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Developing a digital mindfulness-based intervention to improve body image and reduce risk factors for disordered eating: Integrating theory, evidence, and the person-based approach

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ABSTRACT

Mindfulness-based interventions (MBIs) show promise in improving body image and reducing risk factors for disordered eating, and their digital adaptation offers scalable dissemination. However, low engagement rates in digital MBIs highlight the need for user-centred development. The person-based approach offers a systematic framework for improving engagement by integrating evidence, theory, and users' perspectives. This paper describes the application of the person-based approach in developing a digital MBI to reduce risk factors for disordered eating in young people. Intervention development occurred in two iterative phases. In Phase 1, we defined the theoretical context and conducted both a qualitative evidence synthesis and a survey study with a qualitative focus to explore the needs, challenges, and perspectives of the target population. In Phase 2, we developed and refined a prototype based on initial feasibility and acceptability testing through advisory group consultation and think-aloud interviews. These informed the guiding principles and logic model. Our theoretical framework identified the skills of decentred awareness and acceptance, emotion regulation, and self-compassion as key intervention components. Determinants of engagement included negative responses to personal practice, difficulty with habit formation, and social support. Survey findings highlighted the need to address misconceptions about body image, particularly the belief that it refers solely to physical appearance and can be improved through appearance-focused strategies. Feedback from the advisory group helped ensure the intervention was clear, user-friendly, and motivating. This novel integration of theory, evidence, and user-centred design methods provides a replicable model for developing engaging, scalable interventions to reduce disordered eating risk.

1. Introduction

1.1. Background

Disordered eating behaviours and associated difficulties with body image, including concerns about body weight, shape, and appearance, are widespread and have serious consequences. Estimates indicate that over one-third of young women and nearly 20 % of young men have engaged in disordered eating behaviours—including fasting, purging, excessive exercise, or binge eating—in the past year (Warne et al., 2021). These behaviours are linked to a range of negative outcomes, including heightened psychological distress, poorer quality of life, and an increased risk of developing eating disorders (Mitchison et al., 2015; Neumark-Sztainer et al., 2006). Two well-established and modifiable risk factors for disordered eating serve as key targets for intervention: weight and shape concerns (i.e., core aspects of body image disturbance such as dissatisfaction, preoccupation, and over-evaluation in self-judgment) and negative affect (Jacobi & Fittig, 2012; Pennesi & Wade, 2016).

Mindfulness has gained attention as a promising approach for addressing disordered eating and body image concerns (Atkinson & Diedrichs, 2021; Beccia et al., 2018; Linardon, Gleeson, et al., 2019). Mindfulness-based interventions (MBIs) cultivate non-judgemental awareness and acceptance of present-moment experiences (Bishop

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et al., 2004; Lindsay & Creswell, 2017) and have shown some success in reducing risk factors for disordered eating, particularly in the short term and when facilitated by trained experts, among adolescent girls and young women (Atkinson & Wade, 2015, 2016). However, traditional MBIs face challenges in implementation. The need for expert facilitators to deliver in-person sessions makes these interventions costly, labour-intensive, and reliant on the availability of trained instructors. Adapting MBIs into a digital format offers a scalable, cost-effective solution with added benefits such as increased accessibility, standardisation, and ease of personalisation (Linardon, Cuijpers, et al., 2019; Mrazek et al., 2019).

Despite their potential, digital MBIs often suffer from low user engagement, which undermines their effectiveness. A recent meta-analysis of randomised controlled trials of mindfulness apps highlights that, when reported, engagement data varies widely but is generally low (Linardon, 2023). For example, some studies indicate that only half of participants engage with their assigned mindfulness app at all (Bartlett et al., 2022), while others report an average of fewer than two days of app use over a two-month period (Forbes et al., 2020). Since time spent practising mindfulness predicts improvements in mindfulness skills and, in turn, psychosocial outcomes (Carmody & Baer, 2008), it is crucial to invest in designing engaging interventions before committing significant resources to their evaluation and implementation (Yardley, Ainsworth, et al., 2015).

Research suggests that a range of factors influence engagement with digital MBIs, including difficulty grasping core concepts, uncertainty about practicing correctly, and misinterpreting the intervention's purpose (Mrazek et al., 2019; Osborne et al., 2023). However, these factors likely vary across user groups, contexts, and intervention types. As digital MBIs continue to evolve, further research is needed to explore what works, for whom, and when. The person-based approach (PBA) offers a systematic, evidence-informed framework for integrating user perspectives into the development of engaging interventions (Yardley, Morrison, et al., 2015), and is particularly valuable in contexts like digital MBIs, where user engagement is a known challenge.

The PBA comprises two main parts. The first involves collecting evidence about the user context and experience through various methods, such as literature reviews, user needs studies, and think-aloud interviews. The second involves developing the process theory that explains how the intervention should achieve its goals. This includes constructing a logic model that describes how key parts of the intervention should lead to the intended outcomes, developing guiding principles for how the intervention design should support engagement, and using a table of changes to record why intervention elements were selected or changed through optimisation and co-production processes. In practice, these parts are performed iteratively, with public contributors and other stakeholders having a central role, ideally engaged at every stage throughout planning, optimisation, implementation, and evaluation.

While improving engagement is a key priority in digital MBI development, intervention complexity may itself act as a barrier. Most existing MBIs targeting disordered eating risk factors have been evaluated as multi-component packages (e.g., Albertson et al., 2015; Atkinson & Wade, 2015, 2016; Rodgers et al., 2018). This makes it difficult to determine which components drive change. Complex, multi-component interventions tend to be more resource-intensive, requiring greater financial investment, participant time, and cognitive effort, while also posing challenges for implementation (Collins, 2018). Optimising these interventions by identifying and prioritising the most impactful components will not only make them cheaper, shorter, and simpler, but will also likely improve user engagement and sustained use.

There is a growing need for replicable, scalable models to guide the development of digital psychological interventions that are both effective and user-centred. Although triangulating theory, evidence, and user involvement is a recognised strategy in behaviour change research (e.g., Band et al., 2017; Bradbury et al., 2018), it remains underused in digital mindfulness-based interventions and those targeting body image and disordered eating. Co-design has been identified as a key priority for digital eating disorder research, given that end-users are rarely involved during early design stages, when their input may be most impactful in improving intervention adherence and effectiveness (Linardon et al., 2020). Transparent reporting of development methods—especially those that integrate user input with theory and evidence—can support the creation of more engaging, effective, and scalable interventions, while also reducing redundancy and avoidable failure in future trials (Essery et al., 2021; O'Cathain et al., 2019).

1.2. The current study

This paper documents the systematic development of a digital MBI to improve body image and reduce risk factors for disordered eating in young people. Given that few digital eating disorder interventions involve end-users during early design stages, and that this lack of early involvement has been identified as a likely contributor to suboptimal adherence (Linardon et al., 2020), our aim was to model a transparent, evidence-informed, and user-centred development process. We focused on individuals aged 16–35 years, as older adolescence and young adulthood are particularly vulnerable periods for the development and experience of body image concerns and disordered eating (Nagl et al., 2016).

Following guidance from the UK Medical Research Council (MRC) framework for developing and evaluating complex interventions (Skivington et al., 2021a), and drawing on the PBA (Yardley, Morrison, et al., 2015), we adapted an existing evidence-based programme (Atkinson & Wade, 2015, 2016) by translating it into a digital format and separating out individual components to evaluate their effects. By reporting this development process in full, we aim to provide (1) a replicable model to support other researchers in designing engaging, scalable interventions in this field, and (2) practical insights that researchers and intervention developers can apply directly.

2. Methods and results

2.1. Intervention development process

Intervention development followed the UK MRC framework for developing and evaluating complex interventions (Skivington et al., 2021a) and the PBA (Yardley, Morrison, et al., 2015). The process comprised two phases. Phase 1 (planning) involved establishing the theoretical context of the intervention (part 1); identifying the needs, preferences, and contexts of the target users via a qualitative synthesis of experiences with digital MBIs (part 2) and a survey study of adolescents' perspectives (part 3); summarising how key intervention elements were expected to lead to intended outcomes in a logic model (part 4); and developing guiding principles to articulate the design features central to achieving the intervention's objectives (part 5). Phase 2 (optimising) involved creating a draft intervention (part 1) and refining it through initial feasibility and acceptability testing with an advisory group (part 2) and through think-aloud interviews (part 3). While these phases are described separately, they were iterative in practice (Fig. 1). The following sections detail the methods and findings of each part. We report our process in accordance with the GUIDED checklist (Duncan et al., 2020) to ensure transparency and rigour (see Supplementary File 1).

2.2. Phase 1: planning

2.2.1. Phase 1, part 1: theoretical context

Purpose. To specify the theories underpinning the intervention to ensure relevant mechanistic variables are targeted.

Methods. We reviewed literature on MBIs to identify their common components and the psychological mechanisms they are proposed to

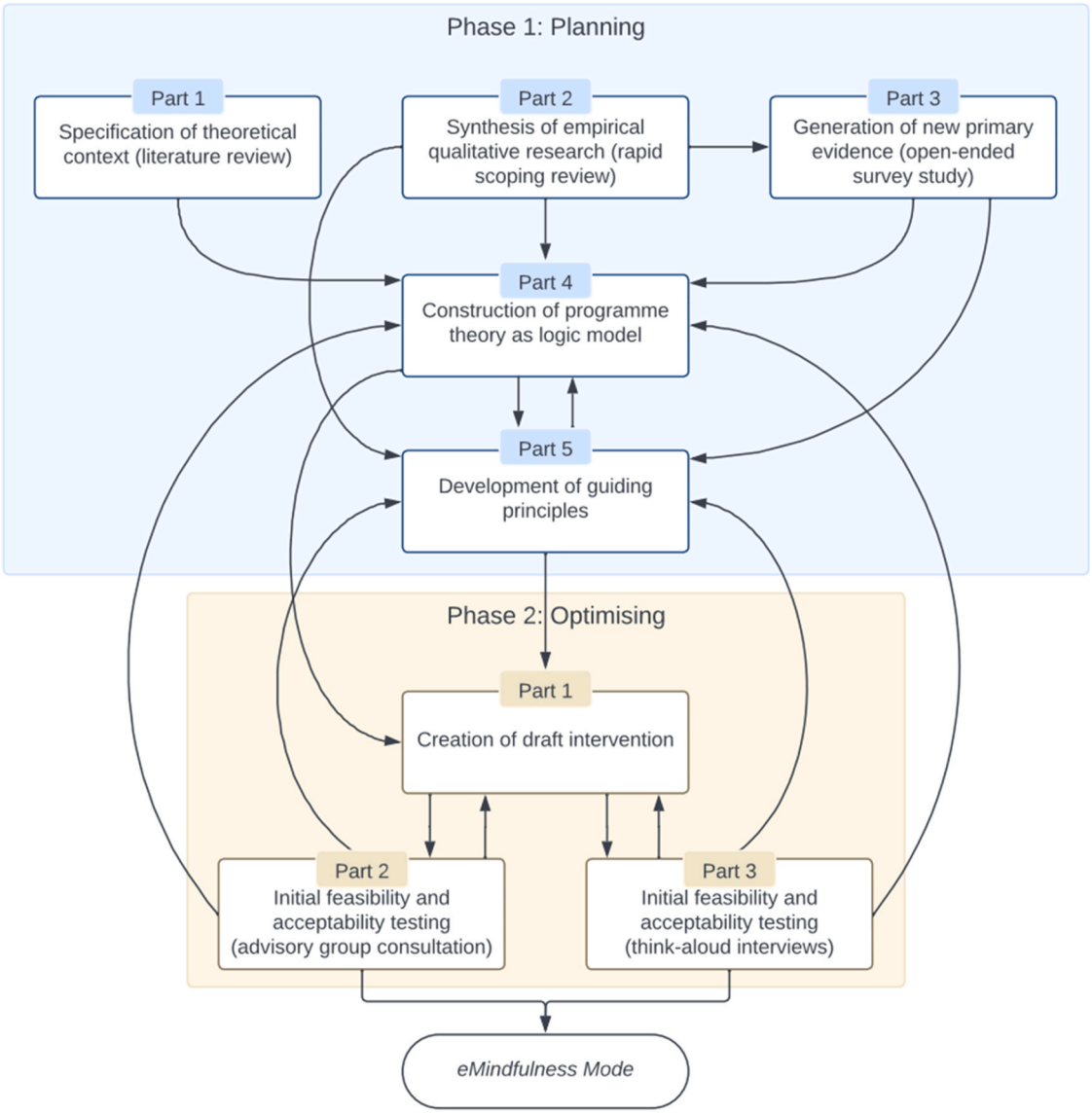

Fig. 1. Iterative intervention development process.

engage. We then examined evidence for these constructs in relation to disordered eating.

Results. Conceptualisations of mindfulness consistently identify the skills of decentred awareness and acceptance (DA+A) of present-moment experience as core components (Bishop et al., 2004; Lindsay & Creswell, 2017; Shapiro et al., 2005), and as forming the foundation of MBIs (see Supplementary File 2). Both skills appear to be necessary for psychological change (Osborne & Atkinson, 2022). Beyond DA+A, many MBIs incorporate two additional components to more directly address and emphasise emotion regulation and self-compassion (see Supplementary File 2 for examples); both are widely recognised as mechanisms of change in general psychological research (e.g., Baer, 2010; Chiesa et al., 2014; Hölzel et al., 2011; Neff & Dahm, 2015) and studies specific to disordered eating (e.g., Barney et al., 2019; Vanzhula & Levinson, 2020).

Emotion regulation refers to the ability to recognise, understand, and manage emotions, enabling individuals to respond constructively to distress (Gratz & Roemer, 2004). Given that difficulties in emotion regulation are common across theoretical models of disordered eating (Pennesi & Wade, 2016), targeting these difficulties through MBIs may help reduce key risk factors for disordered eating (Osborne et al., 2022).

Similarly, self-compassion—defined as treating oneself with kindness during suffering, acknowledging it as a shared human experience, and maintaining awareness of difficulties without overidentifying with them (Neff, 2023)—may be particularly relevant to body image concerns, such as body shame, weight and shape concerns, and appearance anxiety (Atkinson, 2015). Since negative self-evaluation is a core feature of these concerns, cultivating self-compassion may be a critical intervention target. Indeed, evidence suggests that self-compassion meditation can improve body image (Albertson et al., 2015).

Overall, these findings support DA+A as a 'minimally necessary' intervention that all participants should receive (Manasse et al., 2019), while also highlighting the potential importance of incorporating additional components emphasising emotion regulation and self-compassion to ensure that relevant psychological mechanisms are targeted.

2.2.2. *Phase 1, part 2: qualitative evidence synthesis*

Purpose. To systematically map the literature on people's experiences with digital MBIs and identify key barriers to and facilitators of engagement. A full report of this study has been published elsewhere (Osborne et al., 2023). Below, we briefly describe the key methods and results relevant to intervention development.

Methods. We conducted a rapid scoping review to integrate evidence into the early stages of intervention development (Greenwell et al., 2018). The search strategy identified articles containing at least one keyword related to mindfulness, digital interventions, user experience, and psychosocial variables in the title or abstract. The inclusion criteria required that studies contain a qualitative component; report on participants' experiences with a digital MBI designed to improve psychosocial outcomes (e.g., anxiety, depression, distress, and well-being); and include a sample with an age range at least partially overlapping with 16–35 years, our intended target population. We screened all titles and abstracts identified by the search and obtained full-text articles for potentially eligible records to confirm inclusion. We charted study characteristics and qualitative data on user experience from the included sources of evidence, and analysed qualitative data using inductive thematic synthesis (Thomas & Harden, 2008) to generate insights beyond the original studies. We critically appraised all included studies using the Quality of Reporting Tool (Carroll et al., 2012).

Results. The search identified 530 studies, 22 of which met the inclusion criteria. The studies were published between 2010 and 2022 (most from 2017 onward). Samples were approximately 78 % women and 79 % White, with participant ages ranging from 16 to 69 years (weighted average = 26.4, weighted *SD* = 8.8). The most used measures in the intervention studies were mindfulness, psychological flexibility, and mental health variables (including depression, anxiety, stress, and well-being). Important for our intervention development, nearly all studies included participants aged 18 or older and none of the intervention studies evaluated or were designed to target constructs related to body image, weight, shape, appearance, or eating. All studies were assessed as adequately reported.

We identified three themes that characterise barriers to and facilitators of engagement: (1) *responses to own practice* (judging one's practice, difficulty finding time, and associated guilt and self-criticism), (2) *making mindfulness a habit* (establishing a consistent time and place, and personalising practice), and (3) *leaning on others* (relying on support from others, such as a therapist, researcher, significant other, another participant). These themes directly informed the guiding principles for intervention development (see Table 3).

2.2.3. Phase 1, part 3: survey study with a qualitative focus

Purpose. The studies included in the qualitative evidence synthesis revealed a lack of research directly exploring the experiences of (a) older adolescents aged 16–18 years and (b) the use of digital MBIs specifically designed to target disordered eating behaviours and associated difficulties with body weight, shape, and appearance. Given that our intervention will target risk factors for disordered eating in young people aged 16–35 years, and that eating disorders typically develop during adolescence (Nagl et al., 2016), it is crucial to ensure that our intervention is acceptable and engaging for this age group. To address this gap, we conducted a survey study to explore older adolescents' perceptions, preferences, and use of digital MBIs, with a focus on body image, to pre-empt factors influencing engagement.

Methods. Adolescents aged 16–18 years completed a survey comprising primarily open-ended questions via Qualtrics during class time at their Sixth Form College in South East England (approx. 10 min). Since this was an exploratory user needs study that aimed to survey a broad, inclusive target population with relatively brief qualitative input, we sought a larger sample, consistent with the principles of information power (Malterud et al., 2016). After providing informed consent, participants answered questions about their understanding of 'mindfulness' and 'body image', past and current use of related resources, interest in a digital mindfulness programme for body image, potential barriers and facilitators, body image concerns, and demographics (see Supplementary File 3 for the full survey). No incentives were provided for participation. The research was approved by the University of Bath research ethics committee (reference 6305–10083).

We used frequencies and percentages for discrete data and applied conventional content analysis to free-text responses, a widely used technique for interpreting textual data inductively (Hsieh & Shannon, 2005; Vaismoradi et al., 2013). Distinct questions were analysed individually, while related questions were grouped for analysis. ELO first reviewed all free-text responses to develop a holistic understanding, then carefully reread each response, highlighting key phrases and assigning initial labels based on participants' wording. After coding an initial subset (25 %) of responses, preliminary codes were refined and applied to the remaining data. For instance, descriptions of using fitness, calorie-tracking, or weight loss/exercise apps to monitor or achieve health-related goals were coded as "fitness and tracking apps". A flexible coding approach allowed for new codes to be integrated as needed. To ensure consistency and comprehensiveness, the initial 25 % of responses were re-examined using the full codebook. A research assistant independently reviewed and validated the codebook for a subset of questions to enhance coding reliability and ensure that codes were clearly defined and consistently applied. Once all responses were coded, similar codes were grouped into higher-order categories and refined into broader themes through an iterative process. For example, responses describing the use of "fitness and tracking apps", "skincare", and "exercising" were categorised under the theme of "engaging in activities aimed at improving body weight, shape, and overall appearance".

Results. A total of 115 adolescents participated in the survey. Of these, 67 % were female, 82 % were White, and all were aged 16–18 years ($M = 16.59$, $SD = 0.69$). Supplementary File 3 provides detailed demographic characteristics. Almost all participants ($n = 108$, 94 %) reported some level of concern about their body image, and 76 % ($n = 87$) were at least somewhat interested in trying the intervention we are developing. Table 1 provides a full summary of discrete data results.

Free-text responses. Adolescents demonstrated varied understandings of mindfulness, with few aligning fully with its research-based definition. While 31 % referenced 'awareness' and 2 % mentioned 'being present', few recognised mindfulness as the practice of stepping back from thoughts and emotions, observing them with openness and without judgment. Many linked mindfulness to well-being (20 %) and relaxation (15 %), often perceiving it as a tool to eliminate negative emotions rather than accept—and alter relationship to—them. The most commonly reported experiences with mindfulness (68 %) were digital and multimedia-based, including apps, websites, videos, podcasts, and audio content, indicating a clear preference for this format.

A notable proportion of participants (16 %) equated body image with physical appearance (e.g., "the way someone looks, like shape and size") rather than how they think or feel about their body, suggesting a somewhat narrow understanding. There was little recognition that body image can fluctuate over time or can encompass both positive and negative feelings simultaneously. While participants described experiences with various resources related to body image, the most commonly

Table 1
Frequencies and percentages for discrete data from the survey study.

	n/N (%)
Past experience and current use of resources	
Past experience with mindfulness	64/115 (56 %)
Currently using mindfulness resources	17/115 (15 %)
Past experience with body image resources	39/115 (34 %)
Currently using body image resource	17/115 (15 %)
Interest in using body image resources	62/114 (54 %)
Interest in using our intervention (based on a short description)	
Not at all interested	28/115 (24 %)
Somewhat interested, would attempt using it	77/115 (67 %)
Certainly interested, would use the resource	10/115 (9 %)
Frequency of body image concerns	
Never	7/115 (6 %)
Rarely	33/115 (29 %)
Sometimes	23/115 (20 %)
Often	25/115 (22 %)
Almost always	27/115 (23 %)

reported (45 %) focused on altering their physical appearance. Engaging in activities such as exercising, consuming weight-loss content, and watching fitness-related videos suggested that many individuals sought body image support through appearance-focused strategies rather than addressing their thoughts and feelings, including their influencing factors (e.g., media pressures, comparisons with others) and consequences (e.g., shame, anxiety, and unhelpful eating and exercise behaviours). This may reflect a common misconception that improving physical appearance alone will resolve body image concerns. The next most frequently used resource was engaging with digital tools for body image support (38 %), such as videos, apps, social media, and podcasts, again indicating a preference for this format.

Participants identified several factors expected to influence engagement in a digital mindfulness programme for body image (see Table 2). The most commonly cited facilitators were an engaging, interactive, and tailored design (33 %), as well as accessibility, inclusivity, and ease of use (23 %). Notably, the misconception that body image resources should improve physical appearance was also present, as reflected in the facilitator 'Practical support for health, fitness, and appearance' (7 %).

The most common barrier (21 %) related to concerns about the sensitivity of the topic. Participants feared engaging with the programme could make them feel uncomfortable or worsen their self-perception. They also raised concerns about what the tone of the language in the intervention might be like, suggesting it could feel "triggering" or "lead to me thinking even more about my body". Some cautioned against language that could be pathologising ("make people feel […] as though there is something wrong with them"), overly complex (with a preference for "explanations kept simple"), or patronising ("language that is used for children, such as really cautious language"). Instead, they emphasised the need for an encouraging and personal tone. Other barriers included low perceived need for a body image intervention (16 %), as well as uncertainty about its effectiveness, trust, and the potential for misinformation (14 %). A full description of themes and codes for each question, including illustrative quotes and frequencies, is available in Supplementary File 3.

2.2.4. Phase 1, part 4: constructing a logic model

Purpose. To visually represent the intervention components and the mediating variables hypothesised to underlie improvements in risk factors for disordered eating.

Methods. We drew on multiple sources, including the intervention's theoretical context, an existing intervention available for adaptation (*The Mindfulness Mode*; Atkinson & Wade, 2015, 2016), the qualitative evidence synthesis, survey study, guiding principles, and advisory group expertise. *The Mindfulness Mode* is a three-session, facilitator-led programme designed to apply mindfulness to body image and sociocultural appearance pressures, and has been shown to reduce established risk factors for disordered eating among adolescent and young adult women (Atkinson & Wade, 2015, 2016).

The advisory group comprised two undergraduate representatives from the target user group (one male, one female) and researchers with expertise in digital intervention development, the PBA, clinical psychology, mindfulness, and eating disorders. The logic model was theory- and evidence-driven, and was developed by ELO in collaboration with the researchers in the advisory group. Target user feedback (e.g., from the survey study, think-aloud interviews, and user representatives) informed the activities and user engagement component, but the selection of components was primarily informed by theory and evidence.

Results. The logic model, shown in Fig. 2, illustrates how the intervention is hypothesised to reduce risk factors for disordered eating through programme engagement and improvements in psychological mediators (mindfulness, emotion regulation, and self-compassion).

2.2.5. Phase 1, part 5: developing guiding principles

Purpose. To ensure that the intervention is informed by our preparatory findings and to clarify how it will support participants in

Table 2
Identified themes and codes from responses on potential barriers and facilitators.

Themes (number of codes)	Codes
Facilitators	
Engaging, interactive, and tailored design (10)	Motivational features (e.g., goal setting, progress tracking, reminders, stages/levels, acknowledging noticeable progress) Interactive elements (e.g., games, quizzes, reflective questions, journaling) Gamification and rewards (e.g., points, badges, streaks, engagement incentives) Customisable options (e.g., goal selection, content preferences, reminders, scheduling) Personalised guidance based on user input (e.g., questionnaires) rather than general advice Diverse content formats (e.g., videos, guided audios, music, images, sounds, paper-based activities) rather than just text Social support and community interaction (e.g., peer discussions, real-life stories) Content variety to prevent repetition Visually appealing and engaging design (e.g., colourful, well-structured) Relatable and conversational experience (e.g., natural tone, personal feel)
Accessibility, inclusivity, and ease of use (6)	Quick, low-effort sessions (e.g., 5–10-minute daily tasks or activities) Simple, intuitive navigation with clear steps and digestible content Accessible anytime, anywhere Inclusive and accessible for all (e.g., friendly/soothing tone, captions for audio) Free to use and ad-free Avoids long writing tasks
Focus on self-improvement and meaningful, lasting change (2)	Motivation for personal growth (e.g., improved confidence, body image, happiness, appearance) Seeking noticeable and lasting improvements
Practical support for health, fitness, and appearance (6)	A holistic approach beyond body image (e.g., psychoeducation, fitness, mental health, confidence-building) Balance between self-acceptance and self-improvement (e.g., avoiding rigid body positivity that disregards personal goals) Encouragement of healthy habits and self-care (e.g., reminders to eat, hydrate, rest) Integrated fitness and workout plans Real-life confidence tips (e.g., dressing for body type, skincare advice) Alignment with users' existing exercise habits
Encouraging awareness of body image and supporting others (3)	Challenging unrealistic beauty standards (e.g., counteracting social media pressures) Desire to help others (e.g., friends) Normalising conversations about body image
Barriers	
Sensitivity, stigma, and the impact of language (11)	Body image is a private and sensitive topic, which may cause discomfort Reflection on body image may worsen self-perception Potential exposure to triggering or distressing content Unfamiliar or complex language and information overload may create barriers (e.g., unclear body image concepts) Concerns that content could reinforce harmful beauty ideals Risk that triggering language may negatively affect well-being Fear of feeling pathologised (e.g., being made to feel that something is wrong with them) Clinical, childlike, or patronising language Overly pressurising, harsh, or negative messaging Insufficient signposting to mental health resources (e.g., support services, crisis contacts)

(*continued on next page*)

Table 2 (*continued*)

Themes (number of codes)	Codes
	Preference for supportive, encouraging language; avoidance of pressure, harshness, or negativity
Lack of perceived need for a body image intervention (4)	Already satisfied with body image
	Preference for existing coping strategies (e.g., gym workouts, talking to friends, denial)
	No interest in body image concerns
	Low prioritisation in daily life
Uncertainty about effectiveness, trust, and misinformation (9)	Low perceived ability to commit to and complete the programme
	Doubts about whether a digital intervention can meaningfully change thoughts and behaviours
	Scepticism about mindfulness as an effective approach
	Worries about misinformation or harmful messaging
	Perceived lack of clear scientific evidence
	Negative past experiences with similar apps (e.g., repetitive, unhelpful)
	Concerns about trust, reliability, and online safety
	Misunderstanding the aim or content of the programme
	Lack of endorsement from previous users

effectively engaging with the programme.

Methods. We undertook several steps to provide the context for developing the guiding principles (Yardley, Ainsworth, et al., 2015). First, we defined the key objective of the intervention: to support individuals in practising mindfulness regularly through the programme, enabling them to develop more adaptive responses to experiences associated with an increased risk of disordered eating (e.g., weight and shape concerns, negative affect). Ultimately, the goal is to reduce the occurrence and impact of these experiences.

Next, we identified the key issues, needs, and challenges that the intervention must address to achieve this objective. We synthesised evidence from the qualitative evidence synthesis and survey study to determine important characteristics of the target population and essential considerations for intervention design. Building on this synthesis, we established key design objectives to address each identified issue and developed corresponding intervention features to implement these objectives in practice. These guiding principles were regularly reviewed and refined based on initial feasibility and acceptability testing through advisory group consultation and qualitative interviews.

Results. The key issues and guiding principles are summarised in Table 3. Findings from the evidence synthesis and survey study highlighted the need to address self-critical responses to mindfulness practice, support habit formation through routine and flexibility, and integrate opportunities for social support to enhance engagement. Additionally, clarifying misconceptions around mindfulness and body image, building trust and credibility, and ensuring the content feels safe, inclusive, and supportive were identified as key priorities for promoting uptake and sustained use. The guiding principles were further refined based on feedback from Phase 2.

2.3. Phase 2: optimising

2.3.1. Phase 2, part 1: creating a draft intervention

Purpose. To develop a draft version of the digital, programme-led intervention based on theory, previous evidence, and user needs. This prototype was intended to be shared with target users to gather feedback and inform iterative refinement.

Methods. We adapted an existing evidence-based intervention (*The Mindfulness Mode*; Atkinson & Wade, 2015, 2016) by separating out its individual components for experimental evaluation and converting it into a digital format. Content updates were made to align with more recent understanding of mindfulness and to incorporate emotion regulation and self-compassion more explicitly—for example, by adjusting the framing, clarifying the contexts in which to apply these skills, and increasing emphasis to support learning of DA+A—while retaining the programme's key mechanisms, consistent with MRC guidance (Skivington et al., 2021a). Additionally, we incorporated insights from Phase 1, including the person-based intervention features identified in our guiding principles (Table 3), to ensure the intervention included key components, relevant content, and was engaging, acceptable, and meaningful to the target users.

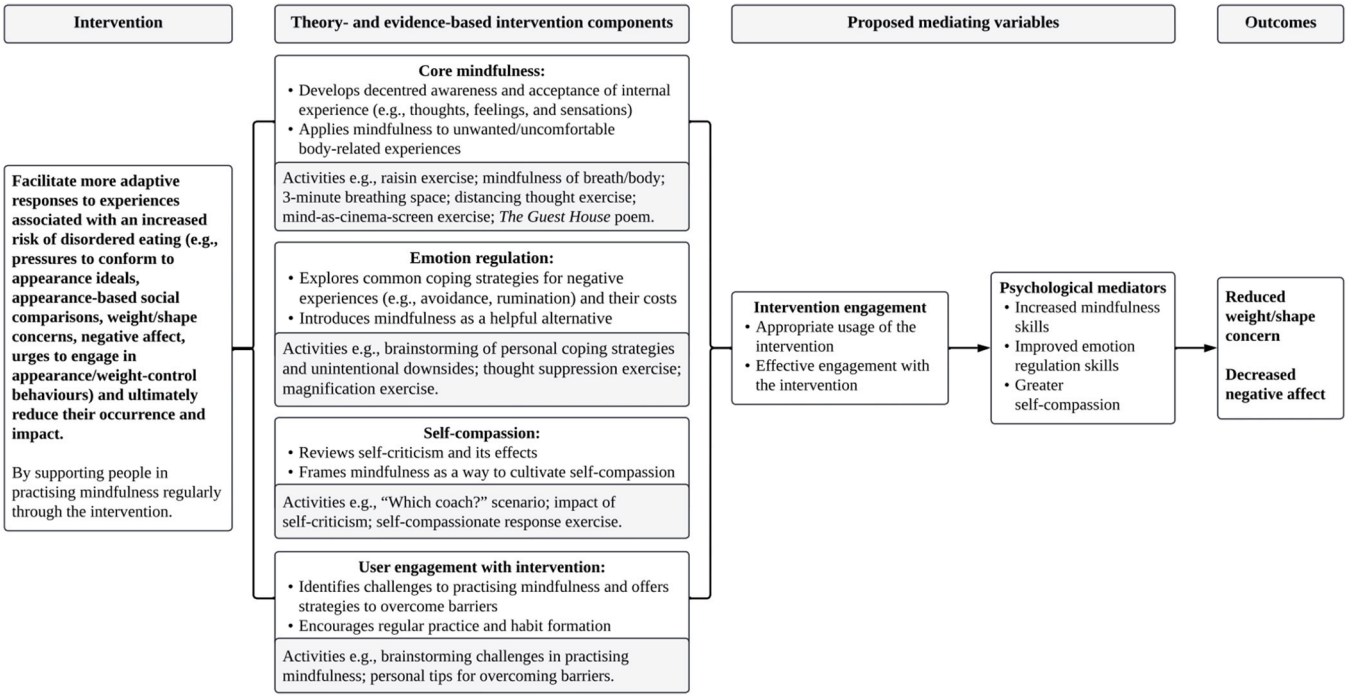

Fig. 2. Logic model of the intervention components, proposed mediating variables, and intended outcomes.

Table 3
Key issues and guiding principles for intervention development.

Key issues	Design objectives	Intervention features
Concerns about effectiveness, misinformation, and privacy may discourage engagement with the intervention.	Build trust and credibility by ensuring transparency about the intervention's purpose, effectiveness, and confidentiality while providing accurate, evidence-based information.	• Highlight scientific evidence on mindfulness for body image and ensure all content is accurate to establish trust and credibility. • Clearly state that user-provided information will remain confidential and that free-text boxes are for personal use only to reassure users about privacy and encourage honest self-reflection.
Misunderstandings around terms like *mindfulness* and *body image*, along with misaligned expectations about body image resources, can lead to confusion and lack of interest.	Ensure users understand key concepts and the intervention's purpose.	• Provide clear, accessible definitions of mindfulness and body image, incorporating psychoeducation to address common misconceptions. • Clarify from the outset that the intervention focuses on improving thoughts and feelings—not physical appearance—to align user expectations.
Thinking about body image is sometimes perceived as uncomfortable, triggering, or patronising. A supportive, relatable approach is preferred.	Ensure the intervention is relatable, encouraging, and supportive by adopting an inclusive and empathetic approach.	• Use a warm, conversational tone that is empathetic and validating, avoiding overly clinical or directive language, to create a welcoming experience. • Incorporate diverse, real-life examples reflecting a range of identities and experiences to enhance relatability and inclusivity. • Acknowledge that body image can be sensitive, encouraging users to be kind to themselves, take breaks as needed, and go at their own pace to minimise discomfort. • Provide clear signposting to mental health support services so users can access help if needed. • Avoid images of bodies and exercise to minimise triggers.
Encountering difficulties or negative reactions during mindfulness practice in digital MBIs is common and can lead to frustration and reduced motivation.	Normalise common challenges in mindfulness practice and equip users with strategies to navigate difficult experiences.	• Normalise difficulties with mindfulness, especially for beginners, to reassure users that challenges are a normal part of learning. • Share real-life examples of challenges others have faced when using digital MBIs to help users recognise and validate their own experiences. • Provide practical, actionable guidance on managing challenges to maintain motivation and engagement. • Offer opportunities for users to reflect on their challenges and brainstorm solutions to develop problem-solving skills and build confidence.
A consistent routine is key to maintaining engagement with digital MBIs, but many struggle to maintain one. An intuitive design and short, digestible sessions may help.	Support habit formation by providing an intuitive design, brief, engaging sessions, and practical strategies to help users build a consistent routine.	• Keep modules short (10–15 min max) to help users overcome time constraints and integrate the intervention into their busy schedules. • Emphasise that users can personalise their schedule, allowing them to complete modules at their own pace and convenience. • Encourage users to complete modules at the same time each day and pair them with a daily activity, citing supporting scientific evidence, to promote consistency and support sustained engagement.
Any form of support or encouragement from others can help enhance engagement with digital MBIs.	Promote social support by encouraging users to seek guidance and encouragement from others to maintain their mindfulness practice.	• Encourage users to involve trusted individuals (e.g., friends, family, significant others, or a therapist) to foster accountability and motivation. • Offer a channel to contact the research team with any questions or concerns about the programme to reduce barriers to engagement.

MBI = mindfulness-based intervention.

Our literature review (Phase 1, part 1) supported DA+A as a 'minimally necessary' intervention and identified emotion regulation and self-compassion as key additional components. We therefore developed four variations of the intervention, each containing DA+A as a constant component (i.e., received by all participants) and all possible combinations of the additional components: (1) DA+A + emotion regulation + self-compassion, (2) DA+A + emotion regulation, (3) DA+A + self-compassion, and (4) DA+A only. This design lays the groundwork for a full 2 × 2 factorial experiment to evaluate whether including emotion regulation and/or self-compassion further reduces risk factors for disordered eating beyond DA+A alone (Osborne et al., 2025b).

We then built a draft version of the intervention using LifeGuide+ , a digital intervention platform developed by the University of Southampton that facilitates rapid modifications to design and content. LifeGuide+ enabled us to iteratively refine the intervention based on user feedback.

Results. We report the intervention in accordance with the template for intervention description and replication (TIDieR) checklist and guide (Hoffmann et al., 2014; see Supplementary File 4 for the completed checklist).

The intervention, called *eMindfulness Mode*, is a mobile-friendly website consisting of a brief introductory section and nine mini-modules, each lasting approximately 10–15 min. The intervention

teaches mindfulness as an adaptive way to respond to body image concerns, associated negative emotions, and appearance pressures, with some exercises adapted from Mindfulness-Based Cognitive Therapy for depression (Segal et al., 2002).

The modules introduce present-moment awareness through the raisin exercise and using the breath as an anchor; encourage viewing thoughts and feelings about the body as transient mental events rather than bad, wrong, or inherently true; and promote practicing non-judgment and acceptance towards these thoughts and feelings. Most interactive and experiential exercises focus on body-related experiences, such as viewing media, eating a meal, or observing one's own reflection in a mirror.

Participants have access to the intervention for three weeks and are encouraged to continue practising specific activities between modules. The intervention content is fixed, but includes opportunities for self-tailoring—for example, users can personalise their schedule, choose between audio or written content, and create their own examples or tips in reflective activities. The intervention is fully automated and programme-led, meaning the digital programme delivers the intervention rather than an external provider (Fairburn & Patel, 2017). Participants can contact the lead researchers with any questions about the programme or their participation.

LifeGuide+ tracks user adherence by monitoring the number of website visits, time spent on each page, and accessed modules or resources. A complete overview of the intervention and how it is intended to work is provided in Fig. 2 (the logic model). Key features designed to support user engagement are outlined in Table 3 (guiding principles). Details on the themes, topics, and activities within each module are presented in Table 4, and example screenshots of the programme are shown in Fig. 3.

2.3.2. *Phase 2, part 2: assessing feasibility and acceptability through advisory group consultation*

Purpose. To gather expert and stakeholder feedback on the draft intervention to assess initial feasibility and acceptability before testing with a larger group of end users.

Method. An experienced researcher in clinical psychology, mindfulness, and eating disorders (MJA) reviewed the content to ensure that each variation differed sufficiently in its emphasis on the additional components (self-compassion and emotion regulation), with this emphasis distributed throughout the intervention—particularly in the first mini-module—while maintaining a strong and identical DA+A component across all variations. MJA directly suggested changes in the content document and left comments for ELO, who responded in collaboration with them.

The two target user representatives independently worked through all sessions of all four variations of the intervention to assess feasibility, relevance, and potential challenges, providing written feedback. The feedback was analysed (see below), and changes were implemented in both the content document and the draft intervention in LifeGuide+ . No incentives were provided to advisory group members.

Analysis. All written feedback from the two representatives was analysed using the 'table of changes' approach to systematically record and evaluate user views on the intervention content and guide modifications (Essery et al., 2021). This approach supports a transparent and replicable decision-making process by tabulating comments, codes, and proposed changes, along with justifications for whether or not each change was implemented. It also helps prioritise changes by highlighting high-impact or frequently mentioned issues and by prompting structured discussion with the wider research team.

ELO reviewed all feedback, extracted positive and negative comments, and used a structured coding framework (Table 5) to propose and justify potential changes. Coding and prioritisation were based on (1) theoretical or empirical support for the change, (2) the number of individuals who raised the issue, and (3) alignment with the intervention's guiding principles.

Table 4
Overview of module themes, topics, and activities.

Module	Themes, topics, and activities
Introduction	**Topics**: Overview and goals; what to expect; making the most of your journey.
1	**Theme**: An alternative way of coping. **Topics**: Psychoeducation on body image; common strategies for coping with negative experiences; mindfulness as a helpful alternative; self-criticism and self-compassion; paying attention in the present. **Activities**: Brainstorm personal coping strategies and reflect on their unintentional downsides; thought suppression exercise; thought magnification exercise; "Which coach?" scenario; raisin exercise and reflection.
2	**Theme**: Getting started with mindfulness. **Topics**: What mindfulness is and how it can help; key attitudes of mindfulness; beginning your mindfulness practice. **Activities**: Mindfulness of breath and body, with reflection.
3	**Theme**: Being present and aware. **Topics**: Becoming aware; brief mindfulness throughout the day; making mindfulness work for you; being present. **Activities**: 3-minute breathing space (scheduled) with reflection; bringing awareness to daily activities.
4	**Theme**: Overcoming mindfulness challenges. **Topics**: Common challenges in practising mindfulness; personal barriers to practice; tips for dealing with barriers. **Activities**: Brainstorm personal challenges; identify tips for overcoming them.
5	**Theme**: Relating differently to experiences. **Topics**: Taking a step back from the mind; the importance of how we relate to our experience. **Activities**: Distancing thought exercise ("I am having the thought that…").
6	**Theme**: We are not our experience. **Topics**: Mindfulness and the media; separating ourselves from our experience. **Activities**: Mind as a cinema screen exercise and reflection; mindfulness of a body-related experience, including negative experiences, with reflection.
7	**Theme**: Practising non-judgement. **Topics**: Judgement and self-criticism; impact of judgement and self-criticism; responding to judgement; welcoming all experiences; experiences as visitors. **Activities**: Reflect on the impact of being critical toward experiences; non-judgemental response exercise; read and reflect on *The Guest House* poem.
8	**Theme**: Treating yourself with kindness. **Topics**: Self-criticism and self-compassion; how self-compassion can help; practising self-compassion; strengthening your mindfulness muscle. **Activities**: Brainstorm the costs of being self-critical; self-compassionate response activity; respond mindfully to media and reflection; mindful mirror exercise; 3-minute breathing space as a coping tool.
9	**Theme**: Beyond *eMindfulness Mode*. **Topics**: Reflecting on your journey; preparing for future pressures; finishing *eMindfulness Mode*; accessing additional support. **Activities**: Mindfulness of the body; making a commitment; developing a personal action plan; personal mindfulness statements.

Note. This table summarises the content of the intervention variant incorporating decentred awareness and acceptance (DA+A), emotion regulation, and self-compassion.

ELO then prioritised changes using the MoSCoW criteria (MUST do, SHOULD do, COULD do, WON'T do), based on their potential to prevent disengagement. Lower-priority changes were only implemented if they were both feasible and quick to address. The wider research team reviewed proposed changes where feedback was ambiguous or potentially conflicted with other evidence, the logic model, or the guiding principles, or where the change would require more substantive revision.

Results. Supplementary File 5 provides a comprehensive 20-page table of changes summarising feedback from the target user group representatives. The positive comments highlighted the programme's simple yet engaging design, including the effective use of audio, visuals, and

LifeGuide+ App

Welcome to *eMindfulness Mode*!

Thank you for your interest! Please read the participant information sheet to see if this research study is right for you.

Register here to get started!

Log in to continue your journey.

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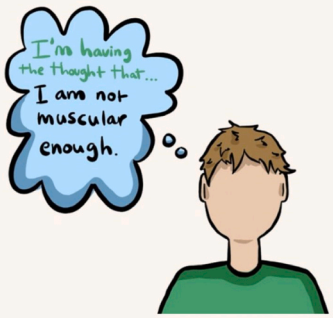
Now take that same thought "I am X" and insert this phrase in front of it: "I'm having the thought that...". For example, "I'm having the thought that I am not muscular enough". Now hold that thought in the mind again for several seconds, using this new phrase.



What did you notice? What, if anything, was different?

People often report feeling a bit more distant from the thought, and notice less negative impact – e.g., less intense feelings, less need to engage in reactive behaviours. The key here is that you haven't tried to get rid of or change the troubling thought; you've simply altered the way that you *relate* to the thought. Much of the struggle that we

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act on it."

Example
Thought: *"I feel disgusted by my body"*
Non-judgemental response: *"I notice that I'm feeling disgusted by my body right now. It's natural to have strong feelings like this from time to time. This feeling is just one part of my experience, and it doesn't define me. Like all emotions, it will come and go. I can observe this feeling without judgment, accept it as it is, and allow it to pass without acting on it."*

Over to you!

Thought 1: *"I'll never be happy with how I look"*

Non-judgemental response:

Thought 2: *"People would like me better if I looked fitter"*

Non-judgemental response:

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Key attitudes of mindfulness

Explore the key attitudes of mindfulness by listening to the audio, reading the text below, or both—it's up to you!

0:00 -1:17

Acceptance Allowing your experience to be as it is and leaving it at that.

Non-judging As best as you can, trying not to evaluate your own experience as good, bad, true, or otherwise – being an impartial witness.

Beginner's Mind Being willing to see everything as if for the first time, without already being affected by what you already "know" – pre-existing beliefs and values, approaching experiences with openness and curiosity.

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today's society, and it can be upsetting and lead to potentially harmful behaviours.

Negative examples could include:

- **Thoughts:** *"I'm not good enough", "They are better looking than me", "I need to work out", "Everyone thinks I'm weak".*
- **Feelings:** Disgust, self-consciousness, anger, sadness, frustration, worry, disappointment, shame, guilt.
- **Physical sensations:** Tension or stiffness, stomach churning or nausea, physical discomfort.
- **Behaviours/urges:** Extreme or obsessive exercise, skipping meals, counting calories, taking supplements or steroids.

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Making Mindfulness Work for You

Now it is up to you to put awareness into practice!

Research suggests that the more you practice mindfulness, the more likely you are to see the impact.

Some people like to practice at a set time each day (e.g., first thing in the morning, or afternoon tea). Research also suggests that practising at roughly the same time each day helps to make it a habit.

Fig. 3. Example screenshots from the intervention.

Table 5
Structured coding framework for proposed intervention modifications.

Code	Stands for	Means
IMP	Important for behaviour change	An important change that is likely to influence behaviour change or a precursor to behaviour change (e.g., acceptability, feasibility, persuasiveness, motivation, engagement), and/or is in line with the logic model, and/or is in line with the guiding principles. For example, participants appear unconvinced by an aspect of the intervention, so you decide to add motivational examples.
EAS	Easy and uncontroversial	An easy and feasible change that doesn't involve any major design changes. For example, a participant was unsure of a technical term, so a brief definition is added.
REP	Repeatedly	This feedback was raised by more than one participant.
EXP	Experience	This is supported by experience. Specify the type of experience, for example: 1. Patient and public involvement (PPI) contributors agree this would be an appropriate change. 2. Experts (e.g., clinicians on your development team) agree that this would be an appropriate change. 3. Literature: This is supported by evidence in the literature.
NCON	Does not contradict	This does not contradict evidence or experience, or the logic model, or the guiding principles.
NC	Not changed	It was decided not to make this change. Explain why (e.g., it would not be feasible or was only raised by one participant).

Note. Adapted from the Person-Based Approach website: https://personbasedapproach.org/.

interactive activities, as well as accessibility features (e.g., transcripts), useful real-life examples, and valuable links to supporting research.

One change we made was to add more reminders in the textboxes of the first few modules to reinforce that reflections are private, gradually phasing out the note as users progress, in case they missed or forgot this information from the introduction. For example, we included the reminder "Remember, no one will read them—they're just for you", which aligned with a key survey finding that adolescents have concerns about privacy. Another change involved revising the time estimate given in the introduction for the first mini-module, as its length might lead users to expect all modules to be similarly long or to doubt the accuracy of the estimates, potentially discouraging them. We updated it to: "The first one might take a little longer, around 15–20 min, as it sets the foundation for the programme." Additionally, we added a new section called *Personal Tips for You* in the mini-module *Overcoming Mindfulness Challenges*, encouraging users to identify their own helpful strategies. This also addresses a key barrier identified in the evidence synthesis—that difficulties practising mindfulness can discourage users.

All changes were incorporated into the draft intervention, as well as into elements of the planning phase, including the guiding principles and logic model.

2.3.3. Phase 2, part 3: assessing feasibility and acceptability through think-aloud interviews

Purpose. To assess how intended users interact with and perceive the intervention, as an initial test of its feasibility, usability, and acceptability to inform further refinement.

Participants. We aimed to recruit 5–10 young people via a mailing list and flyers to test a digital mindfulness programme for body image, based on guidance suggesting that this sample size typically provides sufficient data for intervention optimisation (Muller et al., 2019). Participants received a £ 10 Amazon voucher to thank them for their time. The study received ethical approval from the University of Bath research ethics committee (reference 6305–10083).

Procedure. Interested individuals contacted ELO and were generally invited in order of response, with efforts made to ensure variation in age, gender, and ethnicity where possible. ELO conducted all think-aloud and semi-structured interviews individually via MS Teams. In the think-aloud session, participants shared their screen and verbalised their thoughts while engaging with the intervention in real time, helping us to assess how they interpreted and navigated the material and identify usability and comprehension issues. Each participant reviewed the introduction and one or two mini-modules. To adapt this protocol for experiential exercises, participants also provided feedback after listening to a short guided audio. As is standard in pragmatic person-based qualitative development, participants were reminded that the aim was to test the programme, not their personal performance, and were encouraged to speak freely, including expressing negative responses, as these would help improve the programme.

Following the think-aloud session, a semi-structured interview explored additional facilitators and barriers to engagement, such as elements that were less enjoyable or might discourage continued use. Participants were asked about their overall experience, usability, navigation, and content (see Supplementary File 6 for the interview topic guide for both parts). This two-part approach provided both immediate usability insights and deeper reflections on overall acceptability. We followed an iterative process, modifying the intervention based on feedback between participants to address and re-evaluate key barriers.

Analysis. All interviews were transcribed verbatim and analysed using the table of changes, as described above. As with advisory group feedback, all participant comments were categorised as positive or negative, and each suggestion was assessed using a structured coding framework to guide decisions. Feedback was prioritised based on theoretical relevance, recurrence across participants, and alignment with the guiding principles. Proposed changes were then discussed with the wider research team to finalise modifications. Analysis was conducted alongside data collection to enable real-time refinements before subsequent interviews.

Results. Five young people participated. The sample was broadly representative of our target population: participants were aged 18–25 years (undergraduate and master's students) and included individuals of different genders and ethnic backgrounds. Most were female, which reflects both trends in the existing literature and the greater impacts of body image concerns in women (Jiménez-Limas et al., 2022), but also highlights the need for more targeted efforts to recruit men in future research. As interviews progressed, negative comments decreased—likely due to iterative modifications—suggesting that remaining feedback reflected personal preferences rather than major barriers.

Supplementary File 7 contains a comprehensive 29-page table of changes summarising feedback from the think-aloud and semi-structured interviews. An excerpt is provided in Table 6. Overall, the programme was seen as clear, informative, and well-organised, with minor suggestions for improving engagement. Notably, the most appreciated elements were the intervention features developed as part of the guiding principles, including the research-based content, supportive tone, habit formation tips, privacy reminders, and prompts to be kind to oneself, as well as the use of audio and illustrations. All agreed changes were incorporated into the final version of the intervention and elements of the planning phase, including the guiding principles and logic model.

3. Discussion

3.1. Principal findings

This study presents the systematic development of a digital MBI aimed at improving body image and reducing risk factors for disordered eating, using an integrated approach that combines theory, evidence, and user-centred design. Our focus was on transparently documenting

Table 6
Selected examples from the table of changes based on feedback from the think-aloud and semi-structured interviews.

Negative feedback	Positive feedback	Possible change	Reason	Agreed change	MoSCoW
More reading than expected; felt more self-study than practice-based.		Clearly outline the programme's format in the introduction. Increase the number of audio-guided exercises.	IMP, EAS, EXP, NCON	Renamed *'How To'* section to *'What to Expect'*. Clarified that *eMindfulness Mode* combines reading with practice: *"You'll practise mindfulness techniques both during the modules and, more importantly, in between. The programme also explains the key ideas behind mindfulness and why they're helpful."* Added more audio-guided exercises.	S
	Felt the note (*"This programme will not help you change your actual body"*) was important.				
Misinterpreted timetable as a fixed structure.		Clarify that the suggested schedule table is a suggestion, not a requirement.	IMP, EAS, REP, NCON	Added text above the table: *"↓ Here's our recommended schedule (but it's totally up to you!)"*	S
Asked whether 3 weeks is enough to improve body image or if continued practice is needed.		Add note on short- and long-term benefits of continued practice.	IMP, EAS, NCON, REP	Added text under *'What to Expect'*: *"Research suggests [hyperlink to published study] that this programme can improve body image in just 3 weeks. Everyone's journey is different, and continuing to apply what you learn can help support long-term progress."*	S
	Likes the reminders to be kind to oneself throughout the programme.				

the development process to offer a replicable model for applying the PBA—an established method in behaviour change intervention development (Band et al., 2017; Bradbury et al., 2018)—to the design of interventions that are digital, mindfulness-based, or focused on body image and disordered eating. In addition, the findings from each stage of development provide practical insights that may support other researchers in making evidence-informed decisions when designing similar interventions.

Theoretical groundwork highlighted the skills of decentred awareness and acceptance of present-moment experience as core components and foundational to MBIs (Bishop et al., 2004; Lindsay & Creswell, 2017). These skills formed the foundation of our programme, representing the 'minimal necessary' intervention that should be delivered to all participants (Manasse et al., 2019). Additionally, emotion regulation and self-compassion—both widely recognised as mechanisms of change in MBIs (Baer, 2010; Chiesa et al., 2014; Hölzel et al., 2011) and particularly relevant to disordered eating (Osborne et al., 2022; Vanzhula & Levinson, 2020)—were identified as key additional intervention components.

Building on this theoretical base, we synthesised qualitative evidence on digital MBIs to identify barriers and facilitators to engagement. Self-critical responses to practice were prominent across studies, aligning with reports from in-person MBIs (Forkmann et al., 2016) and reinforcing the relevance of this challenge in digital contexts (Mrazek et al., 2019). Habit formation was also a common barrier, with persuasive technological features such as personalisation suggested as potential solutions (Kelders et al., 2012). Additionally, various forms of social support appeared to enhance engagement, consistent with research on guidance in digital interventions (Musiat et al., 2022). Notably, there was a lack of studies focused on adolescents and on the application of digital MBIs to body image.

Our survey study addressed this gap by exploring adolescents' views on mindfulness and body image resources. Participants often held narrow or inaccurate understandings of both constructs, echoing prior findings that MBI participants can struggle to grasp core mindfulness concepts or misinterpret the intervention's purpose (Mrazek et al., 2019), with our findings extending this issue to body image interventions. Many also appeared to seek support through appearance-focused strategies, reflecting a common misconception that improving appearance alone will resolve body image concerns. These findings highlighted the importance of psychoeducational content that clarifies key concepts and challenges the belief that body image relates only to physical appearance. Intervention design was therefore guided by both empirical data and the specific needs of our target population.

Importantly, stakeholder feedback from young people and experts, gathered through initial feasibility and acceptability testing, suggested that the intervention was perceived as accessible, relevant, and user-friendly. Participants described the content as clear, informative, and well-structured, with manageable module lengths and effective use of real-life examples, audio, and visuals that made it relatable and engaging. These responses align with previous findings that adolescents engaging in eating disorder prevention programmes prefer visually engaging formats, real-world examples, and shorter interventions (Kristoffersen et al., 2022). Iterative involvement of stakeholders enabled us to refine the design to better meet users' needs and give the intervention the best possible chance of success in future feasibility testing.

Few digital MBIs targeting body image or disordered eating currently exist, and those that do often face engagement challenges. For example, a randomised trial of mindfulness and gratitude videos for body image found that, on average, participants viewed just over a third of the videos, engagement ratings were slightly below neutral, and the study retention rate was only 37 % (Fuller-Tyszkiewicz et al., 2019). This underscores urgent calls to consider end-user needs in the design of digital eating disorder interventions to help ensure they are both used and effective (Linardon et al., 2020). Our study demonstrates how such calls can be answered, likely benefiting both existing and future programmes.

3.2. Implications for policy and practice

Stakeholder engagement throughout intervention development is essential to ensure that research addresses relevant questions and translates effectively into policy and practice (Skivington et al., 2021b). This study offers a transparent example of such engagement and aligns with the National Institute for Health and Care Excellence (2022) evidence standards framework, which emphasises co-design and user acceptability in digital health innovation. By documenting how target users shaped the intervention from its earliest stages, this work may support commissioning bodies, funders, and service providers in evaluating and selecting interventions that are not only evidence-based, but also acceptable and appropriate for their intended users and settings.

At the same time, the intervention developed through this process addresses a pressing need for accessible, scalable, early intervention and

prevention strategies targeting disordered eating in young people (Beat, 2022). Interventions like *eMindfulness Mode* may serve as stand-alone resources within community settings or be integrated into educational and mental health services to extend reach and reduce burden on existing provision.

3.3. Directions for future research

There is a recognised lack of user involvement at the design stage of digital interventions in the eating disorder field, with most research collecting user feedback only after implementation, thereby delaying opportunities to enhance effectiveness (Linardon et al., 2020). By providing a detailed example of user-centred development, our work supports eating disorder and body image researchers in embedding earlier and more systematic user input into intervention design. Future researchers can adapt or extend this approach across populations, delivery formats, and outcome targets, and examine how specific development steps enhance intervention quality and engagement.

When involving users in the design phase, an important consideration is how to balance user input with the intervention's theoretical and evidence-based foundations. We found that some suggestions exceeded what was theoretically appropriate or technically feasible—for example, requests for fitness content or gamified features. Rather than viewing this as a limitation of coproduction, we found the structured elements of the PBA—particularly the table of changes and coding framework—offered a transparent and systematic approach to addressing such feedback. For instance, rather than implementing fitness features, we interpreted this feedback as indicating a common misconception that body image can be improved through appearance change, prompting us to strengthen psychoeducation on this point. Future researchers may benefit from using this structured approach to support collaborative yet evidence-aligned decision-making in co-design.

We are currently building on this development work through a feasibility trial of *eMindfulness Mode* to assess the viability of a factorial design, focusing on recruitment, retention, data collection, and intervention adherence and acceptability (Osborne et al., 2025b). Findings will inform further refinements to the intervention and guide the design of a fully powered trial to evaluate component effectiveness, in line with the multiphase optimisation strategy (MOST; Collins, 2018) and MRC guidance (Skivington et al., 2021a).

3.4. Strengths and limitations

This study demonstrates a rigorous and transparent approach to intervention development, integrating theory, evidence, and user-centred design. It also presents new primary evidence addressing gaps in the digital MBI literature, particularly regarding older adolescents and the application of mindfulness to body image. Qualitative methods supported a comprehensive understanding of the context-specific needs and challenges that shaped the intervention. The development of a logic model helped identify proposed mediating variables and informed the selection of process measures for evaluation. This work offers a transferable model for researchers developing person-centred psychological interventions.

Nonetheless, this study has some limitations. First, the evidence synthesis primarily included white, female participants, which may limit the generalisability of the findings to individuals of other genders and ethnicities. Future research should prioritise targeted recruitment to include underrepresented groups. Additionally, the synthesis revealed a lack of research on older adolescents' experiences with digital MBIs and their application to body image. While our survey study addressed this gap, it included only participants aged 16–18, potentially overlooking the perspectives of younger adolescents.

3.5. Conclusion

Digital MBIs hold promise for improving body image and reducing the risk of disordered eating in young people, provided they are both engaging and effective. This paper details the systematic development of one such intervention, integrating theory, evidence, and user-centred design methods to produce a replicable example of good practice. Our transparent reporting of this process is intended to support researchers in applying similar methods to the development of other digital, mindfulness-based, or body image and disordered eating–focused interventions. In doing so, we aim to reduce the duplication of unsuccessful efforts and contribute to the creation of more acceptable, effective, and scalable solutions for early intervention and prevention.

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CRediT authorship contribution statement

Emma L. Osborne: Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Ben Ainsworth:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Paul Chadwick:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Nic Hooper:** Writing – review & editing, Supervision, Methodology, Conceptualization. **Melissa J. Atkinson:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Declaration of Competing Interest

The authors have no competing interests to declare.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bodyim.2025.101925.

Data availability

All data supporting the findings of this study are included in the supplementary materials or available via the University of Bath Research Data Archive (Osborne et al., 2025a).

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