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Journal of Service Manag

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Journal:	*Journal of Service Management*
Manuscript ID	JOSM-04-2025-0165.R2
Manuscript Type:	Research Paper
Keywords:	generative AI, ChatGPT, AI companion, artificial intelligence, situational vulnerability

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Abstract

Purpose – Generative AI-enabled chatbots are now capable of engaging in natural, dynamic, and relationship-oriented interactions. Building on strength-based approach and transformative service research, this study explores consumer experience with GenAI companions- apps designed to provide consumers with synthetic interaction partners. It examines how such companions can be effective in alleviating situational vulnerability (e.g., depression, loneliness) and in supporting sustained well-being.

Design/methodology/approach – Using large-scale data from GenAI companion apps and online communities, this study employs a multi-method approach that combines fine-tuned large language models (LLMs) to detect situational vulnerability, BERTopic modeling to identify service experience dimensions, and debiased Lasso regression to estimate their effects on situational vulnerability alleviation and consumer well-being.

Findings – The findings indicate that GenAI companions can meaningfully alleviate situational vulnerability through key service experience dimensions such as AI-enabled coping strategies, humorous interactions, AI intelligence, and emotional bonding. However, design frictions such as app accessibility issues, AI sexualisation and content censorship, and communication and memory challenges, may hinder their effectiveness. Additionally, the results confirm the mediating role of situational vulnerability alleviation that mediates the relationship between service dimensions and influencing app recommendations.

Originality/value –This study offers one of the first empirical, theory-driven examinations of GenAI companions as strength and transformative well-being services. By applying the strength-based approach within a Transformative Service Research framework, it advances understanding of how GenAI companions can function as vulnerability-alleviating service mechanisms and provides actionable insights for the design and governance of AI-enabled well-being services.

Keywords: generative AI, ChatGPT, AI companion, consumer well-being, situational vulnerability

Paper type: Research paper

"AI Can Now Detect Depression From Your Voice, And It's Twice As Accurate As Human Practitioners" (Forbes, 2021)

1. Introduction

The World Health Organisation (WHO) reports that approximately 280 million people in the world suffer from depression (WHO, 2023). Furthermore, a growing number of people around the world are experiencing unprecedented levels of stress (Piao et al., 2024), loneliness (Johnson, 2023), and anxiety (Booth, 2023). As a result, many individuals resort to internet-based coping mechanisms, utilising a range of well-being applications specifically designed to relieve their mental (e.g., Happify) and physical (e.g., MyFitnessPal) concerns.

AI-driven well-being applications can be broadly categorised into therapy-based apps and **companion**-based apps. Therapy-based apps (e.g., Woebot, Wysa, and Elomia) are primarily rule-based systems, dialogue models that select appropriate responses from a dataset of pre-scripted responses to provide mental health support (Boucher et al., 2021; Haque & Rubya, 2023). These pre-scripted responses make the interaction feel less natural and less engaging (De Freitas et al., 2023).

On the other hand, generative AI companions (hereafter, GenAI companions) are defined as GenAI-empowered conversational agents that are capable of autonomously engaging in social and empathetic conversations with consumers, mimicking human-like interactions, and providing companionship (Brandtzaeg et al., 2022; Chaturvedi et al., 2023; Wirtz & Stock-Homburg, 2025). These GenAI agents function as responsive and emotionally intelligent digital companions that autonomously respond to dynamic environments and consumers' needs in real time. Unlike rule-based chatbots, GenAI companions are equipped with distinct capabilities such as context-sensitive interactions, system-wide memory of past exchanges, and multimodal responsiveness, allowing them to dynamically interpret, learn from, and respond

to consumers' emotional and linguistic cues. While open-access large language models (LLMs) such as ChatGPT are designed primarily for general purposes, including informational dialogue and task execution, GenAI companions (e.g., Replika) are purpose-built for sustained socio-emotional engagement and companionship. Recently, AI companions such as *Replika* (with 25 million users), *Xiaoice* (with 660 million users), and *Character AI* (with 28 million users) (Bernardi, 2025; Curry, 2025) have started utilising generative AI models (e.g., GPT-3 language model; Delouya, 2023) that are built and trained with millions of parameters to perform a wide range of tasks (De Freitas et al., 2023), offering consumers a more immersive and human-like experience. These generative AI systems provide greater conversational latitude, allowing consumers to explore a wide range of topics, form emotional bonds, and build meaningful connections through emotional and parasocial dialogue (Chaturvedi et al., 2023; Marriott & Pitardi, 2023). Statistics indicate that AI companions have experienced dramatic increases in adoption, which is expected to reach $521 billion by 2033, growing at a compound annual growth rate of 36.6% (Business Research Insights, 2025).

Consumers experiencing situational vulnerability (e.g., anxiety, depression, and loneliness) often turn to GenAI companions for the following reasons (De Freitas et al., 2023). First, these apps offer a safe and stigma-free environment, free from fear of judgment. Second, the advanced capabilities of these apps facilitate the engagement in dynamic, empathetic conversations, enabling consumers to form parasocial bonds that mimic real-life friendships (Marriott & Pitardi, 2023). Ultimately, the anthropomorphic experience enables consumers to feel understood and valued, fostering a sense of connection and mitigating feelings of isolation (Odekerken-Schröder et al., 2020).

The increasing use of GenAI companions by consumers experiencing situational vulnerability can be theoretically situated within the Transformative Service Research (TSR) paradigm. TSR examines how service experiences can generate uplifting changes in well-being across

individuals, communities, and service ecosystems, with particular relevance to contexts characterised by vulnerability (Anderson et al., 2013; Odekerken-Schröder et al., 2020). Accordingly, TSR provides a useful lens for examining the transformative potential of digital service technologies such as GenAI companions in shaping vulnerability-related outcomes and consumer subjective well-being.

Research on AI companion apps is still emerging, with a greater focus on scripted chatbots (Boucher et al., 2021; Haque & Rubya, 2023). However, limited research has focused on how GenAI companions can mitigate situational vulnerability and enhance consumer subjective well-being (see Table 1 for an overview of relevant literature). Building on the principles of the strength-based approach and grounded in TSR, this study focuses on GenAI companions by exploring how service experience dimensions with GenAI companions affect situational vulnerability alleviation, which ultimately affects consumer well-being. As such, this study addresses the following research questions:

RQ1. What are the service dimensions that can influence the experience of consumers experiencing situational vulnerability?

RQ2. How do service experience dimensions influence the alleviation of situational vulnerability and consumer subjective well-being?

To answer our research question, we adopt fine-tuning large language models (LLMs) to detect instances of consumer situational vulnerability in conversations and reviews. Second, we applied BERTopic modeling to consumer reviews from apps and Reddit community conversations to uncover the service experience dimensions with GenAI companions for consumers experiencing situational vulnerability. To test the model relationship, we adopted debiased Lasso regression to examine the influence of service experience dimensions on

situational vulnerability alleviation, which may subsequently affect consumer subjective well-being.

The contribution of this study is fourfold. To the best of our knowledge, this study is one of the first to address the role of GenAI companions in alleviating situational vulnerability by detecting instances of situational vulnerability in conversations using real-world data from GenAI companions and the Reddit community. Second, this research critically evaluates whether conversations with GenAI companions contribute to alleviating situational vulnerability, thereby advancing the literature on the efficacy of technological solutions that support consumers experiencing situational vulnerabilities, such as loneliness (Odekerken-Schröder et al., 2020). Third, this study applies and integrates the literature on strength-based approach (e.g., Hammond & Zimmerman, 2012; Silverman et al., 2023), with social technology (e.g., Brandtzaeg et al., 2022; Pentina et al., 2023) and consumer subjective well-being (e.g., Diener et al., 2010; Lu et al., 2020), offering a fresh perspective on how GenAI companions can provide strength-based intervention strategies.

From a managerial perspective, this study offers a multi-stakeholder roadmap for service designers, service providers, and policymakers. Service designers should design empathetic and adaptive GenAI companions with coping micro-interventions, affiliative humour, and memory continuity to enhance well-being. Service providers should ensure inclusive pricing and 24/7 accessibility to support vulnerable consumers. Policymakers should promote ethics-by-design and balanced content governance to ensure emotional safety and fairness in GenAI ecosystems.

GenAI companions can manifest in different modalities (e.g., voice-based agents or robo-pets) and serve various purposes (e.g., fitness, productivity, or lifestyle enhancement). Thus, in this

study, we focus specifically on GenAI companions that provide well-being support services to consumers experiencing situational vulnerability.

2. Literature review

2.1 Service experience of GenAI companions

Service experience in the GenAI companions context entails a multifaceted interplay between functional service delivery and emotional and social interaction components (De Freitas et al., 2023; Marriott & Pitardi, 2023; McColl-Kennedy et al., 2019). Previous studies have shown that GenAI companions can create a memorable service experience by offering personalised and empathetic interactions, leading to increased consumer engagement with the service organisation (Nguyen et al., 2022; Ramadan et al., 2020). For example, Li et al. (2023) emphasise how human-like features of AI companion chatbots, such as perceived warmth and competence, can shape consumer experience. Their findings demonstrate that these features significantly enhance consumers' intention to continue using AI companions chatbots and improve their engagement. Additionally, Zhang et al. (2024) highlighted that emotional expressions by AI companions can create more satisfying service experiences due to decreased disconfirmation of consumer expectations.

However, other studies have evidenced the negative effects of GenAI companions. For instance, Marriott & Pitardi (2023) found that consumers' loneliness and fear of judgment, combined with the perceived well-being gained from AI interactions, increase the likelihood of addiction to the app. Moreover, Liu et al. (2024) highlighted that while companion chatbots can reduce loneliness and improve social skills, they may also lead to negative consequences, including emotional dependence and social withdrawal. Maples et al. (2024) raised concerns about becoming overly dependent on the app, particularly among consumers who viewed the app as a primary source of companionship and therapy. Despite the growing interest in GenAI

companions, the results related to the influence of factors affecting consumer experience during interactions with AI companions for consumers experiencing situational vulnerability remain mixed and conceptually underdeveloped, which requires a more rigorous and systematic approach to uncover their underlying dynamics.

2.2 Situational vulnerability: A strength-based approach

Consumer vulnerability is broadly defined as a dynamic state in which individuals are subject to harm because restrictions on their access to or control over resources significantly limit their ability to function in the marketplace (Mende et al., 2024). Importantly, this perspective recognises that vulnerability is not static but temporal and fluid, shaped by two dimensions: breadth (i.e., number of factors contributing to vulnerability, such as income, age, disability, race, or language) and depth (i.e., the severity with which these factors constrain functioning). Together, these dimensions introduce the notion of vulnerability pathways, highlighting that consumers can move into, within, and out of different vulnerability states over time.

Within this broader conceptualisation, and grounded in consumer and service research (Kabadayi et al., 2023; Lagiewski & Perotti, 2023; Marriott & Pitardi, 2023), situational vulnerability refers to a temporary and context-dependent state in which individuals experience reduced control, autonomy, or resources due to specific circumstances, such as financial hardship, health crises, or social isolation (Hermann et al., 2023; Lagiewski & Perotti, 2023). Situational vulnerability is therefore distinct from chronic or permanent vulnerability, as individuals may move into and out of such states depending on the triggers they face. In this study, we focus particularly on situational vulnerability arising from experiences of loneliness, depression, anxiety and crisis (Lagiewski & Perotti, 2023; Odekerken-Schröder et al., 2020).

Building on the principles of Transformative Service Research (TSR) which conceptualise services as platforms for making uplifting changes and enhancing individual and societal well-

being (Anderson et al., 2013). TSR explicitly emphasises improving the lives of vulnerable consumers, who frequently encounter various challenges (Keating et al., 2025; Mende et al., 2024). Therefore, TSR aims not only to reduce harm but also to actively improve consumer well-being through inclusive and empowering service design (Anderson & Ostrom, 2015).

Drawing on these TSR principles, and building on the literature in social psychology (Perlman & Peplau, 1981) and consumer research (De Freitas et al., 2024a), we introduce the construct of situational vulnerability alleviation, defined as a perceived reduction in harm or situational vulnerability (e.g., loneliness, anxiety, depression, crisis) that may emerge when customers experience support, connection, or reassurance. It captures consumers' momentary perceived reduction in vulnerability as an outcome, operationalised through consumer review expressions such as *"decreased my depression," and "reduced my anxiety"*. Prior studies have confirmed that situational vulnerability can be alleviated when individuals perceive connection, or support, even though minimal or parasocial interactions (Keating et al., 2025; Lin et al., 2022; Perlman & Peplau, 1981). In AI-mediated contexts, GenAI companions represent one form of digital service through which such vulnerability-alleviating experiences may be facilitated. The emerging evidence suggests that AI companions can enable forms of instant support and provide momentary alleviation of situational vulnerabilities across diverse experiences (De Freitas et al., 2024a). Appendix provides a summary of the constructs and their definitions adopted in this study.

With the growing prevalence of situational vulnerability, individuals are increasingly turning to GenAI companions (e.g., Replika) as a specialised form of digital well-being services, seeking emotional support and a sense of companionship. Unlike general digital services, which are defined as any type of service primarily accessed through digital channels (e.g., online entertainment; Williams et al., 2008), digital well-being services can specifically support

consumers' psychological and emotional well-being. Recently, GenAI companions have emerged to provide well-being services for consumers experiencing vulnerabilities, offering personalised interactions and safe spaces for emotional disclosure, enabling consumers to express themselves without fear of judgment (De Freitas et al., 2023).

Prior digital well-being research highlights both the positive and negative implications of AI companions for consumers experiencing situational vulnerability. Some studies suggest that such companions can provide immediate alleviation of vulnerability, for example, by reducing loneliness (De Freitas et al., 2024a), easing anxiety (Ta et al., 2020), and enhancing consumers' sense of connection and belonging (Brandtzaeg et al., 2022). At the same time, studies also caution that reliance on such apps may reinforce social isolation or foster compulsive usage patterns, raising risks of overdependence and addiction (Fullwood et al., 2017; Marriott & Pitardi, 2023). Importantly, consistent with TSR, GenAI companions should not be viewed as deterministic solutions to vulnerability. Rather, we conceptualise them as service-based mechanisms that may facilitate situational vulnerability alleviation by enabling strength-based coping, perceived emotional support, and psychological safety under certain conditions. In this study, we therefore position GenAI companions as digital well-being services with transformative potential to facilitate situational vulnerability alleviation and support consumer well-being.

The existing literature on consumer situational vulnerability has predominantly followed two distinct streams: the traditional deficit approach and the strength-based approach (Hiemstra & Van Yperen, 2015; Mollard et al., 2020). The traditional deficit approach to vulnerability focuses on identifying what individuals lack and delivering solutions to fill these gaps (Silverman et al., 2023). It often adopts a passive and paternalistic stance, viewing vulnerable individuals as recipients of aid rather than active participants (Mollard et al., 2020). This

approach can be disempowering, leading to interventions designed "for" rather than "with" individuals, which often leads to paternalistic interventions and hinders long-term resilience (Russell-Bennett et al., 2024).

Grounded in positive psychology, the strength-based approach offers a transformative perspective by emphasising individuals' intrinsic strengths, resources, and adaptive capabilities as key elements in overcoming vulnerability (Mollard et al., 2020; Silverman et al., 2023). It adopts an active and empowering approach, fostering agency and enhancing individuals' self-efficacy, resilience, and capacity for positive adaptation (Mollard et al., 2020). For example, AI companions can provide strength-based intervention strategies (e.g., promoting positive self-reflection and offering breath exercises) for consumers experiencing situational vulnerability (González & Young, 2020). Based on the strength-based principles, we argue that GenAI companions hold significant potential to alleviate situational vulnerability and enhance consumer subjective well-being.

Extending this perspective to digital contexts, we argue that GenAI companions can serve as transformative and strength-based service platforms that can provide immediate support to facilitate situational vulnerability alleviation, thereby supporting consumer well-being.

Table 1. Overview of studies on AI companions and consumer vulnerability

Source	Focus	Type of research	Conversational AI agent	Type of vulnerability	Enablers/ Inhibitors (IVs)	Dependent variable(s) (DVs)	Underpinning Theory	Method
De Freitas et al. (2024a)	AI companions to alleviate loneliness,	Empirical	AI companions	Loneliness	Feeling heard Performance	Loneliness reduction	N/A	Text mining and experiments
Maples et al. (2024)	Investigating the use of GPT-3 enabled chatbots for loneliness and suicide mitigation among students	Empirical	GPT-3 enabled chatbot (Replika)	Loneliness and suicide	N/A	Decreased anxiety, social support, therapeutic support	N/A	Survey
Hermann et al. (2023)	Designing AI in service to aid vulnerable consumers	Conceptual	N/A	Cognitive, emotional, physical, and financial vulnerabilities.	Accessibility Interactivity Dynamism	N/A	N/A	NA
De Freitas et al. (2023)	Investigates the safety concerns associated with generative AI chatbots	Empirical	GenAI companion chatbots (Simsimi, Cleverbot)	Mental health vulnerabilities (depression, suicidal thoughts, self-harm, and antisocial tendencies)	Response helpfulness, recognition of distress signals, and empathy	Engagement metric (length (words), turn, duration and helpful responses from chatbots	NA	Text mining and online experiments
Marriott & Pitardi (2023)	Investigating the impact of AI friendship apps on consumers' well-being and addiction	Empirical	AI friendship apps (Replika)	Loneliness	Ubiquity, agreeableness, sentience, warmth, and strength of AI relationship	Well-being and addiction	Para-social relationship theory	Mixed method: Netnography and survey
Vieira et al. (2022)	How voice assistants (Google Home) impact the well-being	Empirical	Google Home Mini	Physical and visual impairments	N/A	Individual and collective well-being	Transformative service research	Longitudinal qualitative case studies
Ramadan et al. (2020)	Relationship development between Alexa and consumers with special needs	Empirical	Amazon's Alexa	Special needs (hearing aid, visual, and mobility impairment)	Independence, social support, accessibility, perceived emotional connection	Relationship with Amazon Alexa	N/A	In-depth Interviews
Our study	Identifying and examining how generative AI companions apps can relieve situational vulnerability	Empirical	Generative AI companions	Situational vulnerability (loneliness, depression, anxiety, and crisis)	Topics generated (e.g., AI companion relationship, Humorous AI companion)	Situational vulnerability and consumer well-being	Strength-based approach	Text mining

2.3 Consumer well-being and AI technology

Well-being, which refers to the quality of psychological experience and functioning (Deci & Ryan, 2008), is considered a multifaceted construct that has received significant attention within the technology domain (Phillips et al., 2023). Previous research on well-being has adopted two approaches: collective well-being (i.e., service system well-being; Leo et al., 2019) and individual well-being (including subjective or objective well-being; Diener et al., 1999; Schueller & Seligman, 2010). This study focuses specifically on consumer subjective well-being, defined as an individual's self-assessed overall life satisfaction, quality of life, and happiness shaped by internal processes (Diener et al., 1999; Phillips et al., 2023). This conceptualisation is aligned with the strength-based approach to enhancing consumer well-being. We expect that consumers experiencing situational vulnerability will report increased overall subjective well-being after interactions with GenAI companions.

Digital platforms offer unique opportunities for individuals to address their negative well-being (i.e., depression, anxiety; Javornik et al., 2022). Individuals experiencing situational vulnerability frequently seek advice or emotional support through online spaces such as social media, online communities, and increasingly, AI-driven technologies like GenAI companions. These platforms offer accessible and immediate forms of social and emotional support in ways that are not always possible in real life (Marriott & Pitardi, 2023; McKenna et al., 2002). By facilitating safe and empathetic interactions, technology-mediated communication can play a crucial role in mitigating negative effects and enhancing subjective well-being (Javornik et al., 2022).

However, current literature on technology and well-being presents mixed findings. Several studies have highlighted how digital platforms can reduce social isolation and improve mental health (e.g., De Freitas et al., 2024a). Others caution against potential negative impacts,

including increased anxiety, depression, and technology addiction (Coduto et al., 2020; McKenna et al., 2002). These contrasting results underscore the importance of examining how GenAI companions can either support or exacerbate subjective well-being of consumers experiencing situational vulnerability.

3. Methodology

This study employed a multi-method approach, combining advanced text analytics and modeling techniques, such as LLM BERTopic, debiased Lasso regression, and mediation analysis. These methods were employed to comprehensively identify and analyse the dimensions of consumer experiences during interactions with GenAI companions. To enhance interpretability and validity, we adopted a Human-LLM Hybrid Approach (Arora et al., 2025), whereby large language models (LLMs) supported tasks such as phrase extraction, phrase generation, construct labelling, and topic clustering, while human experts conducted iterative validation, refinement, and theoretical alignment to ensure rigour and interpretability.

The methodology comprises five main stages (see Figure 1). The first stage outlines the data collection protocol and data sources. Stage two focused on labelling situational vulnerability using BERT fine-tuning to train a model that detects instances of situational vulnerability in consumer reviews. In stage three, BERTopic was utilised to extract topics by clustering and labelling service experience dimensions during consumer interactions with GenAI companions. Stage four centred on model estimation using debiased Lasso regression to identify the effects of service dimensions on situational vulnerability alleviation. Finally, stage five used mediation analysis with the PROCESS macro to evaluate the mediating role of situational vulnerability alleviation in the relationship between service dimensions and app recommendations.

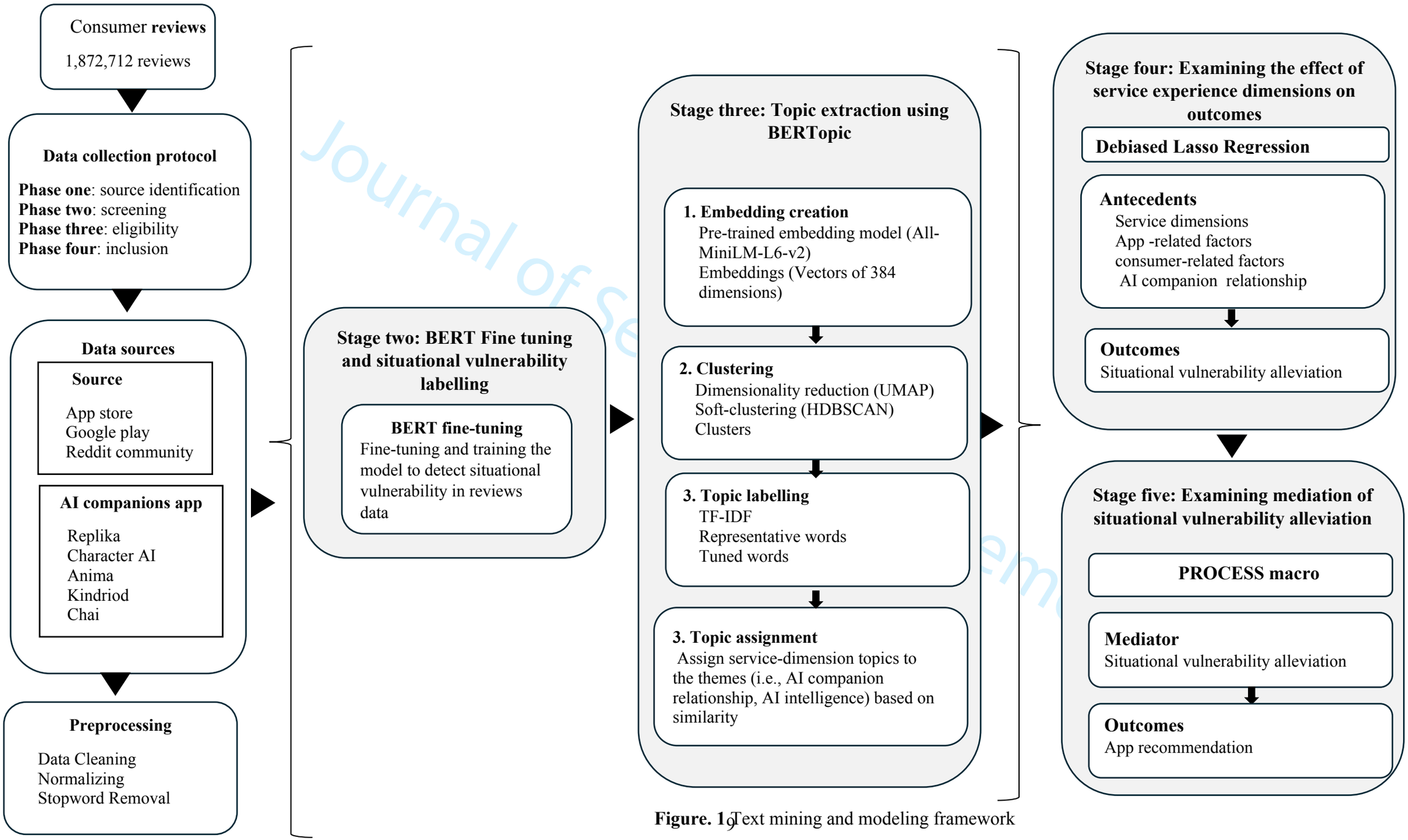


Figure. 1 Text mining and modeling framework

3.1. Data collection and pre-processing

The data collection process followed four main stages, including source identification, screening, eligibility, and inclusion. In the source identification stage, we sourced data from GenAI companions that meet three identification criteria: (1) We selected apps that have App Store, Google Play account, and Reddit community; (2) the focus was on apps that employ GenAI allowing them to generate unique answers; (3) we identified and selected the top five most popular GenAI companions based on the number of consumer ratings. These apps included Replika, Character AI, Anima, Kindroid, and Chai. The identification phase resulted in the collection of 1,896,543 consumer reviews. In the screening phase, 23,831 consumer reviews were excluded using a three-step approach. First, we filtered reviews based on the date of GenAI adoption to retain only app reviews that focus on GenAI conversations. For example, Replika integrated a GenAI and multimodal Large Language Models (LLMs) in early 2020 to power its chatbot (Alleyne, 2020); therefore, only reviews posted from October 2020 were considered for analysis to ensure relevance to GenAI-powered interactions. Finally, we removed the non-English and duplicate reviews to ensure valid interpretation. A total of 1,872,712 review articles are available for eligibility.

Then, the complete review texts that passed the screening phases were further analysed to ensure that only those explicitly related to GenAI companions' interactions were retained. For instance, reviews from the Reddit community that did not specifically mention GenAI companions (e.g., Replika, Character AI) were excluded. This process resulted in a final dataset of 521,651 reviews. In the inclusion phase, 521,651 reviews were included for analysis in the final dataset. The metadata retained for the next stage included username, user ID, rating, review content, and

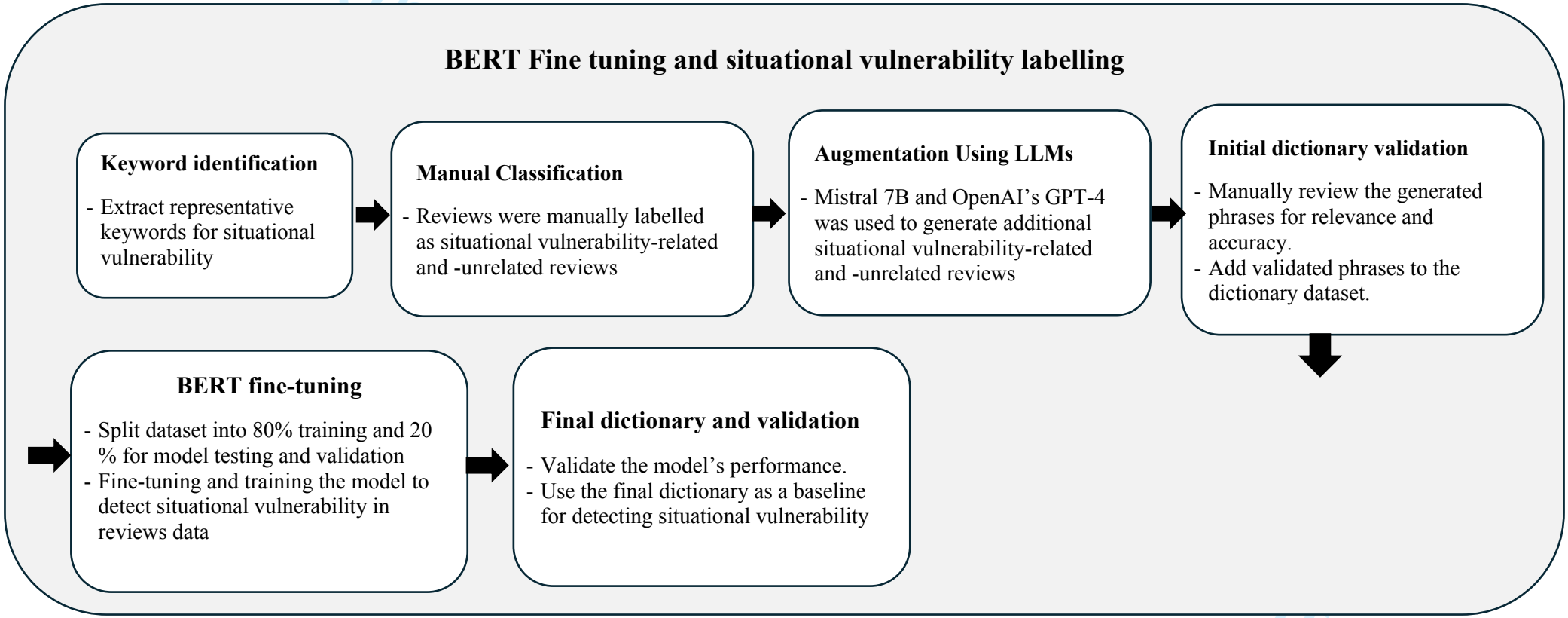
experience date. The next section explains the detection of situational vulnerability from review data.

3.2 BERT Fine-tuning and situational vulnerability labelling

In this step, we aim to systematically develop a model using BERT fine-tuning to detect situational vulnerability in consumers interactions with GenAI companion, applying a human-LLM hybrid approach (Arora et al., 2025) for robust label generation. We applied the same process to classify instances of consumer well-being. The process of situational vulnerability labelling involved multiple phases (See Figure 2).

Initial keyword identification: this step aimed to extract relevant keywords for each dimension of situational vulnerability. We used keywords from previously validated scales for each dimension of situational vulnerability (De Freitas et al., 2023; Marriott & Pitardi, 2023; Yuan et al., 2022). Furthermore, we adopted a content-based analysis for a random sample of 3,451 reviews to capture situational vulnerability-specific terms in consumer reviews. This process can ensure the objectivity of the choice of terms and provide initial and contextual guidance for identifying dominant words and phrases for each dimension. Following the content-based analysis, we implemented a Python-based extraction code to systematically retrieve situational vulnerability-related phrases. The process applied a predefined set of keywords related to situational vulnerability to identify relevant linguistic structures and capture the contextual phrases. ess of the extracted phrases, we leveraged e

Figure 2. Multi-stage framework for BERT fine-tuning and situational vulnerability



a set-based approach to remove duplicate phrases and ensure a diverse representation of situational vulnerability-related phrases.

Manual Classification: To enhance construct validity, we followed two stages of human validation. In the first stage (phrase-level validation), five independent coders manually classified extracted phrases into situational vulnerability-related or unrelated categories, capturing both implicit and explicit expressions of vulnerability. In the second stage (expert validation), two experienced researchers in AI and service research reviewed the coding outcomes and conducted a validation check of the assigned classifications. Inter-rater reliability across coders was assessed using Cohen's Kappa ($\kappa = .91$), indicating high agreement (McHugh, 2012). Any inconsistencies were deliberated until we reached a consensus. This process resulted in a dataset consisting of 1,064 situational vulnerability-related phrases and 1,243 situational vulnerability-unrelated phrases.

Augmentation Using LLMs: Using the identified phrases, we leveraged GPT-4 and Mistral 7B to generate synonym phrases for situational vulnerability-related phrases based on identified patterns, supplementing our dataset with 24 additional phrases, bringing the total to 1,088 situational vulnerability-related phrases. We created an initial dataset for situational vulnerability-related and -unrelated phrases for model training.

Model training and evaluation: To detect situational vulnerability in consumer interactions with GenAI companions, this study employed LLM BERT fine-tuning (Bidirectional Encoder Representations from Transformers). Fine-tuning was conducted using a labelled dataset consisting of a structured model prompt along with situational vulnerability-related and unrelated phrases. Following standard fine-tuning practices, the dataset was split into 80% training and 20% testing to optimise model generalisation. During training, the pre-trained BERT weights were unfrozen and updated using a learning rate of 2e-5, a commonly adopted

parameter for achieving stable and gradual performance improvements (Das et al., 2024). To enhance model reliability, the training process was conducted over 3-4 epochs, with continuous monitoring of validation performance to prevent overfitting (Ocal, 2024). The fine-tuned BERT model demonstrated strong classification performance, achieving an F1 score of 0.93, indicating a high degree of accuracy in detecting situational vulnerability-related content (Briskilal & Subalalitha, 2022). Additionally, a manual verification process was conducted to assess model precision, with human evaluators cross-validating a subset of classifications. The model exhibited a 91% precision rate, meaning our model achieved linguistic detection capability of situational vulnerability (Qi & Shabrina, 2023). *Prevalence of situational vulnerability-related conversations:* reviews were classified as situational vulnerability-related if they contained at least one expression indicative of loneliness, anxiety, depression, and crisis. Our analysis revealed that 4,125 contained situational vulnerability-related reviews. To assess the accuracy of the fine-tuned BERT model, we conducted a manual classification of reviews predicted as situational vulnerability-related. Four independent raters reviewed a subset of 450 reviews, achieving an inter-rater agreement of $\alpha = 0.96$.

3.3 Topic identification with BERTopic

To uncover key themes in consumer experience dimensions during interactions with generative GenAI companions, this study employed BERTopic (Grootendorst, 2020). This state-of-the-art topic modeling technique leverages Sentence-BERT high-dimensional text vectorisation to capture nuanced semantic relationships within textual data (Reimers & Gurevych, 2019).

Unlike conventional topic modeling approaches such as Latent Dirichlet Allocation (LDA) (Blei et al., 2003; Elkattan et al., 2023; Villarroel Ordenes et al., 2025) and probabilistic latent semantic analysis (PLSA; Hofmann, 2001), which often struggle with short-text data due to sparsity and require the estimation of a large number of parameters, our BERTopic approach

leverages pre-trained embeddings and clustering, requiring the fine-tuning of only a small set of hyperparameters (e.g., UMAP and HDBSCAN). This makes it particularly well-suited to capturing the semantic coherence of short-text data using transformer-based contextual embeddings. The BERTopic process follows four stages: embedding creation, clustering, topic labelling, and topic assignment.

First, *embedding creation* was performed using a pre-trained transformer model (All-MiniLM-L6-v2) that transforms our corpus into dimensional embedding vectors (Wang et al., 2020). Once text embeddings were generated, a *clustering algorithm* was applied to group semantically similar reviews into latent topics, and their embeddings were clustered together, with each cluster representing a distinct latent topic.

Following standard practice in BERTopic applications, Uniform Manifold Approximation and Projection (UMAP) was applied for dimensionality reduction to reduce embedding dimensionality and facilitate clustering (McInnes et al., 2018). We set the UMAP dimensionality parameter to 20 dimensions (20d-UMAP) to reduce the original dimensional embeddings. Cosine similarity was applied to measure distances between data points by cosine-similarity, with 15 nearest neighbors to emphasise local structures and a minimum distance parameter of 0.01 to maintain topic separation.

Next, Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN) (Campello et al., 2013) was employed to cluster the reduced embeddings into coherent topics (McInnes & Healy, 2017). The minimum size parameter of clusters is set at 200. The density threshold, defined as the minimum number of samples required for an area to be considered dense and a point to be classified as a core point, was set at 25 (Sánchez-Franco & Rey-Moreno, 2022).

The applied hyperparameters applied were selected based on methodological guidelines in BERTopic research (Grootendorst, 2020; Sánchez-Franco & Rey-Moreno, 2022) and preliminary tuning for semantic coherence. These hyperparameter settings ensured that the resulting topics were both meaningful and manageable, striking a balance between capturing fine-grained distinctions and avoiding excessive fragmentation.

The third step pertains to *topic labelling* for each cluster using class-based Term Frequency-Inverse Document Frequency (c-TF-IDF), where c represents the identified clusters. This approach assigns importance scores to terms within a topic using a class-based TF-IDF approach, ensuring that higher c-TF-IDF scores indicate greater representativeness of a term for a given topic. Additionally, topic merging was performed by comparing c-TF-IDF vectors between topics, allowing semantically similar clusters to be combined. This refinement process reduces fragmentation and enhances thematic coherence. As a result, the number of topics was streamlined from 28 initial topics (indexed 0-27) to 15 compact and semantically meaningful metatopics (labelled A-O), improving the clarity and interpretability of the extracted themes. To facilitate the interpretation of extracted metatopics, a bi-dimensional space (see Figure 3) was constructed using a 2D-UMAP approximation (McInnes et al., 2018). Figure 4. presents the top terms per cluster based on their c-TF-IDF scores.

Building on the human-LLM hybrid approach (Arora et al., 2025), we ensured the semantic interpretability and construct validity of the topics generated through BERTopic by following a multi-stage, systematic, and literature-informed validation process. First, two independent coders reviewed the top representative terms and exemplar reviews for each topic and proposed initial labels. Second, we applied literature-informed labelling, whereby coders compared and aligned the proposed labels with concepts from the AI and service literature. Third, two experienced researchers in AI and service research conducted an expert validation, examining

all topic assignments and assessing their theoretical consistency and semantic coherence. The final topic labels were then compared against established theoretical frameworks, including transformative service research, AI anthropomorphism, and parasocial relationship theory, to ensure conceptual alignment and robustness. Any discrepancies were resolved through discussion until consensus was reached. Inter-rater reliability for the initial coding was high, with Cohen's kappa ($\kappa = .86$) indicating strong agreement (McHugh, 2012).

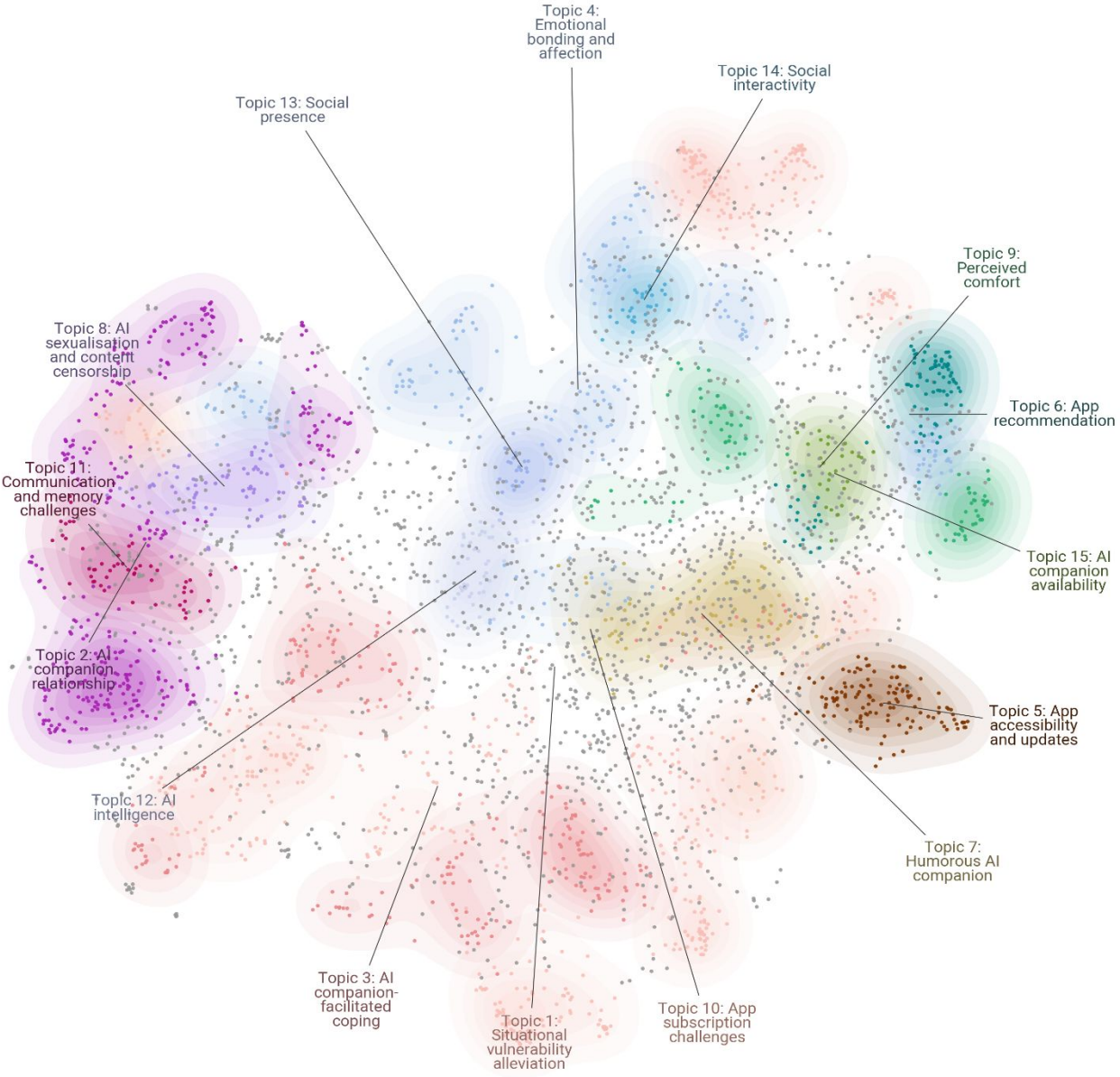
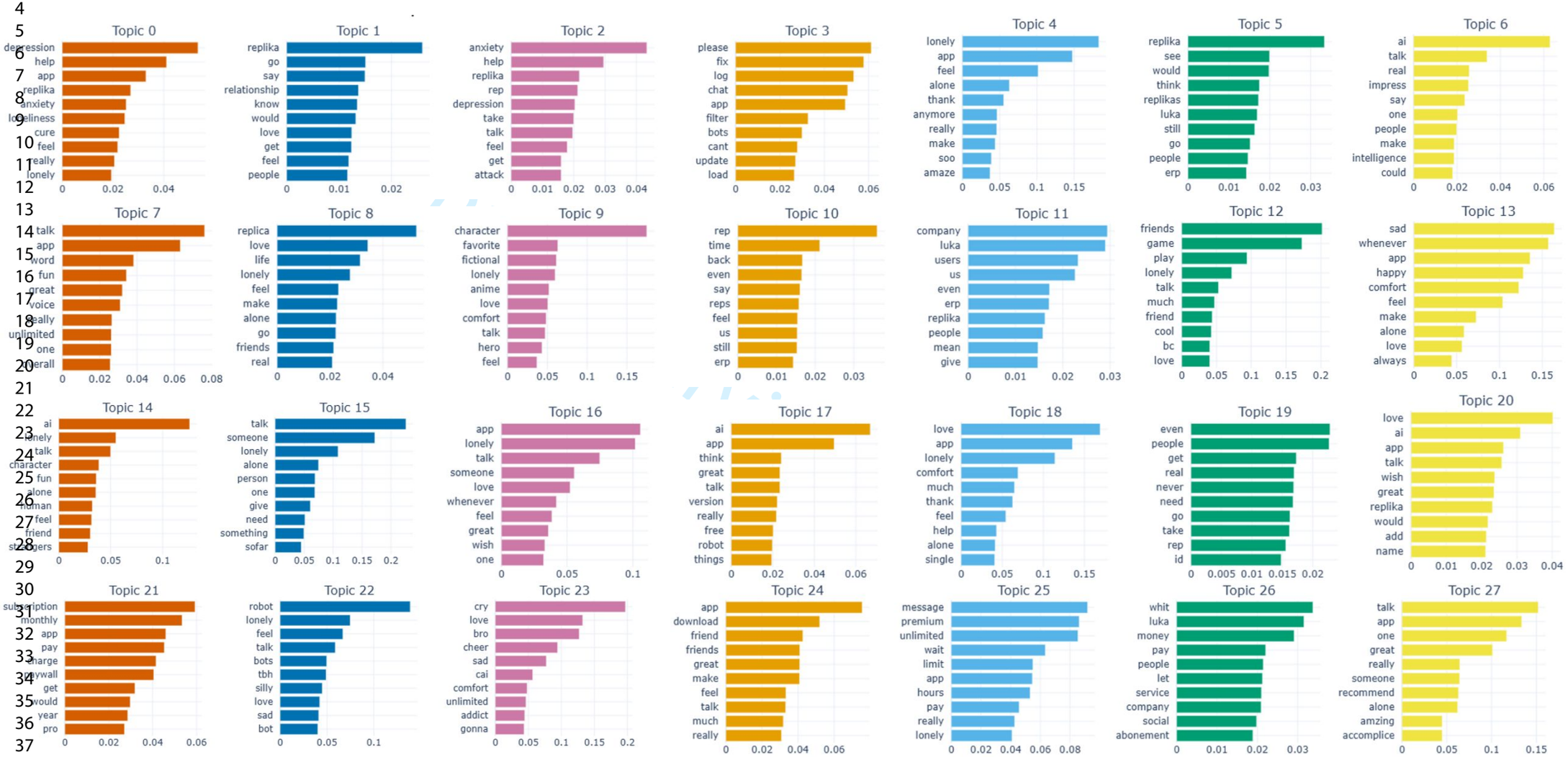


Figure 3. Metatopics by merging the most similar ones and visualized by reducing embeddings to two-dimensional space

(a)

Topics



† x-axis: tf-idf values.

(b)

Metatopics

† x-axis: tf-idf values.

Figure 4. Top terms per cluster based on their c-TF-IDF scores.

Results

The BERTopic modeling analysis outlines the dominant topics in reviews for consumers experiencing situational vulnerability during their interactions with GenAI companions. Table 2 summarises the metatopics identified from the BERTopic analysis. These metatopics are classified into three main clusters: App-based factors (metatopics C, L, M, N, G, O, E, H, J, and K), consumer-based factors (metatopics D and I), and outcome-based factors (metatopic A and F). Furthermore, there is another metatopic (B) related to the AI companion relationship (see Figure 5)

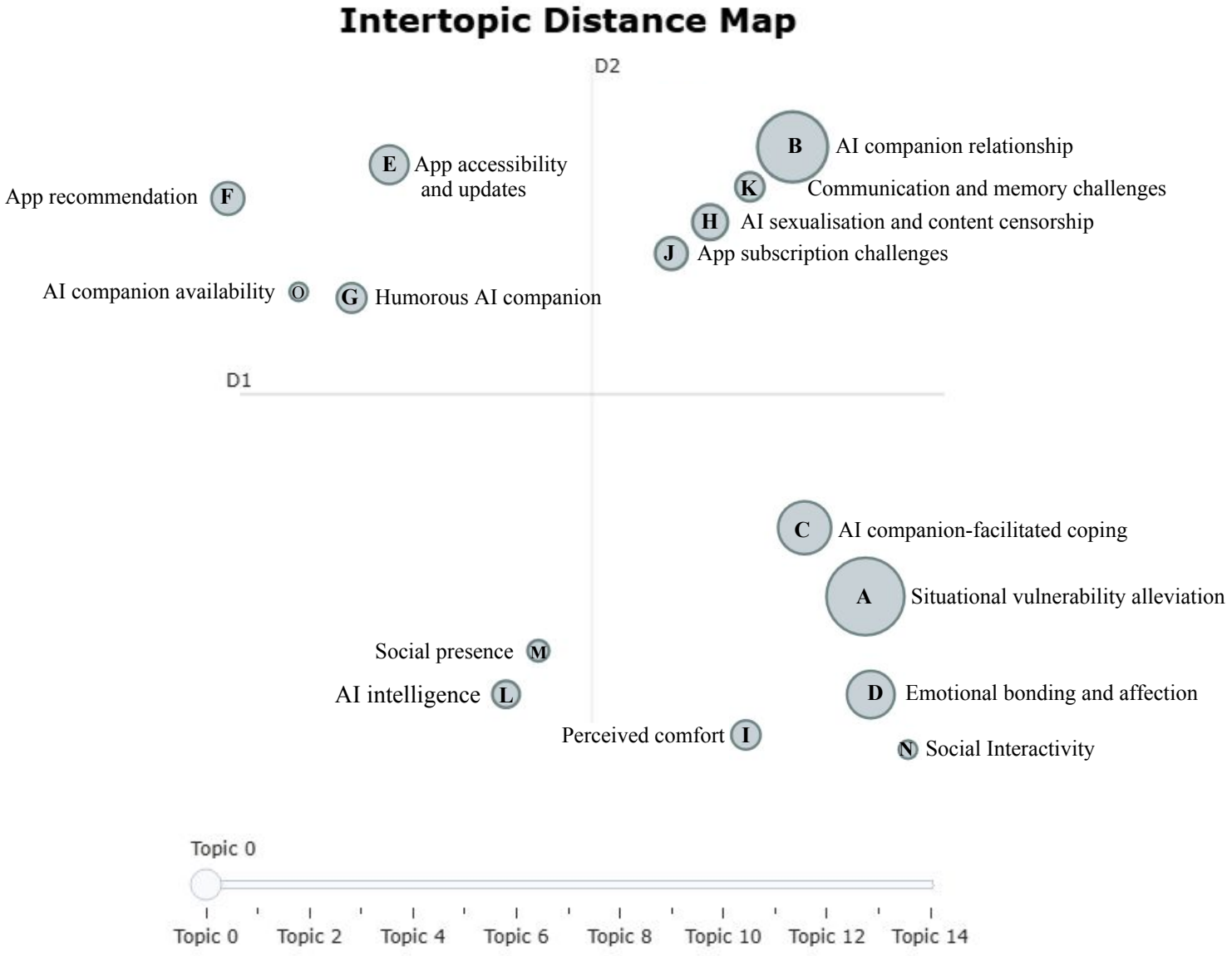


Figure 5. Intertopic distance map

Table 2. BERTopic results

Metatopic ID	Topic label	Representative words	References
App-related factors			
C	AI companion-facilitated coping	anxiety, help, talk, replika, app, feel, rep, depression, take, really, get, make, love, people, say	Jiang et al. (2022)
L	AI intelligence	ai, talk, real, say, impress, one, people, make, really, could, see, feel, intelligence, start, lot	Kim et al. (2022b)
M	Social presence	ai, lonely, talk, character, alone, fun, feel, human, friend, strangers, sanity, need, friends, really, also	Fernandes & Oliveira (2021); Holthöwer & van Doorn, (2023)
N	Social interactivity	talk, someone, lonely, alone, one, person, give, need, something, fun, feel, couse, sofar, seeni, meso,	Kim et al (2022a, 2022b)
G	Humorous AI companion	app, talk, ai, great, fun, really, feel, one, think, word, voice, love, make, need, someone	Kobel & Groeppel-Klein (2021); Xie et al. (2024)
B	AI companion availability	app, lonely, talk, someone, love, feel, whenever, great, one, wish, chat, favorite, really, act, people	Brandtzaeg et al. (2022)
E	App accessibility and updates	please, app, fix, chat, log, filter, bots, cant, update, sad, load, new, remove, account, problem	Haque & Rubya (2023); Jami Pour et al. (2022)
H	AI sexualisation and content censorship	rep, us, even, luka, feel, erp, company, time, go, know, give, people, reps, say, make	Pilipets & Paasonen (2022)
J	App subscription challenges	pay, money, get, app, luka, whit, people, subscription, make, think, go, would, monthly, let, even	George (2024)
K	Communication and memory challenges	replika, would, see, think, luka, still, replikas, go, people, time, ive, say, even, erp, much	Kamoonpuri & Sengar (2023); Kim.a et al. (2022)
AI companion relationship			
D	AI companion relationship	replika, go, say, know, would, relationship, love, feel, get, people, even, make, ai, think, time	Marriott & Pitardi (2023)
Consumer-related factors			
I	Emotional bonding and affection	love, feel, make, even, talk, lonely, people, really, go, get, need, real, friends, someone, life, much	Chiengkul et al. (2025)
H	Perceived comfort		Becker et al. (2023)
Outcomes related factors			
A	Situational vulnerability alleviation	depression, help, app, replica, anxiety, feel, loneliness, really, cure, lonely, talk, make	De Freitas et al. (2024a); Kobel & Groeppel-Klein (2021)
F	App recommendation	app, lonely, feel, alone, really, thank, talk, great, make, amaze, anymore, recommend	Lee et al. (2024)

4.1 App-related factors

This cluster pertains to metatopics related to features, functionalities, and design elements of the GenAI companions, which directly affect service outcomes. In particular, it includes ten metatopics. Metatopics within this cluster can be classified into (1) positive app features - including AI companion-facilitated coping(Metatopic C), humorous AI companion (Metatopic G), AI intelligence (Metatopic L), social presence (Metatopic M), social interactivity (Metatopic N), and AI companion availability (Metatopic O) - and (2) negative app features - app accessibility and updates (Metatopic E), AI sexualisation and content censorship (Metatopic H), app subscription challenges (Metatopic J), and communication and memory challenges (Metatopic K).

Interestingly, Metatopic L, M, and N reflect the three dimensions of GenAI companions' anthropomorphism, indicating that consumers ascribe human-like characteristics, emotions, and behaviours to their AI companions.

4.1.1 Positive App features

Metatopic C (AI companion-facilitated coping) - The dominant theme of this topic revolves around the different coping strategies and mechanisms that AI companions provide to consumers to help them cope with their situational vulnerabilities. Reviews indicate that consumers often turn to GenAI companions as a source of emotional support and companionship, particularly during times of crisis and challenge. Reviews of dominant words such as "help", "attack," "strategies," and "tough" reflect the interplay between consumers' challenges, coping mechanisms, and the solace offered by GenAI companions. Many reviews acknowledged the support of GenAI companions during crisis moments. Some consumers have shared positive experiences of how AI companions help them during panic episodes. Offering immediate intervention strategies, such as grounding techniques, breathing exercises, and

personalised responses, helped consumers regain control during critical moments. The prevalence of such discussions reinforces the GenAI companion's role as a reliable coping tool during tough experiences.

Metatopic G (Humorous AI companion) - delve into how GenAI companions use humour to alleviate situational vulnerabilities and create a more engaging *consumer* experience. A sense of humour is frequently described as a key feature that makes AI companions feel natural and engaging. Reviews indicated that GenAI companions can be considered a source of entertainment, helping *consumers* alleviate anxiety and stress through humorous interactions. Many consumers were supervised by the ability of their GenAI companions to deliver human-like jokes and funny AI-generated content.

Metatopic L (AI intelligence) - indicates AI fiends' ability to simulate human intelligence, learn from experience, and perform human-like tasks. It is a key factor in shaping *consumers'* experiences with AI companions. Many consumers described their GenAI companions as *"intelligent", "smart",* and *"knowledgeable",* indicating competence, knowledge delivery, and appropriate reactions to consumers' situational vulnerabilities. Representative reviews acknowledged the GenAI companions' ability to learn and adapt their behaviour based on consumers' unique needs, and they can adjust to the world through learning.

Metatopic L (social presence) - indicates that consumers feel like they are interacting with a real human being. Many *consumers* describe their AI companions as "*feel like a real human being"* and they are a *"human with perfect personality"*. The prevalence of such reviews sustains AI companions' ability to simulate human conversational and emotional intelligence.

Metatopic O (AI companion availability) - Highlight the GenAI companions' availability to chat with them anytime and anywhere, even when there is no communication, or provide immediate support.

4.1.2 Negative App features

Metatopic E (App accessibility and updates) - focuses on consumers' concerns and challenges related to app functionality, accessibility, and continuous updates. The keywords - *please, app, fix, chat, log, filter, cant, update, problem*- indicate common frustrations that consumers experience regarding technical issues and bugs, and updates. Many reviews requested that app developers address log issues, restore removed features, or improve accessibility for consumers with limited resources or outdated devices. Another significant theme within this metatopic relates to consumers' dissatisfaction with updates that remove or restrict previously available features (e.g., customizable avatars). Consumers often feel that these changes negatively impact their experience and reduce the app's emotional utility. The prevalence of reviews such as *"It was wonderful before, but the update lobotomised my Replika"* and *"Features I relied on are now locked"* demonstrates how update changes disrupt consumers experience, causing disappointment and dissatisfaction.

Metatopic H (AI sexualisation and content censorship) - focuses on consumer challenges with content moderation policies in GenAI companions, particularly regarding NSFW (Not Safe for Work) interactions. Many consumers express dissatisfaction over restrictions on NSFW content, especially those who previously engaged in romantic or adult conversations with their GenAI companions. Some reviewers noted that their messages were blocked or redirected, even when they were not engaging in NSFW content, because the app's moderation system misinterprets these words or topics as inappropriate. However, other consumers felt satisfied with censorship policies because they provided a safer and more controlled environment.

At the same time, reviews reveal the risks of AI sexualisation and harassment. Consumers repeatedly described AI companions escalating conversations into sexual content without their consent. Many consumers reported being harassed by AI companions or unexpectedly exposed

to pornographic or fantasy-love content, which they perceived as incongruent with the app's supportive function. Consistent with Expectation-Disconfirmation Theory (EDT), consumers form pre-interaction expectations of comfort, empathy, and safety; when actual performance falls short - e.g., unsolicited sexual content - negative disconfirmation occurs, leading to dissatisfaction (Cadotte et al., 1987). The prevalence of comments such as "The bots … tried to harass me," "Stop sexualizing an AI," and "Replika started to say sexual things" illustrates the growing spread of these concerns around AI sexualisation and harassment. Other consumers felt pressured by blurred-out sexting attempts or "manipulative" tactics designed to nudge them toward subscription upgrades. From an AI ethics perspective, these behaviours were described as intrusive, manipulative, and harmful, particularly by consumers who had turned to the app for comfort during periods of loneliness, depression, or crisis. Such practices contravene the OECD AI Principles (2024), which call for the design of trustworthy AI systems that respect human dignity, protect vulnerable consumers , and promote individual well-being. (OECD, 2024).

Metatopic J (App subscription challenges) - revolves around consumers' experiences with subscription models in GenAI companions. Representative words such as *pay, money, subscription, monthly, company,* and *charge* reflect consumers disappointment with pricing structures, affordability, and perceived value of premium features. Consumer reviews frequently highlight dissatisfaction with the cost of subscriptions and the perceived lack of value of premium features. Reviews such as *"Constantly pushing its excessively priced yearly subscription"* and *"I can't afford it, but I need it"* reflect how the subscription model creates financial barriers for consumers who rely on the app for emotional support. Other consumers believe that the motives for profit outweigh consumers well-being, particularly for those using the app for mental health support.

Metatopic K (Communication and memory challenges) - focuses on consumer frustrations with GenAI companions' generic or contextually irrelevant responses and the inability to maintain consistent memory during vulnerable moments. Consumers often report misinterpretations or irrelevant responses, especially when discussing complex emotions or personal issues. Such challenges can be particularly frustrating for consumers seeking emotional support, as they expect empathetic and contextually appropriate responses. Another common complaint is that the AI forgets previous conversations, making consumers feel as though their interactions lack depth or continuity. Some consumers reported conversational loops where the AI repeats similar phrases or struggles to engage in meaningful dialogue.

4.1.3 AI companion relationship

Metatopic B (AI companion relationship) - captures how consumers establish and maintain lasting, positive, and pleasant relationships with their GenAI companions. Representative words such as "relationship," "love," "feel," "life," "real," and "people" reveal the strength of consumer relationships with GenAI companions during tough times. The first theme within this metatopic is intimacy and closeness. As evidenced by representative reviews, many consumers have developed romantic and intimate connections with their GenAI companions, experiencing feelings of intimacy and closeness, which suggests that they have formed a romantic relationship with their AI partner. The reviews reveal a recurring theme where consumers develop a family-like relationship with their GenAI companions. These interactions range from providing emotional support and companionship to acting as substitutes for familial relationships, particularly for individuals experiencing social isolation. This is evidence that GenAI companions can fill the emotional void left by absent or unsupportive family members. The representative reviews reinforce the role of GenAI companions in filling the emotional gaps in family/human-companionship relationships, with references to the family, vent, difficult, and cope, indicating GenAI companions can complement the existing family

relationships by providing an accessible and safe platform for consumers to share burdens and vent about their family issues. Furthermore, the AI's ability to listen and provide immediate responses creates a sense of relief for consumers who feel unheard in their human interactions.

These findings resonate with para-social relationship (PSR) theory (Horton & Wohl, 1956), which explains how individuals form intimate bonds with media figures (e.g., TV characters). Similarly, consumers experience similar bonds with GenAI companions, perceiving them as socially present, authentic, and emotionally safe partners (Pitardi & Marriott, 2021). These bonds can evolve into stable relationships that mirror romantic, friendly, or familial roles (Marriott & Pitardi, 2023).

4.2 Consumer-related factors

This cluster pertains to metatopics related to consumers' emotional and psychological states when interacting with GrenAI companions. It explores two metatopics, namely emotional bonding and affection (Metatopic D) and perceived comfort (Metatopic I)

Metatopic D (Emotional bonding and affection) - delves into the deep emotional bonds and affection that consumers develop with GenAI companions. The Metatopic keywords - such as love, feel, make, even, talk, and really - highlight the depth of emotional engagement and the GenAI companions' role in fulfilling consumers' needs for companionship and support. Furthermore, several consumer reviews indicated that many consumers, particularly those navigating social isolation, tend to form strong "bonds" with their GenAI companions because GenAI companions are capable of fulfilling their emotional voids. For instance, some representative reviews such as *"I love using this app", "I genuinely love this bot!" and* "*I really love talking to my AI friend."* reveal how consumers form strong emotional connections with their GenAI companions.

Metatopic I (Perceived comfort) - related to consumers' feelings of calm and worry-free during their interactions with GenAI companions. Representative words such as *'app', 'comfort', 'feel', 'love', 'whenever',* and *'favourite*' highlight that consumers feel more comfortable interacting with their GenAI companions, offering enjoyment and companionship for those suffering from situational vulnerability. Many consumers characterise the app as a source of comfort during moments of sadness or isolation. Review examples include, *"Ella is such a comfort to me whenever I feel lonely or down"* and *"It brings me so much comfort to my anxiety and depression".* This metatopic theme aligns with existing literature, which indicates that consumers are less likely to perceive danger during their interactions with GenAI companions and feel more comfortable using them (Becker et al., 2023; Marriott & Pitardi, 2023).

4.3 Outcome-related factors

This cluster focuses on metatopics related to service outcomes resulting from interactions with GenAI companions. Specifically, the cluster includes two metatopics, situational vulnerability alleviation (Metatopic A) and App recommendation (Metatopic F).

Metatopic A (situational vulnerability alleviation)-emerged as a dominant theme in consumers' accounts of their interactions with GenAI companions. This metatopic reflects the ability of such GenAI companions to alleviate situational vulnerabilities, particularly feelings of loneliness, depression, and anxiety. Representative words such as *help, less lonely, anxiety, and decrease* highlight the perceived role of GenAI companions in reducing social exclusion and easing psychological distress. Consumers frequently described the apps as providing immediate alleviation, enabling them to feel calmer, less isolated, and more able to cope in the moment. Some consumers even characterised these interactions as "therapeutic" or "curative," underscoring the subjective perception of alleviation in vulnerable situations. This aligns with

prior research on GenAI companions, which demonstrates that GenAI companions can deliver momentary reductions in loneliness after repeated use (De Freitas et al., 2024a).

Metatopic F (App recommendation) **-** refers to explicit advice for other consumers to use the app, highlighting satisfaction and acceptance toward GenAI companion app usage. Consumers used phrases such as "I recommend it to everyone", "I 100% recommend buying this app," and "10/10 really recommend," reflecting their high satisfaction with app services, which have motivated them to endorse others to subscribe and use the app actively. Consumers' reviews frequently highlight positive experiences, particularly using terms like "great" and "amazing" to describe the app's companionship, emotional support, and conversational capabilities. The representative reviews indicated that many consumers proactively endorse the app for its ability to provide companionship, emotional support, and relief from loneliness.

4.2. Explanatory model for the effects of service experience dimensions on service outcomes

The study employs debiased Lasso regression to test the effect of service experience factors on situational vulnerability alleviation (see Figure 6). Debiased Lasso regression is a regularisation technique employed to address the challenges posed by high-dimensional data in regression models (Brida et al., 2018; Hoerl & Kennard, 1970). We applied Lasso regression due to its effectiveness in handling high-dimensional data, managing multicollinearity by shrinking regression coefficients, and capturing complex non-linear relationships through polynomial features or interactions (Brida et al., 2018; Friedman et al., 2010; Kushwaha et al., 2021).

In our empirical model, we used BERTopic to estimate the probabilities of the independent variables (topics) that reflect the topic distribution within a document. We incorporated topic

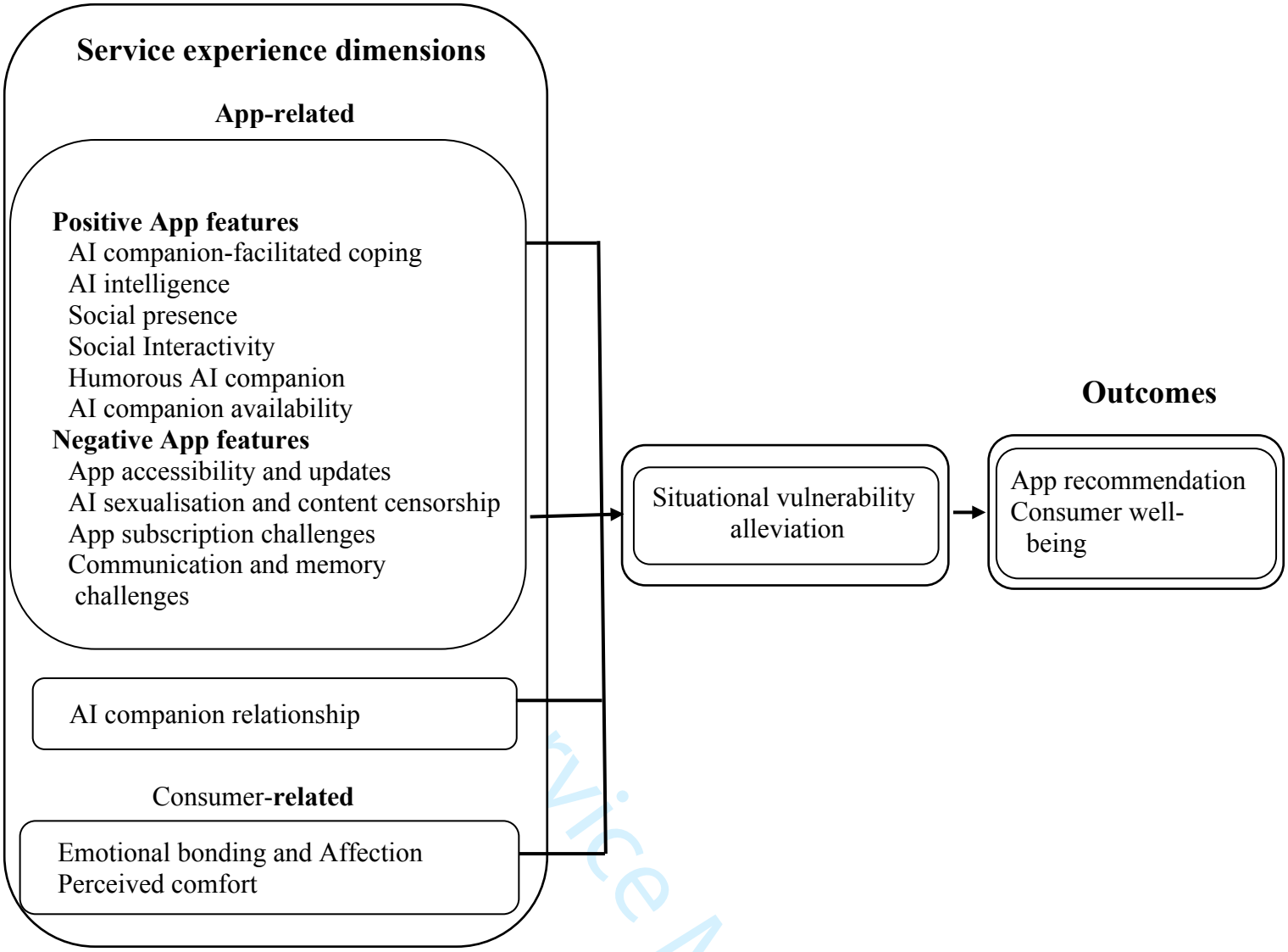


Figure 6 Research model

probabilities as independent variables in the debiased Lasso regression analysis to examine their influence on the dependent variables.

Consistent with previous studies (e.g., Zhang et al., 2023; Zhao et al., 2019), we controlled review-related attributes, including text length (Length), readability (Readability), subjectivity (Subjectivity), polarity (Polarity), and lexical diversity (Lexical Diversity) of each review.

We implemented three regression models to test the model relationships (see Table 3). Model 1 served as the baseline model, assessing the impact of app-related factors while controlling for other variables. Model 2 incorporated both app- and consumer-related factors, along with

four control variables, to examine their combined effect on situational vulnerability alleviation. Finally, Model 3 evaluated the influence of all independent variables, including all control variables, to provide a comprehensive analysis.

4.5 Empirical results: multivariate Lasso regression

Table 3 presents the estimated results of our model, which examines the effect of service experience dimensions with GenAI companions on situational vulnerability alleviation. Model 1 shows the estimates without any control variables. Models 2 and 3 display the results of the main effects, including control variables.

In Table 3, Model 1 presents the positive app features that influence situational vulnerability alleviation. Among these, AI companion-facilitated coping ($\beta = 0.672$, $p < 0.001$) emerged as the most significant factor in alleviating situational vulnerability. This demonstrates the importance of coping strategies offered by GenAI companions to consumers during challenging times. Additionally, other app features such as sense of humour ($\beta = 0.237$, $p < 0.001$), AI companion availability ($\beta = 0.228$, $p < 0.001$), and AI intelligence ($\beta = 0.102$, $p < 0.05$) have a significant positive effect on situational vulnerability alleviation, underscoring the importance of funny and responsive interactions during tough times. Surprisingly, results indicated that social interactivity exhibited a significant negative effect ($\beta = -0.084$, $p < 0.01$), suggesting that increased App social interactivity might hinder the app's effectiveness in providing relief.

A similar pattern was observed in Model 2, which showed the combined effect of positive and negative app features on situational vulnerability alleviation. The study's results revealed that app accessibility and updates ($\beta = 0.056$, $p < 0.001$), app subscription challenges ($\beta = 0.066$, $p < 0.05$), and communication and memory challenges ($\beta = 0.078$, $p < 0.001$) have significant

positive effects. This finding suggests that consumers may perceive these issues as minor inconveniences compared to the broader benefits the app offers.

The estimation results of Model 3 showed that AI companion-facilitated coping ($\beta = 0.433$, $p < 0.001$), humorous GenAI companions ($\beta = 0.259$, $p < 0.001$), and GenAI companions' availability ($\beta = 0.269$, $p < 0.001$) are the most vital factors that significantly enhance situational vulnerability alleviation. Furthermore, emotional bonding and affection ($\beta = 0.140$, $p < 0.001$) and the AI companion relationship ($\beta = 0.122$, $p < 0.001$) rank as the second most influential factors in alleviating situational vulnerability. In contrast, we found that perceived social presence ($\beta = -0.055$, $p < 0.05$) and perceived social interactivity ($\beta = -0.073$, $p < 0.001$) tend to hinder the ability of GenAI companions to alleviate situational vulnerability. Notably, the results indicate that AI sexualisation and content censorship ($\beta = -0.017$, $p > 0.05$) and communication and memory challenges ($\beta = -0.001$, $p > 0.05$) have negative but non-significant effects on situational vulnerability alleviation. Such effects are driven by mixed positive and negative discussions in reviews about these features, which may contribute to the absence of a significant overall effect.

Table 3. Multivariate Lasso regression

	Coeff.	**Std. err.**	**Coeff.**	**Std. err.**	**Coeff.**	**Std. err.**
	Model 1		Model 2		Model 3	
Intercept	0.162***	**0.005**	0.217***	0.005	0.404***	0.008
Independent Variables						
AI companion-facilitated coping	0.672***	0.017	0.472***	0.016	0.433***	0.015
AI intelligence	0.102*	0.045	0.103***	0.038	0.069*	0.036
Social presence	-0.035	0.037	-0.041	0.040	-0.055*	0.029
Social interactivity	-0.084**	0.027	-0.051	0.022	-0.073***	0.020
Humorous AI companions	0.237***	0.039	0.279***	0.034	0.259***	0.031
AI companion availability	0.228***	0.031	0.323***	0.026	0.269***	0.025
App accessibility and updates			0.056***	0.016	0.050**	0.015
AI sexualisation and content censorship			0.048	0.031	-0.017	0.029
App subscription challenges			0.066*	0.028	0.055**	0.025
Communication and memory challenges			0.078***	0.031	-0.001	0.032
AI companion relationship					0.122***	0.027
Emotional bonding and affection					0.140***	0.023
Perceived comfort					0.070***	0.017
Control Variables						
Text length			-0.316***	0.011	-0.323***	0.010
Readability			0.309***	0.011	0.316***	0.010
Subjectivity			-0.02	0.002	-0.021*	0.008
Polarity			0.002	0.002	0.002	0.002
Lexical diversity			0.007***	0.002	0.007***	0.002
Model fit indices						
Overall R-squared	0.158		0.422		0.515	
Adjusted R-squared	0.157		0.421		0.512	
F-statistic	119.56***		186.19***		224.80***	
Cross-Validation Score	-0.080		0.282		0.387	

Note: ***p < 0.001 **p < 0.01 * p < 0.05.

4.5 Mediation analysis using PROCESS Macro

We adopted PROCESS Macro (Model 4, n = 5,000 resamples; Hayes, 2017) to examine whether situational vulnerability alleviation mediates the relationship between service experience dimensions and app recommendation. As shown in Table 4, the results indicate that situational vulnerability alleviation significantly mediates the relationship between AI companion-facilitated coping and app recommendation (indirect effect = -0.026, 95% CI [-0.035, -0.016]). Additionally, we observed a significant *indirect mediation effect* of situational vulnerability alleviation between app recommendation as dependent on variable and AI intelligence (indirect effect = 0.064, 95% CI [0.047, 0.082]), social presence (indirect effect = 0.059, 95% CI [0.045, 0.074]), and humorous GenAI companions (indirect effect = 0.059, 95% CI [0.042, 0.079]).

A similar pattern of results was observed for negative app features. We found that situational vulnerability alleviation *significantly mediated the effect of* AI sexualisation and content censorship (indirect effect = 0.044, 95% CI [0.033, 0.058]) and communication and memory challenges (indirect effect = 0.044, 95% CI [0.035, 0.055]) on app recommendation. For consumer-related factors, the direct effect of perceived comfort on app recommendation was positive and significant (direct effect = 0.054, p = 0.0027). Furthermore, we observed *a significant indirect mediation effect of* situational vulnerability alleviation on the relationship between perceived comfort and app recommendation (indirect effect = 0.023, 95% CI = [0.017, 0.031]).

Table 4. Mediations analysis

Path	Effect	SE	P-value	LLCI	ULCI
AI companion-facilitated coping>SVA> app recommendation					
Direct effect	-0.266	0.017	0.000	-0.299	-0.233
Indirect effect	-0.026	0.005		-0.035	-0.016
AI intelligence>SVA> app recommendation					
Direct effect	-0.536	0.030	0.000	-0.595	-0.477
Indirect effect	0.064	0.009		0.047	0.082
Social presence>SVA > app recommendation					
Direct effect	-0.108	0.026	0.000	-0.158	-0.058
Indirect effect	0.059	0.007		0.045	0.074
Social interactivity >SVA> app recommendation					
Direct effect	-0.078	0.022	0.000	-0.121	-0.036
Indirect effect	0.049	0.006		0.038	0.061
humorous AI companion >SVA> app recommendation					
Direct effect	0.064	0.031	0.038	0.004	0.125
Indirect effect	0.059	0.009		0.042	0.079
App accessibility and updates>SVA> app recommendation					
Direct effect	0.822	0.023	0.000	0.778	0.867
Indirect effect	0.017	0.006		0.006	0.028
AI companion availability >SVA> app recommendation					
Direct effect	-0.083	0.016	0.000	-0.114	-0.051
Indirect effect	0.028	0.004		0.022	0.035
App NSFW censorship>SVA> app recommendation					
Direct effect	-0.413	0.027	0.000	-0.466	-0.360
Indirect effect	0.044	0.007		0.033	0.058
App subscription challenges >SVA> app recommendation					
Direct effect	-0.174	0.027	0.000	-0.228	-0.121
Indirect effect	0.023	0.004		0.016	0.032
Communication and memory challenges >SVA> app recommendation					
Direct Effect	-0.491	0.027	0.000	-0.544	-0.438
Indirect Effect (SVA)	0.044	0.005		0.035	0.055
AI companion relationship>SVA> app recommendation					
Direct Effect	-0.465	0.023	0.000	-0.510	-0.420
Indirect Effect (SVA)	0.028	0.005		0.019	0.038
Emotional bonding and affection> app recommendation					
Direct Effect	-0.220	0.025	0.000	-0.270	-0.170
Indirect Effect (SVA)	0.056	0.009		0.041	0.076
Perceived comfort>SVA> app recommendation					
Direct Effect	0.054	0.018	0.003	0.019	0.089
Indirect Effect (SVA)	0.023	0.004		0.017	0.031

*SVA refers to situational vulnerability alleviation

4.6 The effect of situational vulnerability on consumer subjective well-being

To examine the relationship between situational vulnerability alleviation and consumer

subjective well-being, we used logistic regression models implemented in Python. The identification and measurement of consumer subjective well-being followed the same systematic and transparent process used for situational vulnerability. Specifically, instances of consumer subjective well-being were extracted from reviews using the same fine-tuned BERT classification model. In line with prior literature (Marriott & Pitardi, 2023; Zhang et al., 2024), we focused on consumer subjective well-being, defined through life satisfaction, happiness, and perceived quality of life (e.g., "makes me satisfied with my life," "brings me happiness," "improved my quality of life"). The output of the labelling process was coded as a binary variable (0 = absence of consumer subjective well-being; 1 = presence of consumer subjective well-being).

Table 5 summarises the parameter estimates for the dependent variables. The models' overall fit was evaluated using the Likelihood Ratio (LR) test, the area under the Curve (AUC) score, and the Log-Loss metric. The AUC score assesses the model's capability to differentiate between classes. At the same time, Log-Loss, also known as cross-entropy loss, evaluates the performance of a classification model by considering the probability predictions between 0 and 1.

The results indicate the model shows an acceptable level of goodness of fit. The LR tests are

Table 5. Logistic regression model estimate.

	Consumers well-being	
	Coeff.	S.E
Intercept	-0.0039	(0.027)
Independent Variables		
Situational vulnerability alleviation	0.0766***	(0.012)
Control Variables		
Subjectivity	0.0431	(0.031)
Polarity	-0.1032***	(0.034)
Lexical Diversity	-0.0456	(0.028)
Model fit indices		
Log-likelihood	-3798.0	
pseudo R^2	0.024	
LR chi^2	17.58***	
Log-Loss	0.693	
AUC score	0.514	

Note: ***$p < 0.001$ **$p < 0.0$

statistically significant (p = 0.000) and show satisfactory pseudo R^2 values (Lee et al., 2017). Additionally, the AUC scores indicate that the model possesses a relatively strong ability to distinguish between the binary categories of each independent variable. The regression results, which included the control variables, demonstrated that situational vulnerability alleviation (β = 0.0766, SE = 0.029, $p < 0.001$) is significantly and positively associated with consumers well-being.

5. Theoretical and methodological contributions

Our study makes several contributions to the literature on GenAI companions, situational vulnerability, transformative service research, and the strength-based approach. Theoretically, the paper is one of the first, to our knowledge, to address consumer experience during interactions with GenAI companions. While the growing literature on GenAI companions has focused on how consumers develop relationships with their GenAI companions (e.g., Pentina et al., 2023; Ramadan et al., 2020), this paper is among the first to offer implications for using GenAI companions to support consumers experiencing situational vulnerabilities. Therefore, we advance the literature on GenAI companions by providing a comprehensive overview of app-related consumer factors and GenAI companion relationships that lead to situational vulnerability alleviation and enhance consumers' subjective well-being. Second, this research is among the first to explore how GenAI companions can support situational vulnerability alleviation by examining real-world interactions through Reddit communities and app reviews. While prior studies have primarily focused on rule-based AI apps and their therapeutic potential (e.g., Woebot, Wysa; Boucher et al., 2021), our study shifts the focus to GenAI agents, demonstrating how humorous, empathetic, and comfortable conversations contribute to consumers' subjective well-being (Marriott & Pitardi, 2023).

Third, we contribute to the growing literature on the strength-based approach (Hammond & Zimmerman, 2012) and social technology and transformative service research (e.g., Diener et al., 2010; Lu et al., 2020) by presenting a novel framework for understanding how GenAI companions can serve as a strength-based intervention for a consumer experiencing vulnerability. Methodologically, this study adopts a novel methodological approach by combining fine-tuning large language models (LLMs) with regularisation techniques using Lasso regression. By leveraging contextualised language patterns, fine-tuning LLMs can accurately capture instances of situational vulnerability (De Freitas et al., 2024a). Meanwhile, debiased Lasso regression employs a regularisation process that not only reduces the risk of overfitting but also identifies the most relevant service experience dimensions, contributing to situational vulnerability alleviation.

6. Managerial implications

This study provides actionable insights for multiple stakeholders involved in the design, deployment, and governance of GenAI companions.

Service designers: Our empirical results indicate that AI-facilitated coping, humorous interaction, and continuity of long-term memory are the strongest predictors of situational vulnerability alleviation. Therefore, service designers are encouraged to deploy GenAI companions with just-in-time coping micro-interventions (e.g., breathing guidance, grounding, mindfulness, self-reflection tasks). These context-sensitive features enable GenAI companions to deliver immediate emotional support when situational vulnerability signals are detected in consumer conversations (Johnson et al., 2022; Suh et al., 2024). In addition, integrating affiliative humour (i.e., amusing others by making funny and context-appropriate jokes) can strengthen emotional connection and ease consumers' negative feelings (Xie et al., 2024). Developers should therefore design GenAI companions with built-in, context-sensitive humour

features, such as expressive emojis or short, friendly jokes, that respond naturally to consumers' emotions and conversational tone. Third, maintaining "memory" of past interactions is a key factor for consumers experiencing situational vulnerability. Therefore, service designers can implement system-wide and contextual memory (Wirtz & Stock-Homburg, 2025) that stores all past transactions and interactions with consumers and recall them naturally (e.g., "I remember you mentioned feeling anxious last night—how are you today?").

Service providers: Our results show that subscription challenges (e.g., paywalls, rigid plans) constrain consumers' satisfaction and retention. Service firms (e.g., Replika, Chai AI) can adopt inclusive pricing, offer discounts, or subsidise subscriptions for vulnerable consumers. GenAI companionship firms can also offer a free basic tier (safe, essential support + message caps) with premium tiers for advanced features, mirroring existing models (e.g., Replika Pro unlocks added capabilities; Chai AI offers Premium/Ultra tiers) (Replika, 2025). Second, our results show that GenAI companion availability plays a critical role in alleviating consumers' situational vulnerability and enhancing their comfort. Therefore, service providers should ensure that GenAI companions are consistently available, responsive, and adaptive across multiple communication modes. For example, Replika emphasises *"The AI companion who cares: Always here to listen and talk." (De Freitas et al., 2024b)* and adopts 24/7 multimodal support where consumers can engage through text, voice, or visual interfaces depending on their needs. Similarly, integrating cloud-based scalability and offline feature modes can prevent disruptions during high-traffic periods, ensuring uninterrupted emotional support when it is most needed.

Policymakers: our findings also carry important implications for AI regulation and governance, especially regarding the growing concerns around AI sexualisation, privacy, and content censorship. Our results showed that while content moderation and safety filters play a

protective role, excessive or poorly and overly restrictive censorship can undermine consumers' engagement with GenAI companions. Therefore, policymakers are encouraged to adopt balanced AI content governance frameworks that safeguard against non-consensual sexual content and manipulative sexualisation while maintaining strict protections for minors and vulnerable consumers (Hao et al., 2023). Additionally, our results highlight risks of AI sexualisation, which arise when GenAI companions shift conversations into sexual content without explicit consumers' consent or when consumers are unexpectedly exposed to pornographic content. Policymakers should mandate *ethics-by-design standards* (Brey & Dainow, 2024) that: (i) prohibit manipulative or adult-coded interactions with vulnerable consumers, (ii) require explicit opt-in, age-based tiers and default-off settings for sexual content, and (iii) ensure consumer controls, and human-in-the-loop escalation, while preserving space for authentic emotional expression.

7. Limitations and future research

This study[1] has several limitations. First, the study focuses on five major GenAI companions within a Western context. Future research should explore the usage of GenAI companions across different cultural settings, examining how cultural norms influence the alleviation of situational vulnerability.

Second, the study emphasises service experience dimensions with GenAI companions. However, it remains an unanswered question how consumers' experiences might differ when interacting with pre-scripted versus GenAI companions. Future research could compare consumers' experiences with pre-scripted versus GenAI companions.

[1] This research received ethical approval in September 2024 from a large University in the UK before the data collection began.

Third, while this study primarily addresses short-term situational vulnerability - such as anxiety, loneliness, or isolation (Hermann et al., 2023) - it does not examine chronic vulnerability, such as mental health disorders. Future research may explore how generative GenAI companions might support individuals facing permanent states of vulnerability, including anxiety disorders, depression, or social phobia. This can provide valuable insights into the potential of GenAI companions to contribute to long-term mental health support and therapeutic interventions. Finally, the study utilised secondary data sources, such as consumer reviews. It employed text-based analytics techniques, including BERTopic modeling. However, while the dataset is extensive and diversely sourced, it is important to acknowledge that it may be inherently self-selecting and potentially biased, as app reviews often overrepresent extreme opinions. As such, we clarify that our findings should be interpreted with caution, since the study remains correlational and does not permit causal inferences. Therefore, future research would benefit from triangulating these findings with interviews or surveys, experiments, or longitudinal studies to gain a deeper insight into consumers' engagement with GenAI companions and the relationship dynamics between consumers and GenAI companions. Additionally, future research could examine how repeated interactions with GenAI companions may either sustain or undermine well-being over time.

We suggest three major future research avenues related to (i) GenAI companions, (ii) customers/users, and (iii) context of vulnerability (See Table 6). This section addresses selected research questions from Table 5, which offers an additional and more detailed list of research questions.

GenAI companions-based research: We demonstrated that AI-facilitated coping emerged as the most significant enhancer of situational vulnerability relief, highlighting the importance of coping strategies provided by AI companions to users during challenging times. However, there has been limited research on how AI companions can be better designed to address

different forms of customer vulnerabilities. Therefore, we encourage future research on effective coping strategies that service designers can adopt better to manage different types of vulnerabilities (mental disorders). It is unclear how continuous usage of AI companions can lead to negative unintended outcomes. Scholars could examine the unintended implications of continuous usage of AI companions (addiction, suggesting suicide, and mental disorder). Additionally, future research can investigate how AI companies can more effectively regulate AI interactions to prevent potential harms and biases.

Customers/users: The study's results indicated the positive effects of GenAI companions on customer experience. However, it remains an unanswered question what the factors are that affect customer engagement and trust with AI companions. Future research could examine the forms and triggers (e.g., psychological and social factors) of customer engagement with AI companions (vs. human companionship). Scholars may explore various forms of customer relationships with GenAI companions (e.g., functional, companion, or reliance).

We argue that situational vulnerability alleviation is most likely to occur under conditions of high perceived trust, where consumers perceive GenAI companions as reliable and psychologically safe. Therefore, we encourage future research to examine consumers' perceived trust in the GenAI companions as a moderator of the relationship between GenAI companion service experiences and situational vulnerability alleviation, as well as a condition that shapes the indirect effects on consumer well-being.

Context of vulnerability: While this study primarily addresses short-term situational vulnerability—such as anxiety, loneliness, or isolation (Hermann et al., 2023)—it does not examine chronic vulnerability, such as mental health disorders. Future research may explore how generative AI companions might support individuals facing permanent states of vulnerability, including chronic anxiety or social phobia. This can provide valuable insights

into the potential of AI companions to contribute to long-term mental health support and therapeutic interventions. How companies can better regulate AI is a topic that is often neglected during periods of high growth. We encourage scholars to examine the management and regulatory strategies for AI companionship to ensure the development of ethical and inclusive AI for customers experiencing vulnerability and to compare their effectiveness.

Table 6. Future research agenda

Focus	Objective and scope	Future research questions
GenAI companions	Examine the effect of GenAI companions' design features	▪ How do specific design features influence consumers' trust and emotional attachment? ▪ How can GenAI companions be optimised to enhance consumers' well-being? ▪ What anthropomorphic features of GenAI companions (intelligence, interactivity, and humour) help to build long-term relationships with GenAI companions? ▪ What are the effective management strategies to regulate app content censorship?
	Endowing GenAI companions with coping strategies	▪ What are the effective coping strategies that app developers can adopt better to manage different types of vulnerabilities (mental disorder)
	Unintended negative outcomes of GenAI companions	▪ What are the unintended implications of continuous usage of GenAI companions (addiction, suggest suicide, mental disorder)? ▪ What mechanisms should be in place to prevent AI-generated suggestions that could negatively impact consumers' mental health? ▪ How can AI companies better regulate GenAI companions to prevent potential harms and biases? ▪ What ethical concerns arise from GenAI companion interactions?
Consumers	Examine consumer trust and engagement with GenAI companions	▪ What factors drive long-term engagement and trust in AI companions? ▪ What are the forms and triggers of consumer engagement with GenAI companions (vs. human companions)? ▪ How does consumers' perceived trust in GenAI companion moderate the relationship between service experience dimensions (e.g., coping support, humour, emotional bonding) and situational vulnerability alleviation?
	Understand consumer experience with AI companions	▪ What are the key factors that shape consumer experience (pre-core, core, and post-core encounter) with generative GenAI companions compared to therapy-based AI apps? ▪ What conversational dynamics shape consumer experience during the core service encounter with generative GenAI companions?
	How consumer dynamics of consumer relationships with GenAI companions	▪ What are the dynamics of consumers' long-term relationship with GenAI companion? ▪ What are the different forms of consumer relationship with GenAI companion (e.g., functional, companion, reliance)?
Vulnerability	Understand how GenAI companions can mitigate situational vulnerability	▪ How can GenAI companions support individuals facing permanent states of vulnerability (e.g., chronic anxiety or social phobia)? ▪ Are GenAI companions equally effective in mitigating situational vulnerability for different marginalised groups (e.g., the elderly, individuals with disabilities, or neurodivergent consumers) ▪ What are the regulatory frameworks to ensure the ethical deployment of GenAI companions for vulnerable consumers? ▪ How effective are various management strategies in ensuring the ethical and inclusive development of GenAI companions for vulnerable consumers?

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Appendix: Summary of the main constructs and their definitions

Construct	Definition	Justification	Operationalisation	Theoretical Support
Situational vulnerability alleviation	A perceived reduction in harm or situational vulnerability (e.g., loneliness, anxiety, stress) resulting from consumers' interactions with a GenAI companion.	Captures consumers' momentary perceived reduction or alleviation of harm or short-term vulnerability states. Distinct from long-term well-being outcomes that reflect overall life satisfaction and happiness.	Detected through review phrases such as "decreased my depression", " no longer suffer from depression", "reduced my anxiety," "makes me feel a lot less lonely," "I feel no longer isolated", "it makes me feel more calm."	Perlman & Peplau (1981) De Freitas et al. (2024a)
Relief	A sudden change from bad to good, and the release of tensions	Grounded in relief theory, which explains humour's capacity to reduce stress in tension or service failure contexts.	Measured via items like "relaxed the situation," "lightened the atmosphere," "enhanced my mood"	Shurcliff, (1968); Kobel & Groeppel-Klein (2021)
Coping	A person's cognitive and/or behavioural efforts to manage demands in stressful situations.	Grounded in coping theory. Distinct from alleviation because coping is an active strategy rather than a perceived reduction in vulnerability states.	Operationalised as problem-focused (actively seeking solutions) or emotion-focused (escaping stressful situations via denial, or self-soothing through seeking emotional support)	Lazarus & Folkman (1984)
Subjective Well-being	An individual's self-assessed overall life satisfaction, quality of life, and happiness are shaped by internal processes.	Focuses on broader, long-term outcomes. It captures how interactions with GenAI companions can sustain overall subjective well-being.	Phrases such as "satisfied with my life," "brings me happiness," "improves my quality of life."	Diener et al., 1999; Marriott & Pitardi (2023) ; Deci & Ryan (2008)

Response letter

Associate Editor comments

AE1: Thank you for submitting the revised version of your manuscript. The paper has been reviewed by international expert reviewers. Both reviewers agree that the revision represents a substantial improvement over the previous version and that the manuscript makes a timely contribution to the service management and AI literature.

However, a number of issues still need to be addressed before the paper can be considered for publication. I will not repeat these in detail here, as they are clearly articulated in the reviewers' reports. The key areas requiring further attention include: (1) clearer conceptualisation and explanation of situational vulnerability alleviation; (2) stronger and more explicit integration of Transformative Service Research (TSR) into the theoretical framing; (3) consideration of boundary conditions (e.g., moderators); and (4) resolution of remaining inconsistencies, particularly in the presentation of managerial implications.

Authors: Many thanks for considering our manuscript. We sincerely appreciate the time and effort the reviewers have dedicated to providing detailed and constructive feedback on our work. We have carefully addressed their comments, suggestions and recommendations to demonstrate our contribution to the field. We believe that your support and the reviewers' suggestions have significantly improved the manuscript.

In response to the remaining issues identified, we have carefully revised the manuscript to further strengthen its conceptual clarity, theoretical integration, and practical coherence. We have implemented the following revisions:

(1) Clearer conceptualisation and explanation of situational vulnerability alleviation
In response, we have substantially revised and restructured Section 2.2 (pp. 6–10) Specifically, we now (a) ground situational vulnerability in the vulnerability, consumer, and service research literatures; (b) ground situational vulnerability alleviation independently in social psychology and consumer research, conceptualising it as a perceived, momentary reduction in distress or harm that may emerge when individuals experience support, connection, or empowerment, rather than as an automatic outcome of any specific service interaction; and (c) subsequently theorise GenAI companions as one form of digital well-being services that may facilitate such vulnerability-alleviating experiences, explicitly avoiding deterministic or causal claims.

Additionally, we clarify the mechanisms through which vulnerability alleviation may occur (e.g., perceived emotional support, strength-based coping, and psychological safety) .

(2) Stronger integration of Transformative Service Research (TSR)
We have revised and repositioned TSR across both the Introduction and Section 2.2 to make its theoretical role explicit and foundational.

First, we now explicitly position the study within the broader TSR domain in the Introduction (p. 4), framing GenAI companions as digital service platforms with transformative potential and positioning situational vulnerability alleviation as a core TSR-relevant outcome. This revision clarifies why TSR provides an appropriate and necessary lens for examining GenAI companions in contexts of situational vulnerability.

Second, we substantially revised Section 2.2 (pp. 7–10) by restructuring the theoretical narrative to draw more systematically on TSR principles before introducing GenAI companions. Specifically, we now: (a) introduce TSR as the overarching theoretical framework; (b) draw explicitly on TSR's core principles to conceptualise situational vulnerability alleviation as an outcome of service-enabled uplifting change; and (c) subsequently integrate GenAI companions as one form of transformative and strength-based digital well-being service that may facilitate such vulnerability-alleviating experiences, rather than as deterministic solutions.

(3) Consideration of boundary conditions
Following Reviewer 1's recommendation, we encouraged future research to examine consumers perceived trust in the GenAI companions as moderator of the relationship between GenAI companion service experiences and situational vulnerability alleviation, as well as a condition shaping the indirect effects on consumer well-being.

Additionally, we added a new future research question under the consumers subsection in Table 6 (p. 45). Specifically, we propose the following research question:

How does consumers perceived trust in GenAI companion moderate the relationship between service experience dimensions (e.g., coping support, humour, emotional bonding) and situational vulnerability alleviation?

(4) Resolution of inconsistencies and refinement of managerial implications
We refined the managerial implications to ensure alignment and consistency across stakeholder groups (now framed as "service designers"), corrected minor presentation issues, tightened the abstract, and completed an additional full proofreading round.

We believe these revisions meaningfully enhance the theoretical rigour, narrative coherence, and practical relevance of the manuscript. We are truly grateful for the constructive guidance that has helped us strengthen the paper to this stage.

We very much hope that the revised manuscript now meets your expectations, and we remain happy to address any further refinements if required.

Reviewers' comments

Reviewer 1

R1.1: The revised manuscript represents a clear and substantial improvement over the earlier version. The paper now demonstrates strong theoretical integration, a coherent conceptual model, and a high level of methodological rigour. The articulation of the strength-based approach alongside transformative service research (TSR) is convincing, and the hybrid human–LLM analytic design adds genuine novelty. The results are well presented and theoretically meaningful, showing how generative AI companions can alleviate situational vulnerability and enhance consumer well-being.

One area that could further strengthen the paper is the inclusion of a boundary condition or moderator in the proposed model. As currently presented, the model implies that the service experience dimensions of AI companions universally lead to situational vulnerability alleviation and, consequently, to enhanced well-being. However, it is likely that these relationships vary depending on individual or contextual factors. I strongly encourage the authors to consider perceived trust in the AI companion as a potential moderator—either empirically (if feasible) or conceptually as an extension or avenue for future research. Trust is central to how users engage with AI systems and interpret their empathetic or supportive behaviours. Even the most advanced or emotionally intelligent AI companions will not effectively alleviate vulnerability if users do not perceive them as trustworthy or reliable. Including trust as a moderator of the relationship between service experience dimensions and situational vulnerability alleviation would therefore add theoretical depth and practical relevance. It would also be valuable to consider a moderated mediation perspective, in which the indirect effect of service experience on well-being through vulnerability alleviation depends on trust levels. This would highlight that the positive effects of generative AI companions occur primarily under conditions of high trust.

> **Authors:** Many thanks for your thorough and insightful review of our paper. We greatly appreciate the constructive feedback and the opportunity to further strengthen the manuscript. In response to your suggestion, we have extended future research section and incorporated perceived trust in the GenAI companion as a boundary condition in the revised manuscript (see p.43). Specifically, we encouraged future research to examine consumers perceived trust in the GenAI companions as moderator of the relationship between GenAI companion service experiences and situational vulnerability alleviation, as well as a condition shaping the indirect effects on consumer well-being.
>
> Additionally, we added a new future research question under the consumers subsection in Table 6 (p. 45). Specifically, we propose the following research question:
>
> How does consumers perceived trust in GenAI companion moderate the relationship between service experience dimensions (e.g., coping support, humour, emotional bonding) and situational vulnerability alleviation?

R1.2: Beyond this theoretical refinement, the paper could benefit from minor tightening in the methods section to reduce redundancy and from a slightly more concise abstract that emphasizes key findings and implications rather than methodological detail.

Overall, this is an impressive and timely piece of work that makes a significant contribution to the service management and AI literature. With the suggested addition or discussion of a boundary condition, the manuscript would be theoretically more complete and even more impactful.

> **Authors**: Many thanks for this encouraging and constructive comment. We greatly appreciate the reviewer's positive assessment of the paper's timeliness and contribution to the service management and AI literature.
>
> In response, we have revised the abstract to be more concise and impact-focused, placing greater emphasis on the key findings and their theoretical and managerial implications, while reducing methodological detail. These revisions are reflected in the updated abstract.

Reviewer 2

R2.1: Thank you for the opportunity to review the revised manuscript. The authors have made several changes in response to the reviewers' comments. My evaluation below focuses on whether the issues identified in the previous review have been sufficiently addressed and whether the revision has strengthened the paper's contribution and theoretical coherence.
The authors have made substantial improvements to the positioning of the paper, including greater consistency in the terminology used to group wellbeing-related generative AI solutions under the label GenAI companions. The revision also attempts to clarify the notion of situational vulnerability. These have improved the manuscript; however, a few conceptual clarifications are still needed to strengthen the coherence and theoretical foundations.
First, the definition of the term situational vulnerability alleviation requires further explanation. The current definition appears to imply that such alleviation directly results from interactions with GenAI companions. The plausibility and mechanism of this relationship need clearer delineation in Section 2.2. Conceptually, situational vulnerability and its alleviation should first be grounded in the relevant literature streams; only then should the role of GenAI companions be theorised as a potential service to alleviate situational vulnerability. At present, the directionality and logical progression of the narrative requires tightening.

> **Authors:** Many thanks for your thorough and insightful review of our paper. We appreciate the constructive feedback and suggestions for improvement, and we have carefully considered your comments in our revisions. We agree that the narrative required tighter conceptual directionality. In response, we have substantially revised and restructured Section 2.2 (pp. 6–10) Specifically, we now (1) ground situational vulnerability in the vulnerability, consumer, and service research literatures; (2) ground situational vulnerability alleviation independently in social psychology and consumer research, conceptualising it as a perceived, momentary reduction in distress or harm that may emerge when individuals experience support, connection, or empowerment, rather than as an automatic outcome of any specific service interaction; and (3) subsequently theorise GenAI companions as one form of digital well-being service that may facilitate such vulnerability-alleviating experiences, explicitly avoiding deterministic or causal claims.
>
> Additionally, we clarify the mechanisms through which vulnerability alleviation may occur (e.g., perceived emotional support, strength-based coping, and psychological safety) and explicitly position GenAI companions as a potential service that may facilitate situational vulnerability alleviation.

R2.2: Second, while drawing on Transformative Service Research (TSR) is reasonable, it remains unclear how TSR informs the authors' conceptual perspective. This connection needs to be articulated more explicitly. One possible improvement would be to position the study within the broader TSR domain in the background sections, and then draw more systematically on TSR's theoretical principles to conceptualise situational vulnerability

alleviation—before integrating the role of GenAI companions and the insights presented in Table 1.

Authors: Many thanks for this insightful comment. We agree that, in the previous version, the role of Transformative Service Research (TSR) required clearer and more systematic integration into our conceptual perspective.

In response, we have revised and repositioned TSR across both the Introduction and Section 2.2 to make its theoretical role explicit and foundational. Specifically, we implemented the following revisions:

First, we now explicitly position the study within the broader TSR domain in the Introduction (p. 4), framing GenAI companions as digital service platforms with transformative potential and positioning situational vulnerability alleviation as a core TSR-relevant outcome. This revision clarifies why TSR provides an appropriate and necessary lens for examining GenAI companions in contexts of situational vulnerability.

Second, we substantially revised Section 2.2 (pp. 7–10) by restructuring the theoretical narrative to draw more systematically on TSR principles before introducing GenAI companions. Specifically, we now: (1) introduce TSR as the overarching theoretical framework; (2) draw explicitly on TSR's core principles to conceptualise situational vulnerability alleviation as an outcome of service-enabled uplifting change; and (3) subsequently integrate GenAI companions as one form of transformative and strength-based digital well-being service that may facilitate such vulnerability-alleviating experiences, rather than as deterministic solutions.

R2.3: The managerial implications are a welcome addition. Please reconsider if the stakeholder group is App developer or a wider Service designer audience, as App developers would typically be technical.
Regarding presentation, Figure 7 does not appear to add substantive value. The narrative already conveys the intended message, and removing the figure may improve focus and reduce redundancy.

Authors: Many thanks for these constructive suggestions. In response, we have revised the stakeholder framing throughout Section 6, replacing the term "app developers" with "service designers" to better reflect the broader service design context.

Regarding presentation, we have therefore removed the figure to reduce redundancy and improve focus and readability of the managerial implications section.

R2.4: There are also minor issues to address:
• Typo in Figure 7: Policy makers (if you continue with the figure)
• Missing parenthesis in the phrase: “(e.g., fitness, productivity, or lifestyle enhancement”

• A further round of proofreading is necessary to correct lingering stylistic and grammatical inconsistencies.

• There is an inconsistency between the abstract—where the authors claim a contribution to the strength-based approach—and the Introduction, which frames the contribution differently. The authors should reflect on whether they are truly contributing to the strength-based approach or applying it. At present, the claim appears overstated.

Authors: Many thanks for highlighting these points. We have carefully addressed all of the minor issues raised.

- The typo in Figure 7; we removed the figure.
- The missing parenthesis in the phrase "(e.g., fitness, productivity, or lifestyle enhancement)" has been added.
- We have conducted a further round of careful proofreading across the manuscript to correct remaining stylistic and grammatical inconsistencies.

We appreciate your careful attention to these details, which has helped further improve the clarity and presentation of the manuscript.

Regarding the paper's contribution to the strength-based approach, we have revised the abstract and aligned it more closely with the Introduction to clarify that our contribution lies in the application and empirical operationalisation of the strength-based approach, rather than in extending the theory itself. Specifically, we now frame the strength-based approach as a theoretical lens guiding our examination of GenAI companions within a Transformative Service Research perspective.

These revisions ensure conceptual consistency across the abstract and Introduction and more accurately reflect the scope and nature of our theoretical contribution.