Original Paper

Dietary and Exercise Relapse Management in Mobile Health Apps for Weight and Glycemic Control: Descriptive Qualitative Study

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Abstract

Background: Mobile health (mHealth) apps for weight and glycemic control support self-monitoring and behavior change, but engagement often declines over time. Although relapse in diet and exercise is common, little is known about how users experience relapse within digital contexts or how apps should respond.

Objective: This study aimed to explore how users of mHealth apps for weight and glycemic control experience, manage, and wish to be supported during dietary and exercise relapses.

Methods: A descriptive qualitative design was adopted. Semistructured online interviews were conducted with 26 adults who had used weight or glycemic control apps for at least 3 months and reported at least 1 relapse. Data were analyzed using inductive thematic analysis.

Results: Seven themes emerged: stress and reduced capacity as conditions surrounding relapse; cultural, temporal, and environmental misalignment; psychological disengagement and avoidance; social and relational influences; relapse as emotional disengagement rather than simply a behavioral lapse; informal relapse management and self-directed recalibration; and desire for compassionate, context-aware support. Participants described relapse in relation to stress, grief, caregiving and occupational demands, religious observances, festivals, shift work, travel, and constrained food environments. Relapse was frequently experienced as emotional disengagement, characterized by guilt, shame, identity threat, and loss of meaning, and was often accompanied by avoidance of the app or monitoring devices. Participants managed relapse through self-directed strategies such as temporal resets, goal adjustment, partial engagement, and social support, but reported few structured relapse-recovery tools within apps. They expressed a strong preference for flexible goals, context-aware modes, mood-sensitive feedback, neutral language, and gentle reentry pathways.

Conclusions: Participants' accounts suggest that relapse in mHealth contexts involves emotional responses, contextual constraints, and changing self-management capacity. Flexible goals, neutral feedback, context-sensitive support, and graded reentry are promising design targets for relapse-responsive apps, but their effects on engagement and clinical outcomes require prospective evaluation.

JMIR Mhealth Uhealth 2026;14:e94792; doi: 10.2196/94792

Keywords: mobile health; dietary; weight management; glycemic control; digital health design

Introduction

The major chronic diseases, such as type 2 diabetes, cardiovascular diseases (hypertension, heart disease, and stroke), obesity, chronic obstructive pulmonary disease, and osteoarthritis, with high global prevalence, continue to be major public health challenges, and are associated with mortality risk [1-3]. Lifestyle modification, dietary regulation, and regular physical activity are a few self-management and preventive techniques that can result in improved health parameters, such as weight reduction and glycemic control [4-7]. However, adopting these behaviors in the long term could be challenging and may result in relapses, that is, returning to previous maladaptive behaviors after a period of improvement [8-10]. In weight management and diabetes self-care contexts, relapses may include neglecting or avoiding self-monitoring, reduced or absent physical activity, and adopting previous or unhealthy eating patterns [11,12].

Mobile health (mHealth), with the integration of effective and efficient technologies such as AI, has been observed to be a scalable tool for facilitating dietary tracking, physical activity monitoring, glucose level logging and monitoring, customized feedback, and tailored behavioral coaching [13,14]. However, studies [15-18] have indicated that mHealth interventions can produce modest but significant improvements in weight and glycemic outcomes. Some of the key features of such apps include self-monitoring, goal setting, prompts, and personalized feedback, which can be related to behavior change theories such as Social Cognitive Theory and Self-Determination Theory [19].

Despite their promising benefits, sustained engagement with mHealth apps has been found to decline over time [20,21]. Attrition rates in this context are high, and discontinuation of self-monitoring is strongly associated with poorer weight and glycemic outcomes [22]. Most digital interventions, such as mHealth apps, are designed to promote adherence and behavior initiation but do not extensively focus on user experiences during relapse periods or how the app should respond effectively when lapses occur [23-25]. According to the Relapse Prevention Model, relapse is a process often influenced by high-risk situations, coping responses, and self-efficacy [26]. Furthermore, psychological and emotional factors such as guilt, shame, and reduced motivation can further aggravate disengagement following the relapse period [27].

Therefore, understanding relapses not only as a failure but also as a predictable aspect of behavior change is crucial for designing responsive mHealth apps. However, relapse-responsive features such as dynamic goal adjustment, compassionate messaging, and structured “restart” pathways are poorly addressed in intervention studies [28,29], and empirical evidence on how users experience and wish to be supported during dietary and exercise relapses in mHealth contexts is limited [30,31].

Sustained regulatory behaviors such as dietary planning, physical activity, and self-monitoring are essential for achieving long-term weight management and glycemic regulation [32,33]. mHealth apps for weight management and diabetes self-management have reflected moderate improvements in clinical and behavioral outcomes. However, their impact is usually weakened over time. Studies [15,17,34-36] focusing on mHealth apps that combine diet and physical activity monitoring with tailored feedback, goal setting, and, in some cases, professional coaching have reflected average weight losses of 1 to 2 kg at 3 to 12 months and modest glycated hemoglobin reductions. However, engagement with mHealth apps usually decreases or becomes null, reflecting that intervention content is not well aligned with the cyclical nature of behavior change and relapse.

Studies focusing on behavior change frameworks in relation to weight loss and maintenance digital interventions [37-42] identified that initial success is contributed by factors such as self-monitoring, feedback, goal setting, action planning, and shaping knowledge. However, these frameworks specify only generic messages to resume tracking but do not specify how apps should respond when users miss logs, exceed dietary targets, or stop exercising. Structured relapse-management plans, strategies to bolster autonomous motivation, and emotional self-regulation have been identified as key aspects for achieving sustained maintenance but are not effectively integrated into mHealth apps [37-39].

Furthermore, studies [43,44] have observed that digital apps can enhance awareness, knowledge, and perceived control among users in relation to weight and diabetes management but highlight the need to address complex emotional responses to lapses. It has also been observed that approaches such as reminders and feedback not only support accountability but also trigger guilt and shame among users when goals are not met, which can lead to disengagement from the app and behavior change efforts [27,45]. In relation to diabetes self-management, it was observed that patients value supportive, nonjudgmental communication from health care providers in the event of high glycemic levels [46]. Similar supportive approaches need to be translated into digital apps, but this requires careful design to avoid exacerbating feelings of failure. Some of the challenges identified by users include tracking burden, usability issues, competing life demands, and the feeling that apps do not adapt to their changing capabilities, illness episodes, or psychological factors such as mood that precipitate relapse [47-49]. Studies focusing on user-centered designs highlight the importance of autonomy support, flexible goal recalibration, and normalization of setbacks [50,51].

Research on relapse in diet and physical activity digital interventions highlights that lapses are a common phenomenon, triggered by emotional distress, social situations, environmental cues, and disruptions to routine. A few skills, such as self-efficacy, coping planning, and reframing lapses as learning opportunities, were found to be associated with effective lapse recovery and sustained maintenance of physical activity and weight loss [52]. However, most digital apps assume linear progress, providing limited scaffolding for users to navigate cyclical patterns of engagement and disengagement. Furthermore, there is a lack

of research examining how individuals using weight and glycemic control apps interpret and respond to relapses in diet and exercise, how app features shape these experiences, and what forms of digital support they would find acceptable and helpful during relapse episodes.

Considering these gaps, this study aims to explore how users of mHealth apps for weight and glycemic control experience, manage, and wish to be supported during dietary and exercise relapses. Specifically, it examines the relationships among changing personal circumstances, emotional responses to app-generated feedback, and disengagement from digital self-management. By translating these experiences into proposed relapse-responsive app features and behavior change strategies, the study seeks to inform interventions that support recovery and reengagement rather than assuming uninterrupted adherence.

Methods

Study Settings and Participants

A descriptive qualitative design was adopted to gain a deeper understanding of how users of mHealth apps for weight and glycemic control experience, manage, and wish to be supported during dietary and exercise relapses. A qualitative approach was selected because the study focused on a multidimensional construct—lived experiences, perceptions, emotional responses, coping strategies, and support needs during relapse episodes—that requires in-depth interpretation of users' perspectives. Semistructured online interviews were used to gather participants' accounts of relapse in the context of mHealth app use. Participants included adult users of mHealth apps for weight management and/or glycemic control.

Recruitment and Sampling

A purposive sampling strategy was adopted to ensure the inclusion of diverse participants in different contexts. Inclusion criteria were as follows: (1) use of a mobile app for weight management and/or glycemic control for at least 3 months and (2) self-reported experience of at least 1 noticeable relapse in diet and/or exercise during that period (eg, cessation of logging, reduced physical activity, or reversion to previous eating patterns). Variation was sought in age, gender, app type, and health goals (weight management and/or glycemic control) to capture diverse perspectives. Participants were recruited through online advertisements posted on social media platforms, digital health forums, diabetes and weight management community groups, and university mailing lists.

An initial target of 17 interviews was informed by methodological guidance on sample sizes for qualitative interview studies [53]. Recruitment continued beyond this target to ensure variation in age, gender, occupation, health goal, app type, and relapse context. During analysis, the research team reviewed new codes and themes after each batch of interviews. By approximately interview 24, no substantively new domains of experience were identified, although later interviews continued to provide contextual variation and elaboration. All eligible individuals invited to interview agreed to participate, and no participants withdrew or discontinued their interviews. Interviews continued to 26 to strengthen diversity and depth rather than to increase statistical precision. The final sample of 26 participants is therefore described as providing adequate information for the study's descriptive aims.

Reporting Guideline

This study was reported with reference to the COREQ (Consolidated Criteria for Reporting Qualitative Research) checklist. The completed checklist is provided in Checklist 1.

Research Team and Reflexivity

Interviews were conducted by the primary researcher, the corresponding author, who had no prior relationship with participants. The interviewer introduced the study as independent research examining users' experiences of relapse in mHealth apps. The corresponding author, a female associate professor, conducted the interviews. She had prior experience in multiple research projects, data collection, and the application of research methods.

The research team discussed their assumptions concerning relapse, self-management, and digital health during study design and analysis. These discussions supported reflexive awareness of how researchers' expectations could influence the interpretation of participants' accounts and the framing of themes. Reflexivity was therefore used to make the researchers' interpretive role explicit rather than to claim that researcher influence could be eliminated. During analysis, initial codes and differing interpretations were discussed with reference to the transcripts, and analytic decisions were documented in an audit trail. These procedures supported transparent interpretation and helped limit the uncritical application of preexisting assumptions to participants' experiences.

Interview Guide and Data Collection

The semistructured interview guide was developed from the study objectives and relevant literature on relapse, self-management, and user experience of digital health tools. It was reviewed by 2 academic professors in the eHealth department and piloted with 3 eligible users who were not included in the final sample. Minor revisions were made to improve the clarity and sequencing of questions.

Before each interview, participants were informed that the study concerned experiences of dietary and exercise relapse while using apps for weight management and/or glycemic control. They received information about the interview procedure, voluntary participation, confidentiality, and their rights as research participants. Written informed consent was obtained before interviewing, including consent to audio recording and permission to publish anonymized quotations and nonidentifying participant characteristics. Participants were also informed about the anticipated interview duration and their right to decline individual questions or discontinue the interview. No nonparticipants were present during the

interviews; only the participant and the interviewer attended each session.

Semistructured interviews were conducted through secure online videoconferencing apps. The average interview duration ranged from 40 to 50 minutes. Each participant was interviewed once; no repeat interviews were conducted. No field notes were taken during or after the interviews. Interviews were guided by questions focusing on key components, examining how individuals using weight and glycemic control apps interpret and respond to relapses in diet and exercise, how app features shape these experiences, and what forms of digital support they would find acceptable and helpful during relapse episodes. The interviews were audio recorded and conducted in Arabic with the consent of participants.

Data Analysis

Audio-recorded interviews were transcribed, translated into English, and checked by the authors to preserve the meaning of participants' accounts. Data were analyzed using inductive thematic analysis organized around Braun and Clarke's 6 phases: familiarization, initial coding, development of candidate themes, review of themes, definition and naming of themes, and report production. NVivo (version 14; Lumivero) supported data organization, coding, and theme refinement. Codes and themes were developed through engagement with participants' accounts rather than imposed from a predefined theoretical framework.

Two researchers independently coded all transcripts. Initial codes were compared during analytic meetings, and differences were resolved through discussion and reference to the transcripts. The team maintained an audit trail documenting code development, theme refinement, and decisions about theme boundaries. Following Braun and Clarke's clarification of the diversity of thematic analysis approaches [54], this procedure is reported as an inductive thematic analysis using independent coding and discussion-based resolution, rather than characterized as their contemporary reflexive thematic analysis approach. The 6-phase framework organized the analysis, while the reported coding procedures describe how it was implemented in this study.

Coding was nonexclusive: participants could contribute to multiple themes and subthemes. Consequently, participant counts were used descriptively and were not interpreted as prevalence estimates. The analysis focused on patterns of meaning across accounts, including differences between digital disengagement and continued health-related activity. The final sample was considered adequate for the study's descriptive aims on the basis of the breadth and contextual depth of the accounts, as described in the *Recruitment and Sampling* subsection.

Trustworthiness

Trustworthiness was addressed through procedures supporting credibility, dependability, confirmability, and transferability. Credibility was supported by a review of the interview guide by 2 academic professors, pilot interviews with 3 eligible users outside the final sample, verification of translated transcripts by the authors, participant review of interview transcripts, and the presentation of participant quotations to substantiate interpretations. Transcripts were returned to participants for review and feedback, and a small number of changes were made in response to their comments. This process supported the accuracy of the interview records used for analysis. The reporting of contrasting experiences, including continued physical activity despite withdrawal from app monitoring, also helped preserve variation within the accounts.

Dependability was supported by a documented interview-guide development process and an audit trail recording code development, theme refinement, and decisions about theme boundaries. Confirmability was supported by linking interpretations to transcript material, discussing researchers' assumptions and differing interpretations, and documenting analytic decisions. These procedures made the interpretation process more transparent; they do not imply that the findings were independent of researcher judgment.

Transferability was supported by describing the recruitment strategy, eligibility criteria, participant characteristics, health goals, and cultural, social, and occupational circumstances surrounding relapse. These contextual details enable readers to assess the relevance of the findings to other populations and settings. The purposive sample was intended to provide diverse accounts rather than statistical representativeness, and transferability beyond this Saudi Arabian sample requires attention to contextual differences.

Ethical Considerations

This study adhered to strict ethical guidelines, including voluntary participation, confidentiality, and informed consent. Ethical approval (KFU-REC-2026-FEB--ETHICS4011) was obtained from the Research Ethics Committee at King Faisal University, Saudi Arabia, before conducting the interviews. Participants were fully informed about the interview procedure and their rights before starting the interviews. Written informed consent was obtained from all participants before the interviews. The consent process included permission to use anonymized quotations and nonidentifying participant characteristics in publications. Identifying details were removed or generalized before analysis and reporting. Data were anonymized or deidentified, and access was restricted to the research team.

Results

Participants' Sociodemographic Characteristics, Health Goals, and Patterns of Relapse Triggers

As shown in Table 1, a total of 26 individuals participated in the semistructured interviews. Participants were aged between 19 and 70 years and represented a diverse group, including students, working professionals, shift workers, homemakers, and retirees. Female representation was slightly higher (n=14) than male representation (n=12). Diverse health goals were observed among the participants, with 11 participants

focused primarily on weight management, 8 on type 2 diabetes management, 5 on prediabetes, 1 on polycystic ovary syndrome (PCOS)–related weight concerns, and 1 on muscle gain/bulking. Various types of relapses were observed among the participants. Work- and stress-related relapse was prominent across 5 participants, followed by cultural and celebratory contexts (n=5), digital design–induced relapse (n=4), grief- and loss-related relapse (n=3), injury- or health flare–related relapse (n=3), psychological and emotional eating (n=3), monitoring burnout or anxiety-driven relapse (n=2), structural or occupational environmental barrier–based relapse (n=2), and goal incongruence–based relapse (n=1). Analyzing the relapse types, relapse triggers were distributed across emotional (8/26, approximately 31%), contextual/cultural (5/26, 19%), structural/occupational (2/26, 8%), injury/health-related (3/26, 12%), digital design–related (4/26, 15%), and social influence factors (including peer pressure and isolation; 8%-12%), reflecting the multidimensional nature of relapse, which is influenced by personal, social, cultural, and technological factors.

Table 1. Participant demographics.

Participant ID	Age group (y)	Gender	Health condition/goal	Relapse context (brief description)
P01	30-39	Female	Weight loss/prediabetes	Work stress–induced dietary and exercise cessation
P02	40-49	Male	Type 2 diabetes	Family wedding–related dietary binge and exercise lapse
P03	20-29	Female	PCOS[a]-related weight issues	Hormonal flare-up leading to dietary cravings and yoga cessation
P04	50-59	Male	Type 2 diabetes	Grief-induced comfort eating and walking avoidance
P05	30-39	Female	Weight/gestational diabetes history	Child exam stress causing exercise neglect
P06	20-29	Male	Fitness/weight (bulking)	Injury-related gym halt and macronutrient deviations
P07	60-69	Female	Type 2 diabetes	Arthritis flare and festive sweets overindulgence
P08	30-39	Male	Prediabetes/weight	Night shift disruptions and junk food binges
P09	20-29	Female	Weight loss	Digital disengagement following dietary lapse
P10	50-59	Male	Type 2 diabetes	Contextual/cultural disruption (Ramadan)
P11	30-39	Female	Weight loss	Injury-related activity reduction with algorithmic misalignment
P12	40-49	Female	Weight/prediabetes	Stress-induced emotional eating and selective nonlogging
P13	20-29	Male	Weight gain (muscle)	Goal incongruence and underconsumption during stress
P14	60-69	Female	Type 2 diabetes	Grief-related disengagement from tracking
P15	30-39	Male	Weight loss	Competitive burnout and leaderboard disengagement
P16	40-49	Female	Glycemic control	Monitoring burnout and anxiety-driven avoidance
P17	40-49	Male	Type 2 diabetes	Environmental/structural dietary and logging avoidance
P18	20-29	Female	Weight management	Psychological (“The Streak Trap”)
P19	60-69	Male	Prediabetes	Cultural invisibility during family festivals
P20	19-29	Female	Weight management	Social/binging (peer pressure and alcohol)
P21	30-39	Male	Weight/hypertension	Decision fatigue (exercise and dietary)
P22	30-39	Female	Prediabetes	Chaos-induced glucose monitoring relapse
P23	40-49	Male	Weight management	The “Ostrich Effect” (exercise/data avoidance)
P24	20-29	Female	Weight management	Emotional eating feedback loop
P25	60-69	Male	Type 2 diabetes	Social isolation (dietary and testing)
P26	40-49	Female	Prediabetes/weight	Seasonal/holiday maintenance dietary relapse

[a]PCOS: polycystic ovary syndrome.

The analysis identified 7 overlapping themes: (1) stress and reduced capacity as conditions surrounding relapse; (2) cultural, temporal, and environmental misalignment; (3) psychological disengagement and avoidance; (4) social and relational influences; (5) relapse as emotional disengagement rather than simply a behavioral lapse; (6) informal relapse management and self-directed recalibration; and (7) desire for compassionate, context-aware support (see Table S1 in Multimedia Appendix 1). The themes are presented as interpretive patterns in participants’ accounts. Participant counts were used only descriptively and were not treated as prevalence estimates. Coding was nonexclusive: a participant could contribute to more than 1 theme or subtheme, and subtheme counts therefore do not sum to the total sample.

Stress and Reduced Capacity as Conditions Surrounding Relapse

Participants commonly described relapse in the context of stress, exhaustion, grief, caregiving demands, academic or occupational pressure, and reduced physical capacity. These accounts suggested that relapse was often experienced as a reduction in available emotional or cognitive resources rather than as a lack of knowledge about healthy behavior.

A software engineer described a period of intense occupational pressure:

A major project launch meant 14-hour days, no time for meal prep, and biryani deliveries became my savior.

She explained that logging and exercise stopped during this period, despite her previous success with both activities. Similarly, an intensive care nurse described relapse as a consequence of limited cognitive capacity after prolonged shifts:

Relapse isn't always about a lack of willpower; sometimes it's about a lack of bandwidth.

The account linked missed logging and convenience eating to exhaustion and decision fatigue rather than to a change in health goals.

Caregiving demands produced a similar disruption. A participant caring for 3 children described family emergencies and mealtimes as circumstances in which her own monitoring routine was displaced:

When a kid gets sick, or the toddler has a tantrum during dinner, my health routine is the first thing to go out the window.

A school teacher also described examination periods as a time when stress eating increased and logging became uncomfortable. Together, these accounts positioned relapse within competing demands and temporary reductions in capacity.

Physical and health-related changes also altered what participants could do. Participants with an injury, arthritis flare, or PCOS described reducing exercise or changing eating patterns while their capacity was affected. One participant with a knee injury stated,

I didn't stop moving. I switched to gentle yoga and stretching. But because those activities didn't 'count' toward the app's metrics, they felt invisible.

This account shows that participants did not always experience behavioral disengagement and digital disengagement as the same process.

Cultural, Temporal, and Environmental Misalignment

Participants described relapse when the routines assumed by an app did not fit religious observances, festivals, family events, seasonal schedules, shift work, travel, or constrained food environments. These accounts did not necessarily indicate rejection of health goals. Instead, participants described the app as becoming less relevant when daily routines changed.

A participant managing type 2 diabetes described Ramadan as a period when eating times shifted and glucose readings became more variable. He stated,

Relapse wasn't rebellion; it was misalignment.

The app continued to provide advice based on fixed meal timing, which he experienced as inconsistent with his religious practice. He wanted the app to recognize that

My lived experience wasn't recognized by the digital system guiding me.

Cultural food practices were also described as a source of difficulty. A retired participant explained that the app's database did not adequately represent homemade biryani and festival foods:

I felt like the app was telling me that my culture and my health were incompatible.

He described abandoning logging after repeated uncertainty about how to record traditional meals. Another participant described family weddings and social meals as events that interrupted exercise and dietary routines. Rather than avoiding such events, he wished for an event mode that would support flexible tracking and recovery after celebrations.

Work schedules and travel created additional environmental barriers. A shift worker described night rotations, disrupted sleep, and irregular meals. A long-haul truck driver described limited food choices during a winter storm and stated that the app seemed "designed for someone with a kitchen and a routine, not for someone whose life happens in a 70-foot vehicle." These accounts indicate that relapse was sometimes associated with structural constraints, including limited access to suitable food, irregular work hours, travel, and the physical environment in which self-management occurred.

Seasonal demands also affected engagement. A teacher described school holidays and end-of-term events as periods when weight loss was unrealistic. She wanted a maintenance option because

When the goal becomes 'perfection or nothing', people choose 'nothing' every time the holidays roll around.

This account illustrates how rigid goals could become difficult to sustain during predictable periods of contextual change.

Psychological Disengagement and Avoidance

Participants described a process in which an initial lapse was followed by avoidance of the app, monitoring devices, or feedback. Avoidance took several forms, including not logging, removing or hiding devices, ignoring glucose readings, selectively recording food, or postponing reengagement until behavior appeared more acceptable.

A marketing executive described opening the app after several takeout meals and then closing it without recording anything: "It wasn't forgetfulness—it was avoidance." She associated the app with failure and described the loss of

the reflective pause that logging had previously created. A participant managing weight described a similar process as "The Ostrich Effect," explaining, "If I don't wear the watch, the data doesn't exist." In both accounts, avoidance reduced immediate emotional discomfort but also interrupted monitoring.

Visual feedback and streak systems were particularly salient. One participant stated that red graphs and notifications produced guilt and led her to hide the app. Another described a 75-day streak ending after one missed entry:

> *If I can't have a perfect score, why bother playing the game?*

The participant interpreted the loss of the streak as a loss of status and subsequently stopped using the app for an extended period.

Some participants described selective nonlogging rather than complete disengagement. A school teacher explained that color-coded food categories made recording certain foods uncomfortable: "Red meant wrong." She began eating foods without recording them and later stopped logging altogether because she did not want a record of "bad days." A participant using a continuous glucose monitor described the opposite pattern: repeated checking of minor fluctuations increased anxiety until she avoided the app. Thus, disengagement could follow both undermonitoring and excessive monitoring.

The findings also showed that digital disengagement did not always correspond to complete behavioral disengagement. A participant recovering from injury continued gentle activity even though the app classified her reduced-intensity exercise as insufficient. Another participant continued occasional walking after withdrawing from a competitive leaderboard. These accounts suggest that app data may not fully represent participants' physical or self-management activities during relapse periods.

Social and Relational Influences

Participants described relapse as embedded in relationships and social settings. Family meals, weddings, peer drinking, parenting responsibilities, bereavement, and social isolation all influenced whether participants could maintain routines or felt able to reengage with an app.

A university student described tracking as socially uncomfortable during evenings with friends:

> *If I pull out my phone to track a drink, I feel like a total buzzkill.*

She experienced a conflict between being healthy and maintaining her social identity. Her account suggested that the app made these identities feel incompatible during social occasions.

Family contexts could either disrupt or support reengagement. A business owner described negotiating home workouts with his wife after a wedding-related lapse. A widowed participant stated that her daughter's encouragement helped her return to glucose monitoring:

> *Human connection restarted what technology couldn't.*

Another older participant living alone described relapse as connected to loneliness and requested a check-in system that could alert a trusted person when prolonged disengagement occurred.

Participants also described social features that were not uniformly helpful. Competitive leaderboards initially motivated one participant but later became discouraging when he fell behind. He explained,

> *Relapse here wasn't about inactivity—it was discouragement.*

These accounts indicate that social accountability may support reengagement when it is experienced as relational and supportive, but may contribute to withdrawal when it is experienced as comparison or public failure.

Relapse as Emotional Disengagement

Participants frequently described relapse using emotional terms, including guilt, shame, discouragement, hopelessness, loss of meaning, identity threat, and indifference. These accounts did not imply that every participant understood relapse in the same way. Rather, they illustrate a recurring interpretation in which emotional responses shaped how a lapse was understood and whether the participant returned to the app.

A software engineer described the experience as a threat to her identity: "I'm a failure at this too." A participant with PCOS described feeling that her body had betrayed her during a flare-up. A participant managing diabetes after bereavement stated,

> *Relapse, in that period, was existential. It wasn't rebellion or ignorance. It was emotional depletion.*

These accounts framed relapse as a disruption in meaning and self-understanding, not simply as a failure to perform a health behavior.

Participants also described a difference between a behavioral lapse and an emotional withdrawal from self-management. One participant summarized this distinction as follows:

> *For me, relapse is less about food and more about losing the reflective habit that the app initially helped build.*

Another participant continued gentle physical activity after an injury but considered herself digitally unsuccessful because the app did not recognize the activity. Such accounts suggest that participants evaluated relapse through both their lived behavior and the app's representation of that behavior.

Informal Relapse Management and Self-Directed Recalibration

Participants generally described managing relapse through improvised, self-directed strategies rather than through structured recovery tools within the apps. Strategies included restarting on a chosen date, reducing goals, switching to simpler activities, recording only selected measures, using journaling or professional advice, and seeking support from family or friends.

Several participants described temporal resets, such as restarting on Monday or after a holiday. A participant experiencing social eating described a "Weekend Void" followed by an intention to "start fresh on Monday." Another participant used journaling and discussions with clinicians to manage a health-related flare-up. These strategies helped participants regain a sense of control but were not usually supported by an explicit relapse pathway in the app.

Participants also recalibrated goals when full adherence was unrealistic. Examples included using lighter activity during injury, adjusting goals during night shifts, choosing maintenance rather than weight loss during holidays, and simplifying food recording during long work shifts. A participant working in intensive care wanted an app that would reduce demands during high-capacity periods and ask for a simpler account of eating rather than exact measurements.

Partial engagement was another form of self-management. Participants sometimes measured glucose, continued some movement, or recorded selected meals while avoiding complete tracking. One participant described restarting gradually but found partial entries discouraging because the app treated them as incomplete. These accounts suggest that participants were attempting to maintain a connection with self-management, even when they could not meet the app's preferred level of monitoring.

Desire for Compassionate and Context-Aware Support

Participants consistently described a preference for support that recognized emotional states, changing circumstances, health conditions, and temporary limitations. Their suggestions included pause or crisis modes, event and festival modes, maintenance goals, injury-sensitive plans, mood tracking, neutral feedback, simplified logging, accessible interfaces, and gentle reentry pathways.

A participant experiencing work stress wanted "a pause mode for high-stress weeks" with a smaller goal, such as logging 1 meal. A participant managing type 2 diabetes during Ramadan wanted seasonal or cultural adaptation. A participant with an injury wanted to record that she was recovering so that the app could recalibrate activity expectations. These suggestions shared the assumption that support should adapt to changing capacity rather than continue to evaluate users against a fixed routine.

Participants also requested emotional and relational support. Suggestions included mood tracking, reflection prompts, grief resources, peer stories, family support, check-in buddies, and community connections. A participant experiencing emotional eating stated,

> *When the app only treats the 'what' and not the 'why', it's only doing half the job.*

An older participant living alone wanted the app to function as "a bridge to other people, not just a digital diary."

Gentle reentry was a central feature of participants' desired support. Participants described wanting fresh-start options, archived difficult periods, blind weighing, reset streaks, maintenance modes, and neutral language. One participant wished for a system that would separate logging from judgment, while another wanted to "archive" a difficult week without deleting previous progress. Overall, participants described relapse-responsive support as flexible, nonpunitive, and attentive to the circumstances in which health behaviors occur.

The overall findings indicate that participants experienced relapse as a dynamic interaction among stress, reduced capacity, contextual misalignment, psychological responses to digital feedback, and social circumstances. Participants described self-directed attempts to recover but reported few structured app features for managing relapse. Their accounts pointed to the importance of flexible goals, culturally and contextually responsive interfaces, neutral feedback, and supportive reentry. These findings are interpretive and should not be read as estimates of the frequency of these experiences among all mHealth app users.

Discussion

Principal Findings and Contribution to mHealth

The findings provide deeper insights into how users experience, interpret, and manage dietary and exercise relapse within mHealth apps for weight and glycemic control. Consistent with the Relapse Prevention Model, participants described stress, social events, health-related limitations, and contextual instability as circumstances surrounding relapse. However, their accounts also highlighted emotional disengagement, including guilt, shame, discouragement, and identity disruption. These findings complement research on goal-discrepant feedback and mHealth engagement by illustrating how users may interpret app-generated information during periods of difficulty.

An important distinction was that digital disengagement did not always correspond to complete behavioral disengagement. Some participants continued walking, adapted their exercise, or monitored selected health indicators despite withdrawing from an app. Consequently, an absence of app entries may indicate tracking burden, discomfort with feedback, or a mismatch between app expectations and

users' circumstances rather than abandonment of health goals. This finding adds a user-centered perspective to research examining disengagement from self-monitoring and declining mHealth engagement [20-22].

Participants reported limited structured support for recovering from relapse within the apps they used. Their accounts suggest a possible sequence in which an initial lapse is followed by negative self-evaluation, avoidance of feedback, and delayed reentry. However, the qualitative design does not establish mediation or causality, and these accounts should not be interpreted as evidence that specific features caused disengagement. Instead, they identify potentially important processes for investigation and highlight the need to distinguish support for behavior initiation from support for recovery and maintenance [40].

Emotional Responses and Recovery After Relapse

Participants' accounts suggest that relapse-responsive support should address the emotional meaning attributed to setbacks as well as the behaviors themselves. Broken streaks, unmet targets, and evaluative displays were sometimes interpreted as evidence of personal failure or loss of previous progress. These experiences provide context for research examining engagement following goal-discrepant feedback. Rather than treating feedback as inherently motivating, developers should consider how its language, visual presentation, and timing may be experienced by users whose capacity has temporarily declined.

A practical implication is to combine self-monitoring with supportive reflection and gradual recovery. An app could acknowledge previous progress, invite users to identify the circumstances surrounding a lapse, and support the selection of a manageable next action. For example, a user returning after a stressful week might choose to record one meal or complete a short activity rather than immediately restore all previous targets. These proposals translate participants' existing strategies of partial engagement and goal recalibration into structured support and are conceptually consistent with the role of self-efficacy and coping in weight maintenance.

Compassionate communication should not imply that health goals are unimportant. Rather, it could separate information about behavior from judgments about personal worth. Neutral wording, recognition of partial completion, and preservation of accumulated progress may make reentry more acceptable for users who experience all-or-nothing responses to missed targets. These are user-informed design proposals, however, and their effects on emotional responses, self-management, and sustained engagement require evaluation.

Relapse-Responsive Features and Behavior Change Strategies

The findings identify opportunities to translate established behavior change strategies into relapse-responsive app features. Research on digital weight-management interventions has examined self-monitoring, goal setting, feedback, and persuasive design approaches [37-40]. This study extends this discussion by considering how these strategies could be adapted when users experience stress, emotional distress, injury, or disruption to their usual routines. Table 2 summarizes the relationships between the study findings, proposed relapse-responsive app features, corresponding behavior change strategies, and priorities for evaluation.

Table 2. Proposed relapse-responsive app features and behavior change strategies.

Study finding	Proposed app feature	Corresponding behavior change strategy	Evaluation priority
Stress, exhaustion, and reduced capacity	Optional low-demand mode with simplified logging, fewer nonessential prompts, and smaller goals	Graded tasks, goal review, and action planning	Perceived tracking burden and maintenance of feasible self-management
Cultural, temporal, and environmental misalignment	User-selected Ramadan, celebration, travel, or shift-work settings and culturally relevant food entries	Context-specific planning and problem solving	Cultural acceptability, usability, and clinical appropriateness
Shame and avoidance following evaluative feedback	Neutral language, recognition of partial completion, and preservation of accumulated progress	Supportive feedback and reflection on setbacks	Emotional responses, avoidance, and willingness to resume monitoring
All-or-nothing responses to missed targets	Graded reentry without mandatory completion of missing records or punitive streak resets	Graded tasks and review of achievable goals	Time to reengagement and sustained self-management after a lapse
Social isolation or discouraging comparison	Optional trusted-person check-ins, noncompetitive peer support, and user-controlled sharing	Emotional and practical social support	Acceptability, perceived autonomy, privacy, and supportive contact
Injury or health-related limitations	Capacity-sensitive activity goals and temporary maintenance options within clinically appropriate boundaries	Goal adjustment and problem solving	Safety, feasibility, and recognition of adapted health-related activity

For participants experiencing reduced capacity, an optional low-demand mode could simplify food recording, reduce nonessential prompts, and support smaller, achievable goals. Goal review and graded tasks could allow users to maintain some connection with self-management without requiring full adherence immediately. Similarly, temporary maintenance goals or capacity-sensitive activity targets could recognize that weight loss or usual exercise intensity may not be feasible during every period. These proposals align with user-centered approaches to adaptive interfaces and personalized recommendations, but their effectiveness during relapse remains to be established [50].

Gentle reentry pathways could address the difficulty participants described when attempting to resume app use. Possible features include restarting without retrospectively completing missing records, retaining previous achievements after a broken streak, and allowing users to select a limited set of activities before restoring their usual routine. Such features would recognize recovery as a process rather than a single decision to resume tracking. Importantly, these proposals should complement, but not replace, clinically appropriate self-management guidance.

Social support features also require differentiation between supportive contact and competitive comparison. Participants described family encouragement and trusted-person contact as helpful, whereas leaderboards could become discouraging when they fell behind. Optional check-ins, noncompetitive peer support, and user-controlled sharing may therefore offer acceptable recovery pathways for some users. Their design should preserve choice and privacy rather than assume that increased visibility or accountability benefits everyone.

Cultural and Contextual Adaptation

Cultural and contextual misalignment was a prominent concern in participants' accounts. Religious observances, celebrations, traditional foods, shift work, travel, and constrained food environments altered the feasibility of fixed tracking expectations. These findings complement qualitative research examining the fit between digital self-management tools and users' everyday circumstances [47-49]. They suggest that personalization should extend beyond demographic characteristics to changing routines, available resources, and self-management capacity.

For example, user-selected Ramadan, celebration, travel, or shift-work settings could adjust optional reminder schedules and support context-specific planning. Culturally relevant food entries and simplified recording options could reduce difficulties associated with logging traditional meals. However, such features should accommodate individual variation rather than assume that all users within a cultural or religious group follow the same practices. The relevance of these adaptations should be established through user involvement, consistent with user-centered development approaches [50].

Adaptation should also begin with user confirmation rather than automatic interpretation of missing data as relapse. A missed entry alone cannot establish whether a person is struggling, successfully adapting their behavior, or choosing not to use the app. A neutral invitation to select a smaller goal, change a schedule, or pause optional reminders could provide support while preserving autonomy. This distinction is particularly important given participants' accounts of continued health-related activity despite reduced digital engagement.

Broader Implications and Future Evaluation

The broader implication for mHealth is that sustained self-management should not be equated with uninterrupted app interaction. Research has documented challenges in maintaining engagement and sustaining the benefits of app-based interventions [20,21,34-36]. These findings suggest that useful digital support may involve helping users navigate disruption, preserve feasible behaviors, and return after a lapse rather than prioritizing continuous tracking or perfect streaks.

Relapse-responsive features should therefore be evaluated using outcomes that distinguish digital activity from health behavior. In addition to app use, relevant outcomes could include time to reengagement, recovery after a lapse, perceived tracking burden, emotional responses to feedback, and sustained self-management. Weight and glycemic outcomes should also be examined where appropriate, given evidence linking self-monitoring adherence with weight-management outcomes. Increased interaction alone would not establish benefit if it also increased anxiety or burden [22].

Implementation must also distinguish reduced interaction demands from reduced clinically necessary care. Low-demand modes could simplify optional logging or motivational reminders, but features used in glycemic-control apps would require clinical review to ensure that essential monitoring and safety functions remain appropriate. Mood-related information and trusted-person notifications would similarly require clear consent, privacy protections, and user control. These are considerations for future development rather than outcomes assessed in this study.

Overall, the findings provide a user-informed basis for developing flexible goals, neutral feedback, contextual adaptation, optional relational support, and graded reentry pathways. Participatory development and prospective evaluation are needed to determine their acceptability, safety, and effectiveness. The study's contribution is therefore to identify how digital support might remain useful during periods of reduced capacity and disrupted routines, rather than to demonstrate that these proposed features improve engagement or clinical outcomes.

Limitations and Future Research

Several limitations should be considered. Interviews were conducted in Arabic and translated into English; subtle changes in meaning may have occurred despite author verification. The purposive sample comprised 26 adults using apps for weight and/or glycemic control in Saudi Arabia. Although participants differed in age, gender, occupation, health goals, and relapse circumstances, the study does not support statistical generalization. Recruitment through online communities and university mailing lists may also have favored individuals willing and able to discuss digital self-management.

Transferability depends on similarities between the study context and other settings, particularly concerning religious observances, food practices, family relationships, occupational schedules, and access to suitable food or activity opportunities. Retrospective accounts are also susceptible to recall and social desirability influences. The analysis involved researcher interpretation supported by independent

coding, transcript-based discussion, and documented analytic decisions; these procedures do not eliminate interpretive influence. Although interview transcripts were returned to participants for feedback and a small number of changes were made in response, this process supported the accuracy of the interview records rather than establishing the validity of the researchers' thematic interpretations.

The study did not independently assess app functionality, usage logs, behavioral trajectories, or clinical outcomes. Participants' reports of limited recovery support should therefore not be interpreted as an objective assessment of all apps or proof that such features were absent. Likewise, the study does not establish causal relationships among app feedback, emotional responses, and disengagement. The proposed relapse-responsive features are user-informed design hypotheses requiring participatory development and prospective evaluation.

Conclusions

Participants described dietary and exercise relapse in mHealth contexts as involving emotional disengagement, changing capacity, contextual misalignment, and social circumstances, rather than simply failure to meet behavioral targets. Digital disengagement did not always indicate abandonment of health-related activity. These findings identify opportunities for relapse-responsive support through flexible goals, neutral feedback, culturally appropriate adaptation, optional relational support, and graded reentry. Their acceptability, safety, and effectiveness require evaluation; this study provides a user-informed basis for developing such interventions rather than evidence of their clinical benefit.

Acknowledgments

The authors thank all participants for sharing their experiences. The authors also acknowledge the support of King Faisal University.

Generative AI Use

Generative AI, Paperpal (version 2.1.2), was used solely to assist with language editing and drafting. The authors reviewed, revised, and take full responsibility for all content, accuracy, citations, and conclusions in the manuscript.

Funding

This work was supported by the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia (KFU261183).

Data Availability

The deidentified interview data are not publicly available because they contain potentially identifiable personal information and because the consent and ethics approval did not permit unrestricted public sharing. Deidentified data may be available from the corresponding author on reasonable request, subject to approval by the relevant ethics committee and applicable data-protection requirements.

Authors' Contributions

All 3 authors contributed substantially to this work. They were responsible for the study conception and design, data collection, analysis and interpretation of results, and manuscript preparation. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Key themes emerged from the data analysis.
[DOCX File (Microsoft Word File), 19 KB-Multimedia Appendix 1]

Checklist 1

COREQ checklist.
[DOCX File (Microsoft Word File), 20 KB-Checklist 1]

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Abbreviations

COREQ: Consolidated Criteria for Reporting Qualitative Research
mHealth: mobile health
PCOS: polycystic ovary syndrome

Edited by Lorraine Buis; peer-reviewed by James Hill, Mohamadjavad Ershadmanesh, Vaitsa Giannouli; submitted 06.Mar.2026; final revised version received 09.Oct.2026; accepted 21.Oct.2026; published 17.Nov.2026

Please cite as:
Alhajri AS, Alandanoosi AI, Al-Otaibi HH
Dietary and Exercise Relapse Management in Mobile Health Apps for Weight and Glycemic Control: Descriptive Qualitative Study
JMIR Mhealth Uhealth 2026;14:e94792
URL: https://mhealth.jmir.org/2026/1/e94792
doi: 10.2196/94792

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