Understanding User Needs for a Mobile Health Application: Insights into Fasting, Training, and Muscle Development

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Abstract

Mobile Health (mHealth) applications are increasingly used to support intermittent fasting, fitness training, and nutrition tracking. However, existing solutions remain fragmented, focusing on isolated domains without addressing users' holistic health needs. This study aimed to explore user needs and preferences for an integrated mobile health application that combines fasting, training, and muscle development, emphasizing feature importance, usability expectations, and privacy concerns. A mixed-methods approach was used: a survey (n = 50) captured demographic profiles, feature prioritization, and usability expectations, while interviews (n = 10) explored user experiences and challenges. Quantitative data were analyzed using descriptive statistics, while qualitative interview responses were grouped into key themes through manual coding and interpretation. Results from both approaches were triangulated to strengthen the validity and reliability of findings. Users prioritized workout progression tracking (M = 4.94, SD = 0.18, 95% CI [4.89, 4.99]) and protein/macro monitoring (M = 4.20, SD = 0.42) over fasting timers (M = 2.92/5) or motivational features (M = 2.88). Usability expectations were high (Ease of Use = 6.06/7; System Capability Fit = 6.36/7), and privacy was a non-negotiable factor (M = 5.00/5). Themes revealed frustrations with incomplete exercise libraries, fragmented features, and lack of personalization. The study highlights the need for integrated, user-centered mHealth applications that unify fasting, training, and nutrition while embedding privacy-by-design principles. Future work will advance this study through prototype development and usability testing using SUS and UMUX-Lite metrics.

Keywords: Mhealth, User Needs, Intermittent Fasting, Training, Muscle Development, Nutrition Tracking, Usability, Privacy, Mixed Methods

1. Introduction

MHealth applications have become an essential tool in modern health management, offering users the ability to track diet, exercise, and wellness goals from their smartphones. The growth of these applications reflects a global shift toward digital health and self-monitoring practices [1]. Among the most popular categories are apps for intermittent fasting, training, and nutrition, which respond to increasing demand for weight control, metabolic improvement, and muscle development [2]. These domains are particularly relevant in addressing the growing prevalence of obesity and lifestyle-related diseases, while also catering to fitness enthusiasts and athletes who seek structured guidance.

Despite widespread adoption, a number of challenges remain in the effective use of mHealth apps. Prior research has shown that many existing applications lack integration across fasting, training, and nutrition features, forcing users to rely on multiple apps simultaneously [3], [4]. This fragmentation not only reduces usability but also interrupts user engagement over time. Furthermore, limited personalization and adaptive features mean that users often receive generic recommendations, which may not match their individual goals or physiological needs [5]. Such shortcomings contribute to lower long-term retention rates and reduced effectiveness in achieving desired health outcomes.

Another key challenge is usability and User Experience (UX). Even when apps offer a wide range of features, users may abandon them if navigation is cumbersome or task flows are overly complex. Studies confirm that factors such as perceived usefulness, simplicity, and enjoyment strongly influence whether users continue to use mHealth apps [6]. At the same time, privacy and trust issues remain a major barrier. Users express growing concerns about data sharing, lack

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of transparency in privacy policies, and limited control over sensitive health information [7]. As mHealth apps increasingly integrate with wearables and cloud ecosystems, new technical challenges arise in ensuring accuracy, reliability, and synchronization of health data across platforms [8].

These challenges highlight a clear research gap: while prior studies have analyzed the usability or effectiveness of existing apps, fewer have focused specifically on understanding user needs across fasting, training, and muscle development in an integrated framework. Without this understanding, developers risk building applications that fail to meet user expectations, resulting in poor adoption and reduced health impact.

Therefore, the aim of this study is to explore user needs and preferences for a mobile health application that integrates fasting, training, and muscle development. In particular, this research seeks to identify which features users consider most essential in supporting intermittent fasting, structured training, and muscle development, while also examining the challenges and pain points, they encounter when using current mHealth applications. At the same time, the study investigates user expectations related to usability, personalization, and privacy in next-generation healthy life assistant applications. By addressing these aspects, the paper contributes actionable insights that can guide the design and development of mHealth applications that are more user-centered, engaging, and effective.

2. Literature Review

MHealth applications have become a rapidly growing segment of digital health, with wide applications in fitness, nutrition, and chronic disease management. Systematic reviews highlight the increasing role of mobile applications in promoting physical activity, dietary adherence, and lifestyle change [1]. Behaviour Changes Techniques (BCTs) embedded within diet and fitness apps are recognized as significant determinants of effectiveness, yet the quality and consistency of implementation vary widely [9], [3]. Moreover, the global adoption of fitness and nutrition applications has been fueled by both consumer interest and the COVID-19 pandemic, which accelerated remote health and self-management practices [10], [11]. Despite their promise, concerns remain about usability, engagement, and long-term adoption [4], [12]. However, many of these reviews aggregate heterogeneous app types without standardized evaluation criteria, making it difficult to compare effectiveness across interventions. The methodological rigor also varies, with several studies relying on short-term usage data or self-reported outcomes, limiting longitudinal validity.

Within the domain of Intermittent Fasting (IF) and nutrition management, several studies report positive outcomes such as weight reduction, improved lipid profiles, and better metabolic markers [2], [13]. Apps like DoFasting and Fastic have shown promise in facilitating adherence to fasting protocols, though results vary depending on study design and feature quality [14]. Meta-analyses confirm that IF interventions are effective for overweight and obese populations, yet highlight limitations in app-based evidence and heterogeneity in protocols [15], [16]. Nutrition-focused apps also provide macro tracking and meal logging, but challenges include user burden, low accuracy of food databases, and limited personalization [17], [18]. These gaps suggest that fasting and nutrition apps often fall short of meeting comprehensive user needs, particularly when training and muscle development goals are considered. Notably, most fasting studies employ small, homogeneous samples and lack control groups, reducing generalizability. App-based trials also rarely monitor adherence objectively, relying on self-report data that may inflate compliance rates.

Research on training and muscle development apps has similarly documented both opportunities and limitations. Fitbod and Apple Fitness, for instance, offer structured workout plans and exercise libraries, but studies reveal a lack of adaptive progression models and insufficient integration with nutritional goals [5], [19]. Users frequently express the need for better monitoring of protein intake, macro–nutrient alignment, and visual progress tracking to support muscle growth [20], [21]. Reviews of resistance-training apps note that while personalization features are increasingly common, retention remains limited unless combined with social support and gamification [22], [23]. These findings highlight the fragmented nature of mHealth solutions, where fasting, training, and nutrition are often siloed rather than integrated into a holistic health assistant [24]. Yet, most training app evaluations rely on convenience sampling and short-term testing, overlooking physiological outcomes or objective performance data. This methodological inconsistency makes it challenging to assess actual efficacy in supporting long-term muscle development.

Another stream of research focuses on usability, engagement, and adoption factors in mHealth. The System Usability Scale (SUS) and UMUX-Lite are widely used for measuring usability, with benchmark scores of 68 often cited as the

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threshold for acceptable applications [25], [26]. Beyond usability, retention is driven by factors such as perceived usefulness, simplicity, social features, and positive feedback loops [6], [27]. For example, Wu et al. demonstrated that social-oriented features, such as group challenges and community support, significantly enhance sustained app usage [28]. Qualitative studies further emphasize that young adults expect apps to provide not just functionality but also enjoyable, motivating experiences that align with their lifestyles [29]. However, many apps still suffer from usability flaws, fragmented workflows, and inconsistent engagement strategies [30]. A notable methodological issue in this body of work is the reliance on subjective usability ratings without triangulation from behavioral or log-based metrics. Few studies adopt standardized benchmarks beyond SUS or assess usability longitudinally, limiting comparability and ecological validity.

Finally, concerns related to privacy, data security, and wearable integration are increasingly central to mHealth research. As apps connect with devices such as Apple Watch or Huawei Watch, new challenges emerge in harmonizing data across platforms and ensuring accuracy of step counts, heart rate, and sleep measures [8]. Reviews note variability in device accuracy depending on software versions and usage conditions. Simultaneously, user trust is undermined by opaque privacy policies and limited user control over sensitive health data [31]. Addressing these challenges requires embedding privacy-by-design principles, transparent governance, and robust interoperability frameworks. Yet, despite numerous evaluations of existing apps, there remains a lack of studies focusing on integrated user needs across fasting, training, and muscle development—highlighting the research gap this study seeks to address. However, the majority of these privacy and device studies are technical audits rather than user-centered evaluations. They often omit end-user perspectives on consent, usability, or comprehension of privacy terms, creating a methodological blind spot in understanding real-world trust behaviors.

To provide a clear overview of the thematic clusters identified in the related work, a mind map was developed (figure 1). The visualization summarizes four major domains in the literature—intermittent fasting and nutrition, training and muscle development, usability and engagement, and privacy and integration—highlighting how prior studies connect to each thematic area.

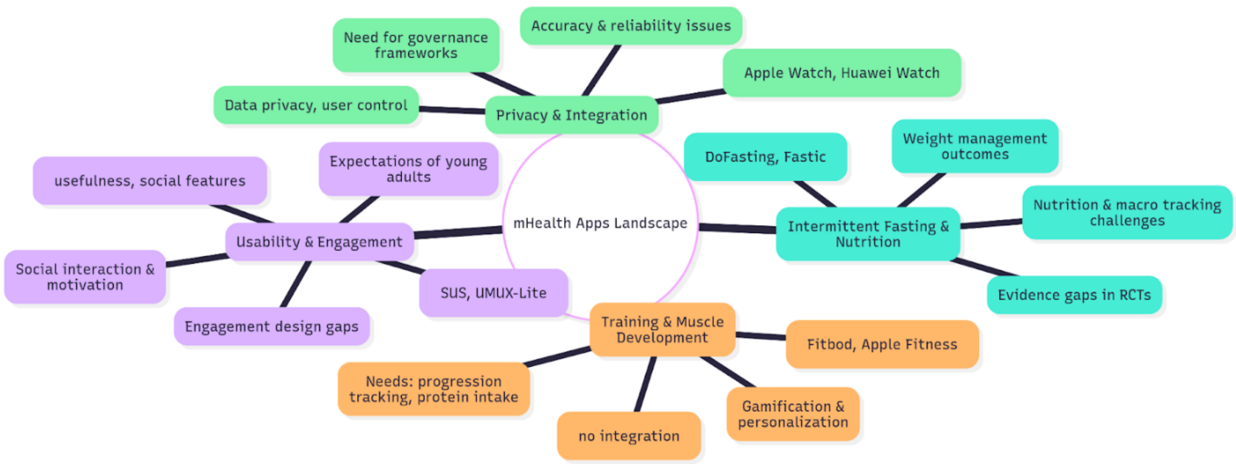

Figure 1. Mind map of themes from related work

Figure 1 illustrates the four literature domains—fasting & nutrition, training & muscle development, usability & engagement, and privacy & integration—showing their interconnections.

3. Methodology

This study adopted a User-Centered Design (UCD) framework and employed a mixed-methods approach structured around four UCD phases to explore user needs for a mobile health application that integrates fasting, training, and muscle development. A combination of quantitative surveys and qualitative semi-structured interviews was used to capture both measurable preferences (e.g., feature prioritization, usability expectations) and deeper insights into user experiences, challenges, and design expectations.

The study operationalized the UCD framework through a sequence of interconnected phases. It began with the identification of user challenges and needs derived from the survey and interview data, forming the foundation for design ideation. The next stage involved synthesizing user requirements into potential app features, aligning them with usability and privacy expectations. The findings guided the conceptual mapping of interface components that could support fasting, training, and nutrition in an integrated manner. Finally, user feedback from both survey responses and interviews was analyzed to evaluate which features were perceived as most essential, ensuring that the final recommendations reflect authentic user experiences and expectations.

Participants were recruited through purposive sampling from fitness communities, university student groups, and online health forums. Eligibility criteria required individuals to be between 18 and 50 years old, to have prior or current experience using at least one health or fitness application, and to express interest in fasting, training, or muscle development. In total, 50 participants completed the online survey, and ten participants joined interviews. Although the qualitative phase involved only 10 participants, the sample size was considered adequate for identifying common user needs. Nevertheless, this limits generalizability across wider demographic and fitness segments, which should be explored in future research. All participants provided informed consent prior to data collection.

Participants (N = 50) consisted of 58% female and 42% male, aged between 18 and 46 years (M = 27.4, SD = 6.2). Most were university students (60%) or working adults (40%), with 72% reporting intermediate technology proficiency and 64% engaged in regular physical activity. This distribution represents a typical demographic of tech-aware individuals within the target user base for mobile fitness and health applications. Participant demographics are presented in table 1.

Table 1. Participant Demographics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	29	58
	Male	21	42
Age (years)	Mean = 27.4, SD = 6.2		
Occupation	University students	30	60
	Working adults	20	40
Tech proficiency	Basic	5	10
	Intermediate	36	72
	Advanced	9	18
Physical activity level	Regular	32	64
	Occasional	12	24
	None	6	12

Data collection involved two main instruments. First, a web-based survey was distributed to gather demographic information, prior app usage, and feature needs. The survey included a structured feature checklist covering fasting timers, workout progression, protein intake monitoring, macro tracking, and privacy controls. Each item was rated on a five-point Likert scale ranging from 1 (not important) to 5 (very important). Additional items adapted from validated usability instruments, such as the SUS and UMUX-Lite, were included to assess expectations regarding simplicity, personalization, and privacy. Second, a semi-structured interview protocol was developed to elicit more detailed insights into user experiences and unmet needs. Example prompts included "Tell me about challenges you face when using fasting apps" and "What features would help you track muscle growth more effectively?" Interviews lasted approximately 30–40 minutes and were conducted virtually using Zoom or Google Meet. Sessions were audio-recorded and transcribed verbatim.

Quantitative survey data were analyzed using descriptive statistics to determine the relative importance of different features and expectations. Group differences by demographic characteristics were explored using independent t-tests and one-way ANOVA where appropriate. Qualitative interview transcripts were analyzed through thematic analysis, following Braun and Clarke's six-step framework of familiarization, coding, theme development, review, definition, and reporting. The integration of quantitative and qualitative findings enabled triangulation and provided a holistic understanding of user needs.

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Horizon University Indonesia. All participants were assured of confidentiality, and their responses were anonymous. Data was stored on encrypted servers with access limited to the research team. Participation was voluntary, and participants retained the right to withdraw at any point without consequence. The overall research procedure is illustrated in figure 2. The process followed four sequential phases, starting with preparation (protocol design, instrument development, and pilot testing), followed by data collection through surveys and interviews, data analysis using both quantitative and qualitative techniques, and culminating in the integration of findings through triangulation to generate design guidelines.

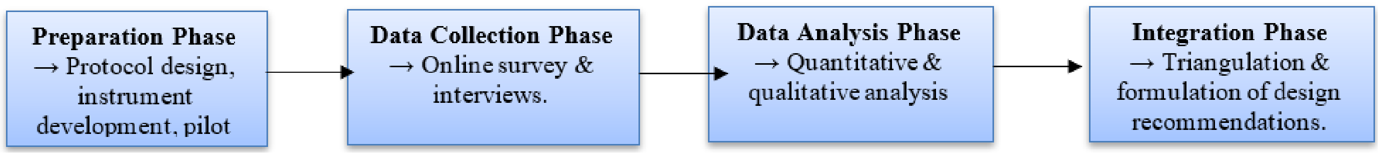

Figure 2. Research Stage

Figure 2 depicts the sequential research stages from preparation to integration, emphasizing the iterative feedback loop characteristic of UCD studies. The research procedure consisted of four main phases: preparation, data collection, data analysis, and integration of findings.

3.1. Preparation Phase

In the preparation phase, the research team designed the study protocol based on a UCD framework. The survey items were adapted from validated usability instruments such as the SUS and UMUX-Lite, and additional items were developed to capture feature needs in fasting, training, and muscle development. The semi-structured interview guide was also constructed, focusing on user experiences, challenges, and expectations. Prior to deployment, the survey and interview protocol were pilot-tested with five participants to ensure clarity and reliability of items.

3.2. Collection Phase

During the data collection phase, participants were recruited through purposive sampling from fitness communities, university networks, and online health forums. Eligible participants first completed an online survey hosted on Google Forms, which took approximately 15 minutes. At the end of the survey, participants could indicate their willingness to join a follow-up interview. From those who volunteered, 15 participants were purposively selected to reflect diverse demographics and fitness goals. Interviews were conducted virtually via Zoom or Google Meet, lasted 30–40 minutes, and were audio-recorded with participant consent.

3.3. Data Analysis Phase

In the data analysis phase, survey responses were exported to SPSS for quantitative analysis. Descriptive statistics (means, standard deviations, frequencies) were used to determine the relative importance of app features and user expectations, and group differences were examined using independent t-tests and one-way ANOVA. To enhance interpretability, Standard Deviations (SD) and 95% Confidence Intervals (CI) were calculated to indicate variability and reliability of the results. Interview transcripts were analyzed using thematic analysis following Braun and Clarke's six-step framework—familiarization, generating codes, constructing themes, reviewing themes, defining themes, and reporting. Two coders independently coded transcripts, and discrepancies were resolved through discussion to improve reliability.

3.4. Integration Phase

Finally, in the integration phase, quantitative and qualitative results were triangulated. Survey data provided broad insights into the prioritization of features and usability expectations, while interviews offered rich contextual detail regarding user challenges and desired improvements.

To ensure coherent interpretation between both data sources, a convergence–divergence framework was applied. Quantitative scores from the survey (Q_i) and qualitative theme intensities (T_i) were normalized and compared. A convergence index was calculated for each feature or theme:

$$CI_i = \frac{| Q_i - T_i |}{\max (Q_i, T_i)} \tag{1}$$

$CI_i = 0 \rightarrow$ perfect agreement, $CI_i < 0.3 \rightarrow$ convergent, $CI_i \geq 0.3 \rightarrow$ divergent and requires further interpretation.

Conflicting insights between survey statistics and interview themes were resolved using a weighted interpretation formula:

$$I_i = w_q \cdot Q_i + w_t \cdot T_i \tag{2}$$

Weights were assigned as:

$$F_i = \begin{cases} \text{Quantitatively driven insight} & \text{if } CI_i < 0.3 \text{ and } w_q > w_t \\ \text{Qualitatively enriched insight} & \text{if } CI_i < 0.3 \text{ and } w_t \geq w_q \\ \text{Reconciled insight (both sources)} & \text{if } CI_i \geq 0.3 \end{cases} \tag{3}$$

Thus:

Quantitative dominance was applied when numerical trends were stable (high w_q).

Qualitative emphasis guided interpretation when outlier narratives provided strong contextual relevance (high w_t).

To determine whether qualitative insights should override quantitative results, a qualitative override ratio was computed:

$$OR_i = \frac{T_i}{Q_i} \tag{4}$$

If:

$$OR_i > 1.2 \tag{5}$$

then qualitative themes were considered substantially more influential for final interpretation.

The integrated finding for each user requirement was reported as:

$$F_i = \begin{cases} \text{Quantitatively driven insight} & \text{if } CI_i < 0.3 \text{ and } w_q > w_t \\ \text{Qualitatively enriched insight} & \text{if } CI_i < 0.3 \text{ and } w_t \geq w_q \\ \text{Reconciled insight (both sources)} & \text{if } CI_i \geq 0.3 \end{cases}$$

Through this structured integration process, the study identified core user needs and produced design guidelines for developing a mobile health application that holistically addresses fasting, training, and muscle development.

4. Results and Discussion

4.1. Quantitative Survey Findings

Survey data from 50 participants show that the most important features for users are workout progression tracking (M = 4.94, SD = 0.18, 95% CI [4.89, 4.99]) and protein/macro tracking for muscle development (M = 4.20, SD = 0.42). These findings emphasize that users are primarily focused on achieving structured training outcomes and supporting them with nutrition monitoring. Interestingly, fasting timers (M = 2.92/5) and motivation features (M = 2.88/5) received lower scores, suggesting that while fasting and gamification remain relevant, they are secondary compared to core functional features. Wearable integration was rated moderate (M = 3.08/5), indicating that not all users rely on external devices, though they still see value in added accuracy. On the system level, expectations were very high: ease of use

(M = 6.06/7) and system capabilities fit (M = 6.36/7) highlight the demand for simplicity and alignment with user goals. Privacy control received the maximum importance (M = 5.00/5), reinforcing that users view data governance as non-negotiable. Figure 3 shows the mean survey scores across variables, highlighting privacy, workout progression, and protein tracking as top priorities.

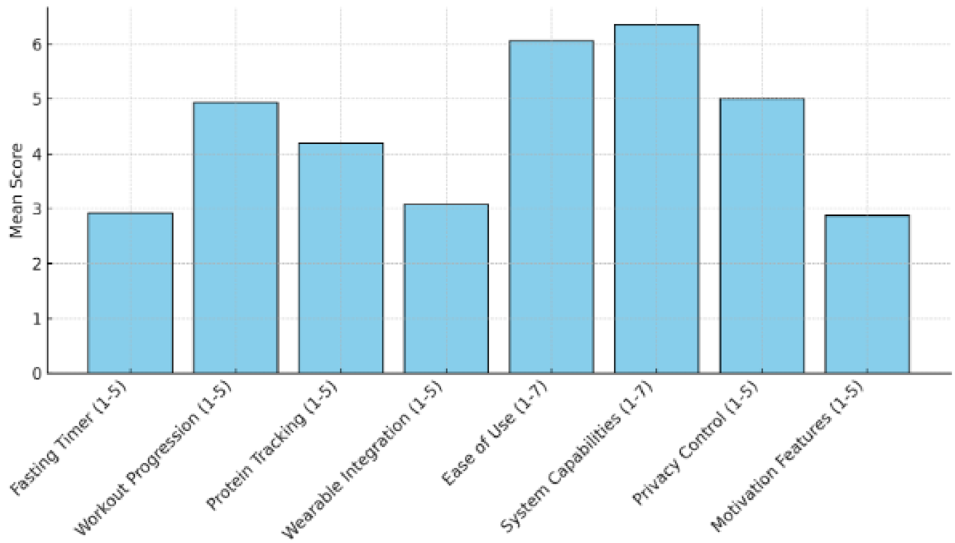

Figure 3. Mean Importance/Expectation Scores from Survey

While motivational features received lower average importance (M = 2.88/5) compared to training and nutrition tracking, user motivation in mHealth apps can involve several mechanisms. Based on common design frameworks in prior literature, these can include gamification elements (e.g., badges, progress streaks), social feedback (e.g., group challenges or leaderboards), and reminder nudges (e.g., notifications for consistency). Although this study did not specifically differentiate between these subtypes, the lower mean score suggests that users may prefer intrinsic progress tracking over extrinsic motivational elements such as rewards or prompts.

4.2. Qualitative Interview Insights

From the ten interviews conducted, four major themes emerged that collectively illustrate user experiences and expectations toward fasting, training, and nutrition applications. Participants frequently discussed their fasting routines, noting that existing fasting apps generally supported discipline through reminders and progress tracking. However, they also highlighted several shortcomings, including inconsistent notifications, limited personalization, and the absence of educational information to guide healthy fasting practices. Many interviewees emphasized that fasting felt disconnected from broader lifestyle goals and suggested that fasting features should be integrated with nutrition guidance and exercise routines to create a more holistic health experience.

Users also described significant challenges in logging and managing their workouts. They expressed frustration with incomplete exercise libraries, particularly for specialized training such as HIIT or body combat, and pointed out the lack of video tutorials or clear instructions for proper form. Several participants described the input flows for logging workouts as cumbersome and unintuitive. Historical tracking was often fragmented, making it difficult for users to see long-term progress, and many noted that current apps made exporting or reviewing past training data unnecessarily difficult.

Despite these issues, participants identified several features they found particularly valuable in existing health applications. Calorie and macronutrient tracking, progress visualization tools, adaptive workout plans, and AI-powered nutrition detection—such as barcode scanning or food recognition—were consistently praised. Many users also valued body composition tracking as an essential measure of their health journey. Across the interviews, a consistent message emerged: while individual features may work well, the lack of seamless integration across fasting, training, and nutrition remains one of the biggest limitations of current apps.

Lastly, participants discussed their expectations around integration and privacy. Wearable device integration was widely seen as important for improving accuracy and personalization, although concerns were raised about accessibility and cost. Privacy emerged as a prominent concern throughout the interviews. Users repeatedly stressed the need for strong encryption, transparent data policies, and greater user control over what information is collected and how it is used. Several participants also voiced fears about the potential misuse of biometric data by advertisers, insurers, or third-party companies. These concerns underscored the need for trust-centered design practices in any future mobile health solution.

4.3. Integrated Findings

By combining the findings from both the survey and the interview results, three key insights emerge that illustrate users' priorities and expectations for a comprehensive health application. First, users consistently prioritize training and nutrition features over standalone fasting tools. While fasting remains valuable, participants expressed that it feels incomplete when not integrated with broader wellness functions, and the survey responses reinforced this preference by highlighting stronger interest in exercise and dietary tracking.

Second, privacy and trust clearly stand out as essential components of any future app design. The survey results show exceptionally high concern for data protection, reflected in a perfect mean score of 5.00 out of 5. This quantitative evidence aligns closely with interview participants' repeated emphasis on the need for encryption, transparency, and user control over personal data. Many expressed worries about potential misuse of biometric information, demonstrating that strong privacy safeguards are not merely desired but expected.

Finally, users articulated a strong desire for design simplicity and meaningful personalization. Throughout the interviews, participants described frustration with complex data input processes, cluttered interfaces, and generic recommendations that failed to adapt to their routines or goals. The survey results echoed these sentiments, indicating a preference for intuitive navigation and customizable features that respond to individual needs. Together, these insights highlight a clear direction for developing an integrated health application that is user-centered, trustworthy, and seamlessly personalized.

Figure 4 shows the relative importance of core features from the survey. Privacy control, workout progression, and protein tracking together accounted for more than half of total user priority, while fasting and motivational features were less central.

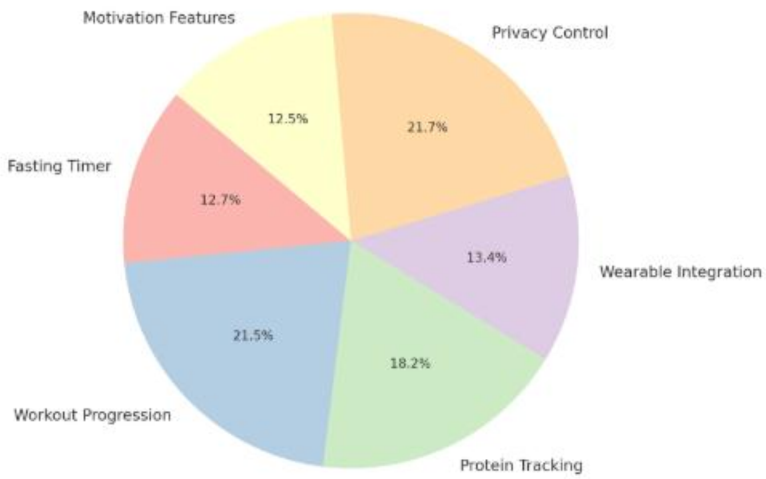

Figure 4. Relative Importance of Core Feature

4.4. Discussion

The present study set out to understand user needs and preferences for a mobile health application that integrates intermittent fasting, training, and muscle development. By combining survey results and interview insights, several important implications for the design of next-generation mHealth solutions were identified.

Future prototypes should implement privacy-by-design practices, including AES-256 encryption for health data, explicit consent dialogs before data sharing, and anonymized storage following GDPR-like standards. These practices can help ensure user trust and compliance with data protection regulations while supporting usability and personalization goals.

First, the findings indicate that training progression and nutrition tracking are perceived as more essential than fasting timers or motivational features. This aligns with prior reviews showing that fitness and dietary monitoring apps are more likely to support sustained health outcomes when they incorporate personalized progression and macro-nutrient alignment [2], [13], [5]. While fasting tools have gained popularity in recent years, their effectiveness appears to be maximized when integrated into broader health management contexts rather than as standalone functions [14], [15]. This suggests that future app development should not treat fasting as an isolated feature, but instead embed it within holistic systems that connect to training and dietary routines.

Second, privacy and trust emerged as non-negotiable elements of user adoption. Both survey scores and interview responses emphasized concerns over health data misuse, echoing previous studies that found users frequently abandon apps due to opaque policies and lack of control over data [22], [28]. In line with current recommendations for privacy-by-design frameworks, developers of health applications must prioritize encryption, transparent governance, and customizable user permissions. Failure to do so risks undermining adoption, regardless of the richness of functional features.

Third, usability and personalization were highlighted as critical determinants of long-term engagement. Survey results showed very high expectations for ease of use (M = 6.06/7) and system capabilities fit (M = 6.36/7), which resonates with prior research that identified usability as a baseline requirement for mHealth adoption [25], [26]. Qualitative insights further revealed frustrations with complex data entry, limited exercise libraries, and generic recommendations. This confirms earlier findings that perceived usefulness, simplicity, and adaptive personalization are key factors sustaining retention in fitness and diet apps [19]. As such, a future healthy life assistant must streamline input flows, reduce cognitive burden, and adapt content dynamically to users' evolving needs. It should also be noted that this study assessed perceived usability based on user expectations prior to prototype use. Future work should include task-based usability evaluations to measure actual interaction efficiency, satisfaction, and error rates, thereby validating whether the expected usability aligns with real-world performance.

Fourth, while wearable integration was rated as moderately important, interviewees suggested that this feature becomes particularly valuable for advanced users who rely on detailed biometric feedback. Prior umbrella reviews have shown variability in wearable accuracy depending on hardware/software versions [8], reinforcing the need for developers to consider reliability when integrating third-party devices. Our findings suggest that while wearable compatibility enhances accuracy and convenience, applications must remain fully usable for those without access to such devices in order to remain inclusive. To strengthen reliability and interoperability, future mHealth development should adopt open API standards such as Apple HealthKit and Google Fit, enabling seamless synchronization of workout and biometric data. Moreover, implementation of the HL7 FHIR (Fast Healthcare Interoperability Resources) model would allow structured, secure, and scalable data exchange across platforms, thereby improving consistency, accuracy, and user trust.

Taken together, the study highlights a research gap identified in prior literature: the lack of integrated mHealth applications that simultaneously address fasting, training, and muscle development [17], [24]. Whereas existing apps often focus on one domain, users clearly expressed the desire for a comprehensive solution that unifies these features within a single platform. Moreover, the integration of AI-driven recommendations, adaptive workout logging, and localized nutrition databases were recurrent needs voiced by participants, suggesting new avenues for innovation.

AI-driven personalization must be implemented responsibly. Ethical safeguards include explainable recommendation logic, bias-testing on gender and age data, and allowing users to override algorithmic suggestions. These measures ensure that personalization enhances user experience without compromising fairness, autonomy, or privacy.

While localization features such as barcode scanning for regional diets were not explicitly mentioned by participants, they are suggested as potential future enhancements to improve contextual relevance and inclusivity across diverse user populations.

The integrated findings from the quantitative and qualitative analyses indicate several important directions for the development of future mHealth applications. Users consistently demonstrated a stronger interest in training and nutrition tracking, positioning fasting features as supportive rather than central to their overall health management. This suggests that fasting should be embedded within a broader ecosystem of exercise and dietary tools rather than functioning as an isolated component.

Privacy also emerged as a foundational requirement, with users emphasizing the need for strong data protection, transparent policies, and meaningful control over personal information. Trust becomes a determining factor in whether users are willing to adopt and consistently engage with a health application, reinforcing the necessity of privacy-by-design principles throughout the development process.

Improving usability and personalization is equally important. Users expressed a clear desire for interfaces that minimize input burden, reduce complexity, and offer adaptive recommendations that evolve with their habits, progress, and goals. These expectations highlight the need for thoughtful, streamlined design that supports long-term adherence and engagement.

In addition, although many participants appreciated the enhanced accuracy made possible through wearable device integration, they stressed that such features should remain optional so that the application remains fully usable on its own. Ensuring that core functionality does not rely on external devices will make the application more accessible to a wider range of users.

Finally, the combined insights point to the potential value of AI-powered and culturally localized features. Interviewees expressed interest in tools such as barcode scanning tailored to regional diets, automated food recognition, and adaptive progression models that personalize fasting and training plans. Incorporating these capabilities can help create a more contextually relevant and responsive mHealth solution capable of supporting diverse user needs and lifestyles.

By addressing these priorities, designers and developers can build more effective and engaging healthy life assistant applications, ultimately bridging the gap between current fragmented solutions and the holistic needs of users.

5. Conclusion

This study investigated user needs and preferences for a mobile health application integrating intermittent fasting, training, and muscle development through a mixed-methods approach combining survey and interview data. The findings consistently demonstrate that training progression and nutrition tracking are prioritized by users, while fasting timers and motivational features are considered secondary yet supportive. Privacy and trust emerged as critical determinants of adoption, with participants demanding transparency, control, and secure handling of sensitive health data. Usability expectations were notably high, emphasizing the importance of simplicity, personalization, and adaptive feedback. Although wearable integration was recognized as valuable for accuracy, inclusivity requires that applications remain fully functional without external devices. These results reinforce earlier findings in the literature while addressing a clear research gap: the lack of holistic solutions that unify fasting, training, and nutrition within a single, user-centered platform. The study contributes actionable insights for the design and development of next-generation mHealth applications, highlighting the need for integrated features, privacy-by-design frameworks, and adaptive personalization.

Future work will advance this study by developing a low-fidelity prototype of the proposed application. The design will undergo usability evaluation using SUS and UMUX-Lite benchmarks to validate ease of use, satisfaction, and functionality in real-world contexts. Iterative testing and user feedback will guide design refinements, ensuring that the final solution aligns closely with authentic user needs and expectations. Although this study focused on end-user perspectives, future iterations should also involve clinicians and fitness experts to ensure feature safety, medical accuracy, and physiological suitability.

6. Declarations

5.1. Author Contributions

Conceptualization: L.S., E., W.Y.A., D.F.W., D., and H.H.; Methodology: E.; Software: L.S.; Validation: L.S., E., W.Y.A., D.F.W., D., and H.H.; Formal Analysis: L.S., E., W.Y.A., D.F.W., D., and H.H.; Investigation: L.S.; Resources: E.; Data Curation: E.; Writing Original Draft Preparation: L.S., E., W.Y.A., D.F.W., D., and H.H.; Writing Review and Editing: E., L.S., W.Y.A., D.F.W., D., and H.H.; Visualization: L.S.; All authors have read and agreed to the published version of the manuscript.

5.2. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

5.3. Funding

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5.4. Institutional Review Board Statement

Not applicable.

5.5. Informed Consent Statement

Not applicable.

5.6. Declaration of Competing Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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