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Psychological Mechanisms Behind the Influence of Immersive Technologies on Consumer Well-Being

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ABSTRACT

Immersive technologies, such as augmented reality and virtual reality, enrich daily life with numerous benefits but also introduce risks such as impulsive spending and escapism. Despite their growing influence, the psychological mechanisms underlying these effects and the impact on consumer well-being remain underexplored. This conceptual research investigates how different immersive technologies (i.e., virtual reality and augmented reality) affect multiple dimensions of well-being. Using theory synthesis, we integrate diverse perspectives to identify key psychological mechanisms, and through theory adaptation, we employed Seligman's PERMA model to integrate these mechanisms into four distinctive themes: (1) Emotions, (2) self-identity and growth, (3) social identity and connection, and (4) mindful engagement and sensory experience. Through this integrative conceptual approach, this research provides conceptual foundations for future studies and makes a key contribution to the marketing discipline by presenting an integrative framework that captures the dual impacts of immersive technologies on various aspects of consumer well-being, particularly within the domains of consumer behavior and consumer experience.

1 | Introduction

Immersive technologies like virtual reality (VR) and augmented reality (AR) are rapidly transforming consumer experiences, with both positive and negative outcomes that are highly relevant to marketing scholars and practitioners. On the positive side, AR applications allow consumers to visualize products in their own space (e.g., trying on virtual makeup or previewing how furniture fits in their homes), which enhances decision-making and overall purchase satisfaction (Javornik et al. 2021; Yim and Park 2019). These tools not only shape consumer attitudes but also influence customer journey and the retail sector, core themes in marketing research. In the medical field, VR is being used to help manage pain and provide a mental escape for patients undergoing painful treatments or dealing with chronic conditions (Deo et al. 2021), presenting opportunities for value co-creation in healthcare marketing contexts. Yet, some studies

indicate that the highly immersive nature of these technologies in shopping environments can motivate impulsive spending (Goel et al. 2024), which may lead to financial stress and regret. Another concern relates to how extended use of VR in everyday life could contribute to escapism and emotional detachment and may erode consumer well-being over time (Saleem et al. 2024). These contrasting outcomes highlight the dual impact of immersive technologies on consumer welfare, with the psychological mechanisms at play remain underexplored.

Existing nonempirical research on immersive technologies has provided a foundational understanding of how these tools shape consumer experiences and interactions (see Table 1). Past systematic literature reviews highlight key areas of impact, such as the consumer experience, purchase journey, and brand-consumer relationships (Ambika et al. 2025), demonstrating how immersive technologies can enhance performance and evoke

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TABLE 1 | Previous nonempirical studies on immersive technologies.

Author (year)	Goal	Method	Key findings	Centering on well-being aspects	Tech type
Suh and Prophet (2018)	Using the S-O-R framework to better understand users' experiences with immersive technologies.	Systematic literature review	Studies on immersive technologies are rapidly increasing, with flow theory being the most utilized construct.	×	AR, VR
Xi and Hamari (2021)	To explore how VR has been used in shopping by investigating its pros and cons, contexts, and its influence on consumer psychology and behavior.	Systematic literature review	(1) VR shopping provides more positive experiences than physical stores. (2) Visual interfaces and interactive technologies improve efficiency and usability. (3) Multisensory features enhance the shopping experience. (4) Social presence may be important in influencing the VR shopping experience.	×	VR
Hilken et al. (2022)	To discuss the underlying psychological mechanisms of immersive technologies on consumer experiences.	Review article	Delivering innovative offerings, supporting sustainability and consumer well-being interventions, balancing value co-creation and privacy concerns, and achieving new modes and means of impact are underlying psychological mechanisms in consumer experiences with immersive technologies. Balancing these multifaceted mechanisms is crucial.	×	AR, VR
Ambika et al. (2025)	To compare consumer behavior across different types of immersive technologies in various sectors by adapting the TCM-ADO framework.	Systematic literature review	(1) Key areas: Consumer experience, purchase journey, comparison, and brand-consumer relationships. (2) For AR, key antecedents are interactivity, vividness, and augmentation; for VR, they are presence and telepresence. (3) Flow and immersion are the most common mediators.	×	AR, VR, MR, and 3D views
Dwivedi, Hughes, et al. (2023)	To understand key aspects of the metaverse in marketing and discuss how these aspects could contribute to diverse fields.	Conceptual paper	The key challenges of metaverse marketing are: (1) creating value by re-evaluating strategies used in the physical realm to fit the metaverse, (2) developing responsible guidelines, and (3) creating hybrid engagement.	×	Metaverse
Dwivedi, Kshetri, et al. (2023)	To unveil the negative aspects of the metaverse from a comprehensive view.	Conceptual paper	Metaverse raises concerns about privacy, security, psychological impacts, vulnerable user protection, invasive advertising, social inequality, ethical concerns, regulatory challenges, and mental health.	×	Metaverse

(Continues)

TABLE 1 | (Continued)

Author (year)	Goal	Method	Key findings	Centering on well-being aspects	Tech type
Jayaswal and Parida (2023)	To offer a comprehensive view of augmented reality in marketing to date.	Review paper	AR research has grown rapidly, primarily employing quantitative methods. Future research should explore cultural factors, consumer psychology, social AR, and AR advertising, while exploring various research designs, utilizing advanced technologies, and examining the negative spill-over effects of AR marketing.	×	AR
Zarantonello and Schmitt (2023)	To understand how AR and VR differently and similarly contribute to consumer experience services.	Conceptual paper	Propose future AR and VR research in these areas: (1) how AR and VR differ conceptually, (2) more consumer-related factors associated with AR/VR, and (3) different purchase stages involving AR/VR experience.	×	AR, VR
Javeed et al. (2024)	To understand AR from a comprehensive perspective and identify whether it is an efficient marketing tool.	Systematic literature review and bibliometric analysis	Research on AR in marketing has grown rapidly since 2016, focusing on consumer acceptability, destination marketing, customer interactivity, and retail.	×	AR
Fares et al. (2024)	To investigate the factors that influence the adoption of VR.	Mixed-methods systematic review	Key factors driving VR use are perceived enjoyment, perceived usefulness, positive previous VR experience, subjective norm, and attitude.	×	VR
McLean et al. (2025)	To understand the complex relationship between technology and consumer well-being.	Review paper	Technology can simultaneously enhance and diminish both hedonic and eudaimonic well-being, depending on factors such as the purpose of use, the type of activity, the type of technology, and the length of time using them.	✓	Social media, wearables, AI, and AR/VR
The present study	To discover the underlying mechanisms of immersive technologies on different aspects of well-being through theory synthesis. In addition, provide research gaps and a future agenda by adapting the PERMA model.	Conceptual paper	Through theory synthesis and adaptation of the PERMA model, this research identifies four key psychological mechanisms that link immersive technologies to multiple dimensions of consumer well-being: (1) emotions, (2) self-identity and growth, (3) social identity and connection, and (4) mindful engagement and sensory experience.	✓	AR, VR

Abbreviations: AR = augmented reality, VR = virtual reality.

cognitive and emotional responses (Suh and Prophet 2018). Other reviews identify factors that influence consumer behavior within virtual shopping environments (Xi and Hamari 2021) and broader marketing domains like consumer acceptability, customer interactivity, retail, and destination marketing (Javeed et al. 2024). While these studies reveal the transformative potential of immersive technologies, they often overlook consumer well-being. Conceptual contributions like Dwivedi, Kshetri, et al. (2023; Dwivedi, Hughes, et al. 2023) discuss societal impacts of the metaverse, such as consumer vulnerability, privacy, and mental health, but focus primarily on market-related outcomes or broader ethical considerations. Some authors provide fragmented insights into user enjoyment, presence, and flow (Ambika et al. 2025; Fares et al. 2024), yet few frameworks fully integrate these elements to comprehensively explain how immersive technologies impact consumer well-being and through what pathways.

In summary, these reviews and conceptual analyses establish a foundation for understanding the experiential and functional attributes of immersive technologies but largely sideline the psychological mechanisms influencing consumer well-being. While McLean et al. (2025) address aspects of well-being, they provide a broad conceptualization of how various technologies can enhance, diminish, or manage well-being, focusing primarily on hedonic and eudaimonic dimensions. The closest study would be Hilken et al. (2022), which examines the psychological mechanisms underpinning consumer experiences with new technologies. However, Hilken et al.'s (2022) work primarily serves as a guiding framework for developing application areas of reality-enhancing technologies rather than directly addressing well-being outcomes. Zarantonello and Schmitt (2023) and Jayaswal and Parida (2023) emphasize the need to explore psychological processes in AR/VR. To close this gap, we address the following research questions: (1) What are the key psychological mechanisms through which immersive technology consumption influences well-being? (2) What research gaps exist, and how could future studies enhance understanding of their impact? Using theory synthesis, we integrate diverse theoretical perspectives and literature streams (Jaakkola 2020) to interpret previous findings through a higher-order lens that connects distinct phenomena (MacInnis 2011), helping us identify key psychological factors. We then apply theory adaptation to broaden existing knowledge by integrating insights from other theories (Jaakkola 2020). Specifically, we employ the PERMA model rooted in positive psychology, which comprises five well-being elements, including positive emotion, engagement, relationships, meaning, and accomplishment, to systematize the psychological mechanisms driving well-being in immersive technology environments.

Our contributions are twofold. First, we advance the immersive technology literature by identifying key psychological mechanisms influencing well-being, highlighting critical gaps, and proposing future directions that will benefit scholars, app developers, and marketers. This aligns with MacInnis (2011) emphasis on the pivotal role of conceptual research in the marketing discipline and addresses calls by Zarantonello and Schmitt (2023) and Jayaswal and Parida (2023) to explore the psychology underlying VR/AR marketing. Second, we integrate these psychological mechanisms into the PERMA model

through theory adaptation to offer insight into how different immersive technologies impact multiple dimensions of well-being. By considering both the positive and negative aspects of immersive technology, we offer a nuanced understanding of its complexities, often overlooked in prior research. By combining theory synthesis and adaptation, we contribute theoretically by reframing current understandings of immersive technology consumption through a psychological perspective. Ultimately, we hope to spark scholarly conversation and inspire research that promotes mindful and responsible immersive technology use, creating a healthy immersive environment that benefits all stakeholders.

2 | Immersive Technologies and Well-Being

Immersive technologies blur the line between physical and digital worlds, with VR, AR, and mixed reality (MR) exist along the reality-virtuality continuum (Flavián et al. 2019). Specifically, VR offers fully computer-generated environments and provides high levels of immersion and presence through devices like head-mounted displays (Flavián et al. 2019) and is widely used in sectors such as tourism, gaming, medicine, and retail (Cao et al. 2020; Cardoso et al. 2017; Merckx and Nawijn 2021; Saleem et al. 2024). In contrast, AR overlays virtual images onto physical surroundings while offering greater accessibility through everyday devices like smartphones and tablets (Zarantonello and Schmitt 2023). Many companies offer AR apps (e.g., IKEA Place, L'Oréal makeup try-on, and LEGO Technic) to enhance customer experiences. MR (e.g., Microsoft HoloLens), sitting between AR and VR on the reality-virtuality continuum, provides greater immersion but relatively less development (Ambika et al. 2025; Flavián et al. 2019).

While these technologies enhance customer experiences and improving quality of life across various domains such as entertainment and healthcare (Deo et al. 2021; Reer et al. 2022), they also pose risks such as addiction and social isolation (Merckx and Nawijn 2021), physical discomfort associated with prolonged use of immersive devices (Cao et al. 2020), and privacy concerns (Cowan et al. 2021). This duality between the benefits and challenges of immersive technologies naturally connects to the broader concept of well-being. Well-being is a complex construct encompassing distinctive, multidimensional aspects (J. Sun et al. 2018). To date, subjective well-being and psychological well-being are the most extensively studied constructs in the well-being literature (Gallagher et al. 2009). Diener's model of subjective well-being, which is emotion-and cognition-driven, focuses on one's evaluation of their life in relation to satisfaction along with positive and negative emotional responses (Diener 1984; Mwangi et al. 2024). Researchers have often used "subjective well-being" interchangeably with the term "hedonic well-being" (Gallagher et al. 2009).

With its roots in Aristotelian traditions, psychological well-being is more cognitively driven and takes an eudaimonic approach, focusing on a meaningful life (Gallagher et al. 2009; Mwangi et al. 2024). As noted by Ryff (1989), psychological well-being is conceptualized as comprising six components: self-acceptance (which is associated with self-actualization), positive interpersonal relationships, autonomy, environmental

mastery, purpose in life, and personal growth. Physical well-being is another crucial construct which is directly impacted by daily life (Porterfield 1987). Whereas subjective, psychological, and physical well-being are primarily private and occur at the individual level, social well-being is primarily a public phenomenon which occurs in the social environment (Gallagher et al. 2009; Mwangi et al. 2024). The components of social well-being include social integration (sense of belonging), social acceptance, social contribution (one's social value within the community), social actualization, and social coherence (Keyes 1998). As immersive technologies have the power to influence various dimensions of well-being, a nuanced understanding of their psychological impact is essential. By focusing on these mechanisms, we can better understand how immersive experiences shape emotions, cognition, and behavior, ultimately contributing to or detracting from their overall quality of life.

3 | Integrating Conceptual Approaches: Theory Synthesis and Adaptation

Theory Synthesis. To comprehensively synthesize the fragmented extant knowledge, we explored literature published from 2016 onwards. This aligns with Ambika et al.'s (2025) observation of a 300% increase in research on immersive technology since that period. We focused on VR and AR, as these are the most extensively studied immersive technologies to date, followed by 3D and MR (Ambika et al. 2025). Rather than adopting an exhaustive search approach typical of systematic literature reviews, we focused on key relevant immersive technology literature across various disciplines (i.e., marketing, tourism and hospitality, information systems, retail, and psychology) that either directly examines well-being or is associated with it. This cross-disciplinary integration ensured that the themes we identified are reflective of the complex and multidimensional nature of the phenomenon under study, thereby strengthening the robustness of our thematic categorization. Five databases (i.e., *Elsevier Science Direct*, *Emerald*, *Sage*, *Wiley Online*, and *Tyler & Francis*) were used to search relevant articles. We used the queries (“virtual reality” OR “VR”) AND (“well-being*”) and (“Augmented reality” OR “AR”) AND (“well-being*”). We only included peer-reviewed articles published in journals ranked A or A* according to the Australian Business Deans Council (ABDC) journal quality list and excluded non-English publications. This results in 42 relevant articles (see Supporting Information S1: Appendix 1).

We synthesize the literature by tabulating key details, including methodologies, study focus, and findings (see Supporting Information S1: Appendix 2). Furthermore, we developed a conceptual framework that highlights antecedents (independent variables), mediators, moderators, and dependent variables, providing a structural overview of how immersive technologies influence well-being in both VR and AR contexts (see Figures 1 and 2). In identifying the key themes, we carefully reviewed each article, recording the primary psychological mechanisms or constructs emphasized in each study (e.g., presence, self-improvement, or anxiety). When constructs could conceptually relate to multiple themes, we categorized them based on their primary emphasis in the original studies. For instance, presence was classified under

either mindful engagement or social identity depending on whether it emphasized environmental immersion or social connection. We then reviewed the recorded constructs across studies to identify recurring elements and aggregated these recurring constructs to reveal broader psychological patterns (e.g., emotional process, social connection). These patterns were subsequently organized into four overarching themes: (1) emotional process (e.g., stress reduction, relaxation, and gratitude); (2) self-growth and identity expansion (e.g., self-exaltation and satisfaction of competence); (3) social identity and connectedness (e.g., co-presence and social relatedness); and (4) cognitive engagement (e.g., flow, feeling of presence, and immersion). After identifying the key themes based on recurring psychological mechanisms, we found they align with the dimensions of the PERMA model. Accordingly, we use the PERMA model as a guiding framework for the analysis presented in the following section. Mapping our insights onto this model added a layer of conceptual validation by providing a clear and structured way to interpret and organize the themes.

Theory Adaptation. Seligman (2011) PERMA model is a multidimensional framework for understanding well-being holistically through five elements: (1) positive emotions (e.g., pleasure, warmth, and life satisfaction) involves experiencing a pleasant life; (2) meaning refers to a sense of purpose and a meaningful life; (3) accomplishment is associated with self-growth and a sense of achievement; (4) positive relationships involves connections with others; and (5) engagement involves flow, a state where individuals are deeply absorbed and fully immersed in the activity. To align with our research context, we integrated the identified psychological mechanisms into the PERMA model by simplifying its five components into four by merging “meaning” and “accomplishment.” While retaining the original meanings of the PERMA elements, we adapted the labels to align with this research: Theme 1 (Emotions), Theme 2 (Self-Identity and Growth), Theme 3 (Social Identity and Connection), and Theme 4 (Mindful Engagement and Sensory Experience). To provide a balanced view, we also consider the underexplored negative effects of immersive technology on well-being (Hilken et al. 2022). Within each theme, we categorized the type of technology (i.e., AR and VR) and identified relevant factors from our literature synthesis (presented in Supporting Information S1: Appendix 2) to illustrate how these technologies distinctively influence various aspects of well-being (see Figure 3), which will be discussed next.

3.1 | Literature Synthesis on Theme 1: Emotions

Immersive technologies impact well-being through emotional regulation and various emotional processes, with hedonic value being the most studied component. Extant research has shown that users gain hedonic benefits (e.g., enjoyment, entertainment, excitement) mostly through leisure-driven AR and VR experiences (e.g., gaming, filter apps, VR concerts, and VR Airbnb), which enhance subjective well-being (e.g., M. J. Kim and Hall 2019; H. Kim et al. 2023; Reer et al. 2022; Wong et al. 2023). Hedonic rewards are amplified by the VR features of flow, escapism, and perceived realism (M. J. Kim and Hall 2019; H. Kim et al. 2023; Van Kerrebroeck et al. 2017), and by AR's interactive engagement with virtual images (Ambika et al. 2023; Javornik et al. 2022). Within the emotional

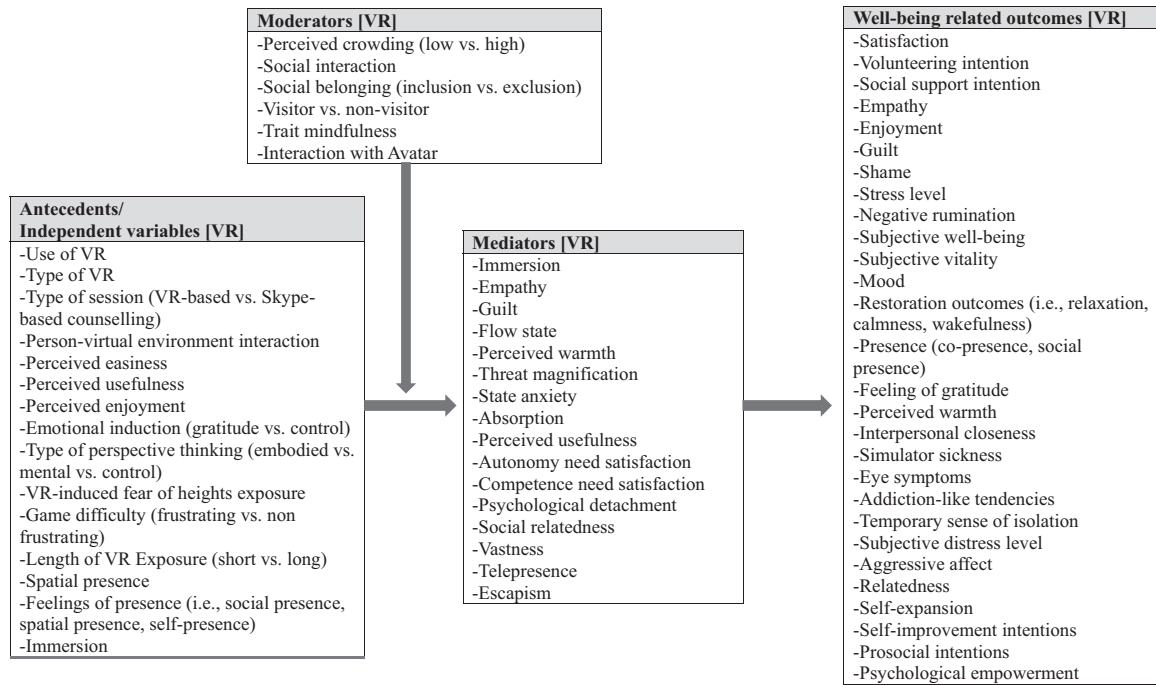


FIGURE 1 | Conceptual framework: Variables related to well-being in virtual reality (VR).

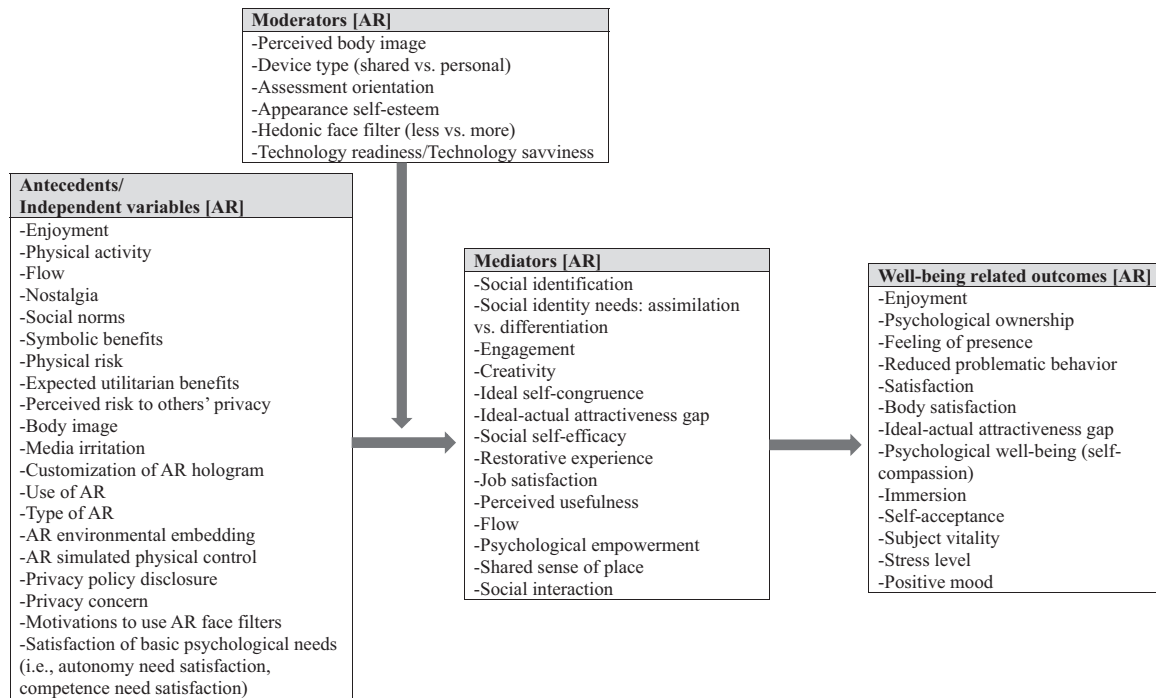


FIGURE 2 | Conceptual framework: Variables related to well-being in augmented reality (AR).

regulation literature, VR and AR studies have shown that therapeutic and fitness apps often alleviate stress and anxiety (Cardoş et al. 2017; Sun and Yuan 2025). Such technologies also enhance mood, which subsequently boosts subjective vitality (Sun and Yuan 2025). As another example, Leung et al. (2023) found that hotel frontline employees' negative mood before work was alleviated after they experienced VR natural scenes, suggesting that immersive technologies can effectively mitigate workplace stressors. Collectively, similar to hedonic value, these effects are positively associated with subjective well-being

(Krupić et al. 2021; Mattila et al. 2020; Sun and Yuan 2025; Weibel et al. 2023).

VR's unique characteristics heighten both positive and negative emotions. On the positive side, the sense of presence in the virtual world without outside-world disruption heightens positive emotions such as perceived warmth, empathy, and gratitude. These emotions, in turn, enhance willingness to help others and are positively associated with social and subjective well-being (Collange and Guegan 2020; Kandaurova and

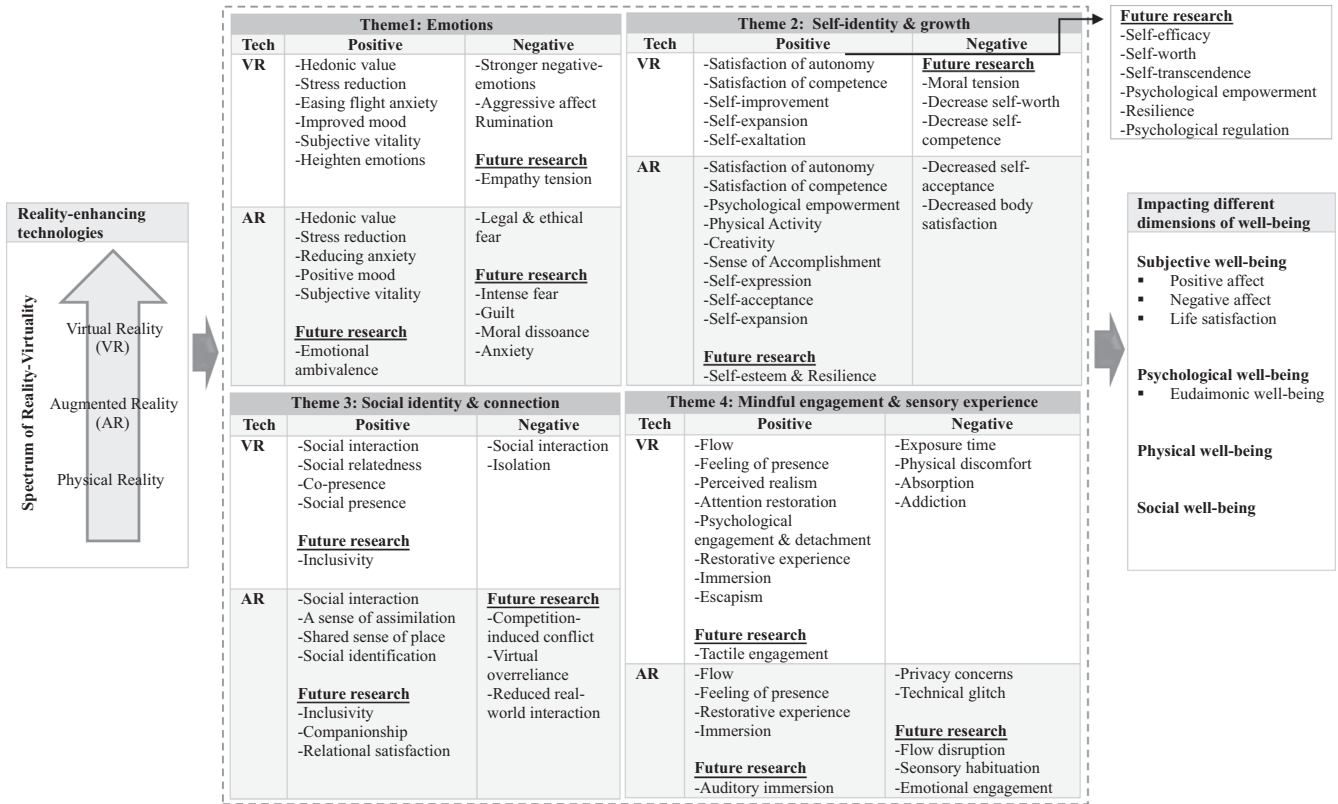


FIGURE 3 | Extended PERMA model: Expanding to negative dimensions. *Notes:* This figure illustrates how AR and VR impact well-being through key psychological mechanisms, incorporating the PERMA model. Both positive and negative effects are presented, with specific factors categorized by technology type. The elements under “Future research” represent potential directions derived from gaps identified through theme-based analysis. *Source:* Authors’ own work through theory synthesis.

Lee 2019; Thériault et al. 2021). On the negative side, the realism of VR fosters users’ level of absorption and immersion, which intensifies negative emotions like shame and frustration, leading to adverse responses, such as aggressive affect and negative rumination (Ferguson et al. 2022; Lavoie et al. 2021), which could ultimately harm subjective well-being.

Like VR, the distinctive features of AR can either evoke or help avoid negative emotions. For instance, when consumers are faced with an overload of choices, AR’s visualization feature lessens confusion, thus reducing cognitive dissonance. This helps consumers avoid pre-purchase anxiety (Barta et al. 2023), which could enhance subjective well-being. On the other hand, AR’s smart glasses feature that collects information about people without consent increases privacy concerns, which evokes legal and ethical fears (Rauschnabel et al. 2018). These concerns may negatively affect subjective well-being. Overall, existing research indicates that the emotional components associated with immersive technologies play a significant role in shaping subjective well-being.

3.2 | Literature Synthesis on Theme 2: Self-Identity & Growth

Autonomy, competence, and relatedness are core psychological needs essential for personal growth (Ryan et al. 2008). AR and VR can enhance these needs through their distinct attributes.

Reer et al. (2022) demonstrate that VR’s realistic gaming environment satisfies needs for autonomy and competence, while Sun and Yuan (2025) highlight AR features to meet these needs through user control, real-time feedback, and community interaction, all of which are positively associated with psychological well-being (Ryan et al. 2008). Fulfilling these needs also enhances psychological empowerment, which boosts vitality and reduces stress (Sun and Yuan 2025).

Certain VR features foster self-growth and enhance life meaning. For instance, the highly immersive nature of VR creates a sense of vastness that induces individuals to feel small, which leads to a stronger need for self-improvement (Lin et al. 2024). The spatial presence of VR social platforms fosters self-expansion, as seen during COVID-19, when users transcended physical restrictions to address unmet self-related psychological needs (Barreda-Ángeles and Hartmann 2022). Virtual tours involving transformative attributes offer novelty, education, and cultural appreciation, fostering one’s growth and expression of self-exaltation (Wong et al. 2023). These behaviors of self-improvement, self-expansion, and self-exaltation are associated with personal growth and purpose in life, which are closely connected to psychological well-being (Ryff 1989).

Like VR, AR fosters self-growth by fulfilling psychological needs in various ways. Regarding self-improvement, Rauschnabel et al. (2017) found that Pokémon Go, a game that requires low-level physical activity to catch hidden virtual creatures in real-world locations, evokes a feeling of euphoria, making individuals feel

they are pursuing a healthy lifestyle. In another example, IKEA placement promotes creativity by allowing individuals to express personal tastes, thereby satisfying intrinsic motivations (Jessen et al. 2020). AR also fulfills individuals' sense of accomplishment; for instance, Windhausen et al. (2024) demonstrate that AR smart glasses improve work efficiency by reducing error rates and increasing speed. Taken together, these feelings of self-improvement and accomplishment contribute to a meaningful life, which in turn enhances psychological well-being (Ryff 1989; Windhausen et al. 2024).

While AR beauty apps (e.g., virtually trying-on makeup, AR face filters) aid self-identification, particularly for those with lower self-confidence, these apps can also harm users' sense of self. These apps enable users to express both their true and transformed selves (Ambika et al. 2023; Javornik et al. 2022), helping those with resource barriers, such as a lack of makeup skills, to explore and express self-identity (Ambika et al. 2023). When aligned with their authentic self-image, they promote self-acceptance, positive mood, and subjective and psychological well-being (Javornik et al. 2022; Ryff 1989), particularly benefiting young women with low self-esteem or body image concerns. Tools like flaw-hiding features reduce the discrepancy between the real and ideal self (Javornik et al. 2021; Yim and Park 2019). However, these benefits come with unintended negative effects. Attaining an ideal virtual image can widen the gap between the actual and ideal self in reality (Ambika et al. 2023; Dijkslag et al. 2024), which harms self-acceptance and body satisfaction (Dijkslag et al. 2024; Javornik et al. 2022), ultimately decreasing subjective and psychological well-being.

Taken together, existing research demonstrates that immersive technologies have the capability to promote psychological empowerment, foster self-growth and purpose in life, and help express self-identity, all of which positively impact subjective and psychological well-being. At the same time, AR can widen the gap between the ideal self in the virtual world and the actual self in real life for individuals with lower self-esteem, which negatively impacts subjective and psychological well-being.

3.3 | Literature Synthesis on Theme 3: Social Identity & Connection

Social interactions, defined as “the social exchange between two or more people” (Wang et al. 2023, 9), are crucial to well-being (Wang et al. 2023). Immersive technologies provide opportunities for individuals to interact with others. For instance, AR face filters apps and AR social apps foster engagement by enabling users to communicate with followers, share photos, and like each other's photos, all of which lead to a positive affective state (Javornik et al. 2022; Wang et al. 2023). Similarly, in VR tourism, interacting with other virtual tourists during a VR experience increases satisfaction. However, when the purpose of the VR experience is to escape from reality, social interaction serves as a cue that brings users back to reality, thereby hindering immersion and reducing satisfaction (Hudson et al. 2019). These studies suggest that social interactions in immersive technologies should be carefully designed to produce positive outcomes.

To illustrate, Wong et al. (2023) indicate that social interaction and social resonance in virtual tours fulfill relatedness needs, thereby enhancing social well-being. AR facilitates belonging through activities like customizing hologram (e.g., an AR truck) with peers, which fosters assimilation (Carrozzi et al. 2019), while sharing virtual spaces that build relationships and a sense of community (Wang et al. 2023). This sense of belonging, fulfilled through social interaction, assimilation, and shared sense of place, is positively associated with social well-being (Keyes 1998).

The fully immersive nature of VR fosters both co-presence (the feeling of being together with other users) and social presence (engaging and interacting with other users when together) in virtual space (Barreda-Ángeles and Hartmann 2022; Van Brakel et al. 2023). Pedram et al. (2020) found that remote VR psychotherapy enhances co-presence and social presence more effectively than Skype, with clients in remote areas feeling as though their therapist is physically present. In social VR platforms, social presence helps build closer relationships, strengthens the perception of psychological social support, and is positively associated with subjective well-being (Barreda-Ángeles and Hartmann 2022; Van Brakel et al. 2023). However, the fully immersive nature of VR, which blocks the outside world, can also evoke a sense of temporal isolation (Merckx and Nawijn 2021). Overall, social presence and co-presence in virtual environments generate feelings of social support, which are positively associated with subjective well-being (Van Brakel et al. 2023).

The positive image of AR apps creates social identification value, which is strongly linked to social well-being (Laato et al. 2021; Rauschnabel et al. 2017). For instance, in the context of AR games, previous research shows that users are motivated to play Pokémon games with a positive social image as they believe that using this app enhances their own social identity (Rauschnabel et al. 2017). Furthermore, playing Pokémon Go increases meaningfulness, as sharing gaming experiences in the Pokémon Go community fosters community identification, which strengthens users' social identity (Laato et al. 2021).

Overall, the social value of immersive technologies lies in their ability to foster social interaction, cultivate a sense of belonging, enable presence, and strengthen social identification. These effects play a crucial role in enhancing individuals' subjective and social well-being.

3.4 | Literature Synthesis on Theme 4: Mindful Engagement & Sensory Experience

Flow is one of the core attributes of immersive technologies (Suh and Prophet 2018). Defined by Csikszentmihalyi (1975) as “optimal experience...developed by the holistic experience that people feel when they act with total involvement” (p. 36). Extant research on immersive technologies shows that a flow state leads to subjective well-being (M. J. Kim and Hall 2019; H. Kim et al. 2023; Rauschnabel et al. 2017). For instance, H. Kim et al. (2023) highlight that flow components—cognitive absorption, time distortion, and enjoyment—evoke positive emotions, which in turn lead to subjective well-being, with telepresence strengthens this relationship. Existing evidence shows that

immersive technologies can enable both presence and tele-presence. For instance, H. Shin and Gweon (2020) show that an AR preschool app increases the feeling that the cartoon character is present with the child, while VR enhances engagement through a sense of presence and perceived realism (McLean et al. 2023; Pedram et al. 2020). For example, clients living in remote areas reported deeper engagement with VR psychotherapy avatars and a stronger sense of “being there” compared to traditional Skype-based sessions (Pedram et al. 2020). In digital leisure, such as tourism and gaming, VR fosters escapism, which allows users to detach from reality and create a sense of presence, enabling a deep connection with their virtual surroundings; this escapism subsequently enhances subjective well-being (McLean et al. 2023; Saleem et al. 2024).

Immersive technologies also offer restorative benefits. Huang (2021) found that AR’s embedding features enhance presence in virtual tourism, thereby providing a restorative experience. VR offers a more multidimensional sensory experience than AR, and immerses users in enclosed virtual environments that evoke a sense of “being away” from reality. For example, users can hear nature sounds and view vivid virtual elements such as butterflies, which enhances users’ subjective vitality and mood within even a short period (Mattila et al. 2020), ultimately promotes subjective well-being (Sun and Yuan 2025). However, while short-term VR use enhances subjective well-being, prolonged exposure leads to sensory overload, diminishing its benefits (Pala et al. 2022) and causing physical symptoms like eye strain and simulator sickness (Cao et al. 2020), which negatively impact physical well-being. In addition, VR’s unique sensory modalities foster absorption by making virtual images seem real, amplifying negative emotions such as shame and leading to rumination (Lavoie et al. 2021), which negatively impacts subjective well-being. Additionally, VR’s immersive environments may foster addiction and temporary social isolation as users reluctant to leave the virtual environment and lack natural social interaction (Merks and Nawijn 2021), ultimately harming social well-being.

With AR, certain elements can disrupt engagement (Ambika et al. 2023; Cowan et al. 2021). For instance, privacy concerns such as the lack of control over private information reduce the perceived utility of the app and disrupt the state of flow (Cowan et al. 2021). Additionally, losing a favorable augmented self-image due to technical glitches induces negative emotions, such as gloom and disappointment (Ambika et al. 2023), which could lead to negative subjective well-being.

In summary, elements such as flow and presence that foster engagement, along with the multisensory attributes of immersive technologies, generally enhance subjective well-being. However, disruption to engagement, excessive involvement, or sensory overload can detract from physical, social, and subjective well-being.

By applying the relevant factors identified from our literature synthesis to the PERMA model and building on the discussion in Section 3, distinct research gaps for each theme were revealed. These gaps guided the development of future research factors, as presented in Figure 3. Specific research topics were then identified within each theme, and these factors are

discussed as potential future research avenues within each topic in the next section.

4 | Opening New Frontiers: Identifying Research Gaps & Future Research

4.1 | Theme 1: Emotions

Previous emotional regulation research has shown that both VR and AR can reduce stress levels (Krupić et al. 2021; Sun and Yuan 2025; Weibel et al. 2023), but it remains unclear which is more effective in fostering positive emotional outcomes. Future research could compare their effectiveness in alleviating stress and increasing satisfaction. For example, we speculate that VR may be more effective in reducing stress and increasing satisfaction for high-intensity activities (e.g., high-intensity interval training) that require deep immersion, while AR may excel in low-intensity exercises (e.g., yoga) that benefit from physical awareness. Future research could also explore users’ subjective experiences with these technologies and how contextual factors (e.g., personal preferences or environmental settings) influence the stress-relief effectiveness of these technologies. Narrative accounts might reveal how VR enhances focus and reduces stress during demanding activities, while AR fosters relaxation and emotional balance through its integration with real-world environments. Another promising avenue is mapping users’ emotional journeys while using AR and VR for stress relief, including how app design features address their stress-related needs in various contexts.

Future research could explore the emotional ambivalence around AR that uses multisensory approaches. For instance, the emotional contrast of fear versus calmness could promote emotional regulation, whereby positive emotions mitigate negative ones. Over time, this process could foster psychological resilience and contribute to psychological well-being. Longitudinal qualitative studies or diary methods could track how users navigate such emotional ambivalence across repeated interactions with AR therapy tools, which provide insights into how conflicting emotions are reconciled over time. Furthermore, focus groups involving therapists and users could offer practical perspectives on optimizing AR design to manage these conflicting emotions and uncover user-driven strategies for enhancing the therapeutic potential of AR experiences.

Further insight is needed into the negative emotional impact of intense AR experiences. Research on horror games shows VR evokes heightened fear compared to non-VR settings, with users employing various coping strategies to recover (e.g., Lemmens et al. 2022). However, little is known about how such experiences unfold in AR. In AR horror games such as *Scrylight*, *Night Terrors*, or *Five Nights at Freddy’s*, virtual horrors integrated into a real-world environment (e.g., a home or backyard) may create more lingering fear and rumination than VR’s enclosed computer-generated world. This overlap could make AR experiences more unsettling and impactful, potentially blurring boundaries between virtual and real environments over time. There is a pressing need for further research to understand how these emotional experiences evolve and how users cope with them.

TABLE 2 | Future research directions developed for Theme 1: Emotions.

Research topics	Proposed research questions
Effectiveness of AR and VR in alleviating stress	<ul style="list-style-type: none"> • How do AR and VR vary in their effectiveness in alleviating stress levels, depending on the intensity of fitness activities? How do these effects influence perceived physical and subjective well-being? • How do users describe their emotional experiences with AR and VR technologies in various environmental settings (e.g., home, workplace, or public spaces), and how do these technologies alleviate stress in these contexts? • What contextual factors shape users' ability to regulate stress and achieve emotional balance in AR versus VR experiences? • How do personal preferences influence users' perceptions of stress relief, relaxation, and emotional satisfaction when engaging with AR or VR apps, and what implications does this have for designing technology that supports psychological welfare? • How do users articulate their emotional journey when engaging with AR and VR technologies for stress relief activities? • What design elements in immersive technologies (e.g., interactivity, sensory feedback, customization) most effectively reduce stress, and how do these features vary in their effectiveness across diverse contexts, such as individual versus shared experiences, leisure versus professional use, or short-term versus prolonged engagement?
Emotional ambivalence in AR	<ul style="list-style-type: none"> • How do users reconcile conflicting emotions evoked by multisensory AR therapy (e.g., fear vs. calm)? • How does emotional ambivalence in AR evolve over time, and what user-driven strategies help foster psychological resilience? • What role do social and cultural contexts play in shaping users' responses to emotional ambivalence in AR experiences? • What specific design elements in AR therapy (e.g., interactivity, narrative, sensory balance) help users manage emotional ambivalence?
Negative emotional impact of intense AR experiences	<ul style="list-style-type: none"> • How do intense AR horror games evoke negative emotions? How long do these negative emotions persist? What coping strategies do users employ to manage these negative emotions? • What specific AR features (e.g., real-world overlay, familiar settings) do users identify as amplifying fear and anxiety? • How do users' coping strategies for negative emotions evolve with prolonged engagement in AR horror games? What long-term psychological and social effects do these coping strategies have on users' overall well-being? • How do contextual factors, such as familiar versus unfamiliar settings, level of lighting, presence of other people, environmental sounds, or time of day, heighten or mitigate the emotional impact of AR horror experiences?
Violent AR shooting games and ethical concerns	<ul style="list-style-type: none"> • What specific aspects of violent AR shooting games evoke negative emotions and subsequently trigger ethical concerns? • How does the interplay of ethical concerns and emotional responses influence users' long-term engagement with AR technologies? • How do users experience and articulate moral dissonance or guilt when engaging in violent AR shooting games? • How do different real-world settings (e.g., public vs. private spaces) affect users' emotional responses to violent AR games? • What long-term effects does repeated engagement with violent AR shooting games have on players' emotional responses, ethical awareness, and capacity for empathy in morally ambiguous situations? • What role does cultural context play in shaping emotional responses to violent AR games, and how do these responses influence the perception of ethical concerns?

(Continues)

TABLE 2 | (Continued)

Research topics	Proposed research questions
Empathy-provoking VR and negative emotions	<ul style="list-style-type: none"> • What are the factors that lead individuals to perceive empathy-provoking VR as manipulative? What negative emotions are triggered by these manipulative elements in VR? How do such perceptions influence subjective and psychological well-being? • How do users interpret and react to specific design elements (e.g., dramatic music, graphic visuals) in empathy-driven VR experiences for promoting pro-social behavior? • How do users perceive manipulation in empathy-driven VR, and how does this influence their emotional responses and willingness to engage in prosocial behavior? • How do users navigate the tension between experiencing empathy and resisting perceived manipulation in VR experiences designed to elicit prosocial behavior, and what does this reveal about the ethical and emotional dynamics of such interactions? • What narratives emerge from users' descriptions of autonomy in VR empathy-building experiences aimed at building prosocial engagement?

Similarly, violent AR shooting games such as *Zombie-Go* or *Walking Dead* raise ethical concerns when virtual zombies are projected near real people or pets. While the target is fictional zombies, the act of shooting in the direction of real people or animals may evoke guilt or undermine psychological well-being. Future research could analyze users' reflections on how their engagement with violent AR games evokes feelings of guilt, discomfort, or moral conflict, which offers useful insights into the emotional complexities and ethical dilemmas involved. Longitudinal studies could examine whether repeated exposure to such games leads to sensory adaptation, which potentially reduces players' sensitivity to ethical concerns over time. This desensitization could have implications for emotional regulation and psychological well-being, such as diminished empathy or increased tolerance for morally ambiguous scenarios. Additionally, future research could explore broader cultural differences in how these games are perceived.

VR has been heralded as an “empathy machine” in the prosocial domain (Kandaurova and Lee 2019; Young et al. 2022). However, scholars have raised ethical concerns, suggesting that the forced incitement of empathy in such experiences can be perceived as manipulative (Young et al. 2022). Despite these concerns, little is known about the specific elements that induce this negative effect, highlighting the need for further investigation. Future research could manipulate various elements such as background music (subtle vs. overly dramatic), the number of crying scenes, and the tone of the voice to examine how these factors elicit negative responses from users and hinder prosocial behavior. These accounts could reveal how such design choices foster negative emotions, such as irritation or resistance, which detract from engaging in prosocial engagement. Moreover, investigating users' emotional responses to these elements could illuminate how perceptions of manipulation influence their willingness to engage in prosocial activities. Another promising avenue for research is exploring how perceptions of autonomy influence users' emotional responses. Such knowledge can offer actionable insights for designing VR experiences that effectively balance empathy-building with ethical considerations to maximize prosocial impact (Table 2).

4.2 | Theme 2: Self-Identity & Growth

Extant research has shown that individuals express both their actual and ideal selves through AR filter apps (Ambika et al. 2023; Javornik et al. 2022), yet little is known about how these representations differentially impact self-esteem or how social dynamics and cultural norms influence the impacts of digital identities on psychological well-being. Furthermore, the long-term implications of engaging with AR-enhanced identities for self-identity development and personal growth remain underexplored. Future research could examine whether an actual or an ideal self-image generated by AR filters increases self-esteem and, consequently, psychological well-being when such photos are liked by other followers. We predict that, compared to a generated ideal self-image, users' self-esteem is more likely to increase when the AR filter photo represents their true self-image. Future studies could also explore how social dynamics and cultural norms shape the construction of ideal versus authentic selves in AR could offer insights into the broader implications for collective well-being. There is also a need to explore how repeated use of AR filters, which allow for both idealized and authentic self-representations, impacts users' self-concept over time.

Future research could also investigate how social VR settings, compared to physical environments, enhance individuals' self-efficacy and competence, thereby positively influencing their psychological well-being. In physical environments, people often experience peer pressure through nonverbal cues, such as facial expressions, which can heighten anxiety and hinder self-expression. In contrast, the physical distance in social VR settings may alleviate this pressure, allowing individuals to focus on their own thoughts without fear of immediate judgment. This reduction in peer pressure could lead to increased self-efficacy and competence. However, there is a lack of understanding of how specific group dynamics in social VR, such as collaborative tasks or competitive challenges, shape users' feelings of self-worth and belonging. Additionally, exploring how immersive VR experiences simulate real-world social scenarios, such as group decision-making or conflict resolution, may contribute to users' self-development.

TABLE 3 | Future research directions developed for Theme 2: Self-identity & growth.

Research topics	Proposed research questions
AR filter apps and self-esteem	<ul style="list-style-type: none"> • Which representation—actual or ideal AR-filtered photos—enhances individuals' self-esteem more, when such photos are liked by others? • How does the frequency of receiving “likes” on AR-filtered images impact long-term self-esteem and social anxiety? • How can AR filters designed to emphasize unique personal traits foster greater self-acceptance compared to idealized filters, and how does this influence the development of authentic self-confidence and resilience in real-world interactions? • How does cultural context influence the construction of ideal versus authentic selves in AR filter apps, and what are the implications for psychological well-being? How do users reconcile discrepancies between their digital and real-life identities? • How does prolonged engagement with AR filter apps influence users' self-identity growth and shape their psychological well-being over time?
Social VR and peer pressure	<ul style="list-style-type: none"> • How does social VR enhance individuals' self-efficacy and competence, thereby positively influencing psychological well-being? How does perceived peer pressure act as an underlying mechanism in these effects? • How do group dynamics in social VR settings enhance or diminish individuals' feelings of competence and self-worth? • How does participation in collaborative VR activities promote a sense of self-worth and belonging and, in turn, shape users' perceptions of societal cohesion? • How can social VR experiences be designed to model inclusive behaviors that promote self-efficacy? • How do immersive VR simulations of social challenges (e.g., conflict resolution) enhance users' real-world social skills and psychological growth?
VR and self-transcendence	<ul style="list-style-type: none"> • How does embodying a superhero and saving the world in VR enhance self-competence and psychological empowerment? Do these positive effects experienced in VR translate into spillover effects in real life, and if so, through what mechanisms? • How can VR experiences that emphasize collective achievements over individual accomplishments promote social cohesion and shared well-being? • What role do specific VR design elements, such as interaction mechanics, play in cultivating prosocial identities and encouraging real-world actions that contribute to societal welfare? • How do collaborative VR missions address global challenges (e.g., environmental crises or social injustices) shape users' perceptions of their sense of responsibility? • Can VR experiences that foster feelings of purpose and connection build resilience and enhance users' ability to navigate challenging life situations, and how lasting are these effects? • What are the long-term implications of VR-based self-transcendence experiences on users' personal growth and well-being?

(Continues)

TABLE 3 | (Continued)

Research topics	Proposed research questions
Destruction behavior in VR: Contribution to the greater good, emotional releases, and self-improvement	<ul style="list-style-type: none"> • Can destructive behavior in VR aimed at saving the world foster self-improvement? Does destructive behavior in VR facilitate the release of negative emotions? • How do users navigate the tension between engaging in destructive actions in VR and their alignment with restorative social goals, and what psychological mechanisms enable the balance of these paradoxical experiences? • What role do destructive VR experiences play in helping users release negative emotions (e.g., anger or frustration), and how effective are they as emotional regulation tools? • How does the narrative framing of destruction in VR (e.g., as a means of achieving justice or preventing harm) influence users' emotional engagement? • Can VR experiences involving destruction as part of social missions inspire users to take real-world actions aligned with advocacy or responsibility? • How effective are VR destruction scenarios in cultivating a sense of control, and what factors influence their therapeutic potential? • What design elements in destructive VR experiences enhance users' ability to connect these virtual actions to meaningful real-world contributions?
AR game design for young players and ethical considerations	<ul style="list-style-type: none"> • How do in-app purchases in AR games affect young players' self-identity and evoke negative emotions? How does the immersive nature of AR interact with such game design and contribute to addictive behavior? How do these dynamics ultimately affect young players' subjective, psychological, and physical well-being? • How can AR game mechanics be redesigned to foster skill-building and autonomy while reducing reliance on monetization strategies? • What role does immersive game design play in promoting long-term learning, personal growth, and resilience in young players? • What ethical design principles can be applied to AR games to prevent negative emotional outcomes, such as frustration or diminished self-worth, among young players?

In terms of self-transcendence, Lin et al. (2024) found that experiencing supernatural and nature-based awe in VR increases prosocial intention, as the perception of vastness promotes self-improvement. Building on this, future research could examine how embodying a superhero in VR and engaging in world-saving missions fosters self-transcendence by boosting self-competence and psychological empowerment. A key avenue to explore is whether heightened positive self-perceptions in VR have measurable spillover effects in real life, such as improved resilience, self-efficacy, and the ability to navigate challenging situations, ultimately contributing to long-term psychological well-being. Future research could also explore how VR experiences involving altruistic missions, such as helping marginalized communities or addressing social injustices, strengthen users' prosocial identities. Despite these promising directions, there remains a gap in understanding how specific VR design elements, such as immersive storytelling and collaborative missions, contribute to fostering self-transcendence. Moreover, the long-term effects of VR-facilitated self-transcendence on

individual growth and societal well-being warrant investigation. Another direction is examining how VR environments simulating collaborative efforts to address global challenges (e.g., environmental conservation or humanitarian crises) promote transcendence by connecting users to a broader societal purpose. These narratives may inspire real-world prosocial actions and deepen commitment to collective welfare.

Future research could explore the paradoxical nature of destructive behaviors in VR, such as demolishing factories harming the environment or endangering animals, to understand how these actions simultaneously evoke feelings of stress relief, empowerment, and societal contribution. This tension offers a fertile ground for examining psychological mechanisms, such as catharsis, moral satisfaction, and personal agency. Scholars could also explore how users reconcile these conflicting emotions, which could generate useful insights for designing VR apps aimed at promoting well-being. Extending this, future research could explore the therapeutic potential of

destructive VR scenarios for managing anger and frustration. Another promising avenue is to investigate how narrative framing can shape users' responses to destructive actions in VR. Furthermore, examining whether these experiences foster long-term behavioral changes, such as increased environmental advocacy or social responsibility, or conversely reinforce opposing tendencies warrants further exploration. Finally, ethical considerations, including the potential for VR destruction to normalize harmful behaviors or desensitize users to violence, merit further investigation.

AR games like *AR Robot*, accessible to children as young as four, raise concerns about their impact on young players' self-identity. While upgrading items and earning rewards may foster self-efficacy, reliance on in-app purchases risks undermining autonomy and evoking negative emotions. Moreover, perceived inadequacy in skills due to these limitations could harm young players' self-esteem and self-worth. In addition, targeting young players still developing self-control may encourage compulsive upgrades, and AR's immersive nature could encourage addictive tendencies. A critical gap lies in understanding how to design AR games that balance engagement with ethical

responsibility. Further research is needed to explore how AR game mechanics can shift focus from monetization to skill-building to promote self-confidence and autonomy. Immersive AR game design should prioritize long-term learning and personal growth over short-term gratification (Table 3).

4.3 | Theme 3: Social Identity & Connection

Future research could compare the impacts of multiplayer games in VR versus AR on social and subjective well-being. While both provide social connection value, their impacts on social well-being may differ due to the distinct interaction dynamics they enable. VR creates shared virtual spaces that simulate social presence but lack natural, co-located interaction. In contrast, AR multiplayer games (such as *Minecraft Earth*) overlay digital elements onto physical environments, which enable real-world social interactions that may enhance social well-being. However, this assumption requires further validation, as AR's physical proximity may introduce new social dynamics, such as heightened awareness of others' presence, which could amplify both positive and negative emotional experiences. At the same time, since VR offers a more

TABLE 4 | Future research directions developed for Theme 3: Social identity & connection.

Research topics	Proposed research questions
Impact of multiplayer games in VR and AR	<ul style="list-style-type: none"> • How do AR and VR multiplayer games differ in their impact on social well-being? How does the type of game act as a moderator in these effects? • How do VR and AR multiplayer games influence group dynamics, and how does this differ between cooperative and competitive gameplay? • What psychological mechanisms mediate the relationship between immersive multiplayer games and subjective well-being? • To what extent can multiplayer games in VR and AR cultivate empathy, inclusivity, and shared goals, and how do these dynamics differ across cross-cultural and intergenerational contexts?
AR pets and the well-being of socially lonely individuals	<ul style="list-style-type: none"> • How do AR pets positively influence well-being across various dimensions for socially lonely individuals? What are the unintentional negative consequences of relying on AR pets? • How do interactions with AR pets influence the development of emotional resilience and coping strategies in individuals experiencing extreme social withdrawal, such as hikikomori? • Can AR pets help socially isolated individuals practice and improve real-world social skills, and if so, what design features (e.g., conversational ability, responsiveness) are most effective in achieving this? • What role do AR pets play in shaping users' perceptions of companionship and relational satisfaction, and how do these perceptions impact their willingness to re-engage with human social interactions?
Social VR platforms and cultural differences	<ul style="list-style-type: none"> • How do users from different cultural backgrounds respond differently to rejection or being ignored on social VR platforms? How do these responses impact subjective and social well-being? • How do users from different cultural backgrounds perceive varying levels of gratitude when receiving help on social VR platforms? Which cultural backgrounds demonstrate a stronger willingness to reciprocate help in social VR? • How can social VR platforms be designed to foster inclusivity and positive social interactions for users from different cultural contexts?

immersive experience than AR, it may be more beneficial in terms of stress relief, which positively contributes to subjective well-being. Furthermore, the type of game further complicates these dynamics. Competitive multiplayer AR games like *Pokémon Battles* may intensify social pressure and interpersonal conflicts due to physical co-location. Despite the growing adoption of multiplayer games, gaps remain in understanding their differential impacts on social interactions and well-being. Further research is needed to explore how cooperative versus competitive gameplay moderates these impacts, particularly in diverse demographic groups, such as adolescents, older adults, or marginalized communities.

Another fruitful line of research could explore how AR pets (e.g., *My AR Puppy*) enhance the well-being of socially isolated individuals, such as those living alone or affected by hikikomori—a trend of extreme social withdrawal where individuals isolate themselves at home for prolonged periods, resulting in adverse psychological impacts (Park and Yap 2024). Given humans' inherent relational nature (Walsh 2009), AR pets could fulfill psychosocial needs by mimicking the companionship of real animals without the logistical burdens associated with physical pet ownership. While a previous study has suggested that AR pets aid in stress reduction (Na et al. 2022), little is known about their broader impact on well-being across psychological, social, and subjective dimensions. Future research could examine the potential benefits of AR pets, such as reducing loneliness, enhancing emotional resilience, and supporting mental health among socially lonely individuals. It is also crucial to explore possible downsides such as whether an overreliance on virtual pets could inadvertently deepen feelings of isolation or hinder social skills development.

Exploration of how users from different cultural backgrounds respond to adverse social experiences in VR, such as rejection or being ignored merits empirical attention. Collectivist cultures may experience more intense emotions like shame or embarrassment, whereas individualist cultures may perceive rejection as a challenge and seek new avatars to socialize with. Scholars could also explore cross-cultural differences in gratitude and reciprocity in social VR, where collectivist users might feel a stronger obligation to reciprocate than individualist users. Another gap in the literature lies in understanding how social VR mediates or exacerbates cultural stereotypes and biases during interactions, which may influence group cohesion and inclusivity. Furthermore, little is known about the long-term effects of cultural mismatches in social VR on user retention and engagement. Another possible idea is to examine how VR features like language translation tools and cultural cues impact users' ability to navigate social interactions across cultural boundaries. Such knowledge could inform culturally sensitive design strategies that promote empathy, inclusivity, and well-being (Table 4).

4.4 | Theme 4: Mindful Engagement & Sensory Experience

Sensory modalities in virtual environments hold great potential for enhancing well-being. Future research could explore how touch and non-touch interactions elicit differing levels of warmth, psychological comfort, and emotional engagement,

thereby influencing subjective well-being in psychotherapy. Future studies could also examine the interplay between haptic feedback, facial expression, and voice tone to understand how their congruence affects emotional resonance and trust. M. Shin et al. (2019) found hyper-realistic avatars may evoke an eerie feeling due to the uncanny valley effect, leading to negative experiences with haptic feedback and highlighting a critical research gap as the unintended consequences of touch in hyper-realistic virtual settings remain underexplored. Future research could examine whether cartoonish avatars mitigate such negative effects, which enhances psychological comfort during VR-based therapy.

In a similar vein, future AR research could examine how unnatural movements or expressions of hyper-realistic virtual characters (e.g., virtual pets) trigger the uncanny valley effect and disrupt the users' flow state. Such effects may be more prominent in AR settings than in fully computer-generated environments, as the presence of hyper-realistic characters within the users' real-time environment can heighten the uncanny valley effect. This unexplored interplay between realism, movement, and user immersion in AR presents an opportunity to study how such disruptions impact flow, emotional engagement, and well-being, particularly when users have formed emotional attachments to these characters.

Another promising avenue is to examine whether voice-over guidance or background music in AR mindfulness apps enhances auditory immersion and engagement, thereby contributing to users' subjective well-being. For instance, researchers could examine which auditory conditions—voice-over only, background music only, or combination—optimize engagement without causing sensory overload, a phenomenon that could lead to decreased effectiveness. Similarly, in the context of VR, research could explore factors that hinder mindfulness practice, an area that has received little attention, particularly the long-term efficacy of VR mindfulness apps is unclear and may be driven by novelty. For example, repeated mindfulness practice within identical sensory surroundings (e.g., background sounds and scenes) over time could lead to sensory dullness and evoke negative emotions such as boredom, irritation, and apathy. This, in turn, could disrupt immersion and negatively influence subjective and psychological well-being.

Future research could examine how different VR mindfulness environments influence well-being over time. Realistic landscape environments (e.g., parks) may enhance mindfulness by fostering a sense of presence and grounding users, while fantastical surroundings (e.g., Tripp's fairytale-like environment) might promote escapism, which can reduce stress but potentially divert from the core purpose of mindfulness: self-reflection and self-growth. While short-term effects of VR mindfulness are documented, their long-term impacts, such as dependency, escapism, or psychological discrepancies between idealized virtual worlds and reality, remain underexplored. For example, returning to a stressful reality after experiencing a perfect virtual setting might harm well-being. Finally, reliance on VR mindfulness apps as primary stress management tools could lead to unhealthy habits or addictive behavior, which could negatively impact psychological and subjective well-

TABLE 5 | Future research directions developed for Theme 4: Mindful engagement & sensory experience.

Research topics	Proposed research questions
Touch and tactile sensation in psychotherapy	<ul style="list-style-type: none"> • How do touch and non-touch interactions elicit varying levels of warmth, psychological comfort, and emotional engagement in psychotherapy? How does congruence between touch haptic feedback, facial expressions, and voice tone of the psychotherapist moderate these effects? • How does the interaction between different types of psychotherapist avatars and touch-based haptic feedback affect emotions and individuals' subjective well-being? • Can cartoonish avatars reduce the negative effects of the uncanny valley while preserving the therapeutic benefits of touch in VR-based therapy, and how do they compare in effectiveness to hyper-realistic avatars? • What psychological mechanisms underlie the relationship between touch-based interactions in VR therapy and long-term improvements in subjective well-being, particularly for individuals with emotional dysregulation?
Hyper-realistic virtual characters in AR	<ul style="list-style-type: none"> • How do unnatural movements or expressions of hyper-realistic virtual characters trigger the uncanny effect and disrupt users' flow state? How do such disruptions influence individuals' well-being, particularly when they have developed an emotional bond with the virtual character? • How do the movement dynamics of hyper-realistic virtual characters in AR influence the user's flow state in immersive experiences? • How can design interventions for hyper-realistic virtual characters in AR balance perceived realism with emotional comfort to promote positive digital well-being outcomes? • How do user perceptions of trust and authenticity evolve when interacting with hyper-realistic virtual characters in AR, particularly in scenarios involving emotional bonds or prolonged interactions?
AR mindfulness apps and immersion	<ul style="list-style-type: none"> • How do different auditory configurations (e.g., voice-over guidance, background music, or a combination) in AR mindfulness apps influence engagement, auditory immersion, and subjective well-being? • How does the novelty effect influence the long-term efficacy of AR mindfulness apps, and what strategies can prevent sensory habituation in repetitive mindfulness practices? • What emotional and psychological impacts arise from prolonged exposure to repetitive sensory surroundings in AR mindfulness apps, and how can adaptive sensory environments be designed to mitigate these effects? • How can design interventions in AR mindfulness apps balance immersion and engagement through personalized auditory stimuli to enhance user experience?

being, necessitating further research into creating balanced, sustainable mindfulness practices in immersive technologies (Table 5).

5 | Conclusion

Through this conceptual exploration, we have illuminated the psychological mechanisms underlying the influence of immersive technologies on consumer well-being and provided an integrative perspective grounded in the PERMA model. By shifting our focus from purely functional and experiential attributes to the psychological processes at play, this research contributes to the growing dialogue on how immersive technologies shape both individual and collective well-being. Echoing Aristotle's timeless assertion that "*happiness depends upon ourselves*,"

our work highlights the potential of these technologies to yield positive psychological outcomes while also addressing the challenges they pose in a rapidly evolving digital space. In doing so, we not only advance theoretical understanding but also provide a foundation for designing immersive experiences that promote mindful consumption and enhance well-being.

This conceptual work raises critical questions about the responsible development and deployment of immersive technologies. How can we ensure that these tools promote self-growth, social connectedness, and meaningful engagement without exacerbating inequalities or diminishing well-being? Addressing these questions will require interdisciplinary collaboration, integrating insights from psychology, marketing, technology design, and ethics. As immersive technologies continue to redefine consumer realities, future scholarship must

address their nuanced and often paradoxical impacts through robust methodological designs. This work lays the foundation for future scholars to deepen our understanding of how immersive technologies shape well-being, paving the way for responsible innovation in this transformative era.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The authors have nothing to report.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.