The Human Side of Service Engineering, Vol. 221, 2026, 59–68
https://doi.org/10.54941/ahfe1007709

Beyond Availability: Closing Adoption Gaps in Digital Health Prevention—A TSRDM Approach

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ABSTRACT

Adoption failures in digital health prevention indicate that availability and technological maturity are insufficient conditions for preventive value creation (Borghouts et al., 2021; Hawkes et al., 2023; Saleem et al., 2021). Prior research suggests that these failures are not primarily driven by user motivation deficits, but by structural problems in translating preventive intent into service design and experienced value (Borges Do Nascimento et al., 2023; Iyanna et al., 2022). This paper applies the Translational Service Research and Design Methodology (TSRDM) (Warg et al., 2025) to examine adoption failures in digital health prevention as service translation problems rather than acceptance or intervention deficits. Drawing on Service-Dominant Logic, Service Science, and Service-Dominated Architecture (SDA) (Vargo and Lusch, 2004; Warg et al., 2016), the study translates observed adoption frictions into service-centered design logic, translational services, and modular service architectures for health insurance ecosystems. The findings demonstrate that preventive value becomes effective only when it is translated into everyday service interactions, that sustained engagement requires continuity-oriented service structures, and that adoption ultimately depends on governance decisions at the level of service architecture rather than on isolated programs or features. The paper contributes transferable service and architectural design knowledge by showing how preventive intent must be translated into service-centered architectures to enable perceivable value, sustained engagement, and adoption in digital health prevention.

Keywords: Digital health prevention, TSRDM, User engagement, Preventive services

INTRODUCTION

Health insurers have increasingly invested in digital prevention programs to support healthier lifestyles and mitigate long-term healthcare costs (Borges Do Nascimento et al., 2023; Iyanna et al., 2022). Despite these investments, many digital prevention services struggle to achieve sustained adoption and engagement (Borghouts et al., 2021; Hawkes et al., 2023; Saleem et al., 2021). Qualitative studies of everyday self-tracking practices further demonstrate that, even when individuals actively collect health data, continued use and perceived value are influenced by routines, context and personal interpretation rather than technology or information alone (Krämer et al., 2024). While existing studies have examined engagement strategies, behavioral continuity, and preventive outcomes, these aspects are often addressed in isolation (Borghouts et al., 2021; Saleem et al., 2021). However,

Received February 5, 2026; Revised April 15, 2026; Accepted May 4, 2026; Available online July 20, 2026

less attention has been paid to how digital prevention services must be designed as service-centred systems so that preventive value becomes perceivable, adoption evolves into sustained engagement, and engagement stabilises over time. Service-Dominant Logic, Service Science, and service-oriented platform architectures provide a promising lens for addressing these challenges, yet their systematic application to digital prevention in health insurance remains underexplored (Spohrer et al., 2008; Vargo and Lusch, 2004; Warg et al., 2025, 2016).

Against this background, this study applies the Translational Service Research and Design Methodology (TSRDM) to analyze adoption challenges in digital health prevention and to translate them into service-centered design and architectural implications (Warg et al., 2025). By focusing on the translation of preventive intent into service interactions and service architectures, the paper aims to contribute transferable service and architectural design knowledge by translating adoption failures into service-centered design and governance implications for health insurance ecosystems.

RESEARCH METHODOLOGY

This study applies the Translational Service Research and Design Methodology (TSRDM) to investigate persistent adoption failures of digital preventive services in health insurance ecosystems (Warg et al., 2025). Rather than conceptualizing these failures as deficits in user motivation or technology acceptance, the research frames adoption as a service translation problem (Iyanna et al., 2022). In insurance-based prevention, value creation depends on the coherent translation of preventive intent, scientific knowledge, service design, and experienced value across multiple actors, platforms, and institutional constraints. Accordingly, this study does not aim to empirically validate individual interventions, but to generate transferable service and architectural design knowledge that supports the systematic redesign of digital prevention services.

TSRDM provides a structured and controllable research process for identifying translational gaps and translating them into design-relevant service mechanisms, translational services, and modular service architectures (Warg et al., 2025). Methodologically, the study follows a design-oriented and abductive logic that iteratively links empirical observations, service-theoretical concepts, and design propositions. TSRDM structures this process into eight interrelated steps that guide problem identification, knowledge integration, and solution development across research and implementation boundaries (Warg et al., 2025). The study integrates multiple sources of knowledge, including prior empirical findings from digital health and preventive care research, conceptual contributions from service science and service architecture, and practice-oriented insights from health insurance contexts (Borges Do Nascimento et al., 2023; Borghouts et al., 2021; Hawkes et al., 2023; Saleem et al., 2021). Rather than collecting primary empirical data, the research synthesizes existing evidence to identify recurring adoption patterns, design shortcomings, and structural barriers. Research rigor is

ensured through the systematic application of TSRDM and the explicit mapping between translational gaps, design principles, translational services, and architectural patterns, enabling traceability between problem framing and solution design.

APPLYING TSRDM TO CLOSING ADOPTION GAPS IN DIGITAL HEALTH PREVENTION

This section applies the TSRDM to address the research question of how digital prevention services offered by health insurers can be designed so that preventive value becomes perceivable, adoption translates into sustained engagement, and engagement leads to long-term preventive outcomes. The following subsections document how TSRDM is enacted to translate observed adoption problems into service-centered design logic, translational services, and service architectures.

Objectives Definition and Identification of Translational Gaps (Step 1)

The objective of Step 1 is to identify the core translational gaps that prevent preventive value from materializing in digital prevention services offered by health insurers. Although many offerings are technologically mature and widely available, sustained adoption and engagement remain limited, indicating structural failures in translating preventive intent into experienced value. Three interrelated translational gaps are identified: First prevention-to-value gap emerges because preventive benefits are typically abstract, probabilistic, and temporally distant. As a result, preventive value remains difficult to perceive in everyday service interactions, limiting users' ability to experience value in the present rather than as a future outcome (Vargo and Lusch, 2004). Second, an adoption-to-value gap arises because preventive value unfolds only through continued participation over time. While many digital prevention services succeed in achieving initial adoption, they often lack mechanisms that support behavioural continuity beyond onboarding or short-term engagement phases (Spohrer et al., 2008). Third, an engagement-to-value gap reflects the predominantly product- or program-centric framing of preventive offerings. When prevention is organized as a portfolio of isolated programs rather than as an ongoing service relationship, engagement remains transactional and fragmented, preventing the emergence of stable service relationships and learning trajectories within insurance ecosystems (Vargo and Lusch, 2004; Warg et al., 2016).

Frictions in Digital Health Prevention (Steps 2)

Step 2 examines how the identified translational gaps manifest as recurring issues in existing digital prevention practices. Despite being widely available and technologically mature, many services fail to encourage sustained use or be perceived as relevant in everyday contexts. Longitudinal studies demonstrate a significant decline in engagement over time (Hawkes et al., 2023), while qualitative research indicates that sustained use hinges on

routines, context, and personal significance rather than information provision or technical functionality alone (Krämer et al., 2024). However, these effects fade quickly and do not translate into sustained engagement. Across existing offerings, preventive value often remains abstract, engagement is limited to initial activation and prevention is framed as a series of isolated programs rather than an ongoing service relationship. These issues suggest that adoption challenges are not primarily due to user motivation or technology acceptance, but rather to the inadequate translation of preventive intent into coherent service design and perceived value (Borges Do Nascimento et al., 2023; Iyanna et al., 2022).

Service-Oriented Knowledge Base (Step 3)

To address these frictions, a service-oriented knowledge base is constructed drawing on Service-Dominant Logic, Service Science, and Service-Dominierte Architektur (SDA) (Spohrer et al., 2008; Vargo and Lusch, 2004; Warg et al., 2019, 2016). From this perspective, preventive value emerges as value-in-use through interaction, resource integration, and co-creation within service systems (Spohrer et al., 2008; Vargo and Lusch, 2004). This knowledge base reframes prevention as a service process rather than a delivered outcome and provides the conceptual foundation for translating adoption problems into service-centered solution logic.

Design Logic: Translational Gaps, Mindsets, and Design Principles (Step 4)

Based on the identified frictions and the service-oriented knowledge base, three translational gaps are specified that prevent preventive value from materializing. For each gap, required mindset shifts and corresponding design principles are derived. As summarized in Table 1, common attempts such as gamification or financial incentives address adoption symptoms, but remain structurally limited when not embedded in service-centered architectures (Borghouts et al., 2021; Hawkes et al., 2023; Vargo and Lusch, 2004).

Table 1: Translational gaps, existing approaches, and structural limitations.

Trans-lational Gap	Typical Approaches in Practice	Structural Limitation	Required Service Translation	Key References
Prevention-to-Value Gap	Health information portals, educational content, self-tracking dashboards, health scores	Preventive benefits remain abstract, future-oriented, and cognitively mediated; value is communicated rather than experienced	Design for experiential value-in-use embedded in everyday service interactions	(Al Mahmud et al., 2026; Feng et al., 2021)

(Continued)

Table 1: Continued.

Trans-lational Gap	Typical Approaches in Practice	Structural Limitation	Required Service Translation	Key References
Adoption-to-Value Gap	Gamification (e.g., step challenges), financial incentives, bonus programs, short-term campaigns	Engagement is primarily extrinsically motivated and time-limited; behaviour is rarely internalised once incentives end	Design for behavioural continuity and progressive commitment over time	(Saleem et al., 2021; Tran et al., 2024, 2022)
Engagement-to-Value Gap	Program portfolios, partner marketplaces, loyalty schemes	Preventive offerings remain fragmented and transactional; no stable service relationship or learning trajectory emerges	Design for co-created service relationships within integrated service systems	(Spohrer et al., 2008; Vargo and Lusch, 2004; Warg et al., 2016)

Translational Services and Service Architectures (Steps 5–6)

In the next step, the derived design principles are translated into translational services. Here, service is understood as a specialized competence applied to enable preventive value creation across activities, interactions, and system components (Spohrer et al., 2008; Vargo and Lusch, 2004). Translational services structure how prevention is enacted through feedback, engagement trajectories, and relational service elements. They transform systems into service systems by orienting architecture, interaction, and coordination toward supporting, fitting, and solving together. Table 2 summarises the translational services and architectural patterns derived in this study and shows how each directly addresses a component of the research question by translating preventive intent into perceivable value, sustained engagement, and stabilised service relationships.

Table 2: From design principles to translational services and SDA-based patterns.

Design Requirement (Derived from Translational Gaps)	Translational Service	Contribution to Preventive Value Creation	SDA / Architectural Pattern
Preventive value must become perceivable in everyday situations	**Value Translation Service** *(addressing prevention-to-value)*	Translates preventive intent into tangible, situation-specific value-in-use that users can experience during routine interactions	Modular Feedback Loop Pattern

(Continued)

Table 2: Continued.

Design Requirement (Derived from Translational Gaps)	Translational Service	Contribution to Preventive Value Creation	SDA / Architectural Pattern
Adoption must evolve into sustained engagement over time	**Engagement Continuity Service** *(addressing adoption-to-value)*	Structures preventive engagement as a staged, adaptive process that supports behavioural continuity beyond initial adoption	Stage-Based Engagement Pattern
Engagement must stabilise as a service relationship	**Relationship-Oriented Prevention Service** *(addressing engagement-to-value)*	Establishes an ongoing service relationship that integrates insurer, user, and health actors into a shared preventive context	Co-Creation Orchestration Pattern
Preventive services must adapt to user context and lifecycle	**Contextualisation Service** *(cross-cutting)*	Aligns intensity, timing, and interaction logic with individual capabilities and situational contexts	Adaptive Service Configuration
Prevention must be governable at the system level	**Service Orchestration Service** *(cross-cutting)*	Enables insurers to steer prevention through modular services rather than isolated programs	Service-Dominated Architecture (SDA)

Definitive Design and Outcomes (Steps 7–8)

Finally, translational services are consolidated into a definitive service design. In this study, this takes the form of a service-centered platform architecture grounded in SDA, in which translational services are embedded as modular, orchestrated components (Warg et al., 2016, 2015). The resulting design enables preventive value to become experientially accessible, supports behavioural continuity, and stabilizes engagement over time. Beyond intended outcomes, side effects and spillovers emerge that contribute to knowledge building in line with Service Science (Spohrer et al., 2008). These findings demonstrate how digital prevention services can be systematically redesigned to close adoption gaps within health insurance ecosystems.

FINDINGS AND IMPLICATIONS

This section presents the findings of the study by directly reflecting the translational services and architectural patterns summarized in Table 2. Each finding corresponds to a specific design requirement derived from the research question and demonstrates how preventive value creation can be operationalized in digital health prevention services.

Finding 1: Preventive Value Requires Translation into Everyday Service Interactions

The findings show that the value of prevention only becomes apparent when it is translated into everyday service interactions. Translational services that incorporate feedback, guidance and orientation into routine interactions allow users to experience the value of the service rather than the potential future benefits. In the absence of such translation, preventive offerings remain communicative artefacts—dashboards, scores or educational content—that inform but do not facilitate action. The perceived relevance of preventive value erodes quickly, and disengagement becomes the dominant usage trajectory despite high availability.

Finding 2: Sustained Engagement Depends on Continuity-Oriented Service Structures

Sustained engagement only emerges when preventive services are explicitly designed to support behavioural continuity over time. Translational services that stage engagement trajectories and adapt to changing user needs allow adoption to evolve into ongoing participation. Without continuity-oriented structures, engagement remains episodic and collapses once the initial attention, novelty or incentives fade. Consequently, prevention initiatives systematically produce short-term activation with no cumulative effect.

Finding 3: Stable Engagement Requires Prevention to be Organized as a Service Relationship

Prevention must be structured as an ongoing service relationship rather than a transactional programme or product if engagement is to be stabilised. Relationship-oriented translational services bring users, insurers and healthcare providers together in a shared service context, enabling cumulative learning and continuity of relationships. When prevention is managed as a series of individual programmes, interactions are repeatedly reset, learning trajectories are interrupted and each new initiative begins afresh, which structurally limits long-term preventive impact.

Finding 4: Contextual Adaptation is Essential for Translating Engagement into Preventive Value

Across all translational services, contextual adaptation is a necessary condition. Services that adapt timing, intensity and interaction logic according to individual capabilities and life situations can encourage engagement and translate it into preventive value. Without contextualisation, however, generic personalisation mechanisms produce superficial variation that is irrelevant to behaviour, thereby reinforcing engagement fatigue and detachment from everyday life.

Finding 5: Adoption Gaps are a Result of Governance Failures at the Level of Service Architecture

Adoption gaps cannot be resolved at the level of individual programmes, features or interfaces. Instead, they arise from governance decisions that divide preventive services into organisational silos and technological components. Without a service-centred architecture, each additional programme or technology increases complexity, dilutes responsibility and undermines the coherence of the user experience. Innovation under such conditions exacerbates fragmentation rather than creating value.

Implications

Taken together, these findings demonstrate that closing the adoption gap in digital health prevention requires shifting from programme-based prevention portfolios to service-centred platform architectures. The articulated translational services and architectural patterns are not optional design improvements, but rather structural preconditions for the creation of preventive value. For health insurers, this implies that continued investment in isolated programmes, incentives or digital features without reorienting governance towards service architectures will systematically result in low adoption and engagement, while increasing operational complexity. Conversely, governing prevention through service-centred platforms enables insurers to integrate existing capabilities, absorb new technologies without fragmentation and sustain engagement through coherent service relationships.

In terms of research, the findings show how TSRDM translates abstract service logic into concrete design and architectural consequences, supporting an understanding of adoption as an emergent property of service system design rather than a behavioural deficit.

CONCLUSION AND OUTLOOK

This paper puts forward a clear argument: the failure to adopt digital health prevention measures persistently is not caused by a lack of motivation, missing incentives or underdeveloped technology, but by structural failures in translating preventive intent into service-centred architectures. Prevention cannot be sustained through isolated programmes, features, or portfolios — regardless of investment level or technological sophistication.

Crucially, such governance not only fails to create preventive value, but also progressively erodes the system's capacity to learn. Fragmented programmes reset user relationships, break feedback loops and prevent experiential knowledge from being accumulated across interactions. Under these conditions, each new preventive initiative begins anew, making long-term value creation structurally unattainable. Therefore, adoption is not a variable to be optimised at the user interface, but rather an emergent outcome of how service systems are designed and governed. This study's central contribution is to demonstrate that preventive value, engagement and adoption are determined at the level of service architecture.

Outlook

Future research should empirically investigate how service-centred prevention platforms function within real organisational and regulatory constraints, and the influence of translational services on long-term engagement and preventive outcomes. In particular, longitudinal studies are needed to examine how governance mechanisms and architectural decisions shape continuity, learning and value in insurance-based prevention ecosystems.

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