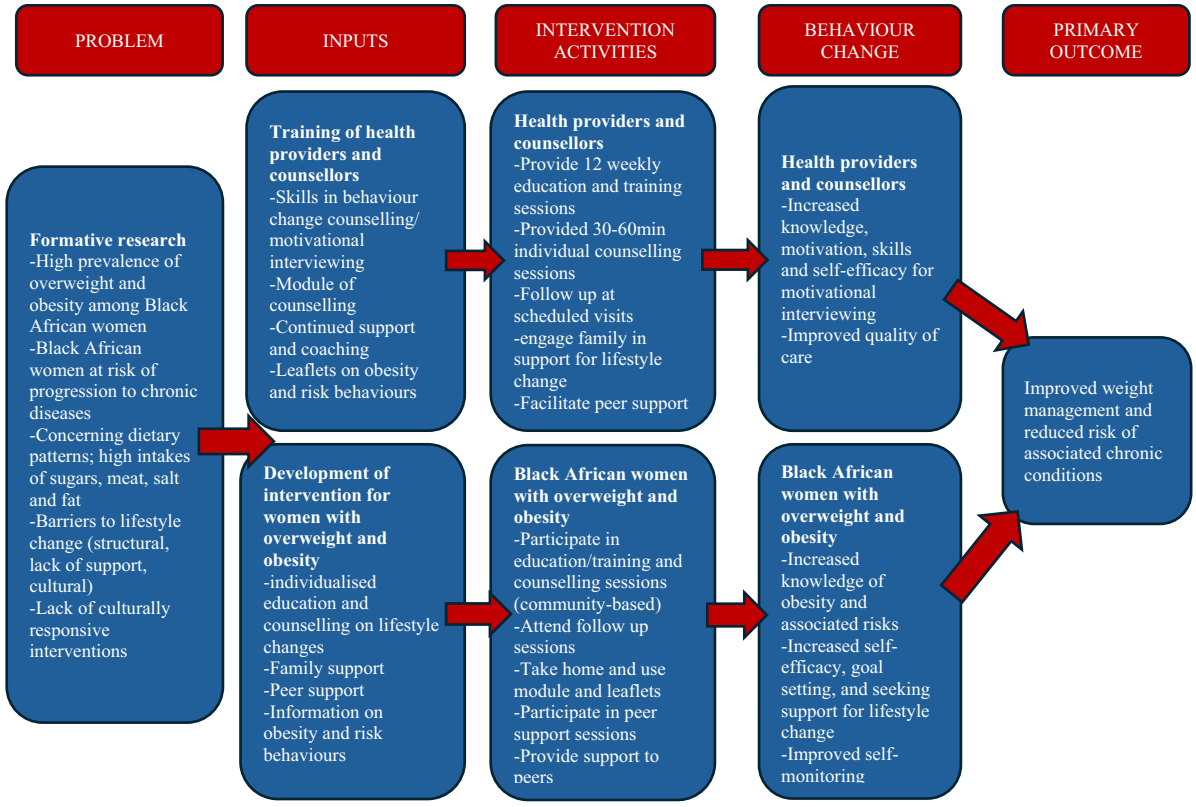

Figure 3. Logic model for the BALANCED intervention.

Table 4. Components of the balanced intervention.

Key intervention features			Evidence base
Nutritional Education:	Week 1	Focused on health risks related to overweight and obesity and specific to this demographic Framing healthy body size and weight loss in terms that align with cultural values, emphasising well-being over appearance to foster intrinsic motivation	Systematic review Practitioners' webinar
Training:	Week 2	Shopping: Budgeting and label-reading	Systematic review dietary pattern assessment In-depth interviews on programme practicality Practitioners' webinar
	Week 3	Cooking classes: Adjust Ethnic recipes- low-fat techniques/recipes	
	Week 4	portion control demonstrations	
	Week 5	Sampling of new foods and recipes swap	
	Week 6	Cooking classes: Adjust Ethnic recipes- low salt techniques/recipes	
	Week 7	Cooking classes: Go for grains, fruits and vegetables	
	Week 8	Meal planning: Review of menus	
	Week 9	Role-play: Confidence-building for setting dietary boundaries and navigating social pressures: eating out/social eating	
	Week 10	Stress management	
	Week 11 and 12	Exercise options	
Behavioural Counselling:	Bi-weekly individual sessions addressing psychological and emotional barriers to weight loss.		Systematic review
Family-Inclusive Support:	Workshops engaging family members to create supportive environments for participants.		In-depth interviews on programme practicality
Peer support/accountability partners			In-depth interviews on programme practicality

studies with the target population revealed significant dissatisfaction with traditional approaches that dictate behaviour change without considering individual concerns. Peer sessions will support social learning and skills practice (Craig et al., 2008). Case records, feedback meetings, and ongoing coaching will promote consistency and fidelity (Handley et al., 2015; Power et al., 2024).

4 Discussion

The proposed BALANCED intervention, designed through an application of the BCW and the COM B model and informed by qualitative, quantitative and evidence synthesis methods, represents an innovative step in addressing overweight and obesity among Black African women in the UK. To the best of our knowledge, this is one of the first studies to describe the use of BCW in developing an intervention specifically for Black African women living with overweight and obesity in the UK. This culturally tailored, evidence based programme fills an important gap by addressing the complex, multidimensional barriers faced by this population, providing a theoretically robust and contextually relevant framework for behaviour change. Through rigorous foundational research and a participatory approach, the intervention demonstrates the potential of culturally sensitive public health strategies to reduce health disparities and promote sustainable lifestyle changes within this demographic.

The BALANCED intervention was developed following the UK MRC framework for complex interventions (Maynard et al., 2023), which outlines a systematically phased approach including development, pilot testing, evaluation, and implementation. This study focuses on the development stage, ensuring the intervention is theory and evidence based before advancing. The structured approach enabled identification of key behavioural targets and the integration of culturally tailored strategies. Central to this process was the application of the BCW and COM B model, which provided a systematic framework for understanding behavioural influences and designing tailored intervention components suited to Black African women in the UK. Findings highlighted gaps in capability, opportunity, and motivation, consistent with trends among marginalised groups (Joo and Liu, 2021). The BALANCED programme responded by integrating culturally sensitive educational and environmental strategies, including cooking workshops, peer support, and motivational counselling, illustrating how the COM B model can guide targeted solutions.

Comparisons with other interventions provide context. Power et al.'s UK home based exercise programme (16) and the STAR MAMA project in the US (Handley et al., 2015) applied the BCW and COM B model to embed cultural and contextual relevance. Like the BALANCED programme, these interventions demonstrated the value of participant engagement in design. The BALANCED programme

expands this evidence base by specifically addressing dietary practices of Black African women in the UK, underscoring the adaptability of the BCW to marginalised populations. The Stay Active project (Smith et al., 2022) similarly highlighted the need to address multiple determinants of behaviour simultaneously, supporting the BALANCED's holistic approach. These studies highlight the BCW's capacity to capture complex health behaviours and translate theory into practice but highlight challenges, particularly the time intensive nature of the BCW process and need for interdisciplinary expertise. The BALANCED programme required extensive formative research over two years, reflecting the resource and time commitments reported in similar studies. Strategic planning and resource allocation are therefore critical for feasibility and sustainability.

A key strength of the BALANCED programme lies in its participatory co-design approach, involving Black African women in qualitative interviews and feedback workshops on intervention content and delivery modes. This approach enhanced cultural relevance, acceptability, and ownership (Murphy et al., 2023). Nevertheless, the iterative BCW process is resource intensive and may limit stakeholder engagement at all stages, a challenge noted in GDM interventions (Murphy et al., 2023). Involvement of multidisciplinary teams including GPs, behavioural scientists, nutritionists, dietitians, public health practitioners, and community representatives is essential to maintain theoretical robustness and contextual relevance.

Despite its strengths, the COM B model is not without limitations. Scholars have criticised its omission of key motivational factors, including 'wanting,' the intrinsic desire to achieve a goal (Abrutyn and Lizardo, 2024). Addressing this may require integrating frameworks such as self determination theory. Additionally, there is no standardised measure for assessing predictive validity of COM B based interventions. Future research should pilot and evaluate BALANCED, including feasibility, recruitment, retention, engagement, acceptability, process evaluation, and economic analysis. Longitudinal studies are necessary to assess long term effects on dietary behaviours and health outcomes, alongside exploration of systemic and structural factors including social determinants and healthcare inequities to advance equity and reduce disparities (Maynard et al., 2023).

5 Conclusion

The BALANCED intervention demonstrates the value of a theoretically grounded, culturally tailored approach to addressing health disparities. Using the BCW and COM-B model, it provides a comprehensive and relevant programme to support behaviour change among Black African women living with overweight and obesity in the UK. The intervention's participatory and culturally sensitive design enhances acceptability and directly addresses the unique challenges faced by this population. Future research will focus on piloting and evaluating the interventions effectiveness and scalability, contributing to efforts to reduce health inequalities and improve outcomes for marginalised communities.

Acknowledgements

We are profoundly thankful to all the Black African women and health practitioners who participated in this study. Without their willingness and contribution, this important research would not have been possible.

Author contributions

IO, KM, NB, EK and FT conceptualised and designed the study. IO collected the data and conducted the data analyses. IO draughted the initial manuscript. KM, NB, EK and FT critically reviewed and revised the manuscript.

Disclosure statement

The authors declare no conflicts of interest.

Funding

This study did not receive dedicated funding.

Data availability statement

Data generated during the present study may be considered by the corresponding author on reasonable request.

Institutional review board statement

The study was conducted in accordance with the Declaration of Helsinki and was approved by an Institutional Review Board/Ethics committee. See details under Methods.

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Appendix 1. Table showing In-depth Interview questions asked to Black African women with overweight and obesity in the UK in accordance with the TDF and COM-B model

COM-B component	TDF domain	Questions	Sample excerpts
Psychological Capability	Knowledge	• What do you think a healthy diet is? • What's your understanding of a healthy diet? • Are you aware of the nutrition/diet-related services available in the UK? • What did you need to learn when you first arrived?	'A diet that contains all of the nutrients in the correct proportions for the individual, so taking into account what dietary, what health conditions the individual has. Peer pressure affects kids' food choices.' 'I've been taught to mentally share your plate: half for fruits/vegetables, one quarter for carbs, one quarter for proteins. I'm still learning healthier options and consistency in preparing balanced meals.'
	Memory, Attention, and Decision Processes	• Do you feel that there are enough sources of information available for you to learn about healthy eating? If not, what would be the best way to learn?	'I asked a very simple question: 'Where are the resources?' Even when you try, something always stops you. It feels performative. like there's no real accessibility for Black women like me.' 'I didn't access these resources until my diagnosis. That was my wake-up call to explore apps, join a health club, and use their meal plans and tracking tools to gain knowledge about healthy living.'
	Behaviour Regulation	• What things do you still need to learn?	'I need help passing knowledge down to my kids. They face peer pressure to make unhealthy choices. I also want to understand portion sizes better and how to adapt the science behind it for myself.' 'Learning to manage consistency in meal timing, portion control, and balancing cultural meals with new healthier options is a continuous process I'm navigating now.'
Physical Capability	Skills	• What did you need to learn when you first arrived in the UK to manage food for your family?	'Places to get food. in the UK, you learn as you go. There wasn't much guidance, and I had to adapt without proper support for cultural foods.' 'I didn't have to learn much initially since I had access to similar foods. But later, I learned to integrate UK options like bulgur, almond milk, and healthier oils into our meals.'
Social Opportunity	Social Influences	• What cultural factors do you think need to be considered when developing a healthy lifestyle programme?	'If you're not taking into consideration my cultural food and teaching me how to eat it healthily, the programme won't work. Cultural food must be included to make the intervention sustainable.' 'Substituting African staples like yam with sweet potatoes or cooking beans without palm oil is a start. But cultural familiarity and gradual adaptation are key to acceptance.'
Physical Opportunity	Environmental Context and Resources	• Where did you get information about food when you arrived? Has that changed? • Are there enough services? If not, what should be available? • How much time would you commit?	'You kind of learn as you go. there's little culturally relevant guidance on buying or preparing food. Accessing weight-loss services felt bureaucratic, with many delays and no clear resources.' '…I've used tools like meal plans, gym programmes, and tracking apps. I'm learning about affordable substitutions for healthier meals, but consistent and flexible resources would help.'
Reflective Motivation	Beliefs about Consequences	• What are the benefits of attending a healthy lifestyle programme for Black African women?	'Obesity and its health risks are still on the rise. How does the message translate into practical, actionable steps people can follow daily?' 'It's crucial for our health and mental well-being. These programmes help us balance our busy lives while managing risks like diabetes and hypertension, which are more prevalent among us.'
	Social/ Professional Role and Identity	• What factors will make you participate?	'If the programme had proper physical activity and nutrition counselling and diagnostic tests, I would participate. I need evidence-based guidance, not a one-size-fits-all approach.'

COM-B component	TDF domain	Questions	Sample excerpts
			'Seeing results motivates me. I joined a paid programme to improve my health because I wanted to ensure changes that benefit my family long-term.'
	Beliefs about Capabilities	• What are the main barriers to enrolment and completion?	'I feel like there's no diagnostic support to address unique needs like PCOS. If such conditions are ignored, participants may feel like failures and drop out.'
			'Time and busy schedules are barriers. Programmes must adapt to flexible timings and involve family support to make participation feasible, especially for those juggling multiple responsibilities.'
	Intention	• What factors will make you participate? • What factors will make you not participate?	'I want guidance, like nutritional counselling tailored to my cultural needs, and not just general advice. Otherwise, it feels irrelevant to me.'
			'I joined because of my diagnosis or pre-diabetes. Programmes need to emphasise the personal health benefits. Without a compelling reason, many might not feel motivated.'
Automatic Motivation	Reinforcement	• Are financial incentives important?	'I think it's just the willingness to do it. I think it's just also if people don't feel like it would add any value to their lives…people want to get paid to do just get these things, even if it's for their health, you know. People want to get paid to do those kinds of things, you know…'
			'For some, financial incentives could help. Personally, I paid to join a programme because I valued the health benefits more than external rewards.'
	Emotion	• What would help keep you and others in the study?	'The cycle of weight gain and stress is disheartening. A programme that integrates mental health support with physical interventions would help.'
			'Stress from balancing family meals and personal health goals often derails consistency. Shared goals with family or community support can be uplifting and motivating.'