

AN IDENTITY-ORIENTED FRAMEWORK FOR AI-SUPPORTED mHEALTH

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Metabolic chronic conditions require sustained lifestyle change, yet mobile health (mHealth) interventions typically show modest and short-lived effects. A central unresolved question is how behavior change becomes personally meaningful. Beyond meaningful gamification, a growing body of literature emphasizes identity processes as crucial for long-term change: health behaviors persist not merely through motivation or prompts, but when narratively integrated into the self-concept. In the age of large language models (LLM)-based conversational systems, this perspective becomes urgent. While LLMs can scaffold reflection at scale, it may normatively script users' developmental trajectories. Existing work has addressed related questions around identity, reflection, and behavior change, but an integrative framework for identity-oriented mHealth design remains underdeveloped. This paper proposes an identity-oriented framework for designing mHealth systems that support narrative identity development and sustained behavior change. The paper organizes empirically reported design patterns along four narrative identity processes (interpretation, temporal integration, episodic configuration, and self-representation) to offer a design-relevant conceptual lens for LLM-supported mHealth systems.

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1 Introduction

Healthcare systems are facing steadily increasing costs, largely driven by chronic conditions that require long-term management rather than episodic treatment. In Switzerland alone, total healthcare costs were estimated at 97.1 billion Swiss francs (CHF) in 2024, corresponding to CHF 10,783 per capita (Swiss Health Observatory Obsan, 2025). Many metabolic conditions, including type 2 diabetes and obesity, are at least partly preventable through sustained lifestyle patterns such as regular physical activity, healthier eating, and stress regulation (Chen et al., 2025). Mobile health (mHealth) applications promise scalable support for lifestyle change, and thousands of behavior-change apps are available across platforms. However, recent reviews indicate that their effects on weight and metabolic indicators are generally modest, heterogeneous, and often limited in long-term follow-up (Da Couto et al., 2025; Leuzzi et al., 2026; Pujia et al., 2025). High dropout rates and relapses into previous behavioral patterns remain persistent problems. This suggests that engagement alone is insufficient; rather, sustained change may require deeper psychological integration.

Meta-analytic evidence suggests that identity is both associated with and predictive of health-related behaviors (De Hoog & Pat-El, 2024; Di Zhu et al., 2024). Empirical studies on physical activity show associations between behavior and activity identity, yet findings on identity change are inconsistent. Wierds et al. (2024) report only small and unstable identity gains among beginners, whereas Priebe et al. (2020) found significant increases in running identity correlated with training frequency. Rhodes (2025) therefore emphasizes that identity development is dynamic and does not automatically result from repeated behavior. This evidence suggests that identity should be conceptualized not merely as an outcome, but as an actively supported developmental process.

This gains renewed significance with the rise of LLM-based systems, which enable scalable, dialogical exploration and co-construction of identity narratives (Meyer & Elsweller, 2025; Rahsepar Meadi et al., 2025). Context-sensitive artificial intelligence (AI) journaling deepens meaning-making by prompting linguistic interpretation rather than mere documentation (Nepal et al., 2024), while narrative progress framing and immersive reminiscence systems may support broader autobiographical integration (Murnane et al., 2020; Tran et al., 2022; Xu et al., 2025). Without a solid psychological and conceptual foundation, however, such developments risk giving

rise to significant safety and ethical concerns (ibid.). At the same time, such developments raise important safety and ethical concerns. If reflective processes are overly structured or tied to optimized behavioral pathways, AI-supported systems may unintentionally constrain users' interpretive autonomy and self-authorship (Chandra et al., 2025).

In this paper, LLM-supported mHealth refers primarily to user-facing conversational and reflective features, especially LLM-enabled journaling, coaching, and narrative prompting. Backend analytics, prediction-only AI, and non-interactive personalization are outside the main scope. The framework is further intended for contexts in which sustained lifestyle change and reflective sense-making are central, rather than for brief or purely transactional interventions.

Against this backdrop, the paper makes three contributions. First, it proposes narrative identity as a useful mediating lens between mHealth design and sustained health behavior, complementing existing behavior change perspectives with a stronger focus on long-term internalization. Second, it offers a conceptual framework that organizes identity-oriented design knowledge along four narrative processes: interpretation, temporal integration, episodic configuration, and self-representation. Third, it presents an initial taxonomy of empirically reported design patterns that may inform the development of mHealth systems intended to scaffold identity work rather than prescribe predefined optimization trajectories.

Methodologically, the paper does not present a systematic review but a structured conceptual synthesis of empirical work across Human-Computer Interaction (HCI), mHealth, lifelogging, digital reminiscence, and LLM-supported journaling. Studies were considered insofar as they described or evaluated interactive features related to reflection, narrative reconstruction, temporal sense-making, or identity-relevant self-representation. The aim is not exhaustive coverage, but theory-informed integration and design abstraction.

2 Theoretical Background

To theoretically ground identity-oriented persuasive design, behavior change must be situated within broader models of self-construction, particularly considering emerging LLM-based conversational systems that increasingly mediate reflective

health interactions. This section therefore integrates four complementary perspectives: identity theories, behavior change models, meaningful gamification, and narrative identity in the context of LLM-based systems.

2.1 From Trait Models to Narrative Identity: A Theoretical Rationale

Several psychological frameworks conceptualize identity and its developmental trajectories across the lifespan. Trait- and status-based models, such as the Big Five and Marcia's identity status model, reify relatively stable characteristics or categorical outcomes (Costa & McCrae, 1992; Marcia, 1966) and thus underemphasize the situational, socially negotiated, and technologically mediated dynamics through which identities are enacted and revised. Social identity and interactionist perspectives (Mead, 1934; Goffman, 1959) illuminate belonging and contextual performance but are less suited to explaining how experiences are integrated into biographical coherence over time. Developmental models like Erikson's psychosocial theory (Erikson, 1968) offer a strong life-span heuristic yet remains difficult to operationalize empirically and only indirectly address digitally mediated identity construction.

Against this backdrop, McAdams' narrative identity framework is adopted (1996, 2001; McAdams & McLean, 2013), which conceptualizes identity as an internalized, evolving life story integrating past, present, and future into a coherent self-understanding. This approach is particularly suitable because it (1) treats identity as dynamic and reconstructive, (2) specifies analytically distinct narrative processes, such as meaning making and temporal integration, which can be translated into design relevant mechanisms, and (3) foregrounds interpretation and authorship, aligning with interactive systems that scaffold reflection rather than prescribe behavior.

2.2 An Identity-Based Perspective on Behavior Change

An identity-based perspective on behavior change does not replace established behavioral models but reinterprets them through the lens of self-construction. Fogg's Behavior Model explains how behavior is triggered in digital environments through the convergence of motivation, ability, and prompts, yet motivation itself already encompasses socially grounded drivers such as belonging and social

acceptance (Fogg, 2009). While identity is not explicitly modeled, it shapes the stability and qualitative character of motivation by influencing whether a behavior is experienced as self-relevant rather than situationally attractive.

Self Determination Theory deepens this view by distinguishing forms of regulation and demonstrating that behavior becomes durable when it is internalized and integrated into the self (Deci & Ryan, 1985; Ryan & Deci, 2000). Behavioral persistence is most likely when behavior aligns with core values and self-understanding. Narrative identity can, in this context, be linked to the concept of self-defining action. Michie's COM-B model (2011) complements these accounts by offering a systemic framework for diagnosing behavioral determinants (capability, opportunity, and motivation). Although identity is not explicitly theorized, it is embedded in psychological capability (beliefs about competence and role) and reflective motivation (values, intentions, self-evaluation). Identity thus operates as a mediating layer linking evaluative processes to self-definition.

Taken together, these models provide a multilevel account of behavioral enactment, motivational quality, and systemic intervention design. An identity-oriented framework builds on this foundation by conceptualizing narrative identity as the mechanism through which behavior becomes biographically integrated rather than merely situationally enacted.

2.3 Reframing Meaningful Gamification Through Narrative Identity

McAdams conceptualizes identity as an internalized and evolving life story through which individuals organize experiences, values, and goals into a temporally coherent self-understanding (McAdams, 1996, 2001; McAdams & McLean, 2013). This processual and interpretive account of identity provides a deeper theoretical foundation for analyzing gamified systems than approaches that focus primarily on motivation. Nicholson's (2014) concept of meaningful gamification already moves beyond reward-based mechanics by emphasizing personal relevance, autonomy, and reflection. However, its conceptualization of meaning remains theoretically underdeveloped with respect to identity formation and self-construction.

Narrative identity theory extends this perspective in three significant ways: First (1), it reframes meaning as temporally structured self-interpretation: beyond asking whether a goal is important “to me,” it examines how repeated actions become integrated into an unfolding life story (McAdams, 1996, 2001; McAdams & McLean, 2013; Ricoeur, 1984). Sustained behavior depends on biographical integration, not momentary relevance. Second (2), it conceptualizes reflection as longitudinal and reconstructive, involving the integration of turning points, setbacks, and revised self-ascriptions rather than situational motive clarification. Identity work thus becomes an ongoing interpretive process. Third (3), it reveals the normative assumptions embedded in gamified systems. By privileging growth and optimization, many designs reinforce narrow self-improvement scripts while marginalizing alternative trajectories such as stability or care. Narrative identity theory makes these exclusions analytically visible.

Meaningful gamification can thus be linked to the four narrative processes proposed here: reflection and personal relevance support interpretation, journey framing supports temporal integration, quest or chapter structures support episodic configuration, and role-related framing supports self-representation. From this perspective, narrative identity extends meaningful gamification by framing persuasive systems not only as motivational architectures, but as infrastructures for narrative self-construction shaped by temporality, moral positioning, and sociocultural context.

2.4 Narrative Identity in the Age of LLM-Based Systems

LLM-driven agents are increasingly used in mobile health to provide adaptive coaching and reflective dialogue (Meyer & Elsweiler, 2025; Rahsepar Meadi et al., 2025). Unlike traditional gamification mechanisms, LLMs may function as infrastructures for identity work: they can scaffold meaning-making, support temporal integration, and assist in interpreting setbacks within a broader personal trajectory (Kvietkute & Ness, 2026). However, this capability also introduces a new form of normativity. Because LLMs are trained on large-scale cultural corpora, they may implicitly reproduce dominant scripts such as self-optimization and continuous improvement (Dokic et al., 2025). If conversational systems over-structure reflection or privilege specific developmental arcs, they risk shaping identity rather than supporting its autonomous construction (Chandra et al., 2025).

Taken together, these perspectives play different roles in the paper: narrative identity provides the core explanatory lens; behavior change models specify how sustained enactment becomes possible; meaningful gamification clarifies how motivational design can support personally relevant engagement; and LLM-based systems introduce both new scaffolding opportunities and new ethical risks.

3 Operationalizing Narrative Identity in HCI Design

In this section, the conceptual foundations underlying the taxonomy of narrative identity in HCI design are first systematically elaborated. Subsequently, representative examples from empirical literature are presented for each category to illustrate and substantiate the proposed framework.

3.1 Taxonomy of Narrative Identity in HCI Design

The proposed taxonomy builds on the assumption that identity is not a stable trait but an ongoing, constructed life story (McAdams, 1996, 2001; McAdams & McLean, 2013). Narrative identity theory conceptualizes identity as an internalized and evolving self-narrative through which individuals integrate experiences over time into a coherent sense of self (ibid.). This integrative process involves intertwined operations: interpreting and assigning meaning to events, structuring them temporally, and positioning the self as an acting figure within the story.

From this processual understanding, four design levers can be derived that translate core narrative operations into interactive systems. (1) **Prompting interpretation** supports meaning-making: events become identity-relevant only through reflective processing. Context-sensitive prompts or dialogical reminiscence systems can actively scaffold this interpretive work (Adler et al., 2016; Zimmerman et al., 2007). (2) **Structuring time** enables temporal integration by organizing past, present, and future into visible developmental trajectories, thereby supporting biographical continuity (McAdams, 1996; 2001; McAdams & McLean, 2013; Habermas & Bluck, 2000). (3) **Composing episodes** addresses configurational integration: fragmented experiences are condensed into meaningful episodes. Systems that curate artifacts or semi-automatically generate stories scaffold the process of narrative identity construction (Ricoeur, 1984). (4) **Representing the self**-targets narrative agency. Because life stories center on an acting protagonist, features such as identity-

congruent self-representation or avatar customization can reinforce autonomy and perceived efficacy (McAdams, 1996, 2001; McAdams & McLean, 2013; Yee & Bailenson, 2007).

In summary, the taxonomy does not categorize interface functions but core operations of narrative identity construction: **interpretation, temporal integration, episodic configuration, and agentic self-positioning**. It thus clarifies how interactive systems can scaffold identity work by deliberately shaping narrative processes rather than merely collecting data.

3.2 Empirically Grounded Design Patterns for Narrative Identity

To operationalize narrative identity in interactive systems, empirical research from HCI, lifelogging, digital reminiscence, LLM-supported journaling, immersive media, and mHealth interventions were synthesized, including studies that investigate reflective scaffolding and identity processes in digitally mediated health behavior change. We treated the studies in Table 1 as empirical instantiations of broader design patterns and abstracted them into four higher-level narrative processes based on their primary identity-related function.

Across these studies, a common pattern emerges. Systems become identity-supportive not when they merely capture behavioral data, but when they scaffold the transformation of experience into interpretable narrative units.

Context-sensitive reflection prompts, for example, encourage users to articulate personal significance rather than passively log events (Nepal et al., 2024). Timeline-based elicitation methods and revisitable journey views make developmental continuity visible and allow reinterpretation across time (Haimson et al., 2023). Narrative framing of progress transforms metrics into story-like trajectories, positioning the user as an active protagonist (Murnane et al., 2020). Similarly, lifelog curation tools and semi-automated story composition features help consolidate fragmented traces into coherent episodes (Byrne & Jones, 2009). Immersive reminiscence systems and narrative VR prompts further deepen episodic reconstruction by coupling emotional re-experiencing with guided interpretation (Tran et al., 2022; Xu et al., 2025). Finally, dialogic photo-based AI systems and structured memory scaffolds support elaboration and social sharing, enabling

identity to be co-constructed in interaction (Wang et al., 2024). By mapping each feature to its narrative contribution and empirical grounding, we provide a structured foundation for designing systems that actively support identity work.

Table 1: Design for Narrative Identity

Design-Feature	Contribution to Narrative Identity	Empirical Basis
Reflection (Context-sensitive reflection prompts (LLM-supported sensing-based prompts) (Nepal et al., 2024))	Foster meaning-making and coherence by prompting interpretation rather than mere logging.	MindScape: MindScape: contextual journaling prompts; users report enhanced self-reflection.
Temporal Structuring (Timeline/phase elicitation for identity transitions (structured retrospection) (Haimson et al., 2023))	Strengthen temporal coherence and agency through reinterpretation of turning points.	Technology-mediated elicitation of reflection on past identity transitions.
Temporal Structuring / Self-Representation (Narratively framed progress feedback (chapters/quests instead of metrics) (Murnane et al., 2020))	Support continuity (progress as storyline) and agency (self as protagonist).	WhoIsZuki: activity goals visualized as multi-chapter quests; users experience data as story.
Temporal Structuring (Revisitable journey/flashback views (“Previously on...”) (Murnane et al., 2020))	Maintain biographical coherence by enabling reinterpretation of earlier episodes.	Narrative tracking setup emphasizes longitudinal story access.
Episodic Composition (Semi-automated story composition from lifelog artifacts + user curation (Byrne & Jones, 2009))	Transform fragments into meaningful episodes; support coherence.	Lifelog reduction/composition into narrative retrospectives.
Episodic Composition (Immersive virtual reality (VR) reminiscence (spatial re-experiencing) (Tran et al., 2022))	Facilitate episodic reconstruction and narrative reconsolidation.	VR reminiscence prototype: user study reports helpful yet sometimes overwhelming experience.
Reflection (Narrative identity prompts in VR story frames (e.g., “Who am I?”) (Xu et al., 2025))	Trigger identity exploration and active meaning-making.	Someone else’s Lifelog in Virtual Reality (SLIVeR): narrative VR with existential prompts and lifelog fragments.
Reflection (LLM-supported photo-based memory dialogues (Wang et al., 2024))	Support narrative elaboration and social identity through storytelling.	GoodTimes: multimodal photo album with dialogical AI.
Episodic Composition / Self-Representation (Memory scaffolding via dialogical photo AI + structured cues (who/what/when/where) + sharing preparation (Wang et al., 2024))	Enhance coherence through structured reconstruction and social narratability.	GoodTimes: development of LLM-supported multimodal photo album.

Source: Own elaboration

4 A Framework for Identity-Oriented mHealth Design

Building on the theoretical foundation outlined in Section 2 and the operationalization of narrative identity in Section 3, a conceptual framework for identity-oriented persuasive design in mHealth can be derived. Figure 1 illustrates this framework, linking identity-oriented design features in mHealth applications to sustained health behavior through processes of narrative identity development. It synthesizes these abstractions into a three-level conceptual model linking design features, identity processes, and downstream behavioral outcomes.

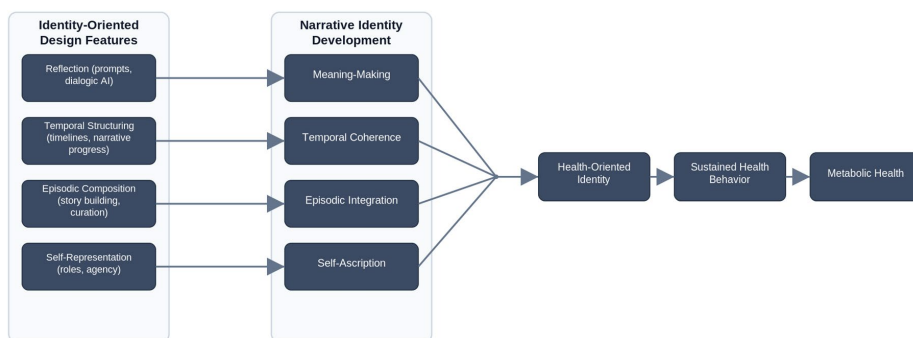


Figure 1: A Framework for Identity-Oriented mHealth Design

Source: Own Elaboration

A person using an identity-oriented mHealth app is supported in making sense of setbacks, linking present behavior to past and future, and viewing health actions as part of an evolving personal story. In this way, the system scaffolds a health-oriented identity rather than merely tracking behavior. The framework assumes that long-term behavior change does not primarily emerge from external reinforcement mechanisms, but from the integration of health-related behaviors into a person's self-understanding. Accordingly, the model differentiates between three analytical levels: (1) identity-oriented design features, (2) narrative identity development processes, and (3) behavioral and health-related outcomes.

At the design level, four groups of features are distinguished. Reflection features (e.g., context-sensitive prompts or dialogical LLM-systems) stimulate active meaning-making. Temporal structuring features (e.g., timelines or narrative progress

framing) support the integration of experiences across time. Episodic composition features (e.g., curated story-building from lifelog data) enable the transformation of fragmented behavioral traces into coherent episodes. Finally, self-representation features (e.g., role framing or identity-congruent self-positioning) reinforce agency and the experience of oneself as an acting subject within an unfolding narrative.

These feature groups scaffold four corresponding processes of narrative identity construction: meaning-making, temporal coherence, episodic integration, and self-ascription. Together, these processes contribute to the emergence of a health-oriented identity, that is, the perception of oneself as a person for whom health-related behavior is self-defining and value congruent.

The model further proposes that once health-related behavior becomes identity-congruent, it is more likely to be regulated through integrated forms of motivation rather than external pressure. This identity-based internalization increases the likelihood of sustained lifestyle behaviors, such as regular physical activity, balanced nutrition, and stress regulation, which in turn support long-term metabolic health. Importantly, the framework conceptualizes mHealth systems not as instruments that prescribe identities, but as environments that scaffold identity work. The effectiveness of identity-oriented design therefore depends on preserving user autonomy and interpretive flexibility, allowing individuals to construct personally meaningful health narratives rather than conforming to predefined optimization scripts.

5 Discussion: Identity Integration in mHealth Design

Many mHealth interventions continue to show limited long-term effectiveness despite increasingly sophisticated tracking and personalization capabilities (Puja et al., 2025). This paper argues that an important explanatory gap lies at the level of identity integration. Health behaviors are more likely to persist when they become integrated into an individual's evolving narrative understanding of the self rather than remaining externally prompted actions. The proposed framework therefore reconceptualizes persuasive mHealth as narrative scaffolding and positions narrative identity as mediating layer linking design features to sustain behavior change. It organizes identity supportive design knowledge around four narrative processes: interpretation, temporal integration, episodic configuration, and self-representation.

From this perspective, interaction design features such as reflective prompts, narrative progress representations, lifelog curation, and identity congruent forms of self-representation can help individuals interpret behavioral data as meaningful episodes within a broader life trajectory.

This perspective is particularly relevant in the context of emerging LLM-based conversational systems. Such systems enable longitudinal interaction and reflective dialogue around behavioral change. Research on narrative interfaces indicates that technological framing shapes how users position themselves developmentally (Murnane et al., 2020). Generative systems may therefore not only scaffold meaning making but also privilege narratives of self-optimization, productivity, or moralized health behavior (Dokic et al., 2025). The framework thus invites critical reflection on identity-oriented design, including which identity trajectories are amplified by technological framing and how interpretive openness and user authorship can be preserved. At the same time, the importance of narrative identity integration likely varies across behavioral contexts. Identity level processes may be particularly relevant for complex and sustained lifestyle changes such as long-term metabolic health management, where individuals must repeatedly reinterpret progress, setbacks, and turning points (Hajdarevic et al., 2025). In contrast, more routine or time limited interventions may require less identity level integration (Verplanken & Sui, 2019).

This work has several limitations. The framework is based on a structured synthesis of literature across HCI, mHealth, lifelogging, and digital reminiscence rather than a fully systematic review. While the taxonomy organizes existing design knowledge conceptually, further empirical research is needed to evaluate how identity-oriented design features influence long-term behavior change in real world interventions. Future work should therefore investigate how narrative scaffolding mechanisms operate in longitudinal mHealth deployments and how LLM mediated reflection shapes identity processes over time. Mixed method approaches combining narrative coding, validated psychosocial measures, and behavioral and clinical tracking such as glycated hemoglobin (HbA1c), a long-term blood glucose indicator and weight trajectories could assess identity development as a process level mechanism rather than merely an outcome. Ultimately, the long-term effectiveness of mHealth may depend less on optimizing behavioral prompts than on supporting the narrative integration of health behaviors into a person's evolving sense of self.

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About the author

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Summary

Metabolic chronic conditions require sustained lifestyle change, yet mHealth interventions often produce only modest and short-lived effects, with high dropout and relapse rates. This paper argues that a central explanatory gap in persuasive mHealth design lies at the level of identity integration. Health behaviors are more likely to persist when they are not merely performed but become narratively integrated into an individual's evolving self-understanding.

To address this gap, the paper reconceptualizes persuasive mHealth as narrative scaffolding instead of behavioral control. Drawing on McAdams' narrative identity theory and extending the concept of meaningful gamification, it introduces an identity-oriented framework that conceptualizes narrative identity as the mediating mechanism between design features and sustained behavior change.

The framework organizes identity supportive design knowledge along four core narrative processes: interpretation, understood as meaning making; temporal integration, referring to biographical continuity; episodic configuration, which transforms behavioral traces into coherent episodes; and self-representation, emphasizing agency and protagonist positioning. Based on a structured synthesis of empirical HCI and mHealth research, a taxonomy of design patterns such as reflective AI prompts, narrative progress framing, lifelog curation, reminiscence interfaces, and identity congruent self-representation is mapped onto these processes.

The framework is particularly relevant in the context of LLM-based conversational systems. While such systems can scaffold reflection and longitudinal meaning making at scale, they also risk reproducing culturally dominant self-optimization scripts and over structuring identity development. The paper therefore contributes both generative design guidance and critical evaluation criteria and advocates for mHealth systems that preserve interpretive openness and user authorship while supporting the gradual integration of health behaviors into narrative identity over time.