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Hilken, Tim, Keeling, Debbie I, Chylinski, Mathew, de Ruyter, Ko, Golf Papez, Maja, Heller, Jonas, Mahr, Dominik and Alimamy, Saifeddin (2022) Disrupting marketing realities: a research agenda for investigating the psychological mechanisms of next-generation experiences with reality-enhancing technologies. Psychology and Marketing. pp. 1-12. ISSN 0742-6046

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Disrupting marketing realities: A research agenda for investigating the psychological mechanisms of next-generation experiences with reality-enhancing technologies

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Abstract
Reality-enhancing technologies such as augmented reality and virtual reality are rapidly becoming a part of everyday life. Seizing this moment, we set out a research agenda for studying the psychological mechanisms underpinning consumer experiences with these new technologies, structured around four application areas: (1) delivering innovative offerings, (2) supporting sustainability and consumer well-being interventions, (3) balancing value cocreation and privacy concerns, and (4) achieving new modes and means of impact. For each area, we identify research directions that can guide the development and use of reality-enhancing technologies for the realization of next-generation consumer experiences. We explicitly balance potential advantages and disadvantages, thus encouraging researchers and practitioners to prioritize developing the “purpose” of these technologies, by focusing on the psychological mechanisms that underlie their use, over the technological development of their “pixels.” In this way, we guide the impactful development of reality-enhancing technologies for applications with significance for consumers and firms.

Keywords
augmented reality, cocreation, customer experience, sustainability, virtual reality, well-being

1 | INTRODUCTION

Over the past decade, consumers and firms have witnessed the emergence of an ecosystem of reality-enhancing technologies, most notably augmented reality (AR) and virtual reality (VR). Whether on readily available devices (e.g., smartphones, tablets) or futuristic headsets (e.g., Oculus or HoloLens), applications that promise to enhance consumer experiences are emerging at a frenetic pace (Flavián, Ibáñez-Sánchez, et al., 2019). Concomitant increases in adoption rates (Skeldon, 2021) and market value forecasts ($454BN by 2030; Allied Market Research, 2021), accelerated by the Covid-19 pandemic, have led to the proclamation of reality-enhancing technologies as the gateway to the “Metaverse” (Ipsos, 2021). Indeed, AR and VR have come a long way in terms of both “pixels” and “purpose.” While early applications often had limited realism and were primarily suited for training, prototyping, entertainment, or gaming (e.g., Second Life, Pokémon Go), the current generation of these technologies is disrupting marketing strategy and practice (Buhais et al., 2019).
Reality-enhancing technologies innovate the consumer’s path to purchase (Hilken et al., 2018), for example, enabling online shoppers to view 3D models of IKEA furniture projected into their homes on the screen of their smartphone. They also support responsible marketing efforts (Kandaurova & Lee, 2019), as in the case of UNICEF VR experiences that immerse consumers into the living circumstances in a Syrian refugee camp. At the same time, social media platforms utilize the technologies to facilitate communication between firms, consumers, and other consumers (e.g., Snapchat AR lenses). This offers new ways of cocreating value (Alimamy & Nadeem, 2021), while amplifying privacy concerns (Cowan et al., 2021). Furthermore, reality-enhancing technologies present unique opportunities as research tools that offer new insights into consumer behavior across marketing contexts (e.g., simulating new products in VR; Harz et al., 2021).

Such examples highlight the scope of next-generation consumer experiences, in which reality-enhancing technologies amplify “cognitive, emotional, behavioral, sensorial, and social responses to a firm’s offerings” (Lemon & Verhoef, 2016, p. 69). However, the momentum of technological development has arguably led to a situation in which the application of these technologies is outpacing managerial and academic understanding. This bears the risk of designing and deploying them in ways that do not provide value or might even be detrimental to consumer or firm well-being. Indeed, research reveals discrepancies in managerial confidence about their value (Berman & Pollack, 2021), as well as prevalent consumer concerns about information overload and privacy (Slater et al., 2020). Thus, there is a need for more insights on the psychological mechanisms that underlie consumer experiences with reality-enhancing technologies. This would enable managers and researchers to develop and harness the full potential of their application in marketing contexts.

The marketing literature on this subject is emergent but remains fragmented and separated into distinct AR and VR research streams. Thus, the purpose and contribution of this paper is to synthesize current knowledge and outline a future research agenda for studying the psychological mechanisms underpinning consumer experiences with reality-enhancing technologies, so as to guide managers in developing value-adding applications of these technologies. Drawing on research priorities at the intersection of psychology and marketing (Donthu et al., 2021), we identify four application areas that capture the most promising developments in reality-enhancing technologies (Figure 1). These include (1) delivering innovative offerings, (2) supporting sustainability and consumer well-being interventions, (3) balancing value co-creation and privacy concerns, and, to support scientific inquiry into these themes, (4) achieving new modes and means of impact. Notably, in the fourth area we reflect on how researchers can utilize reality-enhancing technologies to inform practitioners on how to develop more societally relevant and impactful applications in marketing (de Ruyter et al., 2022). For each application area, we review relevant literature and specific applications to pinpoint gaps in our understanding of the psychological mechanisms and formulate corresponding directions for research and practice.

2 | THE PROMISE OF INNOVATIVE OFFERINGS THROUGH REALITY-ENHANCING TECHNOLOGIES

2.1 | Omnichannel development

Technological advancements have radically transformed consumers’ purchase journeys from linear, single-channel processes to complex, omnichannel paths to purchase (Lemon & Verhoef, 2016). Achieving convergence in physical and digital marketing strategies and integrating offline and online experiences into an omnichannel experience is thus becoming a strategic priority. Reality-enhancing technologies uniquely support such integration through psychological mechanisms related to “situated cognitions” (Hilken et al., 2018)—that is, integrating affordances from one channel, such as smell, touch, and feel in physical stores, with those from another channel, such as visualization (e.g., virtual try on of sneakers with the “Wannakicks” AR app), interactivity (e.g., building a “Hidden-side” AR LEGO set), and customization (e.g., digitally changing wall colors...
with the Dulux Visualizer AR app. This promises to counteract channel switching behaviors (i.e., show- or webrooming) by letting consumers feel more informed and confident with their purchases (Flavián, Gurrea, et al., 2019). Accordingly, the literature exploring the use of AR or VR early in the purchase journey is one of the most developed research streams and has documented improved decision-making when consumers use the technologies for “trying before buying” both products (e.g., sunglasses or makeup; Hilken et al., 2017) and services (e.g., in tourism and hospitality; Bogicevic et al., 2019; Orús et al., 2021). However, researchers have documented potential benefits across other stages of the journey, including improved awareness (de Ruyter et al., 2020), information search (Síhi, 2018) and after-sales support (Boyd & Koles, 2019).

At the same time, research has yet to provide insights into the psychological mechanisms that determine the optimal timing, place, and situation within a consumer’s path to purchase where AR and/or VR should be integrated—and, crucially, which features, content types, and devices to choose or combine. Consumers have distinct informational needs at each stage of their purchase journey, and the configuration of reality-enhancing technologies must be suited for addressing these needs. Extant research indicates that the affordances of AR (e.g., embodiment, environmental embedding; Hilken et al., 2017) or VR (e.g., immersion and presence; Flavián, Ibáñez-Sánchez, et al., 2019) have different levels of utility for achieving distinct marketing objectives (e.g., stimulating purchase vs. building brand attitudes; Hilken et al., 2022). Relatedly, the interplay of different content types (i.e., real or digital) and devices (e.g., head-mounted display or smartphone) is an important consideration, especially as the devices through which reality-enhanced consumer experiences are delivered offer progressively higher levels of “technological embodiment” with concomitant psychological effects (Flavián, Ibáñez-Sánchez, et al., 2019, 2021a). Such findings are, thus far, limited to specific contexts (e.g., experiential retail, tourism), and, hence, present an important research avenue for configuring purchase journeys with reality-enhancing technologies across marketing domains, product categories, and consumer segments. In this context, research on the integration of AR and VR into “Mixed Reality” would also provide insights on overcoming the limitations of each individual technology.

While reality-enhancing technologies are considered to benefit a wide range of consumer segments, research has also identified relevant boundary conditions related to consumer characteristics. These include consumers’ preferred type of information processing (Heller et al., 2019a; Hilken et al., 2017), styles of goal pursuit (e.g., assessment vs. locomotion; Heller et al., 2019b), communication goals (Hilken et al., 2020), need-for-touch (Gatter et al., 2022), self-esteem (Javornik et al., 2021), or social exclusion (Kandaurova & Lee, 2019). However, we still do not yet fully understand such consumer heterogeneity, particularly with regard to consumers’ actual behaviors (e.g., channel preference, loyalty levels, and habits around technology use) or contextual factors (e.g., time pressure, financial constraints). To better understand the conditions under which reality-enhancing technologies effectively improve omnichannel experiences, further relevant boundary conditions need to be addressed, some of which we summarize in Table 1.

### 2.2 Meaningful engagement and experiences

Firms increasingly leverage reality-enhancing technologies to create memorable experiences and stimulate deeper engagement. Especially AR, in the form of interactive face filters or product lenses, has been integrated into existing social media platforms, including Instagram, SnapChat, and Pinterest, such that consumer-to-consumer engagement on these platforms is nowadays partially driven through AR (Ibáñez-Sánchez et al., 2022). AR enables consumers to directly try out virtual products, such as cosmetics or eyewear, which are promoted by brands or their influencers. In terms of psychological mechanisms, hedonic factors such as playfulness, fun, enjoyment, or esthetics are often viewed as the key value drivers of such experiences (Zanger et al., 2022). Relatedly, research demonstrates that AR affords a unique type of escapism, where consumers can experience the physical world in new ways, thus fostering hedonic gratification and engagement (Sung et al., 2021). While these mechanisms stimulate first-time use, the effects on repeated usage and meaningful engagement with firms or other consumers are less clear (Heller et al., 2021). The literature highlights that consumers are willing to try AR due to its ease of use and hedonic features (Rauschnabel et al., 2017), however, there is limited research into whether consumers are driven to engage with firms through reality-enhancing technologies in meaningful ways—that is, repeatedly and in form of favorable cognitive, emotional, and behavioral responses.

Emerging research thus highlights the need to study reality-enhancing technologies from an engagement perspective rather than an interaction perspective (Heller et al., 2021). However, most research focuses on engagement with the technology itself, which is likely due to the fact that researchers in the marketing and human-computer-interaction domains still grapple with the definitions of customer and user engagement, often using these terms interchangeably—indicating that we still miss theoretical clarity on engagement as an underlying mechanism for explaining technology-enabled consumer experiences (Heller et al., 2021). Hence, while reality-enhancing technologies are often heralded as the “Hail Mary” for engagement, research predominantly documents short-term, unsustainable, hedonic-driven engagement with technological features that have not yet shown to be used repetitively by consumers (McLean & Wilson, 2019). For example, the Dutch furniture retailer fonQ reported conversion increases in A/B tests, but found a lack of longitudinal effects on consumer. In response, research has provided first conceptualizations and frameworks for AR (or VR)-enabled engagement (Chylinski et al., 2020; Heller et al., 2021), however, more research is needed on this crucial psychological mechanism, as we highlight in Table 1.

Although AR and VR are primarily seen as visual technologies, they increasingly enable multisensory interaction with virtual content (e.g., hand gestures, voice commands) and feedback (e.g., sound effects, scents, haptic sensations), and thus are poised to substitute
3.1 Technologies with reality

Growing calls for responsible marketing strategies (de Ruyter et al., 2022), technologies to achieve omnichannel experiences. Researchers have thus guided mediation and gaming applications. Researchers have thus created hundreds of smells to enhance consumers’ experiences in VR environment; Flavián et al., 2021b) and feedback (e.g., accurate importance of congruent sensory stimuli (e.g., scents that fit with the experiences with reality started to unpick the psychological mechanisms of multisensory guided mediation and gaming applications. Researchers have thus create hundreds of smells to enhance consumers’ experiences in "the lack of sensory experience in online settings. For example, the “Feelreal” scent masks that can be attached to VR headsets can create hundreds of smells to enhance consumers’ experiences in guided mediation and gaming applications. Researchers have thus started to unpick the psychological mechanisms of multisensory experiences with reality-enhancing technologies, emphasizing the importance of congruent sensory stimuli (e.g., scents that fit with the VR environment; Flavián et al., 2021b) and feedback (e.g., accurate sounds when an AR object is moved; Heller et al., 2019b). Based on these findings, there is significant scope for further research, for instance, on how to optimally choose (or combine) different sensory modalities in reality-enhancing technologies.

### TABLE 1 Future directions for delivering innovative offerings.

<table>
<thead>
<tr>
<th>Key topics</th>
<th>Theoretical questions</th>
<th>Managerial challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementing reality-enhancing technologies</td>
<td>In which stages of the purchase journey do consumers need specific affordances of reality-enhancing technologies? When is AR or VR more effective to address consumers' informational needs? How to choose or combine reality-enhancing technologies (e.g., AR with VR) and determine the right level of technological embodiment of the employed devices (e.g., handheld or head-mounted)</td>
<td>Blueprinting the deployment of reality-enhancing technologies across the purchase journey. Determining optimal configurations of reality-enhancing technologies in terms of features, content, and device types.</td>
</tr>
<tr>
<td>Understanding consumer heterogeneity in the use of reality-enhancing technologies</td>
<td>Which affordances of reality-enhancing technologies complement or compensate specific consumer characteristics? When can reality-enhancing technologies improve consumer experiences under various circumstances (e.g., temporal, social, physical)?</td>
<td>Effectively targeting consumers with reality-enhancing technologies (e.g., through self-selection vs. personalized communications). Determining when and where to deploy either AR or VR, or a mix of both to benefit different market segments.</td>
</tr>
<tr>
<td>Determining optimal features of reality-enhancing technologies for a multisensory experience</td>
<td>How can reality-enhancing technologies provide multisensory experiences? Which different sensory modalities should be combined in reality-enhancing technologies?</td>
<td>Deciding which sensory features should be included when designing reality-enhancing technologies. Determining whether more sensory features always beneficial to add or are there negative effects in certain situations.</td>
</tr>
<tr>
<td>Mapping the impact of reality-enhancing technologies on consumer experiences that maximize engagement</td>
<td>Which touchpoints can reality-enhancing technologies improve to drive engagement? How, and how long, can reality-enhancing technologies create meaningful engagement?</td>
<td>Monitoring managerial outcomes (e.g., sales vs. brand outcomes) change when reality-enhancing technologies are deployed at different touchpoints. Stimulating sustained use of reality-enhancing technologies.</td>
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</table>

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

the lack of sensory experience in online settings. For example, the “Feelreal” scent masks that can be attached to VR headsets can create hundreds of smells to enhance consumers’ experiences in guided mediation and gaming applications. Researchers have thus started to unpick the psychological mechanisms of multisensory experiences with reality-enhancing technologies, emphasizing the importance of congruent sensory stimuli (e.g., scents that fit with the VR environment; Flavián et al., 2021b) and feedback (e.g., accurate sounds when an AR object is moved; Heller et al., 2019b). Based on these findings, there is significant scope for further research, for instance, on how to optimally choose (or combine) different sensory modalities in reality-enhancing technologies.

3 | SUPPORTING CONSUMER INTERVENTIONS WITH REALITY-ENHANCING TECHNOLOGIES

3.1 Sustainability interventions

Reality-enhancing technologies offer opportunities for responding to the growing calls for responsible marketing strategies (de Ruyter et al., 2022), and thus are used by many nonprofits such as UNICEF, Greenpeace, and WaterAid to advocate for environmental sustainability or humanitarian aid. Lack of consumer engagement with these issues is often because they seem intangible, distant, and of low relevance to the self (White et al., 2019). In response, VR is viewed as an “empathy machine” that puts consumers into the perspective of those in need of help for sustaining their livelihood. For example, “Tree VR” by the Rainforest Alliance transforms consumers into a rainforest tree and lets them experience growth from seedling to giant before witnessing shear helplessness in the face of deforestation. In a similar vein, UNICEF’s VR videos give viewers a first-hand experience of the precarious circumstances and uncertain fates of those living in Syrian refugee camps. Research demonstrates that VR’s ability to help consumers build empathy is the crucial underlying mechanism in responsible marketing contexts, resulting in enhanced prosocial behavioral intentions (e.g., donations; Kandaurova & Lee, 2019).

However, overall, the research stream remains nascent and is being outpaced by new applications, including VR experiences with endangered species (Moriuchi & Murdy, 2022) or the hosting of fundraising events in VR (e.g., Hope for Haiti). Important directions for future research, as summarized in Table 2, thus include the study of optimal VR formats and storytelling approaches that support the psychological mechanism of empathy through narrative...
Transportation, as well as how empathy might be enhanced when VR environments are populated by other “real” consumers or even the recipients of donations. Beyond charitable fundraising, for-profits also use VR to better advertise their sustainability efforts. For example, Chiquita Bananas allows consumers to follow the journey of their products, highlighting the varied initiatives to reduce environmental impact. Research suggests that such use of VR might improve brand attitudes (Hilken et al., 2022), but whether this is the case for communicating sustainability initiatives remains to be tested—consumer concerns about the authenticity of “staged” VR experiences might act as a suppressing mechanism for such effects.

AR is deployed as a more active way of nudging consumers to make sustainable consumption choices and close the attitude-behavior gap. For instance, the UK’s National Health Service used AR in combination with interactive billboards to achieve the goal of 200,000 donations in the 2016 National Blood Week. With their smartphone, consumers could virtually donate blood and in real-time see the positive impact on a recipient. In shopping contexts, brands such as Mars use AR to visualize information about the environmental impact of their grocery products, resulting in reduced information asymmetries and a discernible impact on the choice of more sustainable options (Joerß et al., 2021). Relatedly, research has shown that AR (e.g., food menus) prompt users to imagine consuming the products, identifying mental simulation as an important psychological mechanism for AR (Petit et al., 2021). Thus, continued study might assess whether AR can help consumers overcome the "neophobia" of trying less-known products with a lower environmental impact (e.g., jackfruit, bug or algae burgers).

Though currently less considered in the literature, reality-enhancing technologies also present potential sustainability interventions in their own right. For instance, AR enables product designers to virtually “mock up” prototypes without the need for physically producing these (e.g., different packaging designs). During the covid-19 pandemic, VR platforms such as ENGAGE have also experienced a large uptake for video conferencing and online meetings, as they provide the personal touch that is often lacking in many 2D applications such as Zoom or Skype. VR thus offers opportunities for reducing physical travel, and hence carbon emissions, beyond the pandemic. Further research is thus needed to identify marketing activities (e.g., meetings, conferences, events) that can (or cannot) be effectively delivered through reality-enhancing technologies rather than through in-person experiences.

### 3.2 | Well-being interventions

Reality-enhancing technologies are also used to enhance consumer well-being, for example, in the treatment of physical and mental health disorders, including anxiety, phobias, eating disorders, substance use disorder (e.g., Maples-Keller et al., 2017), physical rehabilitation (Levin et al., 2015), and pain reduction (Kenney & Milling, 2016). An illustrative example is OxfordVR, an automated program that helps consumers tackle their fear of heights, has been
proven 68% effective after just 2 hours of treatment time (Oxford Health NHS Foundation Trust, 2019). However, there are also gaps in this understanding as well as concerns that AR and VR might hinder well-being, for example, due to sensory overload (Pala et al., 2022). Future research thus needs to advance our understanding of the psychological mechanisms that contribute to both positive and negative well-being outcomes during and after the use of reality-enhancing technologies (see Table 2).

A fruitful research avenue would be to explore reality-enhancing technologies as a driver for different dimensions of consumer well-being. While prior research demonstrates that AR can improve psychological well-being (Javornik et al., 2022), current applications suggest a potential impact on well-being in other domains. For instance, the use of the Oculus Guided Meditation VR app might enhance spiritual well-being, interacting with other avatars in virtual world platform VR Chat could be beneficial for consumer social well-being, and participating in VR smoking cessation program MindCotine may support physical well-being. In this context, one relevant area for further work would be to explore how unique styles of decision-making (e.g., contextualized in AR vs. escapist in VR) and the experience of different selves (e.g., augmented self in AR vs. virtual self in VR) impact consumer experience and compliance with different well-being interventions.

There is also a need for insights into (unintended and unanticipated) negative experiences with reality-enhancing technologies. Initial research in this area identifies information overload as an important psychological mechanism that leads to stress, frustration, and impaired judgment on the part of the consumer (Behr et al., 2005). Furthermore, some consumers find the immersive and realistic virtual environment too confronting, while up to 80% of consumers experience cybersickness during or after using VR (Kim et al., 2021). Thus, there is a compelling need for a better understanding of consumer susceptibility to different negative well-being effects when using reality-enhancing technologies as well as the actions that marketers should take to prevent or manage the occurrence of these effects.

Special attention should also be given to potential negative outcomes that occur after consumers stop using these technologies and “re-enter the real world.” Very little is known about emotional, cognitive, and behavioral disturbances that consumers experience during and after the transition from immersive virtual environments to nonvirtual ones (Behr et al., 2005). Prior research warns that the use of AR mirrors, which allows virtual try-on of products such as make-up, can make some consumers (e.g., those with low self-esteem) more prone to self-change and esthetic procedures (Javornik et al., 2022). Similarly, continued exposure to embodied experiences, enabled by VR, could lead to a type of body dysmorphia with consumers becoming confused about specific features of their own bodies (Slater et al., 2020). VR’s potential to intensify negative emotions, for instance during gameplay, can also lead to increased negative rumination afterwards (Lavoie et al., 2021). Such observations call for more research into the psychological mechanisms that shape positive versus negative consequences of using reality-enhancing technologies, and whether these effects are long- or short-lived. At the same time, managers need guidance on how AR and VR can be used in a responsible manner to minimize negative well-being outcomes for consumers. A case in point is Pinterest, which offers AR-enabled make-up try-on that does not include any skin smoothing or image altering effects.

4 | BALANCING VALUE CocreAtION AND PRIVACY CONCERNS IN REALITY-ENHANCING TECHNOLOGIES

4.1 | Enriched cocreation

Facilitating the cocreation of product and service experiences is a marketing priority, and reality-enhancing technologies can support firms and consumers in this process by suggesting and transforming digital content against real or virtual world backgrounds (Alimamy & Nadeem, 2021; Boyd & Koles, 2019). For example, many garden design firms use AR apps (e.g., AR Landscaper, YARD) that allow consumers to interactively cocreate the design of their backyard. Increasingly, artificial intelligence (AI) is integrated in this design process by “visually searching” the physical environment and suggesting proposed “bundles” of planting schemes (de Ruyter et al., 2022). In a similar fashion, Akzo Nobel’s Visualizer AR app supports cocreation between consumers in (re)decorating their homes, by enabling them to exchange product recommendations through AR-enhanced images (e.g., of different wall colors). Initial research identifies enhanced feelings of social empowerment as a key psychological mechanism of the use of AR for such coccreational purposes (Hilken et al., 2020).

At the same time, there are potential unintended consequences of using reality-enhancing technologies in these ways, as they may cause debate, disagreement, conflict, and be psychologically challenging. Due to their highly persuasive nature, they might also create misinformation (e.g., through optical trickery) and incite consumers to choose something they would normally not opt for. Reality-enhancing technologies use may also induce focal rivalry, which refers to the fact that some people may not be able to simultaneously focus on virtual and real objects (Carbone et al., 2020). There are additional challenges associated with amplified social assimilation or differentiation (Carrozza et al., 2019) as well as persuasion or impression management in reality-enhanced communication (Hilken et al., 2020). This suggests that value can not only be cocreated but also codestroyed with reality-enhancing technologies. Consequently, there is a need for in-depth insights into how cocreation can be achieved and sustained through these technologies, and codestruction avoided.

To deliver such insights, we propose that future research should leverage theorizing on shared reality (Echterhoff et al., 2009). Central to this body of work from the domain of social psychology, is the notion that people are disposed to seek interdependence in psychological resources to elicit meaning. As an ongoing process, this involves three distinct but related stages: (1) shared attention, (2) shared judgment, and (3) shared memory. Reality-enhancing
technologies can be used to leverage a myriad of psychological mechanisms that play a role in affording these stages. For example, VR can foster shared attention, by helping consumers to focus on the environment that they wish to cocreate (e.g., designing a lighting plan for a garden). To afford shared judgment, AR can help consumers reach consensus and achieve social acceptance through visually enhanced communication (e.g., sharing 3D product models). Finally, establishing shared memory involves jointly creating a repository of (past) experiences that can serve as a reference guide for future interactions (e.g., revisiting previous creations that are stored as VR environments). To better understand the role of reality-enhancing technologies in affording cocreation, a plethora of research questions about these psychological mechanisms needs to be addressed, which we summarize in Table 3.

4.2 Extending the personalization-privacy paradox

The use of reality-enhancing technologies has been associated with a range of privacy concerns (Cowan et al., 2021; Lammerding et al., 2021). For this class of technologies to enrich cocreation processes, it is important that these are addressed. The psychological mechanisms underlying these privacy concerns include (1) unwanted exposure due to a general lack of information as to what data is captured (e.g., location-, movement-, or person-specific visuals both for users and bystanders) particularly by mobile cameras; (2) a potential biased perception of reality, as users have little control over the composition and quality of digital representations and data that is presented to them; (3) in cocreation environments in which users collaborate on one digital object and this is accessed through different devices, it is unclear how privacy can be safeguarded against invasions by others; (4) how marketers might responsibly use AR and VR to provide contextualized and hyper-personalized marketing communications (e.g., 3D images of promoted products appearing in one’s home in AR). These concerns have rapidly taken center stage in discussions about the implementation of reality-enhancing technologies, as the scale and scope of data collection necessary for the core uses of the technology are unparalleled. After all, AR and VR involve a rapidly widening range of personal and interpersonal visual, numerical, biometric, and verbal data.

Lack of exhaustive data classification frameworks that distinguish between, for example, observable (virtual personas, in-application assets, and screenshots and records), observed (location and spatial coordinates, eye- and hand-tracking, and activity logs) and derived

### Table 3 Future directions for balancing value cocreation and privacy concerns.

<table>
<thead>
<tr>
<th>Key topics</th>
<th>Theoretical questions</th>
<th>Managerial challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploring how reality-enhancing technologies can create shared realities that enhance the cocreation process</td>
<td>Does explicit guidance to engage in perspective taking (vs. the effortless affordance by AR or VR) influence the degree of shared reality the cocreation process?</td>
<td>Facilitating shared decision-making during cocreation using reality-enhancing technologies.</td>
</tr>
<tr>
<td></td>
<td>As reality-enhancing technologies can store previous decisions and designs, will this positively influence value cocreation through awareness of the contributions by collaborators?</td>
<td>Supporting longitudinal cocreation amongst consumers with reality-enhancing technologies.</td>
</tr>
<tr>
<td>Identifying relevant cultural and contextual thresholds of reality-enhancing technologies in cocreation</td>
<td>Are shared judgments and valence in reality-enhancing technologies contingent on users’ cultural backgrounds?</td>
<td>Understanding the cultural sensitivities required for successful deployment of reality-enhancing technologies in cocreation.</td>
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<td></td>
<td>In how far is the process of cocreating value influenced by preventing negative (e.g., “losing face”) versus creating positive impressions (e.g., self-promotion)?</td>
<td>Mitigating against negative influences during the cocreation process using reality-enhancing technologies.</td>
</tr>
<tr>
<td>Mapping consumer characteristics that shape privacy concerns about reality-enhancing technologies</td>
<td>Does the personalization-privacy trade off depend on personal characteristics (e.g., extraversion, agreeableness, neuroticism, openness to experience, susceptibility to persuasion)?</td>
<td>Understanding how to best operationalize reality-enhancing technologies facilitated personalized offerings based on segmented groups.</td>
</tr>
<tr>
<td>Understanding the cocreation and privacy mix for reality-enhancing technologies</td>
<td>Is the personalization-privacy trade-off contingent on type of product (e.g., furniture vs. jewelry) or service (e.g., wayfinding or personal coaching)?</td>
<td>Understanding how to best operationalize reality-enhancing technologies facilitate personalized offerings based on product categorization.</td>
</tr>
<tr>
<td></td>
<td>Does the personalization-privacy trade-off differ between actors (e.g., an AI-based agent vs. a human collaborator)? And does this impact on (either improving or degrading) the cocreation process over time?</td>
<td>Instigating a cocreation process using reality-enhancing technologies with consumers based on understanding preferences.</td>
</tr>
</tbody>
</table>

Abbreviations: AI, artificial intelligence; AR, augmented reality; VR, virtual reality.
data (links to social media profiles, biometric identification) hinders privacy concerns mitigation (Dick, 2021). Moreover, the current regulatory landscape for reality-enhancing technologies and privacy protection measures consists of a patchwork of laws, rules, and regulations. To address these issues and provide much-needed safeguards and reassurances to consumers, there is an urgent need to develop a research agenda that assists in alleviating existing and emerging privacy concerns and provide more trustworthy experiences.

To guide such inquiry, future research should utilize the personalization-privacy paradox as a guiding psychological mechanism (Aguirre et al., 2015). The principle is based on the fact that consumers trade-off privacy concerns against the convenience that personalization brings. Having access to products and services that can be cocreated in such a way that they are in line with their personal preferences may either mitigate or boost privacy concerns around reality-enhancing technologies (Ameen et al., 2022; Carrozzi et al., 2019). Interactive fitting rooms, virtual mirrors, and shared virtual spaces are just a small set of specific examples that illustrate that AR and VR are immersive and "up close and personal." There is little knowledge on how the potential for hyper personalization offered by these technologies might be traded off against privacy concerns. To recalibrate the personalization-privacy paradox to the use of reality-enhancing technologies, there are a several fundamental research questions that need to be addressed, which we present in Table 3.

5 | ACHIEVING NEW MODES AND MEANS OF IMPACT THROUGH REALITY-ENHANCING TECHNOLOGIES

5.1 | Observing and measuring impact

Relatively little attention has been paid to reality-enhancing technologies as a method of research design, even though this approach could be transformative for marketing research that drives forward the impact agenda (de Ruyter et al., 2022). Allowing researchers to simulate real-world interactions in controlled digital settings provides advantages over traditional research methods, such as surveys or laboratory studies; and enables studying counterfactual or difficult-to-access consumer experiences. For instance, plain cigarette packaging, which was introduced in Australia in 2011, has shown efficacy in laboratory studies (Wakefield et al., 2015), but has not translated into extensive reduction in cigarette sales (Greenland, 2015). Part of this discrepancy can be attributed to difficulty in studying cigarette sales environments. However, with VR researchers can create lifelike simulations of sales environments and allow consumers to enact actual behavior and decisions (Meißner et al., 2019). This, coupled with advanced tracking methods (e.g., eye-tracking) amplifies the potential of generating rich, contextual, and real-time data that is amenable to experimental control (de Ruyter et al., 2020). Accordingly, the application of reality-enhancing technologies in marketing research offers a viable methodology for both measuring the impact and informing the design of many marketing interventions in new ways.

The idea of using reality-enhancing technologies as a research method is not new, but it has made little progress over the past decades. For instance, Urban et al. (1997) introduced the notion of "information acceleration," where VR visualizations of new products would integrate with choice experiments to create future sales scenarios. Information acceleration traditionally had a narrow focus toward "really new products" (Proff & Fojcik, 2015), the argument being that participants must first be exposed to "future-conditioning" so they can learn about the resulting market structures, media, and marketing environment "as if he or she were now in the market of the future" (Urban et al., 1997, p. 1). Integrating VR in this process would accelerate the participant's learning about new products helping them to make more informed decisions in a choice experiment (Richard et al., 2012).

However, the idea was ahead of its time, and only recent advances in reality-enhancing technologies and the emerging understanding of the psychological mechanisms through which these technologies affect consumers' decisions have converged to make such research designs viable (Lee et al., 2021). A recent evaluation of VR-based research designs, for example, concluded that VR can foster "behavioral consistency" between participants' preferences and choices, which in turn reduces the prediction error between market forecasts and actual sales (Harz et al., 2021). Yet, the scope of the now accessible research questions extends beyond sales forecasting to allow researchers to study consumer behavior in more "natural" settings. For example, in AR, instead of recreating a cigarette sales counter digitally, researchers can superimpose digital information on packaging designs at the actual point of sale to observe consumer reactions. This can be done with multiple interacting participants and with real-time randomized experimental control.

5.2 | Innovative methodologies for studying psychological mechanisms

Given the novelty of reality-enhancing technologies, more investigation is needed to resolve fundamental questions about their appropriateness as research tools, not only for studying the impact—but also the underlying psychological mechanisms of marketing interventions. These relate to the ecological validity of research findings, as well as which protocols are needed to account for the fact that people process information differently in reality-enhancing technologies compared with traditional online or physical settings (Hilken et al., 2022). It is also vital to establish ethical, privacy, and safety guidelines for research with these technologies due to their potentially highly invasive nature.

Despite emerging research (Meißner et al., 2019), there is currently no systematic approach to applying various reality-enhancing technologies in marketing research, especially as they become increasingly portable, wearable, and a part of everyday
accessories. Academic investigation is needed to establish how these technologies can amplify “information acceleration” across multiple research settings, as diverse as investigating customer lifetime-value outcomes, psychological processes underlying those outcomes, service design, consumer well-being, and social and cocreative customer journeys. For example, Facebook’s vision of the “Metaverse” which attempts to become a medium of day-to-day interactions across multiple settings like work, relationships, or simply buying or selling products offers a novel potential for collecting vast amounts of contextual, real-time data on consumers (Ipsos, 2021). As such platforms begin to provide new insights into the mechanisms of how consumers think, behave, and interact, they offer a potential boon to marketing research. However, there remains paucity of academic knowledge on how best to utilize such platforms, what are their strengths and weaknesses, and how best to apply them across different research settings.

The rationale for using reality-enhancing technologies as research tools hinges on their potential for increased ecological validity of the research findings (Harz et al., 2021). Several features (and accompanying psychological mechanisms) potentially aid in this process. First, the visualizations offered by AR and VR have been found to enable deeper immersion in scenarios, where participants can feel a sense of presence (Flavián, Ibáñez-Sánchez, et al., 2019). Encounters with others using a “multiplayer” mode extend such experiences to social presence (Hilken et al., 2020). Similarly, engagement of multisensory experiences, for instance when using a combination of motion controllers, sent enabled headsets, audio and visual displays transports participants even deeper into the research scenarios (Harz et al., 2021). This immersion, combined with “noninvasive” data collection, which can record information in the background, for example, using eye- or gaze-tracking, allows for potentially rich understanding of purchase journeys. Yet, little is known about which features of immersion and/or multisensory engagement in reality-enhancing technologies promote consistency between research findings and market outcomes, or crucially what are the limitations of such simulations.

While early attempts at establishing information acceleration as a viable research method focused on developing standardized protocols for research (Urban et al., 1997), the expanded range of research questions and settings which now become available with reality-enhancing technologies implies that there is a need to revive the investigation into such research protocols. This is necessary to allow replicable study designs, especially in the face of rapid technological developments. Hence, not only external validity, but also equal reliability and replicability of research designs becomes important to the acceptance of research methods with reality-enhancing technologies. For example, of the academic papers published to date on AR and VR in marketing (Rejeb et al., 2021), there have been no replication studies, and the range of technologies and experimental designs employed makes close comparisons between those studies difficult. While this may be a more general concern in research, investigators driving the new research methods with reality-enhancing technologies have a unique opportunity to develop more standardized research protocols.

The imperative for more purposeful, long-term collaborations between academics and practitioner developers cannot be underestimated. As reality-enhancing technologies integrate in everyday life, the potential for unethical or unsafe use of research is magnified. We know, for example, that online providers like Google, Amazon, or Facebook routinely conduct live experiments on their platforms to learn about consumer behavior, and they collect personal information to feed sophisticated algorithms that maximize their profitability. These same providers are currently driving the push toward reality-enhancing technologies, likely with the similar objectives that extend their practices beyond online settings and into highly immersive settings. de Ruyter et al. (2020) outline how advertisers potentially can gain access to private, contextual, and real-time information often without consumers’ knowledge or consent simply as a function of how these technologies operate. Currently, the ethical, safety, and privacy dimensions of reality-enhancing technologies are among the least studied implications of these technologies, even though in the long run these implications may have the greatest impact on consumer well-being. Academic research is well-placed to address this paucity and, hence, collaborate with practitioners so at to inform future applications of reality-enhancing technologies that are ethically developed, based on sound insight into the psychological mechanisms that can be harnessed to serve consumer needs, while mitigating against potential negative consequences of such applications. Such an approach is likely to boost the sustainability of reality-enhancing technologies over the long-term (Table 4).

6 CONCLUSION

With this paper, we seek to set a future research agenda that will inform the development of applications that support the next-generation consumer experiences with reality-enhancing technologies. Against the backdrop of rapid developments, we emphasize the need for developing a better understanding of the psychological mechanisms that underlie consumers’ use of these technologies. Our consideration of the current knowledge base reveals that these mechanisms are multifaceted, including cognitive, emotional, behavioral, sensory, and social processes that shape consumer experiences with reality-enhancing technologies. Existing marketing frameworks of consumer experience and engagement increasingly acknowledge these varied psychological mechanisms, and thus serve as a basis for the first dedicated frameworks, as in the case of “situated” experiences with AR (Chylinski et al., 2020; Hilken et al., 2018) or technology-enabled engagement through AR (Heller et al., 2021). However, to keep pace with the development of these technologies, such frameworks need to be extended—both through contemporary theorizing in the marketing domain (e.g., privacy-personalization paradox) as well as novel theoretical perspectives from other disciplines including social psychology (e.g., well-being, shared reality), sustainability sciences (e.g., life cycle assessment), management (e.g., information acceleration), and computer science (e.g., AR- or VR-based research methods). Our proposed four application
areas offer a roadmap of the key areas in which such research might be developed and organized around current marketing priorities that include delivering innovative offerings, supporting consumer interventions, facilitating value cocreation, and improving the means and modes of impact in marketing research.

When pursuing these opportunities for future research, we stress the importance of considering several inherent complexities of this novel class of technologies. These include persistent ambiguity around conceptual and technological differences between the main classes of reality-enhancing technologies (AR and VR) leading to confusion about how and when to choose which of these technologies. This conundrum is being amplified through developments toward "Mixed Reality," which promises to integrate both AR and VR features, creating, for example, virtual spaces within physical environments (e.g., a virtually themed restaurant experience). Furthermore, as we have discussed, reality-enhancing technologies not only have the potential to create—but also to destroy—value for consumers. Future research must, thus, take a holistic perspective to assess what, when, and how much to present to consumers through reality-enhancing technologies in an increasingly digitally cluttered environment with growing privacy challenges and well-being concerns related to sensory overload, blurred perceptions of reality, and amplified social dynamics on social media. Furthermore, if reality-enhancing technologies indeed present the next evolution of the Internet (i.e., the "Metaverse"), pertinent questions about digital ostracism for those who are not willing or able to use these technologies, will also become relevant for marketers and especially policymakers.

Our proposed research agenda explicitly balances these potential advantages and disadvantages of reality-enhancing technologies, and, crucially, puts understanding their "purpose" before the development of their "pixels." In this way, we hope to inspire researchers and practitioners to prioritize gaining an in-depth understanding of value that can be delivered through reality-enhancing technologies over their technological development, by focusing on the psychological mechanisms that underlie their use.

**DATA AVAILABILITY STATEMENT**

Data sharing is not applicable as no data sets were generated or analyzed for this article.


