



# Designing sustainable mobile weight management applications: information technology (IT) experts perspectives

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**Background:** Weight management mobile applications have become increasingly popular as a tool for individuals to achieve their weight loss goals. However, key challenges with mobile weight management applications are sustaining user engagement and promoting long-term behavior change. This study examines the key functions and features of weight management mobile applications from the viewpoint of information technology (IT) experts. We have developed a framework that outlines the optimal design strategies for mobile apps to support sustainable weight management.

**Methods:** We conducted face-to-face interviews with five experts to evaluate and give input on the proposed framework.

**Results:** Eight specialized functionalities have been categorized and defined based on initial framework system features and recommended features based on experts' feedback: (I) customization; (II) usability; (III) integration; (IV) online support; (V) tracking; (VI) nutrition database; (VII) gamification; and (VIII) notification. In addition, common functionalities were identified as (I) registration/sign in; (II) data privacy; (III) security; and (IV) user feedback. An online discussion indicates the system functionality in four themes: (I) configuration; (II) data analytics; (III) support/performance; and (IV) platform: iOS, Android, Native.

**Conclusions:** These functionalities and features will be incorporated into a framework to design mobile applications for sustainable weight management. Also, to be part of user interface development for the user experience experiments.

**Keywords:** Weight management; mHealth; mobile application framework; expert's review; sustainable living

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## Introduction

Weight management is a critical aspect of maintaining good health, as obesity and overweight have been linked to numerous health issues, such as diabetes, heart disease, and stroke. In recent years, the use of mobile applications for weight management has become increasingly popular, as they provide a convenient and accessible way for individuals

to track their progress and achieve weight loss (1). The use of mobile applications for weight management is a promising approach to achieving weight loss and promoting health (2). The development of a weight management mobile application can provide individuals with a convenient and accessible tool to track their progress and achieve their weight loss goals (3). These applications provide users with

features such as calorie tracking, exercise tracking, goal setting, and coaching, making weight management more accessible and convenient (4).

Several studies provide evidence of the effectiveness of sustainable mobile weight management applications and the strategies used to promote long-term behavior change (2). Examined the use of persuasive system design principles and behavior change techniques in electronic health interventions to support weight loss maintenance (5). Interventions that incorporated these principles and techniques were effective in promoting sustained behavior change and improving adherence to healthy lifestyle habits (5). Also, a study that examined the effectiveness of mobile phone applications for weight management in randomized controlled trials found that mobile phone applications were effective in promoting weight loss and improving other health outcomes, such as blood pressure and cholesterol levels (4). Mobile applications that incorporated social support and behavior change techniques were more effective in promoting sustained behavior change over time (6). In addition, examined behavioral management strategies for sustainable weight loss such as self-monitoring, goal setting, social support, and cognitive-behavioral therapy were effective in promoting sustained behavior change and improving weight loss outcomes (6).

Furthermore, the use of mobile applications for weight management resulted in significant reductions in body weight, body mass index (BMI), and body fat percentage

compared to control groups. Also, the use of mobile apps was associated with improvements in dietary intake and physical activity levels. Mobile applications could be effective tools for promoting weight management and improving overall health outcomes, especially when paired with other behavioral interventions such as coaching and social support. There is strong evidence to support the use of mobile applications for weight management and the potential benefits of incorporating these apps into weight loss interventions (4).

Weight management mobile applications are effective tools for promoting weight loss and improving health outcomes, and the development of a weight management mobile application can provide individuals with a convenient and accessible tool to manage their weight. There are key challenges with mobile weight management. User engagement: keeping users interested in a weight management mobile application is a big challenge. Many users download these applications but quickly lose interest and stop using them (7). The application design, interface, and features need to be engaging and easy to use to keep users interested in the long run (7). Accuracy of tracking: weight management mobile applications rely on users to input data like food intake, exercise, and weight measurements. However, the accuracy of self-reported data can vary, leading to inaccuracies in tracking and analysis (8). Making sure users enter accurate data is a challenge for app developers. Behavioral change: changing eating and exercise habits is crucial for a successful weight management mobile application. However, mobile weight management applications often struggle to encourage behavior change effectively (9). Mobile weight management applications need to provide personalized suggestions, reminders, and motivational features to help users adopt and stick to healthy habits. Lack of personalization: people have unique needs and preferences when it comes to managing their weight (10). Many mobile apps use a one-size-fits-all approach, without offering customization options. Tailoring the app experience to individual user goals, preferences, and health needs is crucial for long-term engagement and success (10). Sustainability: managing weight is a long-term process, and keeping up the progress beyond initial weight loss can be challenging. Apps need to provide ongoing support, including continuous tracking, progress monitoring, and access to resources like healthy recipes, workout plans, and educational content to help users sustain their weight management efforts (11). Privacy and security: mobile weight management applications often collect

### Highlight box

#### Key findings

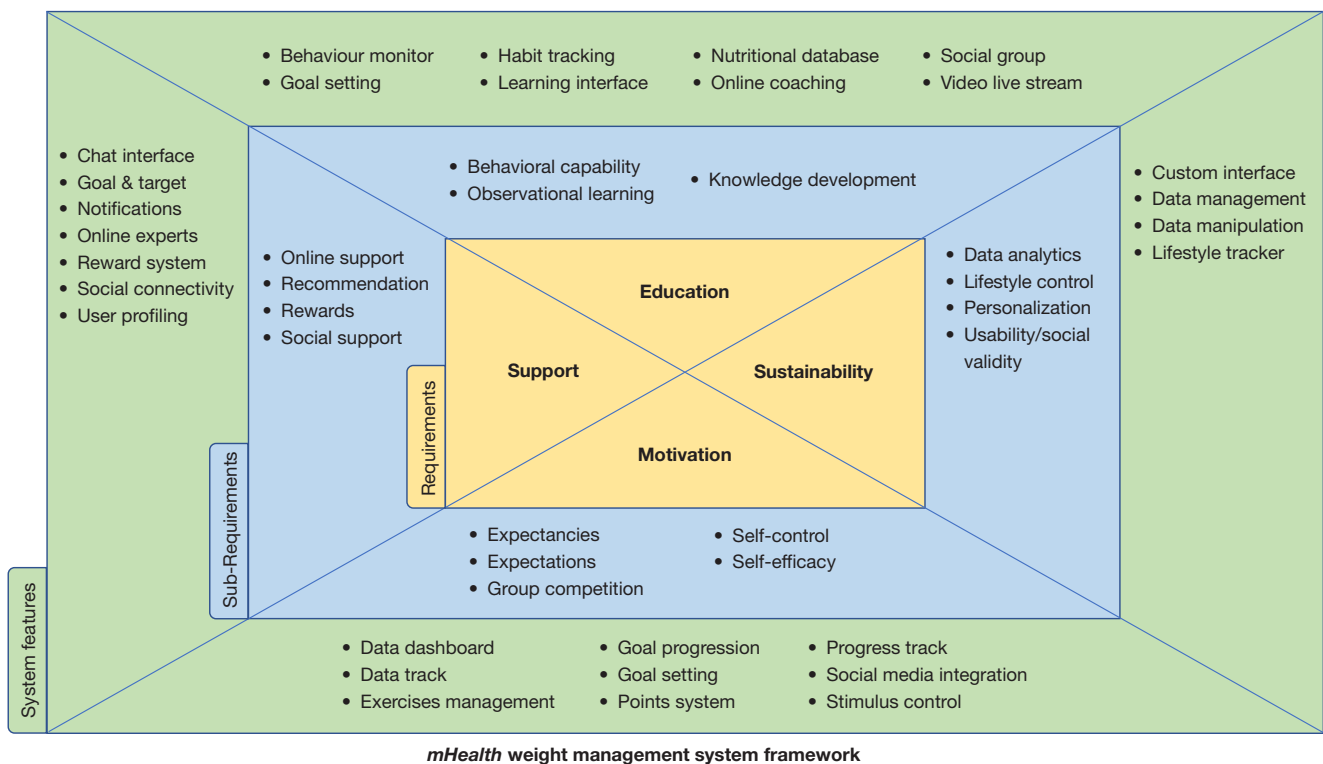
- We propose new framework design and factors that support sustainable weight management and user engagement for long-term behavior change.

#### What is known and what is new?

- Mobile weight management applications have different features that can manage weight and daily exercises and calories tracking.
- When we integrate online support features and define the key features that support sustainability based on experts review results on framework design that promote long-term user engagement and behavior change.

#### What is the implication, and what should change now?

- There are important implications for similar mobile weight management applications design that are applicable and usable. The findings will incorporate the adoption of designing mobile weight management applications framework that support sustainability.



**Figure 1** mHealth weight management system framework proposal based on FGD. FGD, focus group discussion.

sensitive personal information like health data, dietary habits, and exercise routines. Ensuring robust privacy and data security measures is crucial to protect user information from unauthorized access or misuse (12).

To address these challenges and limitations, we proposed a new framework for designing mobile weight management applications that prioritize sustained engagement and promote lifestyle change. The proposed framework for designing mobile weight management applications incorporates personalized feedback, social support, and motivation to promote sustainability and user intention to control lifestyle change and weight loss.

The proposed framework was developed based on findings from literature review (LR) and focus group discussion (FGD). The FGD was carried out with potential users to find out the challenges they face in weight management and how weight management applications help them maintain a healthy lifestyle. Several factors that contribute to low engagement and adherence to mobile weight management applications have been identified, which include lack of personalization, limited user feedback, low motivation, and difficulty in integrating the app into daily routines. In addition, many apps focus on short-term

weight loss goals rather than promoting sustainable lifestyle changes. *Figure 1* shows the initial proposed framework designed based on the FGD. The framework has multiple dimensions in terms of factors and system features.

Information technology (IT) experts are participants from the IT sector who specialize in systems development and structure. These experts have different roles in each organization to ensure they cover most of the IT aspects to support our study.

The primary objective of this study is to gather input from IT experts regarding how well the elements within the initial framework align to create a successful and efficient mobile application for managing weight sustainably. The outcome of this study is a refined and improved framework that can serve as the basis for designing a mobile application focused on effective and long-lasting weight management.

This article is organized as follows: section “Methods” describes the methodology employed in conducting the IT expert review; section “Results” outlines detailed information about the findings from the IT expert’s discussion; section “Discussion” discusses the key findings of the expert review; and section “Conclusions” concludes the study and outlines the way forward.

**Table 1** Expert participant's demographics

Participant	Field of experience	Role	Total experience, years
IT expert 1	Technical support	Manager technical services	12
IT expert 2	Technical development	Technical support supervisor	13
IT expert 3	Functional support	Techno functional lead	11
IT expert 4	Technical development	System developer	7
IT expert 5	Business consultation	System consultant	9

IT, information technology.

## Methods

In this study, an expert interview methodology has been selected. Expert interviews are mainly defined as a research technique that involves speaking with people regarded as authorities on a certain subject or field. The purpose of expert interviews is to learn more about a certain topic or problem from people who are knowledgeable or experienced in that field (13). Additionally, the interviews can be carried out in a variety of modalities, such as in-person, over the phone, or as an online discussion. Expert interviews are a useful research technique that offers distinctive and beneficial insights into a particular subject or situation, getting feedback from people who specialize in a certain field or topic area or who have experience in it (14).

Based on the study objectives and research requirements, we employed the expert review approach to identify important viewpoints and insights. To get the most out of expert interviews, it is essential to pick participants carefully who have the right knowledge and experience, employ the right interviewing methods, and conduct a thorough and methodical analysis of the data gathered.

The study was conducted by the Declaration of Helsinki (as revised in 2013). The study was approved by Universiti Tenaga Nasional (UNITEN) and informed consent was taken from all the participants.

### Participants

The selection of participants for expert interviews is a critical step in the research process. The goal is to identify individuals who have specialized knowledge or experience in IT, particularly mobile application development, and can provide valuable insights and perspectives on the research question or problem. Five IT professionals who are experts in mobile application development and who can provide important insights and viewpoints have been selected.

*Table 1* shows the participant's fields of experience and their roles in the industry.

### Procedures

The IT expert discussion was conducted in three stages. The first stage was an on-site discussion, as we called for all participants to be in one place. During this discussion, we presented the framework and explained all the dimensions. Also, we clarified the main goals and objectives of this discussion. In addition, we pointed out the requirements for support and information from all participants. Finally, the plan and schedule for the next discussion sessions were confirmed.

The second stage was to conduct online discussion sessions with all participants using online team meetings. During these discussions, participants shared their comments and experiences based on the current framework from an IT perspective. Semi-structured questions have been employed to allow for both flexibility and structure in the interview process. Five open-ended questions have been asked to experts to gain a deeper understanding of their experiences and perspectives. In addition, the participants were required to provide feedback on each proposed framework dimension and feature. A detailed report was written based on the data collected during online sessions, and the framework was revised based on the feedback.

The third stage was to review the revised framework with the participants to ensure that the revised framework captured all the requirements and suggestions given by the participants.

### Data analysis

A thematic approach was employed in the stage of data

analysis. This approach has been used to identify important themes derived from the participants' feedback. It is also used to compare different perspectives and experiences across experts. The following are the steps that were followed to reach the main objectives of the study:

- (I) Response gathering and transcription: feedback from online discussions has been recorded along with relevant resources or documents shared during the sessions. The audio records were transcribed into text.
- (II) Analyzing the transcripts: the transcripts were read through and analyzed using NVivo, which resulted in the responses being categorized into key themes and categories based on the following questions:
  - ❖ Whether the experts agree with the dimensions included in the framework;
  - ❖ Additional features and functions;
  - ❖ Suggestions for improvements to the framework.
- (III) Revise the framework incorporating the suggestions from the experts.

## Results

Several functionalities have been identified based on discussion feedback and data analysis. These functionalities mainly refer to the mobile application framework features and capabilities. The identified functionalities are critical in the development process, as they help to ensure that the mobile application developed meets the needs and expectations of the users. Furthermore, the identified functionality could also provide a clear understanding of what the product or system is expected to do, and they serve as a roadmap for the development team to follow.

*Figure 2* shows the proposed new framework design that has been revised based on experts' discussion. The findings were categorized into three categories: (I) specialized functionality; (II) common functionality; and (III) system functionality. As shown in *Figure 2*, for specialized functionality, there are 8 main themes: (I) customization; (II) usability; (III) integration; (IV) online support; (V) tracking; (VI) nutrition database; (VII) gamification; and (VIII) notification. Also, for common functionality, there are 4 themes: (I) registration/sign in; (II) data privacy; (III) security; and (IV) user feedback. In system functionality, there are four themes: (I) configuration; (II) data analytics; (III) support/performance; and (IV) platform: iOS, Android,

and Native.

Based on expert review, the initial framework has been refined into the new proposed framework. The transition from a proposed framework to a refined framework to improve its structure, clarity, and effectiveness. Based on the expert analysis, the items in the framework have been reorganized and refined. This was achieved by restructuring the categories, merging, or splitting items, eliminating redundancies, and introducing new features that were identified during the feedback process. The rearrangement of items during the transition from the proposed to the refined framework is driven by the goal of improving the framework's overall structure, clarity, and utility. It aims to better capture the essential elements, relationships, and concepts relevant to the area of study, ensuring that the framework provides a comprehensive and effective guide for understanding during the development process of the application. The below steps detail the new framework restructuring:

- ❖ Review data themes: ensure all themes captured during the discussion are aligned and grouped.
- ❖ Identify key functions: identify the essential functionalities and features that weight management applications should include.
- ❖ Design framework architecture: develop the information architecture of the framework, which involves organizing and structuring the functions and features.
- ❖ Design iteration and refinement: redesign the framework based on the proposed design incorporate improvements and address any identified issues or challenges.

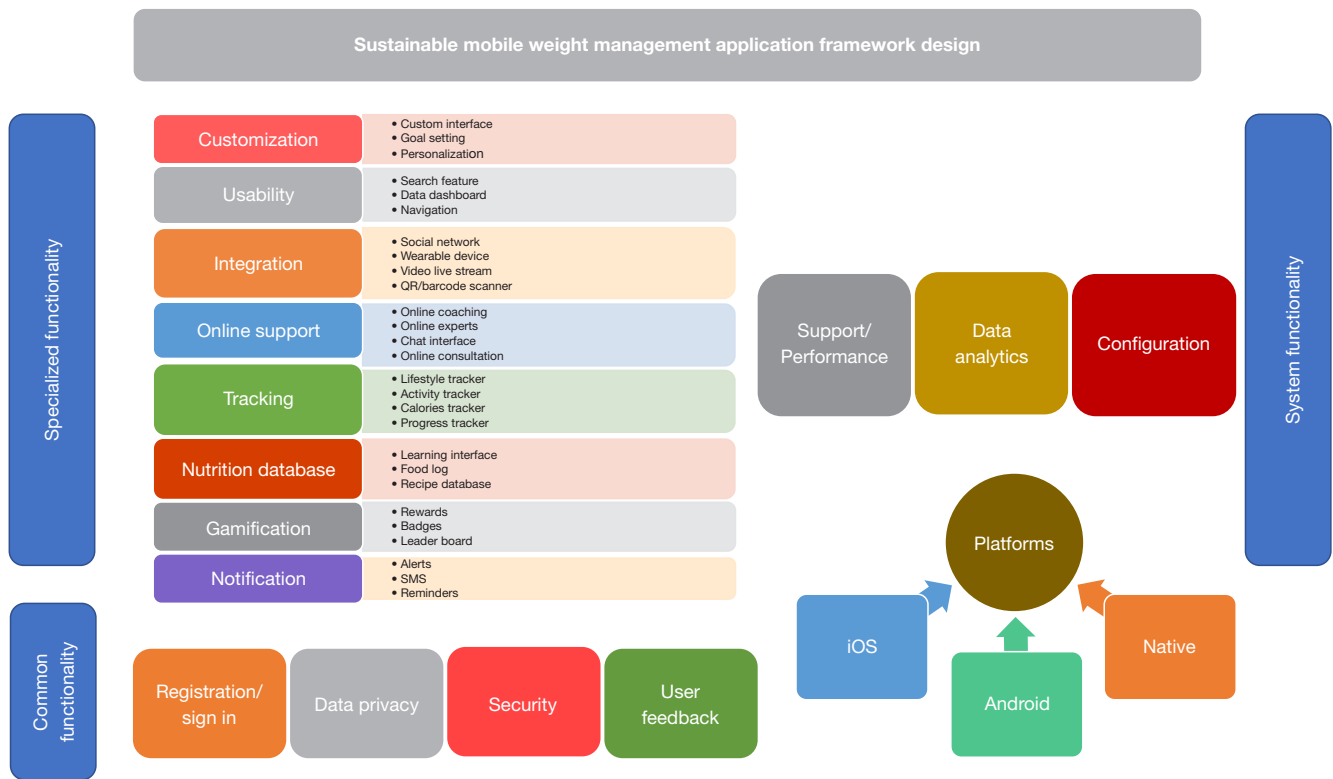
The following sections explain each functionality in detail.

### *Specialized functionalities*

The eight specialized functionalities are: (I) customization; (II) usability; (III) integration; (IV) online support; (V) tracking; (VI) nutrition database; (VII) gamification; and (VIII) notification.

#### **Customization**

Customization of weight management mobile applications is an effective strategy for promoting weight loss success and improving user engagement and adherence to weight loss goals. Customization is a key component of weight management mobile applications that helps users stay



**Figure 2** Sustainable mobile weight management application framework design. QR, quick response; SMS, short message service.

engaged and committed to their weight loss objectives. Experts claim that personalized interventions with a high degree of personalization are more effective than generic ones at promoting weight loss and improving health outcomes.

As stated by experts 1 and 2, MyFitnessPal is one instance of a mobile weight-management application that makes use of personalization. Users of MyFitnessPal can create their own specific goals for weight loss, keep track of their dietary consumption and exercise, and get recommendations and tailored feedback based on their results. It has been demonstrated that this degree of customization increases user interest and encourages successful weight loss. Another example is the Noom weight loss app, which utilizes artificial intelligence and personalized coaching to help users achieve their weight loss goals. The app provides customized meal plans, exercise plans, and daily challenges based on the user’s goals, preferences, and progress. As mentioned by experts, studies found that users who received personalized coaching through the app lost significantly more weight than those who used a generic weight loss app.

Based on the discussion with experts, they identified

three features related to customization:

- ❖ Custom interface;
- ❖ Goal setting;
- ❖ Personalization.

**Custom interface**

In mobile apps for weight management, a custom interface refers to the option to tailor the app’s appearance and functionality to the needs and preferences of the user. This may contain options like custom text sizes, color palettes, and dashboard layouts.

As explored by experts, one example of a weight management app with a custom interface is Lose It! The app allows users to customize their dashboard layout, choosing which data points they want to see and in what order. Users can also choose from a range of color schemes and font sizes to make the app more visually appealing and easier to use. Another example is MyPlate by Livestrong, which allows users to customize their home screen with their preferred meal tracking options, such as tracking macros or meal timing. Users can also choose from several different themes to customize the look and feel of the app.

By offering a more individualized experience, custom



interfaces in weight management mobile applications can increase user engagement and happiness. According to experts “Personalization is essential for user acquisition, engagement, and retention”.

### **Goal setting**

A mobile application’s goal-setting tool enables users to define and monitor SMART (specific, measurable, achievable, relevant, and time-bound) goals for their health and well-being. These objectives could relate to users’ physical activity, diet, sleep, or other areas of their health. An important component of weight management mobile applications is goal setting, which enables users to create precise, quantifiable, and doable objectives for losing weight and leading a healthy lifestyle. Setting goals can encourage behavior change over time, track progress, and motivate people.

As stated by experts 2 and 4, MyFitnessPal is one instance of a weight-management app that includes goal setting. The application enables users to log their food intake and activity, create specific weight loss goals, and receive tailored feedback and recommendations based on their success. Another illustration is the Noom weight reduction app, which uses individualized coaching and goal setting to assist users in losing weight. Users can set specific objectives for weight loss, exercise, and healthy eating on the app, and it offers continual encouragement and feedback to keep users on track. According to experts, users of the application who received personalized coaching were more likely to succeed in their weight loss efforts than users of more general weight loss apps.

### **Personalization**

The capacity to customize a mobile application for weight management to a user’s unique needs, preferences, and goals is referred to as personalization. This feature can include feedback depending on the user’s progress and preferences, as well as personalized nutrition plans, workout schedules, and feedback.

As mentioned by experts 1 and 2, Noom is one instance of a weight-management app that uses personalization. Based on the user’s goals, preferences, and progress, the app combines artificial intelligence and personalized coaching to generate customized meal plans, exercise schedules, and daily challenges. According to experts, users who utilized the app’s personalized coaching services lost more weight than those who only used a generic weight loss application. Another example is MyFitnessPal, which allows users to set personalized weight loss goals, track their food intake and exercise, and receive personalized feedback and

recommendations based on their progress. As stated by expert 5, users who received individualized feedback and social support were more likely to succeed in their weight loss objectives than those who did not.

### **Usability**

The degree to which a mobile application for weight control is simple to use, logical, and offers a satisfying user experience is referred to as usability. The capacity to track progress, keep track of food and exercise habits, and maintain motivation to lose weight are all benefits of effective usability in the context of weight management.

Usability, according to experts 2 and 5, includes several elements, including the app’s design, navigation, feedback systems, and user interaction features. A weight management system, for instance, should have an easy-to-use interface that enables users to set goals, track their diet and exercise, and get feedback on their development. Additionally, the app must offer helpful hints and tools to keep users inspired and on task. In addition, participants mentioned that good usability can increase user engagement and adherence to weight management goals. It can also help users overcome common barriers to weight loss, such as lack of motivation, time constraints, or confusion about how to track their progress.

Based on the discussion with experts, three features related to usability were identified, which are:

- ❖ Search feature;
- ❖ Data dashboard;
- ❖ Navigation.

### **Search feature**

The search feature in a weight management mobile application allows users to search for specific foods or meals within the app’s database to track their calorie intake and stay within their daily calorie goals.

Users can search for foods by name, brand, or category and the app will provide nutritional information such as calorie count, macronutrient breakdown, and serving size. This feature can be particularly useful for individuals who are trying to monitor their calorie intake and make healthier food choices.

As mentioned by experts 1 and 4, some weight management apps also allow users to scan the barcode of packaged foods to quickly add them to their food diary, and some even offer personalized meal recommendations based on the user’s dietary preferences and goals. The search feature is an important tool for individuals looking to manage their weight and make informed choices about their diet.

### ***Data dashboard***

The data dashboard feature in a weight management mobile application provides users with an overview of their progress toward their weight loss goals. It typically displays key metrics such as weight, BMI, calorie intake, and exercise activity.

Users can view their progress over time through graphs and charts, allowing them to track trends and identify areas where they may need to adjust their diet or exercise routine. Some data dashboard features may also provide personalized recommendations based on the user's goals and progress.

Based on expert feedback, the data dashboard feature can be a helpful tool for individuals looking to manage their weight, as it provides a visual representation of their progress and can help keep them motivated and on track. In addition, the data dashboard function is a key part of weight management mobile applications because it offers users insightful feedback on their weight reduction process.

### ***Navigation***

The navigation feature in a weight management mobile application refers to the functionality that allows users to easily access different sections of the app. Navigation typically includes a menu or toolbar that users can use to navigate between features such as tracking their meals, logging their exercise, or accessing their data dashboard. The navigation feature is important in weight management mobile applications because it helps users quickly find and access the features they need. This feature can be particularly useful for individuals who are new to the app and may not be familiar with its layout or features.

Effective navigation design can also enhance the user experience and make the app more engaging and user-friendly. For example, a well-designed navigation menu can make it easier for users to find and use the features they need, leading to increased user satisfaction and engagement. The navigation function of weight management mobile applications is important since it aids users in navigating the app and gaining access to the elements, they require to efficiently manage their weight. This is highlighted by experts during the online discussions.

### ***Integration***

Integration in a weight management mobile application refers to the ability of the app to connect with other devices or applications to enhance its functionality. For example, integration with wearable devices like fitness trackers or smart scales can allow the app to automatically track

exercise activity and weight, providing users with more accurate and detailed data.

Integration with other apps, such as food diaries or recipe apps, can also allow users to easily import data into their weight management app and track their calorie intake more effectively. This can help users to make more informed decisions about their diet and stay within their daily calorie goals. Integration is an important aspect of weight management mobile applications, as it can enhance the app's functionality and provide users with a more comprehensive and personalized experience.

As mentioned by experts, integration with other apps and devices was one of the most important factors in determining the effectiveness of weight management apps. The mobile applications that integrated with other devices and apps were more likely to be successful in helping users achieve their weight loss goals.

Based on the discussion with experts, they identified four features related to integration functionality as below:

- ❖ Social network;
- ❖ Wearable device;
- ❖ Video live stream;
- ❖ Quick response (QR)/Barcode scanner.

### ***Social network***

A social network in a weight management mobile application refers to a feature that allows users to connect with other users for support, motivation, and accountability. Social networks can provide a sense of community and help users stay motivated and engaged in their weight management efforts.

As stated by experts 1 and 5, using an online social network was associated with greater weight loss among overweight and obese adults. The users who were given access to a weight management mobile application that included a social network component lost more weight than those who were less engaged. Experts suggest that social networks can be effective for promoting weight loss and weight management in the context of a mobile application. However, it is important to note that social networks may not be suitable for everyone, and some users may prefer to engage in weight management efforts privately. Additionally, social networks should be designed with privacy and security considerations in mind to protect user data and ensure that users feel comfortable sharing their progress and engaging with other users. Moreover, social networks can be a useful feature in weight management mobile applications for those who find support and motivation through social connections.



### *Wearable device*

A wearable device in a weight management mobile application refers to a device that is worn on the body and is used to track physical activity, monitor heart rate, and/or track sleep patterns. Wearable devices can provide users with real-time feedback on their physical activity levels and can help to motivate users to engage in more physical activity.

During the discussion, experts suggested that wearable devices' function can be effective for promoting weight loss and weight management in conjunction with a lifestyle intervention. However, it is important to note that wearable devices should be used as part of a comprehensive weight management plan that includes healthy eating habits and regular physical activity. Additionally, wearable devices should be chosen based on the individual's needs and preferences, as different devices have different features and capabilities. Finally, it is important to consider privacy and security concerns when using wearable devices, as these devices may collect personal data that needs to be protected.

### *Video live stream*

A video live-stream feature in a weight management mobile application refers to a feature that allows users to participate in live-streaming video sessions with a coach or other users to receive guidance, support, and motivation for achieving their weight management goals. This feature can provide a more interactive and personalized experience for users and can help to create a sense of community and accountability among users.

IT experts 3 and 4 stated that video live stream features can be effective for promoting weight loss and weight management when combined with other weight management interventions such as coaching and goal setting. However, it is important to note that video live-stream features may not be suitable for everyone, and some users may prefer other forms of support or coaching. Additionally, video live-stream features should be designed with privacy and security considerations in mind to protect user data and ensure that users feel comfortable participating in live video sessions.

To sum up, video live stream features can be a useful feature in weight management mobile applications for those who find support and motivation through live video sessions. However, it is important to use this feature in conjunction with other weight management interventions and to choose a weight management mobile application that is personalized to user requirements and profile.

### *QR/Barcode scanner*

A QR/Barcode scanner feature in a weight management

mobile application refers to a feature that allows users to scan the barcode or QR code on packaged foods to retrieve information about the nutritional content of the food. This feature can help users make more informed choices about the foods they consume and can help users track their calorie intake and other nutritional parameters.

Experts 2 and 3 mentioned that QR/Barcode scanner features can be effective in promoting weight loss and weight management by helping users make more informed choices about the foods they consume. However, it is important to note that QR/Barcode scanner features rely on accurate and comprehensive nutritional information for packaged foods and may not be suitable for tracking the nutritional content of homemade or restaurant meals. Additionally, users should be encouraged to use QR/Barcode scanner features in conjunction with other healthy eating habits and to consult with a healthcare professional or registered dietitian to determine appropriate calorie and nutrient goals.

### **Online support**

An online support function in a weight management mobile application refers to a feature that allows users to receive support, coaching, and motivation from a healthcare professional or other trained personnel through online messaging or video sessions. This feature can provide personalized guidance and support to users and can help to create a sense of accountability and motivation. Experts have suggested that online support functions can be effective in promoting weight loss and weight management. The online application included features such as self-monitoring, goal-setting, and personalized coaching through video and online messaging.

Experts suggest that online support functions can be effective for promoting weight loss and weight management when combined with other interventions such as self-monitoring and goal setting. However, it is important to note that online support functions may not be suitable for everyone, and some users may prefer in-person support or coaching. Additionally, online support functions should be designed with privacy and security considerations in mind to protect user data and ensure that users feel comfortable sharing personal information online.

Online support functions can be a useful function in weight management mobile applications for those who benefit from personalized coaching and support. It is important to use this feature in conjunction with other weight management interventions and to choose a weight

management mobile application based on user requirements and preferences.

It is important to note that the development process for integrating an online support function into a weight management mobile application should be iterative, meaning that each phase should be revisited and refined as needed based on feedback from users and stakeholders. Additionally, privacy and security considerations should be integrated throughout the development process to ensure that user data is protected, and the application meets regulatory requirements. This includes implementing secure data storage, encryption, and user authentication measures. Incorporating user feedback and continuously evaluating the effectiveness of the online support function can also help to ensure that the application remains relevant and useful for users.

Based on the discussion with experts, they identified four features related to online support functionality as below:

- ❖ Online coaching;
- ❖ Online experts;
- ❖ Chat interface;
- ❖ Online consultation.

#### ***Online coaching***

Personalized coaching and assistance from a healthcare expert or other qualified persons can be provided to users through online messaging or video sessions when referring to an online coaching feature in a weight management mobile application. This feature can make users feel more motivated while also offering them assistance, support, and encouragement for attaining their weight control objectives. Experts contend that when used in conjunction with other therapies like goal-setting and self-monitoring, online coaching elements can effectively promote weight reduction and weight control. Online coaching in these apps can take many forms, such as chat or messaging features, video calls, or access to a personal coach or nutritionist. Mobile weight management apps that offer online coaching typically provide users with tools to track their daily food intake, exercise, and weight, and may also offer features such as recipe suggestions, meal plans, and progress tracking. Users may overcome obstacles and difficulties in accomplishing their weight management objectives with the aid of online coaching, which also offers a feeling of accountability and encouragement.

#### ***Online experts***

A weight management mobile app's "online experts" function enables users to connect with medical professionals or other subject matter experts for assistance, guidance, and

advice via online chatting or video conferences. Users of this feature may have access to evidence-based knowledge and tailored advice for attaining their weight control objectives. Experts declared that by giving users access to individualized advice and support from qualified healthcare professionals, online expert features can effectively promote weight reduction and weight control. The registered dietitian in the online application offered participants individualized guidance and information based on the latest research to help them reach their weight control objectives.

#### ***Chat interface***

A chat interface feature in a weight-loss mobile app is a function that lets users interact with a chatbot or virtual assistant to provide tailored advice, encouragement, and inspiration for attaining their weight-loss objectives. This feature can provide users with a simple and easy method to get advice and assistance for developing healthy behaviors, which can promote accountability and motivation. According to experts, chat interface elements can help people lose weight and maintain their weight by offering them individualized advice and assistance through a conversational interface. The weight control application's chatbot, which offered participants feedback, counsel, and inspiration, was created to be user-friendly and simple.

#### ***Online consultation***

A smartphone application for weight management with an online consultation function enables users to communicate through online video or message with a medical expert or other qualified individuals. This tool can help users to be engaged in the application and motivated by offering them specific assistance, advice, and support for reaching their weight control objectives. Online consultation tools, according to experts, can help users lose weight and maintain their weight by offering them individualized advice and assistance from qualified healthcare professionals. The weight management application's online consultation service offered participants evidence-based knowledge, individualized guidance, and support to assist them in reaching their weight control objectives.

#### ***Tracking***

An element that enables users to measure their calorie intake, physical activity, and other health-related behaviors to track their progress toward their weight management objectives is known as a tracking function in a mobile weight management application. This feature can give users a simple and quick method to keep track of their development and alter their behavior as necessary. According to experts,

monitoring features can help promote weight reduction and weight control by giving users an easy method to keep track of their progress and alter their behavior as necessary. Users could measure their food consumption, physical activity, and other health-related habits using the tracking feature in the weight management mobile application. The feature also offered comments and pointers to assist users reach their weight management objectives.

Following discussions with specialists, they determined the following four elements that pertain to the functionality of tracking:

- ❖ Lifestyle tracker;
- ❖ Activity tracker;
- ❖ Calories tracker;
- ❖ Progress tracker.

#### ***Lifestyle tracker***

A lifestyle tracker feature in a weight control mobile app is a tool that enables users to track several lifestyle elements in addition to tracking food consumption and physical activity, such as sleep, stress, and mood. Users may benefit from this feature since it can provide them with a more complete picture of their health and make it easier to see trends and triggers that may affect their attempts to lose weight. According to experts, lifestyle tracker features can help users achieve their weight management objectives by giving them a complete picture of their health and by assisting them in identifying trends and triggers that may influence their weight. In addition to tracking food intake and physical activity, the lifestyle tracker feature in the weight management mobile application also allows users to track other lifestyle factors like sleep, stress, and mood. It also offered feedback and pointers to help users reach their weight management objectives.

#### ***Activity tracker***

A weight management mobile app's "activity tracker feature" is a function that enables users to monitor their physical activity, including steps taken, distance traveled, and calories burnt. Users may be able to track their physical activity using this feature and alter their behavior as necessary to achieve their weight-management objectives. By giving users, a handy and accessible means to measure their physical activity and make necessary behavioral modifications, experts contend that activity tracker features can be useful for encouraging weight reduction and weight control. Users of the weight management mobile application were able to measure their steps taken, distance traveled, and calories burnt. The activity tracker component also offered comments and tips to assist users reach their

weight control objectives.

#### ***Calories tracker***

A mobile weight management application's "calories tracker feature" is a function that enables users to keep track of their caloric intake and measure how far they have come in their weight loss efforts. The usage of caloric tracker features, according to experts, can help users lose weight and maintain their weight by giving them an easy way to keep track of and control their calorie intake. Users of the weight management mobile application were able to measure their caloric intake using the calorie tracker function, which also offered comments and tips to assist users reach their weight-management objectives. By keeping track of your calorie intake, you can make more informed decisions about what you eat and make adjustments to your diet as needed to achieve your health and fitness goals.

#### ***Progress tracker***

A progress tracker feature in a mobile weight management application enables users to monitor their advancement toward weight management objectives like weight reduction or increased fitness. The tool gives users an easy method to keep track of their development over time, which may be inspiring and support continued adherence to weight control strategies. Some progress tracking options in mobile weight management apps also provide users advice and comments to assist them reach their objectives. As expressed by experts, the progress tracker in a mobile app may include features such as a list of tasks or milestones that need to be completed to achieve the goal, as well as a timeline or schedule for completing each task. Users can mark off each task as it is completed, and the progress tracker will update to reflect the progress made.

#### ***Nutrition database***

A nutrition database function in a weight management mobile application refers to a feature that allows users to search for and track the nutritional content of foods. This feature can provide users with a convenient and accessible way to monitor their calorie and nutrient intake, which is an important component of weight management. The nutrition database function in a weight management mobile application can be designed to allow users to search for and track the nutritional content of various foods, including packaged foods and restaurant meals. The feature can also be designed to provide users with feedback and guidance on how to improve their nutrient intake and make healthier food choices. As stated by experts 4 and 5, users using weight management mobile applications with a

nutrition database feature had access to a database of foods and their nutritional information. Users could search for specific foods or scan the barcode of packaged foods to automatically input nutritional data into their tracking log. The mobile application provides users with personalized feedback and guidance to help them make healthier food choices.

Following consultations with experts, they identified the following three aspects of nutrition database functionality:

- ❖ Learning interface;
- ❖ Food log;
- ❖ Recipe database.

#### ***Learning interface***

A learning interface feature in a mobile weight management app is a function that gives users knowledge and education about healthy eating, weight management, and lifestyle choices. This feature may be created to offer users individualized feedback and direction based on their requirements and preferences. As per the discussion with experts, the learning interface feature in a weight management mobile application can be designed to provide users with a variety of educational resources, such as articles, videos, quizzes, and interactive tools. The feature can also be designed to provide users with personalized feedback and guidance based on their individual needs, preferences, and progress toward their weight management goals. The feature may provide users with information about the nutritional content of different foods, tips for meal planning and preparation, and advice on how to make healthier food choices when eating out. The feature may also provide users with guidance on how to incorporate physical activity into their daily routine and how to set and achieve realistic weight management goals.

#### ***Food log***

Users may track their food consumption and keep track of their calorie and nutrient intake using the food log function in a mobile weight control application. This feature can be a helpful tool for managing weight since it gives users a method to keep an eye on their food consumption and modify their diet as necessary. The food log feature in a weight management mobile application can be designed to allow users to input the foods they eat throughout the day and track their calorie and nutrient intake. The feature may also provide users with feedback and guidance on how to make healthier food choices and adjust their diet to achieve their weight management goals.

#### ***Recipe database***

A weight management mobile app's recipe database function

enables users to look up and access wholesome dishes that are catered to their unique dietary needs and tastes. As it gives users a means to locate and prepare wholesome meals and snacks that support their weight control objectives, this feature might be a helpful tool for weight management. As cleared by experts, users may be able to search for recipes using a range of parameters in the recipe database component of a weight management mobile application, including dietary preferences, ingredients, and cooking times. Users may also receive details on the nutritional value of each dish, including calorie and nutrient data, through the function. In addition to providing users with access to healthy recipes, the recipe database feature may also provide users with guidance and feedback on how to make healthier food choices and adjust their diet to achieve their weight management goals. For example, the mobile application may recommend healthy substitutions for high-calorie or high-fat ingredients or provide users with tips for meal planning and preparation.

#### **Gamification**

The gamification function is a feature that uses game-like elements, such as points, badges, and challenges, to motivate and incentivize users to engage in healthy behaviors and achieve their weight management goals. This feature can be a useful tool for weight management, as it provides users with a fun and engaging way to track their progress and stay motivated. Based on the discussion, a mobile weight management application's gamification feature may be created to provide users with a range of game-like aspects that encourage and reward healthy behavior. For instance, the feature may grant points for monitoring calorie consumption or finishing physical exercise, or it may reward badges to users who reach certain weight control milestones. To promote healthy behaviors, the function may also provide users with challenges, such as daily step targets or weekly menu planning obligations. In addition, the gamification function may offer users feedback and direction on how to make healthier food choices and modify their diet to reach their weight management objectives in addition to giving them a fun and engaging way to track their progress and remain inspired. For instance, based on the users' dietary choices and limits, the mobile application may suggest to users' nutritious meals and snacks.

Experts clarified the main features that come with the gamification function in the mobile application as follows:

- ❖ Rewards;
- ❖ Badges;

❖ Leader board.

### **Rewards**

A rewards feature in a weight management mobile application is a feature that offers users incentives or rewards for achieving specific weight management goals or engaging in healthy behaviors. This feature can be a useful tool for weight management, as it provides users with a tangible and motivating reason to stay on track with their weight management interventions. As mentioned by experts, rewards function may be made to provide users with a range of incentives or prizes for reaching their goals or following healthy habits. For instance, the feature can supply users with coupons for nutritious meals or exercise courses, or it might award users with badges or points that can be exchanged for gifts. In addition, users may receive feedback and instructions on how to choose healthier foods and modify their diets to reach their weight management objectives in addition to incentives and awards from the awards function, which is available to users. Following their dietary choices and limits, the mobile application might, for instance, suggest to users' healthful meals and snacks. The functionality can be created to accommodate unique tastes and requirements as well as to offer users a range of motivational rewards. Users may receive benefits from the feature, for instance, discounts on outdoor equipment or subscriptions to healthy food delivery services, depending on their preferences. The feature can help to maintain motivation over the long term and support sustainable weight loss.

### **Badges**

A weight management mobile app's badges feature awards users with virtual badges or medals to monitor their progress and recognize their accomplishments. As it gives users a pleasant and encouraging way to track their progress and keep on track with their weight management goals, this feature might be a beneficial tool for weight management. Badges feature can be created to provide users a selection of virtual badges or medals for attaining particular weight control milestones or practicing healthy habits. For instance, the feature might provide badges to users who report their food consumption for a predetermined number of consecutive days or who reach a predetermined weight loss target. In addition, the badge feature may offer users feedback and direction on how to choose healthier foods and modify their diets to meet their weight control objectives in addition to rewarding and recognizing them virtually. For instance, based on the users' dietary choices and limits, the mobile application might suggest

to users' nutritious meals and snacks. Given that it gives users a sense of accomplishment and acknowledgment of their success, the function can be a motivational tool for weight management. The feature can encourage long-term sustainable weight loss by monitoring progress and acknowledging accomplishments.

### **Leader board**

A leaderboard feature in a weight management mobile app compares the accomplishments and progress of users to those of other users of the same app. Given that it gives users a sense of camaraderie and healthy competition to stimulate and encourage healthy behaviors, this feature can be helpful for weight management. Leaderboard features can be created to show users' progress and accomplishments in a variety of ways, for as by ranking them according to their degree of physical activity or weight loss. Users may be able to interact with one another using the feature and exchange guidance on a healthy diet and exercise routine. The leaderboard feature may offer users comments and directions on how to make healthier food selections and modify their diet to reach their weight management objectives, in addition to fostering a sense of community and healthy competition. For instance, based on the users' dietary choices and limits, the mobile application might suggest to users' nutritious meals and snacks. Additionally, it is critical to watch out for how the leader board function is applied so as not to put users under unwarranted stress or strain.

### **Notification**

This feature enables the app to give users notifications, alerts, and updates to help them stay on track with their weight management objectives. As it gives users reminders and encouragement to engage in healthy habits and adhere to their weight management plan, this feature might be a helpful tool for weight management. A mobile weight management application's notification feature can be created to give users reminders and alerts for a variety of reasons, such as tracking food consumption, reminding users to exercise, or giving users feedback on their progress. These messages can be sent at different times throughout the day and can be tailored to the user's needs and preferences. As mentioned by experts, the notification feature may also offer users feedback and advice on how to change their diet and make healthier food choices to meet their weight management objectives, in addition to serving as a reminder and a source of encouragement. For instance, based on the users' dietary choices and limits, the mobile application



might suggest to users' nutritious meals and snacks. As it gives users prompts and encouragement to adopt healthy habits and adhere to their weight management plan, the function can be a motivational tool for weight management. The function can aid users in maintaining motivation and supporting long-term sustainable weight loss by offering them regular feedback and direction.

Experts clarified the main features that come with the Notifications function in the mobile application as follows:

- ❖ Alerts;
- ❖ Short message service (SMS);
- ❖ Reminders.

### **Alerts**

Users can set reminders or notifications for various weight management-related activities using the alerts function of a mobile weight management application. These alerts can be configured to remind users of a range of things, such as recording their meals, exercising, or measuring their weight. As expressed by experts, the users can apply a daily alert to log meals at times of the day. Ensuring that they are monitoring their daily dietary intake, can help them stay responsible for their weight loss objectives. For that, users can apply an alert to work out at a particular hour or on days of the week. This can guarantee that they are engaging in regular physical activity and help them stay on track with their fitness objectives. Alerts often relate to more critical notifications that call for immediate action, such as notifications regarding missed workouts or medicine reminders. These alerts are intended to get the user's attention and motivate them to act immediately.

### **SMS**

SMS is a function that enables users to get text messages including advice, recommendations, reminders, or inspirational messages about weight loss. Users of mobile weight-loss applications can get text messages with advice, suggestions, reminders, or inspirational messages about weight loss by using the SMS capability. As stated by experts 3 and 4, users can join up to get daily or weekly SMS messages with nutritious cooking or exercise suggestions. By giving them fresh ideas and inspiration, might aid them in maintaining their motivation and engagement with their weight loss objectives. Similarly to this, a user might get SMS messages reminding them to keep a food journal, weigh themselves, or work out frequently. This can guarantee that they are following their weight management strategy and help them encouraged to reach their weight loss goals. Finally, some apps for managing weight may provide SMS-based coaching or assistance, allowing users

to text a coach or support team to receive individualized direction and counsel. The weight management app, a coach, or support staff connected to the app may send these notifications. Users may find that receiving regular encouragement and coaching via SMS messages is an easy and effective approach to staying motivated and on track with their weight loss objectives.

### **Reminders**

A mobile weight-loss app's reminders function is a tool that enables users to schedule reminders or notifications for various weight-loss-related tasks. These reminders can be set up for a variety of objectives, such as reminding users to record their meals, to drink water, or to measure their weight. For instance, a user may apply a reminder to log meals at times of the day. By ensuring that they are monitoring their daily dietary intake to reach their weight loss objectives. For that, users can apply a reminder to consume water throughout the day at regular intervals. To make sure users are drinking enough water, the reminders can assist them in staying hydrated and preventing overeating. Finally, users can apply a reminder to take regular weight measures, such as once a week. This feature can enable individuals to monitor their development over time and maintain motivation to pursue their weight loss objectives. This information was clarified by experts during the online discussion. Typically, reminders are more generic notifications that are used to remind users to accomplish tasks connected to weight management at set intervals of time or regularly. Reminders might be set up, for instance, to remind users to record their meals, weigh themselves, or regularly drink water.

To summarize, alerts are used for urgent notifications that call for immediate attention. Short message service is a feature that enables users to receive text messages with weight management-related information, tips, reminders, or motivational messages while reminders are used for regular notifications that remind users of weight management-related activities.

### **Common functionality**

In most mobile applications, there are essential functions that should be part of the systems. As stated by experts 1 and 5, the below functionalities were suggested during the discussion.

- ❖ Registration/sign in;
- ❖ Data privacy;
- ❖ Security;

- ❖ User feedback.

### **Registration/sign in**

Registration/sign-in in a mobile application refers to the process of creating an account or logging into an existing account to access the app's features and functionality. This method normally needs users to enter certain information, such as their name, email address, and password, which is then saved securely by the app. As stated by experts 1, 2 and 4, mobile apps, including those for weight management, must include this process to personalize the user experience, give users access to their data, and track their progress. Users can set goals, monitor their food intake and physical activity levels, get personalized recommendations, and connect with other users for support by creating an account. In addition, registration/sign-in assists in protecting user data privacy and security by granting access to app functionalities. The app can verify the user's identity and protect their data from unauthorized access or use by requiring users to create a special account.

### **Data privacy**

In a mobile application, data privacy refers to preventing unauthorized access to, use of, or disclosure of user data and information. This includes private data, such as name, email, and other identifying information, as well as health data, like weight, diet, and levels of physical activity, which are frequently gathered by weight management mobile applications. As expressed by experts, weight management mobile applications should have security features like encryption, authentication, and access restrictions to prevent user data from unauthorized access or usage to guarantee data privacy. Apps should also abide by any applicable data privacy laws, such as the General Data Protection Regulation (GDPR) in the European Union or the Health Insurance Portability and Accountability Act (HIPAA) in the United States, which specify how to handle and safeguard user data. Additionally, mobile applications for weight management should be open and honest about how they gather and use user data, providing users with concise privacy policies that explain what information is gathered, how it is used, and with whom it is shared. Users should have control over their data, including the ability to delete or export it and be given the choice of opting in or out of data sharing.

### **Security**

Security in a mobile application refers to the measures taken

to protect the app and its users from unauthorized access, use, or manipulation of data. This includes protecting user data, as well as the app itself, from cyberattacks and other security threats. To ensure security, weight management mobile applications should incorporate a range of security measures, including encryption, authentication, and access controls. Sensitive user information cannot be intercepted or stolen thanks to encryption, which is used to protect data both in transit and at rest. Users' identities are confirmed by authentication, which also serves to guard against illegal access to the application or user data. Access controls are used to limit access to specific app features or data, making sure that only users with the proper authorization can view or modify sensitive data. This information was clarified during the discussion sessions. In addition to these technical measures, weight management mobile applications should also employ best practices for secure application development, including regular code reviews, testing, and vulnerability assessments. Apps should also be updated regularly to address security vulnerabilities and other issues that may arise over time.

### **User feedback**

The comments, advice, and criticism offered by users of a mobile application are referred to as user feedback. The app developers can utilize this feedback to gain an important understanding of user preferences, wants, and requirements to enhance the app's features, functioning, and user experience. Experts mentioned that in weight management mobile applications, user feedback can be particularly beneficial in helping developers understand how users are using the app, what features are most useful, and what areas may require development. User opinions can be gathered in a variety of ways, including through social media platforms, app store reviews, and in-app surveys. Developers should be receptive to user comments and recommendations to effectively incorporate user feedback into a weight management mobile application. They should also take action to resolve problems as they come up. This can be adding new features to the application, making it easier to use, or giving users more tools or support.

### ***System functionality***

The below features have been identified based on the expert discussion, that should be part of the application which are:

- ❖ Configuration;
- ❖ Data analytics;

- ❖ Support/performance;
- ❖ Platform: iOS, Android, Native.

### System configuration

The system configuration function in a mobile weight management application typically refers to the settings or options that allow users to customize and personalize their experience within the application. These settings can vary depending on the specific application. Experts 1 and 5 stated that this function has multiple capabilities such as user profile setting, privacy setting, and measurement setting. Users may have the option to indicate their dietary preferences or restrictions within the system configuration. This can include preferences such as vegetarian, vegan, low-carb, or specific allergies or intolerances. By considering these preferences, the application can provide suitable meal plans and recipe suggestions. Also, users can select their preferred measurement units, such as kilograms or pounds for weight, centimeters or inches for height, and metric or imperial units for other measurements. This ensures that the application displays information in the units that the user is most comfortable with.

### Data analytics

The data analytics function in a mobile weight management application involves the collection, analysis, and interpretation of user data to provide insights, tracking, and recommendations for effective weight management. Experts say that by analyzing historical data, data analytics can identify patterns and trends in a user's weight management journey. This can help users understand factors that contribute to their progress or challenges. For example, the application may identify correlations between certain dietary choices and weight fluctuations or patterns of increased physical activity leading to better outcomes. Data analytics can assist in tracking user goals and providing reminders to stay on track. The application can analyze the user's progress toward their weight loss or weight gain goals and send reminders or notifications to encourage adherence to their plan. This feature helps users maintain consistency and motivation in their weight management efforts. Also, the app can generate insights and feedback based on user data. These insights may include recommendations for adjustments in calorie intake, exercise frequency, or other aspects of the weight management plan. The application can also provide feedback on progress, highlighting achievements or areas for improvement based on the data analysis.

### Support/performance

This function in a mobile weight management application refers to the features and capabilities that optimize the application's performance, usability, and user experience. In terms of responsiveness and speed, mobile applications should have fast and responsive performance to ensure a smooth user experience. Slow loading times or delays in response can negatively impact user engagement and satisfaction. As stated by experts 2 and 4, an intuitive user interface is crucial for mobile weight management apps. It should be designed with user-friendly navigation, clear labeling, and intuitive interactions to enhance usability and facilitate seamless user interactions. Also, apps should be compatible with a wide range of mobile devices and operating systems to ensure accessibility for users. Compatibility issues can limit user adoption and usage. In addition, apps should be optimized for battery efficiency to minimize battery consumption and prolong device usage. Excessive battery drain can be a significant concern for users.

### Platform

In the context of mobile applications, the term "platforms" refers to the different operating systems or mobile platforms on which the app is available such as iOS, Android, and Native. Mobile weight management applications should be available and compatible across different mobile operating systems and devices. As stated by experts 4 and 5, cross-platform compatibility ensures that it can be used seamlessly on various operating systems such as iOS and Android. This allows users to access the app regardless of their preferred mobile platform. Also, experts declared that offering a web-based version of the mobile weight management application expands its accessibility beyond mobile devices. Users can access the app through web browsers on desktops, laptops, or any device with an internet connection, providing flexibility in how users engage with the app. Weight management applications need to consider multiple platforms to reach a broader user base and accommodate the preferences and devices of different individuals.

### Discussion

Several essential aspects of weight management mobile applications that are critical to their effectiveness in helping users achieve and maintain a healthy weight have been highlighted during the expert's discussions. Results from discussions provide solid information and

feedback related to the main functions and features of sustainable mobile weight management applications. Eight major functionalities were observed: (I) customization; (II) usability; (III) integration; (IV) online support; (V) tracking; (VI) nutrition database; (VII) gamification; and (VIII) notification. In addition, common functionalities were identified as (I) registration/sign in; (II) data privacy; (III) security; and (IV) feedback. Moreover, system setup has been conducted as (I) configuration; (II) data analysis; and (III) support/performance along with the application platforms required for the system development environment as (I) Android; (II) iOS; (III) Native.

The weight loss mobile application that allowed users to customize their goals, preferences, and feedback messages made them more likely to use the app regularly and achieve their weight loss goals (15). Customization is a key function in mobile weight management apps because it enables users to tailor their weight loss journey to their unique needs, preferences, and goals. These functions give the user more personalization for instance, someone who is vegetarian can customize their meal plan to exclude meat, or someone with a busy schedule can customize their exercise routine to fit into their day. Customization can help users stay motivated by providing them with a sense of ownership over their weight loss journey. When users can create a plan that fits their individual needs, they are more likely to stick to it and achieve their goals. In general, customization is a key feature in mobile weight management apps because it enables users to design a plan that is specific to their needs and preferences, which improves results and boosts user satisfaction.

The usability of a mobile app for weight management that included gamification elements like incentives and challenges to boost user engagement had a high rate of user satisfaction and was successful in encouraging weight loss (16). Usability is an important function in mobile weight management applications because it affects how easily and effectively users can interact with the application. These functions give the user satisfaction in terms of ease of use and navigation. An application with good usability can lead to increased user satisfaction and engagement. Moreover, accessibility is an important part of application usability as an application that is easy to use and navigate is more likely to be used by a wider range of people, including those with disabilities or who are less tech-savvy. An application with good usability can help users complete tasks more efficiently. In summary, usability affects how easily and effectively users can interact with mobile weight

management applications, making it an essential feature. While poor usability can result in user annoyance and application abandonment, good usability can increase user satisfaction, and retention, and produce better results.

The integration of the apps with the weight loss application was effective in improving weight loss outcomes and user engagement (17). In addition, the integration of the app with the wearable tracker was effective in promoting physical activity and weight loss (18). Integration is an essential feature in mobile weight management apps because it enables users to connect with other applications, hardware, and online resources to improve their weight loss efforts. Integration with other apps and devices makes it more convenient for users to track their progress. For instance, integration with a wearable device can automatically log workouts and activity, saving users time and effort. Also, integration with social networks provides users with additional motivation through connections with other users who are also trying to lose weight, providing encouragement and accountability. In terms of learning, integration with video stream leads to more motivation and better outcomes. In addition, integration with other apps and devices can help users track their progress more comprehensively. For example, a barcode scanner gives more detailed nutrition information, allowing users to make more informed decisions about their diet.

Mobile applications for weight management that included online support were successful in encouraging weight loss and increasing user engagement, especially among those who participated more actively in online communities (19). The outcomes of a mobile application for weight management that included online counseling and assistance from a qualified dietician were successful in encouraging weight loss and nutritional improvement (20). Mobile weight management apps that offer online support are essential because they give users access to a network of people who share their goals and who can provide encouragement, support, and guidance. Users might find inspiration to stick with their weight loss objectives online. Users can gain support and encouragement by interacting with individuals who are also attempting to reduce weight, which can keep them motivated and on track. Online support is a key function of mobile weight-management apps since it offers users flexibility, incentives, accountability, and expert advice. Users can find the support and motivation they need to succeed by interacting with people who are also trying to lose weight.

The outcomes of a weight control mobile app that

included self-monitoring of diet and exercise indicated that users who frequently tracked their food intake and physical activity saw the most benefits from the app in terms of weight loss and dietary habits (21). In addition, smartphone applications for managing weight that automatically tracked physical activity using wearable activity monitors were successful at encouraging exercise and weight loss, especially among users who utilized the automatic tracking option (22). Tracking is an important function in mobile weight management applications as it allows users to monitor their progress and make informed decisions about their diet and exercise. Users can utilize tracking to become more conscious of their dietary and exercise-related habits and behaviors. Users may spot patterns and adjust as necessary by tracking what they eat and how much exercise they get. In terms of lifestyle tracking, users can adjust their daily routine with reliable outcomes as some daily activities may lead to an inactive lifestyle. Activity trackers allow users to monitor their daily physical activities by tracking their steps, distance, and active minutes, users can identify opportunities to increase their activity level and reduce sedentary behavior. An activity tracker can provide users with more accurate information about their physical activity levels than self-reporting. A calorie tracker is also essential future because it allows users to monitor their daily calorie intake and make informed decisions about their diet. By logging their meals and snacks, users can identify areas where they may be consuming too many calories and make changes as needed.

Nutrient databases of well-known mobile weight-management apps utilize exercise caution when depending on nutritional databases for reliable nutrient information because of the nutrient databases' varying levels of accuracy and completeness (23). Users who frequently used the nutrition tracking tool and received individualized dietary suggestions felt the app helped promote weight reduction and improve eating habits (24). The effects of a weight management mobile application that incorporated gamification elements, such as challenges, badges, and social support were effective in promoting weight loss and improving user engagement, particularly among users who were more motivated to lose weight and who were more engaged with the gamification elements (25). Nutrition database in mobile weight management application is an important function as users can easily access information about the nutrient content of different foods. A nutrition database can also educate users on the nutrient composition of various foods. Users can make better dietary selections

and gain a better understanding of nutrition by learning about the nutritional value of various foods. A food log can increase users' awareness of their food intake throughout the day. By logging their meals and snacks, users can identify areas where they may be consuming too many calories or not getting enough of certain nutrients. Moreover, the recipe database feature is essential as users can access a variety of healthy recipes and plan their meals accordingly. By providing a variety of healthy recipes, users can easily plan their meals and make informed decisions about what to eat.

Gamification is a key function in mobile applications as it makes the weight management journey more engaging, fun, and motivating for the users. By incorporating game-like elements such as challenges, rewards, and progress tracking, users can feel a sense of accomplishment and be motivated to continue making progress. Gamification can increase user engagement with the weight management application by making the app more interactive and enjoyable. In addition, a leader board that ranks users according to how well they are doing in their efforts to lose weight. Based on metrics like the amount of weight lost, calories burned, or steps walked, the leaderboard often displays the top-performing users.

Using daily tailored notifications to encourage self-monitoring of nutritional intake, a weight control mobile application was more successful in encouraging weight loss and improving eating habits among users who were more interested in the notification feature (26). The notification function is one of the top key features aligned with mobile applications for weight management. Users may receive notifications to remind them to log their meals, monitor their progress, or finish other chores relevant to their weight reduction journey. This can assist users in maintaining accountability and preventing the forgetting of critical acts that are necessary for their success. Notifications can also motivate users by sending encouraging messages or reminders of their progress toward their goals. Also, provide users with feedback on their progress and performance. By receiving regular updates on their progress toward their goals, users can make informed decisions about their diet and exercise and adjust their goals as needed.

For the common functionalities of the mobile application, registering the user in the app will allow the other part of the system to capture the main aspects of the user's preferences, such as age, health, and current level of weight. Data privacy and security were also discussed, as this is an essential part of any mobile application. This



is to ensure data and the system are secure, and users can trust the application and engage more with the system. Along with that, user feedback was addressed, as this function helps users align with application enhancements and feature improvements. Moreover, system configuration has been discussed to ensure that it can be changed and updated. Also, the system can analyze user input data to provide accurate feedback and results. Another part was about system support and performance, as most mobile applications require these functions to ease use and ensure user engagement. Besides this, experts have declared that applications should be implemented on different platforms, such as (I) Android; (II) iOS; and (III) Native. This is to ensure that users with different mobile platforms will have access to the mobile application with all the required capabilities.

In summary, conducting an expert review provides several benefits beyond what is available in the literature and other research. While other research may provide a comprehensive overview of a topic, an expert review provides a more nuanced and practical understanding of how to apply that knowledge in practical settings. We gain from expert discussions valuable insights into the practical application of the information, and they offer guidance on how to apply this data to application development. Also, expert discussions support the study by contextualizing the information available in the other research within a specific context and providing a more tailored understanding of the topic. Moreover, validation of initial framework factors, identification of any gaps or limitations, and categorization of features into functionalities.

## Conclusions

In conclusion, several key features in mobile weight-management apps might aid users in achieving their weight-loss objectives. Users can benefit from awareness, accountability, motivation, personalization, education, feedback, social support, and engagement by using tools such as a caloric tracker, nutrition database, food log, leaderboards, gamification, and notifications. Users may make wise food decisions, adhere to their goals, and get better results by implementing these features into weight management applications. Weight management systems must use these features morally and sensibly, taking into account the potential negative effects on users' physical and emotional health. In addition, during the discussion, common functionalities were defined along with platforms

and system configurations. The application platform is defined based on mobile system environments such as Android and Apple. The obtained findings will contribute to the development of a design framework for sustainable mobile weight management applications to promote long-term weight management and the intention to use mobile applications. The adoption of the framework would enable application developers to design weight management applications that would meet the current needs of health users in managing their weight. This study has a limitation on the number of participants and the area of each participant in terms of experience. Future direction should involve participants from different organizations such as diet centers and health care. In addition, to involve users in experts' discussions to ensure that the application is more applicable and usable, especially in Oman. Moreover, involve IT experts' revision after the feedback from user testing in the user interface design to support in the enhancements required in the mobile application.

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## Footnote

*Data Sharing Statement:* Available at <https://mhealth.amegroups.com/article/view/10.21037/mhealth-24-4/dss>

*Peer Review File:* Available at <https://mhealth.amegroups.com/article/view/10.21037/mhealth-24-4/prf>

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*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted by the Declaration of Helsinki (as revised in 2013). The study was approved by Universiti Tenaga Nasional (UNITEN) and informed consent was taken from all the participants.

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