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Augmented self: the effects of virtual face augmentation on consumers' self-concept.

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Abstract

Augmented reality mirrors are popular marketing tools that allow virtual try-on of products, such as makeup. We study how such sensory experiences affect consumer perception of the self, specifically the gap between actual and ideal attractiveness, and we conceptualise this change as augmented self. Over three lab experiments we show that viewing oneself in an AR mirror (as opposed to the regular mirror) affects the ideal-actual attractiveness gap and that this effect differs depending on a consumer's self-esteem. Furthermore, we uncover that ideal self-congruence mediates this process. We also demonstrate that augmentation significantly changes variety-seeking. An additional survey-based study shows downstream effects of ideal self-congruence and ideal-actual gap on product choice and psychological well-being. While commercial immersive technologies are deployed to generate responses related to brands and products, this study demonstrates that the effects extend to consumers' self-concept. We offer implications for academics and practitioners in marketing and human-computer interaction.

Keywords: Augmented reality; Self Concept; Self-esteem; Ideal-actual gap; Appearance; Variety-seeking

Introduction

Fueled by technological advancements that generate hyper realistic visualisations, augmented reality (AR) mirrors are rapidly gaining pace, further cementing the visionary role of AR in marketing (Wedel, Bigné, & Zhang, 2020; Rauschnabel, 2021). Beyond providing a platform for a lifelike representation of how products like cosmetics or glasses would appear on one's face without actually wearing them (Javornik, 2016), they also offer a novel format for enchanting sensory experiences on smart devices or in retail (Petit, Velasco, & Spence, 2020; Roggeven, Grewal, & Schweiger, 2020). The appetite for such experiences is accelerating due to global pandemic (Pantano et al., 2020). AR mirrors depict augmented looks that are transformational, virtually modifying one's face in the mirror while offering a variety of interactions. The AR overlay can seamlessly appear on a person standing in front of a mirror without any input from the consumer (Javornik et al., 2017), which can entice the consumer to interact in a retail context and focus attention on a specific look - for instance, the Charlotte Tilbury "Magic Mirror" virtually applies the brand's signature looks such as "The Rebel" on the faces of those visiting the brand's stores. Other types of AR mirrors are focused on enabling the consumer to browse through and virtually try-on a wide range of products via a smartphone app (Scholz & Duffy, 2018). However, despite advancing such interactions that one can have with AR mirrors, little is known about how consumers perceive this augmentation. Virtual makeup can significantly augment the appearance of one's face, but how does this actually make consumers feel about themselves? Modifying someone's face can influence the perception of that individual (Etcoff et al., 2011; Samper, Yang, & Daniels, 2017), therefore such virtual enhancement could indeed impact a consumer's sense of self. The self-concept has long been known to be a strong driver for consumer behaviour, both in offline (Sirgy, 1982; Malär, Krohmer, Hoyer, & Nyffenegger, 2011) and digital contexts (Marder et al., 2019).

Marketing scholars have mostly studied the effects of AR at the product and brand level (Javornik, 2016; Heller et al., 2019; Rauschnabel, Felix, & Hinsch, 2019). For instance, Carrozzi et al. (2019) and Hilken et al. (2017) show how AR enhances consumers' mental imagery and generates psychological ownership of products. We shift the perspective away from the product and brand level to how AR affects the 'self'. As AR mirrors allow consumers to see alternative versions of themselves, we postulate that it gives rise to an *augmented self*, which we conceptualise as a change in consumers' self-concept when they are faced with the hybrid representation of a virtual overlay on their physical self. We propose that the activation of the augmented self disrupts the well-documented process of comparing the actual self to a desired ideal that accompanies viewing oneself in a regular mirror (Scheier & Carver, 1985; Phillips & Silvia, 2005). We show that viewing oneself in AR mirror changes the ideal-actual gap - a key construct in consumer research, shown to drive compensatory behaviour (Mandel et al., 2017), such as self-boosting activities (Park & Maner, 2009) or refraining from identity-associated consumption (White & Argo, 2009).

Furthermore, we demonstrate that the disruption in ideal-actual gap depends on the person's appearance self-esteem. We build on prior research that showed how individuals differ in their susceptibility to self-related stimuli depending on their self-esteem (Campbell & Lavallee, 1993; Brockner, 1983; Story, 2004). We show that viewing oneself in AR mirror reduces the actual-ideal gap for those with lower self-esteem, who may be more open to new representations and thus engage in variety-seeking. This is in line with Yim & Park (2019) who show that low self-esteem consumers are generally more positive towards the AR technology experience. Conversely, high self-esteem consumers exhibit lower behavioural plasticity (Brockner, 1983) and generally accept only those external cues that are consistent with their existing self-concept. We show that they respond negatively to seeing themselves visually modified with AR makeup. Crucially, we underline the importance of self-congruence of

augmented image with one's ideal appearance, which affects consumer propensity for variety-seeking and is particularly relevant while browsing products to achieve a desired look. We report three experimental studies that demonstrate how augmentation changes the actual-ideal appearance gap that ordinarily emerges in a regular mirror and that this process is mediated by ideal self-congruence. The fourth, survey-based study unveils further downstream effects of these key constructs, as we show that ideal congruence affects responses related to products – i.e. confidence in product choice – and that both ideal congruence and ideal-actual gap have an impact on mental well-being, specifically self-compassion.

Our contribution is fourfold. First, we move beyond AR effects on brand and product-level effects by providing critical insights into the effects on the self-concept and thus add a new research area to the scholarship on AR in marketing (Dwivedi et al., 2020). Second, we provide deeper understanding of the differing AR effects for consumers of varying appearance self-esteem (i.e. high vs. low) - research highlighted recently as important by Yim and Park (2019) in relation to technology-focused responses. We demonstrate that self-esteem also moderates the effect of AR on other responses, specifically the self-concept (Sirgy, 1982) and variety-seeking (Yang & Urminsky, 2015; Goukens, Dewitte, & Warlop, 2009). Third, we uncover the mediating role of ideal self-congruence in this process, adding to the growing research in that area (Ko & Park, 2020; Confente, Scarpi, & Russo, 2020) and highlighting previously unexplored self-congruence with augmented images. Lastly, we underline the importance of understanding the effects of AR in the self-domain. We show that it affects not only product-related responses (for instance, choice confidence), but also one's self-compassion (Neff, 2003), thus unveiling the influence of AR in the well-being domain. Overall, we support the dynamism of augmented self and urge the managers deploying AR mirrors to take into account the effects that this sensory input will have on consumers' self-concept.

Theoretical Background

In comparison to a real product try-on, an AR try-on is a virtual experience that does not involve tangible interaction with the product (Javornik, 2016; Yim & Park, 2019). AR visualisation appears instantly and can be applied, modified, varied and removed rapidly and with little effort. Such product try-ons are fuelled by AR technology, which overlays virtual annotations onto the physical world and allows for real-time interactivity (Dwivedi et al., 2020). Prior research has investigated how the specific nature of an AR experience enhances service and product experiences (Heller et al., 2019; Barhorst et al., 2021) and provides a range of individual and social gratifications (Rauschnabel, 2018). Despite the growing body of work on AR in marketing, also in the context of multisensory experiences (Petit, Velasco, & Spence, 2019), research examining the effect of AR on the self is missing (Grewal, Hmurovic, Lamberton, & Reczek, 2019), but is crucial for a meaningful deployment of AR.

There is a nascent stream of AR literature that examines self-related concepts in the context of AR (see Table 1), such as how AR affects the connection between the self and the brand (Baek, Yoo, & Yoon, 2018) or the technology (Huang, Matthews, & Chou, 2019). In their ethnographic study, Scholz and Duffy (2018) uncovered how AR facilitates more intimate brand relationships, providing space to consumers for self-experimentation. AR apps can also increase perceived personalisation (Smink et al., 2020) and inspire consumers (Hinsch, Felix, & Rasuchnabel, 2020). Moreover, experimental studies have considered the moderating role of self-related concepts such as body satisfaction (Yim & Park, 2019) or narcissism (Baek, Yoo, & Yoon, 2018). We contribute to this prior literature that emphasises the moderating role of self-related constructs. We offer the first study that specifically examines the effect of AR on the self-concept. While prior research explains what humans do with AR (and why), our work looks at what AR does with humans in relation to their selves. Such motivation corresponds with a user-centred approach, as researchers have long called for technology

deployment to consider human values and well-being (Sellen, Rogers, Harper, & Rodden 2009). This approach remains important for sensory technologies (Mueller et al. 2020).

-- TABLE 1—

Self-concept and appearance

The concept of self refers to the overall thoughts and feelings towards oneself (Rosenberg, 1979) and is composed of the *ideal self* and *actual self*, where the ideal self is the desired representation that one aspires to in terms of values and goals, while the actual self is related to "who I really am" (Sirgy, 1982). The self is not a rigid, solidified concept (Markus & Nurius, 1986; Aaker, 1999; Gao, Wheeler, & Shiv, 2008) and is driven by a need for both consistency and positivity, with consumers pursuing strategies that would help them approach the ideal self or protect the self from any threats (Riis, Simmons, & Goodwin, 2008; Hepper, Gramzow, & Sedikides, 2010) as well as reconcile self-discrepancy - the gap between the existing (actual) and a desired (ideal) state (Gaustad et al., 2019; Marder et al., 2019).

Importantly, within a person's self-concept resides an unbounded set of potential ideal selves that are associated with different self-domains (e.g., intelligence, attractiveness, power, sense of adventure etc.) (Markus & Nurius, 1987), with personal appearance representing one such domain. Physical outlook is often essential to a consumer's sense of self, as their appearance represents an important part of who they are (Bloch & Richins, 1992). Discrepancies in the domain of attractiveness can negatively impact the well-being of consumers (Harrison, 2001), leading to important downstream effects on consumption behaviour and coping strategies in decision-making (Mandel et al., 2017; Sobol & Darke, 2014). Comparison with a desired appearance generates affective and motivational responses (Markus & Nurius, 1986), for instance body dissatisfaction (Ahadzadeh, Sharif, & Ong, 2017) or motivation to improve (Sobol & Darke, 2014). Consumers wear makeup, buy new products

and undertake cosmetic surgeries to approach their ideal physical attractiveness (Askegaard, Gertsen, & Langer, 2002; Cash et al., 1989).

A critical antecedent for these evaluations is the activation of selves within a particular domain. Numerous stimuli have been found to make consumers self-aware of their physical attractiveness, including mannequins, advertising models and mirrors (Argo & Dahl, 2017; Jansen et al., 2016). Mirrors specifically can activate self-discrepancies by increasing a person's self-awareness. Viewing one's reflection leads to thoughts about who one is (actual self), who one would like to be (ideal self), and the discrepancy between the two (Duval & Wicklund, 1973; Scheier & Carver, 1980), but also evokes negative emotions for people who perceive their reflection as undesirable (Veale & Riley, 2001).

Augmented self

AR mirrors differ from regular mirrors in that they do not reflect an actual appearance, but a virtually modified one (Javornik & Pizzetti, 2017). Although the augmentation is a virtual and out-of-body experience, it appears realistic and individuals have been shown to act with reference to the modified representation of the body and not their actual physical body (Lenggenhager, Tadi, Metzinger, & Blanke, 2007). Viewing it gives rise to the *augmented self*, introduced by Javornik and Pizzetti (2017), who evidenced that seeing oneself in an AR mirror can increase self-esteem and product psychological ownership.

We build on this initial work by proposing a more extensive conceptualisation of augmented self in relation to self-concept, i.e. ideal and actual self and the discrepancy between the two (Sirgy, 1982). Consumers recognise the AR mirror reflection as their own but are also aware that it is virtually modified. This introduces a new reference point for the self. We define *augmented self* as a change of the self-concept that can occur as a result of viewing this virtually modified representation in an AR mirror. Specifically, viewing it can modify the belief about

one's actual attractiveness, as the augmented image represents a deviation from how one really looks. Viewing a visual face modification could also change one's ideal self, i.e., the aspiration for how attractive the consumer would ideally like to be. Shifting actual or ideal self leads to a changed gap between these two dimensions of the self (see Table 2 for distinction between concepts). Understanding such shifts is highly important, as the ideal-actual gap can lead to negative psychological consequences (Higgins, 1987), such as decreased body satisfaction (Ahadzadeh, Sharif, & Ong, 2017). To resolves discrepancies, consumers engage in compensatory behaviour (Mandel et al. 2017), for instance escapism (Marder et al., 2019).

However, users' reactions to viewing their augmented face could differ depending on their pre-existing beliefs or traits. One such critical trait, we highlight, is their self-esteem. There is already prior evidence that self-esteem is relevant for AR interaction. Yim and Park (2019) have shown that body-image affects the AR experience, as low body-image individuals report being less irritated if AR media features are not of high quality, in contrast with those who have positive body-image. Complementing this focus on technological features, we study the role of self-esteem in relation to the impact of AR on the self-concept.

Self-esteem

Whereas the self-concept refers to "who am I?", self-esteem relates to "how do I feel about who I am?" (Campbell & Lavallee, 1993, p.4; see conceptual distinction in Table 2). Self-esteem is therefore the general attitude that one holds towards oneself (Rosenberg, 1979) and is a key factor in determining consumer responses to external stimuli that trigger self-evaluation (Sirgy, 1982; Albalooshi, Moeini-Jazani, Fennis, & Warlop, 2020). Our focus here is on domain-specific appearance self-esteem, which is a general feeling towards one's physical appearance (Gentile et al., 2009). Two research streams have examined how self-enhancement can occur via external stimuli or direct self-enhancement and have shown that consumers

respond to these differently depending on their self-esteem. Compared to those high in self-esteem, individuals with low self-esteem tend to be negatively influenced by an external stimulus or social comparisons, such as a beautiful mannequin or another customer that is attractive, as these draw attention to the perceived deficiencies in their appearance, while high self-esteem participants do not experience such negative effects (Dahl, Argo, & Morales, 2011; Argo & Dahl, 2018). Also, low esteem individuals are drawn more positively to direct self-enhancement stimuli (e.g., cosmetics, vanity clothes sizing) than high esteem individuals (Robertson, Fieldman and Hussey, 2008; Aydinoglu & Krishna, 2012).

We propose that the effect of augmented self on high vs. low self-esteem individuals is more aligned with the latter standpoint as it acts as a more direct self-enhancement stimulus. Mannequins (physical bodies) and social comparison to other people does not directly change or enhance one's physical appearance as opposed to wearing cosmetics in reality or virtually, which directly change one's appearance. In support of the supposition that low – as compared to high - self-esteem individuals may respond more positively to the augmented self is the theory of plasticity. It posits that low self-esteem consumers are more open to activities that allow them to change, while the high self-esteem ones are more resilient to them due to their inherent certainty about their present self (Brockner, 1983; Story, 2004). As augmented reflection represents a direct change to one's appearance, it will be more challenging for high self-esteem individuals to reject it. These individuals exhibit lower plasticity, are more assured about their appearance and are less favourable of self-enhancement activities (Alicke & Sedikides, 2009). We propose that an AR overlay will destabilise their self-concept because of its realistic and invasive virtual change. Consequently, the otherwise narrow ideal-actual gap of high-esteem individuals will widen.

Conversely, we expect the augmentation to reduce the discrepancy between the actual and the ideal self that those with low self-esteem appearance usually experience when this

domain is activated. This is because those with low self-esteem have inherently lower levels of certainty and clarity in the self-domain (Brockner, 1983; Story, 2004) and experience a stronger drive to attain ideals (Malär et al., 2011). We thus predict that low self-esteem individuals' self-concepts will react to augmentation as an opportunity to change and thus experience a reduced gap between the ideal and actual self.

H1) Appearance self-esteem moderates the effect of AR mirror on the ideal-actual attractiveness gap, such that: a) high self-esteem consumers experience a larger ideal-actual gap when viewing themselves in an AR mirror vs. regular mirror, and b) low self-esteem consumers experience a smaller ideal-actual gap when viewing themselves in an AR mirror vs. a regular mirror.

Variety-seeking

We now propose that viewing one's modified image can affect another important variable that has received wide attention in marketing: variety-seeking (McAlister & Pessemier, 1982; Mogilner, Rudnick & Igenyar, 2008). We consider here both the cognitive side of variety-seeking, associated with variety that consumers seek in the domain of self-concept (Kim & Drolet, 2003; Maimaran & Wheeler, 2008), and the behavioural side, associated with one's propensity to seek variety in product choice (Goukens, Dewitte, & Warlop, 2009). This is in line with prior research emphasising the link between self-concept and product variety-seeking (Yang & Urminsky, 2015; Martenson, 2018); for example, preference for maintaining the self-concept was shown to lead to product choice consistency (Yang & Urminsky, 2015), while curiosity for introducing novelty and changes to one's life was shown to be associated with variety-seeking in the behavioural domain (Martenson, 2018). Self-related variety-seeking, also termed self-expansion, explains that the exposure to novel internal or external stimuli motivates some consumers to cognitively expand their self-concept and develop new identity-

related aspects (Aron & Aron, 1996). Conversely, when consumers' self is under threat, this results in lower product variety-seeking (Finkelstein, Xu, & Connell, 2019). This is relevant also in commercial contexts. De Kerviler & Rodriguez (2019) demonstrated that brands act as external cues that expand the self as consumers "learn about or imagine new worlds" through brand relationships (p. 252). We propose that AR mirrors act in a similar manner in that they provide new information to be evaluated within a consumer's self-concept. They not only offer a possibility for behavioural variety-seeking such as considering new products, but also to cognitively engage in a variety of new possible appearances and, ultimately, "new selves".

For such variety-seeking to occur, consumers must be open to new information and new perspectives of the self. Yet, they have different levels of openness to the variety of possible selves that they could potentially adopt (Brockner, 1983). Individuals feeling threatened by the augmented image would develop a defensive attitude to protect the actual self (Hepper, Gramzow, & Sedikides, 2010) and refrain from variety-seeking. This, we predict, will happen for high self-esteem consumers confronted with augmentation. Conversely, those with low appearance self-esteem have a more plastic sense of self (Brockner, 1983). For them, the augmentation will represent a possibility for change and, thus, make them more inclined to embrace variety-seeking in both cognitive (considering and imagining new aspects of self) and behavioural (product variety-seeking) domains. Hence;

H2: Appearance self-esteem will moderate the effect of AR mirror on variety-seeking, such that, after seeing themselves in an AR mirror vs. a regular mirror: a) high self-esteem consumers will show a decreased propensity for variety-seeking, and b) low self-esteem consumers will show an increased propensity for variety-seeking.

-TABLE 2-

Ideal self-congruence and augmentation

We have predicted that appearance self-esteem can lead to differences in the ideal-actual gap and in openness to variety-seeking, but we have not yet elucidated the process by which this occurs. We propose ideal self-congruence as an omitted mediator that is crucial in explaining 'why' self-discrepancies changes in response to AR.

Theoretically, self-congruence is the cognitive match between a consumer's self-concept and an external stimulus, such as a product or a brand (Sirgy et al., 1997; Malär et al., 2011). It is conceptually distinct from the ideal-actual gap, where an individual is evaluating the proximity or distance between the two self-dimensions (actual vs. ideal) rather than comparing them to an external entity, as is the case for congruence (see Table 2 for conceptual distinctions). Digital stimuli, such as online self-representations, differ in how congruent they are with one's identity (Yau, Marder, & O'Donohoe, 2019). Self-congruence can lead to favourable responses, such as brand attachment, but also to negative behaviour, such as impulse buying (Japutra, Ekinci, & Simkin, 2019).

In the context of AR mirrors, ideal self-congruence is particularly important when consumers are browsing virtual products, as they evaluate such products by examining if those are congruent with the appearance they would ideally like to obtain. We expect self-esteem to significantly determine the extent to which a consumer perceives their augmented image to be (in)congruent with their ideal representation. As the high self-esteem individuals are relatively certain about their image (Hepper, Gramzow, & Sedikides, 2010), they are likely to find AR representations less congruent with their existing ideals. Browsing through a wide range of products in an AR mirror vividly depicts possibilities for change, which is not welcome with high self-esteem consumers, who are resilient to self-change. In contrast, more malleable lower self-esteem individuals are more likely to find an AR representation as congruent with how they would ideally like to look.

H3: *Appearance self-esteem will moderate the effect of AR mirror on ideal self-congruence such that, after seeing oneself in an AR mirror vs. a regular mirror: a) high appearance self-esteem consumers will experience significantly lower ideal self-congruence and b) low appearance self-esteem consumers will experience significantly higher ideal self-congruence.*

Self-congruence affects a range of consumer responses, most of which have been reported in relation to brands or products. Self-congruence with a brand, for instance, leads to significantly higher brand attachment (Malär et al. 2011; Huber, Eisele, & Meyer, 2018) and it also affects buying behaviour (Japutra, Ekinci, & Simkin, 2019). Similarly, self-congruence with a product is linked to more positive product evaluations (Song et al., 2018). There has also been some exploration of the link between self-congruence with stimuli and consumer identity (Hollenbeck & Kaikati, 2012; Confente, Scarpi, & Russo, 2020; Ko & Park, 2020). In the context of online games, for instance, ideal self-congruence with game characters was shown to lead to the player's identification with that character (Ko & Park, 2020). We emphasise the link between congruence and self-concept in the context of AR, specifically in relation to ideal-actual gap. We postulate that seeing an augmented image that is congruent (incongruent) with one's ideal representation would decrease (increase) the gap between one's actual and ideal attractiveness and mediated the effect of AR mirror on the gap. In other words, browsing products in an AR mirror leads the consumer to evaluate how congruent the augmented image is with the ideal representation in order to determine which product would be the suitable choice. If consumers find the augmentation to be congruent with their ideal image, this would also affect their self-concept and reduce the discrepancy between their actual and ideal state.

H4: *Ideal self-congruence with augmented image mediates the effect of AR mirror on ideal-actual gap.*

Overview of the studies

We tested our hypotheses in three experimental studies that all contrasted participants viewing themselves with virtual makeup in AR vs. regular mirror without such makeup. Both Studies 1 and 2 focus on understanding a seamless overlay of solely one makeup look, in order to examine that specific phase of interaction with AR mirror, which can also typically constitute a consumer's initial interaction with such mirrors in a retail store (Javornik et al., 2016). We deploy two different tasks: Study 1 explicitly focuses the consumer's attention on their facial appearance in an AR (vs. a regular) mirror, while Study 2 presents the augmentation without specific instructions drawing attention to the self. Study 1 examines our central prediction (H1) about the effect of AR on the ideal-actual gap, moderated by appearance self-esteem. Study 2 replicates the findings and explores the effect on variety-seeking (H2) in the behavioural domain. In Study 3, we introduce customisation of AR look, as product browsing is a typical feature of AR makeup apps. Thereby, we again focus participants' attention on their appearance, as in Study 1. We examine whether consumers experience a different ideal self-congruence in AR (vs. regular) mirrors, as well as the mediating effects of such congruence on the ideal-actual gap (H3, H4). Study 3 replicates the effect of AR on variety-seeking (H2), demonstrating it in the cognitive domain. Figure 1 summarises the hypothesised conceptual model. Finally, Study 4 presents an online survey with AR try-on in a browser to validate the effect of ideal congruence on ideal-actual gap (H4) and to also explore their effects on other downstream variables, namely self-compassion and choice confidence. Only female participants took part in our studies, as they typically wear more makeup products than men (Mafra et al. 2020). The AR makeup pre-designed look (Studies 1-3) consisted of mascara, eyeshadow, foundation and lipstick and was developed in collaboration with experts at an agency that specialises in AR makeup applications.

--FIGURE 1--

Study 1: Testing the effect of AR and self-esteem on self-discrepancies

We used a single-factor between-subject design with three conditions to test H1. Participants were recruited from a large British university and received £8 for their participation. In total 111 female participants took part (M_{age}=23.78, SD=6.6), of whom 94.6% were students, furthermore 33.3%, 47.7% and 19% completed a high school degree, Bachelor's degree and Master's degree respectively as their highest level of education. The study involved a pre-survey administered about 5 days before the lab experiment. To conceal the exact purpose of the study, participants were told throughout both stages that the study aimed to examine how cognitive processing of words is affected by the way people think of faces (see Appendix A). Word tasks (such as crossword puzzles) were presented to support this cover. The pre-survey was completed via an email link, measuring appearance self-esteem (ASE) (Heatherton and Polivy, 1991), along with belief of personality traits being fixed (α=.84) or malleable (α=.76) (Dweck, Hong, & Chiu, 1993) and demographics.

In the lab experiment, each participant was randomly assigned to a single experimental condition: AR mirror, a regular mirror or a no mirror (control group). They were instructed not to wear makeup when arriving for the study (the same instructions were also given in studies 2 and 3). The purpose of the tasks across the three conditions was to make the participants focus on their faces. The tasks in the two mirror conditions were: observing one's face in the mirror and describing how one's face looked in that instance. In the AR condition the participants saw the makeup applied in real time to their own face on the screen of a smart tablet (an iPad). A pretest of the stimulus demonstrated that the makeup was perceived as sufficiently appealing - see Appendix A. In the regular mirror condition the same device was used, but without the AR functionality. In the no mirror condition the participants were asked to think about their face as it looked on that day and describe it. The no mirror condition was

included to account for the potential effect of self-awareness, because a mirror reflection heightens self-awareness (Scheier & Carver, 1985).

After completing the task, we measured self-awareness and ideal-actual gap with two items (one measuring the actual and the second the ideal self), which were condensed into a single index by subtracting the actual scores from the ideal scores. Scales are reported in Appendix B. The participants in the AR condition were also asked about their familiarity with AR i.e. “How familiar are you with augmented reality technology?” (1 = not familiar at all to 7 = extremely familiar). Finally, the participants were fully debriefed and thanked.

Results

Preliminary analysis. To rule out competing explanations for differences in ideal-actual gap, we assessed the perceived malleability of personal traits and familiarity with AR as predictors in a linear regression. No significant effects were found (trait malleability: p=.52; AR familiarity: p=.24). We omitted these variables from further analysis. Furthermore, we compared self-awareness across the three condition with an ANOVA. No significant difference emerged (F=.86, p=.43). The inclusion of the no-mirror condition was to control for differences in self-awareness compared to the mirror conditions. As no difference in self-awareness was found, the no-mirror condition was excluded from further analysis. We now compared the effects of AR vs. regular mirror to assess H1.

Ideal-actual gap. To test H1, we used PROCESS (version 3.2) Model 1 set to 5,000 bootstraps (95% CI), with mirror conditions (AR vs. regular mirror) as the IV, appearance self-esteem (ASE) as the moderator and ideal-actual gap as the DV. Results are shown in Table 3. Significant main effects were found for both ASE levels and mirror conditions, as well as an interaction between these two variables on ideal-actual gap. The conditional effects showed the ideal-actual gap in the AR mirror condition (vs. regular mirror) to be significantly larger for

those with high self-esteem, but the significant differences were not observed for those with low self-esteem (see Fig. 2 and Table 3). Floodlight analysis (Spiller at al., 2013) identified the Johnson-Neyman (J-N) point to be at the value of 4.55, demonstrating that the conditional effects are significant for ASE value above 4.55 (t=1.99, p=.05), with 56.25% of the participants in this significance region (Preacher, Curran, & Bauer, 2006).

-- FIGURE 2 –

Actual and ideal attractiveness. For a deeper understanding of the above effects, we examined whether variations in the ideal-actual gap were attributable to differences in actual or ideal attractiveness by again running the PROCESS Model 1. ASE significantly moderated the effect of AR mirror on actual (B=-.67 (.23), t=-2.98, p<.01, see Fig 2b for illustration and Table 3 for analysis), but not ideal attractiveness (B=.08 (.22), t=.39, p=.70).

Conditional effects of the mirror conditions showed that those with high self-esteem reported significantly lower actual attractiveness in the AR condition as opposed to the regular mirror. Floodlight analysis showed that the J-N point for ASE occurred at 4.89 (t =1.99; p=.05), representing 38.75% of the sample, as well as for an ASE value of 2.38 (t=-1.99; p=.05; 5% of the sample). This indicates that the AR (as opposed to a regular mirror) generates significantly lower levels of actual attractiveness for those with ASE above 4.89, and significantly higher actual attractiveness for those with self-esteem below 2.38.

-- TABLE 3 –

Discussion – Study 1

Study 1 provides evidence that the ideal-actual gap significantly differs in the presence of an AR versus a regular mirror, depending on ASE. Higher ASE consumers experience a significantly larger ideal-actual gap when seeing themselves in the AR (vs. regular) mirror,

while no differences were detected for those with low ASE (H1 partially supported). This increase in the ideal-actual appearance gap was linked to the decreased actual attractiveness (but not increased ideal) that the high ASE participants reported when observing the augmented image, demonstrating that augmentation affected the perception of their actual attractiveness.

As expected, we found no differences in self-awareness across the three conditions. While previous studies (Scheier & Carver, 1985) demonstrated differences in self-awareness between no mirror and mirror conditions, in our case the lack of such differences is very likely to be attributable to the experimental task. It required an intense focus on the face, leading to similar self-awareness across the conditions. This is in line with Govern and Marsch (2001), who point out that focus on personal thoughts and feelings can induce self-awareness. These results allow us to rule out self-awareness as an alternative explanation for our results. No-mirror and regular mirror conditions did not differ in the key variable (ideal-actual gap)[1], therefore we deployed only the mirror conditions as they were the focus of our investigation.

The task in Study 1 (i.e. "observe your face and describe it in detail") may have drawn disproportionate attention to participants' actual attractiveness and possibly inflated the results. In Study 2 we sought generalisability by using a less intrusive attention-related task. We simply asked participants to look at the AR mirror (vs. regular) without prompting a detailed examination of their actual appearance.

Study 2

In total 76 female participants (M_{age}=23.95, SD=3.73), recruited from a Norwegian business school and offered 100 NOK as an incentive, took part in a single-factor (regular vs. AR mirror) between-subjects design. Within the sample, 22.4%, 53.9% and 23.7% completed high school,

[1] For additional robustness we contrasted no-mirror with regular mirror in Model 1 to analyse the moderation, finding no significant difference on actual ideal-gap ($p>.05$), supporting our focus on the two mirror conditions only.

Bachelor's and Master's degrees respectively as their highest education level. 81.6% of the participants were students, 7.9% with full time employment, 7.9% with part-time employment and 2.6% unemployed. The cover story was the same as in Study 1 (Appendix A). Prior to stimuli exposure, participants again filled out a pre-study survey to report ASE, demographics and also rated the importance of physical appearance and their makeup expertise. The assignment to one of the two conditions was random. The pre-survey showed no significant difference in ASE, the perceived importance of appearance and makeup expertise across the groups ($p>.05$), which could have otherwise impacted the results.

In the lab session, the participants were exposed to either a mirror on a smart device (i.e., the tablet) with no virtual overlay or with an AR makeup look overlaid. The same AR look and the same application was used as in Study 1. All participants were asked to look at themselves in the mirror, which remained beside the computer used for responding to the survey throughout the whole study. We measured the perception of accurate representation (Samper, Yang, & Daniels 2017), checking to which extent the virtual change of the facial reflection was registered (scale items in Appendix B). After completing this observation, the participants were asked about their actual and ideal attractiveness, as per Study 1. Finally, we also examined the effect of AR on behavioural variety-seeking related to product choice. We developed the measure by relying on established studies in this domain (Kahn & Isen, 1993; Mogilner, Rudnick & Igenyar, 2008). The questionnaire included an image of 16 shades of lipstick. The participants were instructed to look at the lipstick colours and write a number indicating how many individual lipstick colours they would be willing to wear for different occasions (considering wearing one lipstick per occasion); in other words, how many lipstick shades would the participant wish to use for a broad range of occasions.

Results

Preliminary analysis. Participants in the regular mirror condition reported more accurate representation than those in the AR condition (ANOVA: F=42.99, p<.001, M_{AR}=2.74(1.30) vs. $M_{Regular\_mirror}$=4.83(1.47)), which indicated that they noticed a significant visual change of their face in AR. ANOVA showed no significant main effects of mirror conditions on ideal-actual gap (F=1.58, p=.21), self-awareness (F=2.61, p=.11), lipstick variety-seeking (F=.56, p=.46) or eyeshadow variety-seeking (F=.25, p=.62).

Ideal-actual gap. As before, we examined the interaction effects to test H1 (Model 1 in PROCESS, 5000 bootstrapping samples) and again found a significant interaction between mirror conditions and ASE on the ideal-actual attractiveness gap - see Table 4 for results. The ideal-actual gap was significantly lower for the low ASE participants who viewed themselves in the AR mirror (vs. regular mirror) – see Figure 3. Floodlight analysis showed significant differences between the two conditions for those with ASE moderator below 4.83 (t=1.99; p<.05), which represented 34.21% of the sample. Conversely, no significant variations between the two mirror conditions were found for participants with high ASE (p>.05).

-- *TABLE 4* --

Ideal and actual attractiveness. With the same method as before we examined ideal and actual attractiveness. ASE did not moderate the effect of the mirror on actual attractiveness (B=-.14, SE=.28, t=-.49, p=.62), but we found a significant moderation effect on ideal attractiveness - see the results for ideal attractiveness in Table 4. Those with low ASE reported a significantly lower ideal attractiveness after observing their face augmented in an AR mirror (vs. a regular mirror) (see Fig. 3). Floodlight analysis identified the J-N point at 4.91 (t=1.99, p=.05), signifying that those with ASE below 4.91 experienced significant differences in ideal

attractiveness between the two conditions, which represented 34.21% of the sample. No significant differences were detected above this value.

-- FIGURE 3 --

Variety-seeking. Finally, to test H2 we examined the effect on behavioural variety-seeking in makeup category – specifically lipsticks - to see if the participants would consider a significantly different variety of products depending on the mirror conditions and their ASE. Analysis was the same as before, with the variety-seeking variable as the DV. There was a significant interaction effect on the number of lipstick colours - see Table 4 for results. Those with high ASE reported considering significantly fewer lipsticks after seeing themselves in the AR mirror compared to the regular mirror (see Fig. 3). Floodlight analysis identified the J-N point to be at 6.28 (t=-1.99, p=.05), which corresponded to 13.16% of the sample and signified that those with high self-esteem - above 6.28 - would choose fewer lipsticks after viewing their augmented image as opposed to viewing a regular mirror reflection. We checked for confounding effects of makeup expertise and appearance importance. Neither of the two significantly covaried with or moderated the proposed effects.

Discussion – Study 2

Study 2 provides support for H1b in that the actual-ideal gap tends to reduce for low-esteem individuals when presented with an AR mirror as opposed to the regular mirror. Here, the change was due to a reduced ideal attractiveness for low ASE. Not only was an AR mirror not perceived as a threat to their actual appearance, it also lowered the desire and aspiration to be highly attractive. Low ASE individuals are known to self-enhance in order to reach such ideals, as they often engage in social comparison and assess themselves against beauty standards

(Argo & Dahl, 2018). The augmented image diminished such aspirations. Here, the AR mirror refocused their attention away from ideals and momentarily changed this tendency by visualising a potentially different self in the appearance domain.

Though this study has provided further core support for H1, the results differed from Study 1, where the effects were observed for high ASE. Crucially, the tasks in two studies differed substantially and focused the participants' attention on their actual appearance (Study 1), while in Study 2 no such specific instructions were given. We acknowledge the disparities as important and we expand upon them in detail in the general discussion.

H2 was partially supported: AR mirrors were shown to decrease behavioural variety-seeking for high esteem individuals, who reported significantly lower propensity to consider product variety (i.e. fewer lipsticks), demonstrating lower self-plasticity. These findings conform with the plasticity theory that those more certain about their self-concept are less open to amending it (Brockner, 1983).

Importantly, in Studies 1 and 2 only one makeup look was provided, which is typically the case when consumers encounter AR mirrors in cosmetics stores without intentional interaction. Magic mirrors often overlay a consumer's face with one look as part of the initial interaction with the system, with the intention to entice further engagement with the technology (Javornik et al., 2017). However, the same makeup can look very different on different faces. Also, when used purposefully as a tool for makeup selection, a consumer would engage in browsing through a variety of looks and products. In Study 3, we aim to further increase generalisation of our findings by allowing participants to browse through a series of eye shadow and lipstick colours to customise the AR superimposition according to their preferences. In line with H3 and H4, we test the assumption that the congruence of the mirrored image with ideal self would be an important part of such browsing process.

Study 3

We now included a condition in which the participants could partially customise the AR makeup. The study was a single-factor between-subject design with three conditions: Regular mirror vs. AR_Predesigned mirror (same as in Study 1 and 2) vs. AR_Customised (the same AR makeup, but with an option to customise lipstick and eyeshadow). The app used here had the same AR technology as the one used in Studies 1 and 2, but permitted browsing through a variety of eyeshadow and lipstick products without leaving the AR mirror mode. Such interfaces are a popular feature in the cosmetics retail space (Javornik et al., 2016).

123 female participants (M_{Age}= 24.35, SD = 6.66) were recruited from a British university and received £10 as an incentive. 91.1% were students and 8.1% were in full- or part-time employment. 32.5%, 41.5%, 23.6%, 1.6% and 0.8% participants held high school, Bachelor's, Master's, PhD and professional degrees respectively as their highest level of education. Participants completed the same survey as in Study 2 at least five days before the lab study. They were randomly allocated across three lab conditions. These did not differ significantly in participants' ASE and makeup expertise ($p>.05$).

In the lab, participants were asked to customise their look by choosing a virtual lipstick and an eyeshadow to create a makeup look that they would like to wear. They were told to choose the colours by using a virtual palette (see Fig. 4). In the AR_Customised condition, the virtual palette was part of the AR mirror and the chosen lipsticks and eyeshadows would be visualised on their face in the AR mirror. In the AR_Predesigned and regular mirror conditions, the participants used the virtual palette on a desktop computer on a separate website that was created ad hoc for this study to ensure similar tasks for participants. The virtual palettes in the conditions had the same design layout, the same number of makeup products and the colour names were composed in the same manner. To complete the task, each participant had to type the name of the selected lipstick and eyeshadow.

-- FIGURE 4 --

When assessing ideal and actual attractiveness, we added three additional items to the previous single-item measures of ideal and actual attractiveness to capture further nuances. The actual and ideal attractiveness items were again condensed into a single index to measure the ideal-actual gap. Finally, we examined cognitive variety-seeking, related to self-concept (scale adapted from de Kerviler & Rodriguez, 2019). We also measured task enjoyment and effort as potential covariates. Appendix B reports scale measurement items.

Results

Preliminary analysis. As a check of the AR manipulation, participants in the regular mirror perceived their own reflection as significantly more accurate compared to the two AR conditions - ANOVA: F=63.35, p<.01. $M_{AR\_Customised}$= 3.15(1.37), $M_{AR\_Predesigned}$= 2.49(1.24), $M_{Regular\_Mirror}$ =5.44(1.09). There were no main effects on actual or ideal attractiveness, ideal-actual gap, ideal self-congruence, variety-seeking or self-awareness (p> .05). The participants experienced significantly different enjoyment with their makeup task (ANOVA: F=7.60, p<.01; $M_{AR\_Customised}$=5.40(1.21), $M_{AR\_Predesigned}$=4.48(1.45), $M_{Regular\_Mirror}$=4.28(1.44)) and significantly different task effort (F=3.10, p=.049; $M_{AR\_Customised}$=2.59(1.30), $M_{AR\_Predesigned}$=3.29(1.54), $M_{RegularMirror}$=2.68(1.34)). We included the two measures as covariates in the subsequent analysis. Neither correlated significantly with ASE.

Ideal self-congruence. We ran Model 1 in PROCESS (5,000 bootstrapping samples) to examine the effect of the AR conditions on ideal self-congruence with the mirror image and ASE as the moderator. We separately compared each of the AR conditions to the regular mirror condition. ASE significantly moderated the effect of both AR mirror (AR pre-designed and AR customized) on ideal self-congruence. The results are reported in Table 5.

-- *FIGURE 5* --

Those with high ASE reported significantly lower ideal self-congruence when using either of the two AR mirrors compared to the regular mirror (H3a supported) and no significant differences were observed for low ASE (H3b rejected) - see Fig. 5. When comparing the AR_Predesigned (vs. regular mirror), floodlight analysis showed that those with ASE above 4.44 (t=-1.99, p=.05; 48.78% of the sample) experienced significantly lower ideal self-congruence in the AR_Predesigned mirror. When comparing AR_Customised vs. regular mirror, the J-N point for ASE was 4.50 (51.85% of the sample). We next tested whether ideal self-congruence mediated the effect of an AR mirror on the ideal-actual gap (H4).

Moderated mediation. We ran Model 7 in PROCESS by relying on a bootstrapping procedure (5,000 subsamples, 95% BootCI). We tested for moderated mediation and separately compared AR_Customised vs. regular mirror and AR_Predesigned vs. regular mirror. Regression results are reported in Table 5. Results were similar and significant for both moderated mediations. In both cases the effects of ideal self-congruence on the ideal-actual gap were negative and significant. We also found that the indirect effects of mirror type through ideal congruence on ideal-actual gap were significant for those with high ASE, but insignificant for low ASE (H4a partially supported). The index of moderated mediation was significant: AR_Predesigned (vs. Regular mirror): index=.37, BootSE=.17, $BootCI_{95}$[.05, .70]; AR_Customised (vs. Regular mirror): index=.20, BootSE=.08, $BootCI_{95}$[.07, .36]. Hence, when high ASE individuals are selecting a product, viewing themselves in an AR (vs. regular) mirror significantly lowers their ideal self-congruence with the mirror image, which increases ideal-actual gap. This mediation occurs both when AR makeup is predesigned or customised.

-- *TABLE 5* --

Additionally, we again examined the two gap dimensions by running Model 7 (AR_Customised vs. Regular mirror*ASE=>Ideal congruence=>Ideal/Actual attractiveness). Ideal self-congruence increased actual attractiveness: B=.39(.09), t=4.47, p<.001; CI: [.21,.56]. We found significant indirect effects on actual attractiveness through ideal congruence for high ASE: B=-.40(.13), CI: [-.69,-.17], but not for low ASE and with no such effects on ideal attractiveness (p=.28). Results were similar for AR_Predesigned vs. Regular mirror.

Variety-seeking. To further test H2, we examined whether ASE moderated the effects of mirror conditions on variety-seeking (related to seeking variety of personal appearance to imagine different selves). We again separately contrasted each of the two AR mirrors with the regular mirror. We found significant moderation effects (see Fig. 5) – AR mirrors (vs. regular) lead to significantly higher self variety-seeking for low ASE.

Ideal self-congruence and variety-seeking. Albeit non-hypothesised, we examined the ideal self-congruence as a mediator of the AR mirror effect on self variety-seeking. Each AR condition was compared with the regular mirror, considering the moderating effects of ASE (Model 7). These effects of ideal self-congruence on variety-seeking were significant for AR_Predesigned (vs. Regular mirror), as well as for AR_Customised (vs. Regular mirror) – see Table 5. We found indirect effects on variety-seeking through ideal congruence for high ASE for AR_Predesigned (vs. Regular mirror) and for AR_Customised (vs. Regular mirror) and no insignificant effects for low ASE. The moderated mediation was significant for AR_Predesigned (vs. Regular mirror): index=-.13, SE=.08, $BootCI_{95}$[-.32, -.002] and for AR_Customised (vs. Regular mirror): index=-.10, SE=.06, $BootCI_{95}$[-.23, -.02].

Discussion – Study 3

This study examined the process of using an AR mirror to browse makeup products. We show that when high ASE individuals engage in browsing for a desired look in AR, they find the

AR-modified look (vs. regular mirror image) significantly less congruent with their ideal appearance and this diminished ideal self-congruence increases their ideal-actual gap. This widened ideal-actual gap for high ASE was associated with decreased actual attractiveness. This further supported the findings from Study 1 that the change in the gap for high ASE is activated in the domain of the actual, rather than ideal self. While regular and AR mirrors induced a similar level of general self-awareness (as in Study 1 and 2), the two mirrors led to significant differences in the specific dimension of self-concept.

We further interpret these results in the light of experimental tasks; as in Study 1, the participants in Study 3 were explicitly instructed to focus on their appearance. Through the mediating role of ideal self-congruence, high ASE thus experienced a diminished belief about their actual attractiveness, which widened their ideal-actual gap. On the other hand, such explicit instructions to focus on one's appearance did not affect the ideal-actual gap of low ASE, validating the results from Study 1, which employed similar instructions. We also observed that low ASE did not perceive the augmented image to have a higher ideal self-congruence. This complements the findings from Study 2 that for these consumers AR does not represent a platform for attaining specific, clearly defined beauty ideals.

Importantly though, we observed that when low ASE individuals were able to browse through products directly in the AR mode (AR_Customised condition), this made them significantly more prone to considering newer versions of the self, increasing their willingness to engage in cognitive variety-seeking. This process was not mediated by ideal self-congruence. This suggests that augmentation provides a new reference point for low ASE individuals as they explore potential appearances outside of their existing self-concept – instead of seeking ideals, they are exploring change. As expected, viewing the augmented (vs. virtually unmodified) image leads to a lower propensity for such variety-seeking in the high ASE individuals (in both AR conditions) and this process is mediated by ideal self-congruence. As

high ASE individuals experience lower ideal self-congruence with an augmented image, this makes them less willing to look for variety in the self-domain. This result complements the findings of Study 2, which showed that AR affects behavioural variety-seeking, while Study 3 shows that these effects occur also in the cognitive domain of variety seeking.

Studies 2 and 3 support the upstream effects of augmentation on the self and also show evidence for downstream effects on variety-seeking. Building on these previous findings, we now explore other effects on downstream variables.

Study 4

This study examined downstream effects as a consequence of changes in the key constructs – ideal congruence and ideal-actual gap. The aim can be met by measuring responses to an AR try-on, without the need for experimental manipulation as per earlier studies. Because of the study's exploratory nature, we focused on three different areas: cognitive variety-seeking (again in the self-domain), psychological well-being (self-compassion) and responses to the chosen products (choice confidence).

A survey was distributed online via the platform Prolific and participants were paid £1.30 for taking part. Participants confirmed they were responding on a personal computer with a webcam to avoid variations caused by differences in response device (e.g., vs. mobile). The survey involved participants using a makeup virtual try-on tool (Max Factor My Virtual Makeup Artist https://www.maxfactor.com/vmua/, built by Holition). Participants reported their brand attitude (see Appendix B). They were provided with a short description of the AR try-on and a video tutorial demonstrating how to try on the full AR look. They then used the website with the aim of finding the 'full look' they liked most.

To check successful completion of the task after using the AR tool, the participants first answered whether they selected 'full look' as instructed or options related to single products.

They were asked to briefly describe their chosen look. Afterwards the following measures were randomly shown: ideal self-congruence; actual and ideal attractiveness (to calculate ideal-actual gap as in Study 3); self variety-seeking; choice confidence and self-compassion. We also measured their satisfaction with the chosen look as a control (see Appendix B).

239 females who resided in the UK took part in the study. 39 were eliminated as they failed the 'full look' attention check and a further 16 were removed due to failure of an additional attention check or indication in their open comments of experiencing technical issues with the tool. The final sample was 184 (M_{age}=31.6, SD=9.6), 25.5%, 51.5%, 18.5%, 3.8% and 1.1% had high school, Bachelor's, Master's, PhD or professional degrees respectively as their highest level of education.

We conducted factor analysis to check whether the items load appropriately on their constructs and also to examine common method bias (Podsakoff, 2003). Oblimin rotation showed that the items loaded respectively onto their constructs (all factor loadings >.60 and there were no cross-loadings >.40) (Hair et al. 2006). Moreover, no single factor accounted for the majority of the variance (the highest variance explained by one factor was 33.4%). Common method bias was therefore not considered a concern.

Results

We ran Model 4 in PROCESS (5,000 bootstrapping resamples, 95% CI) by Hayes (2017) to examine direct effects of ideal self-congruence on the above-identified downstream variables and to explore whether the ideal-actual gap mediates these effects. Brand attitude was added as a covariate, given that the AR try-on tool was visibly branded, as well as look satisfaction. The results are presented in Table 6 (see Fig. 6 for visualisation).

The analysis shows that the ideal congruence directly and positively affects variety-seeking related to the self and confidence in the chosen product. Ideal self-congruence reduces

the ideal-actual appearance gap, but it also decreases self-compassion. Importantly, the ideal-actual gap was shown to significantly mediate the effects of ideal self-congruence on self-compassion and these indirect effects were positive.

-- TABLE 6 and FIGURE 6 –

Discussion – Study 4

These results support and extend the findings from Study 3. When consumers try AR looks, the congruence of the chosen look with their ideal appearance decreases the ideal-actual attractiveness gap (H4 again supported). Ideal congruence increases self-related variety-seeking as in Study 3. We also found that ideal congruence inspires stronger confidence in the chosen look, confirming the link between self-congruence and responses to products (Song et al., 2018) and extending it in relation to virtual products. Overall, these results confirm that when consumers perceive the augmentation to be congruent with their ideal self, this elicits positive downstream effects related both to variety-seeking and choice.

An important finding was that the ideal congruence and ideal-actual gap both directly decrease self-compassion, making consumers less tolerant towards any flaws that they perceive they might have in their appearance. However, as ideal congruence diminishes the ideal-actual gap, this leads to positive indirect effects on self-compassion. Reducing the gap is therefore important, because it increases self-compassion, which is associated with mental well-being (Neff, 2003).

General discussion

AR technologies are well known to have important impacts on ‘what’ products and brands we buy or like (Heller et al., 2019; Rauschnabel, Felix, & Hinsch, 2019), but do they change ‘how’

we perceive ourselves? Our study series unveils that such augmentation indeed affects the self-concept. Study 1 and 3 demonstrate that AR mirrors widen the ideal-actual gap for high appearance self-esteem individuals and that this occurs when they are explicitly asked to focus on their appearance. On the other hand, Study 2 shows that when an augmented image is casually displayed without specific instructions – as is often the case with stand-alone mirrors with automatic face recognition in retail stores – the ideal-actual gap diminishes for low appearance self-esteem individuals, while those high in self-esteem demonstrate no change in the gap. We further show that for high-esteem consumers, AR mirrors reduce variety-seeking both in the behavioural domain - in relation to products (Study 2) – and in the cognitive domain – in relation to the self-concept (Study 3). Variety-seeking of the self-concept increases for those with low appearance esteem if they are given customisation options (Study 3). Furthermore, we unpack the effects of AR mirrors on the ideal-actual gap for high esteem individuals to show they are due to lack of congruence between the AR image and their ideal selves (Study 3). Study 4 highlights further downstream variables that augmented self affects: consumer confidence in the chosen AR look; consumer mental well-being, notably self-compassion (Neff, 2003), and the aforementioned variety-seeking. In response to the previous calls for further research on consumer reactions to sensory input and visual cues (Petit, Velasco, & Spence, 2019) and on the effect of sensory experience on the self (Mueller et al. 2020), we contribute knowledge to four areas.

First, business scholars have long discussed the importance of understanding their consumers' self-concepts as these determine behaviour (Sirgy, 1982). We contribute to the literature on this concept by investigating it in the context of immersive technologies. Our findings support the fascinating potential of AR makeup mirrors to inject novel information into the self-concept of consumers by giving rise to a new reference point, conceptualised as "augmented self". Specifically, we show that such augmented visualisation momentarily

affects the perception that the consumers have of themselves (actual) or of their appearance-related aspirations (ideal), disrupting pre-existing discrepancies between these points. The augmented self, indeed, provides evidence that the impact of AR technologies is not skin deep (be it real or virtual skin), but have important effects on what lies underneath.

Second, we contribute knowledge on the critical role of self-esteem in moderating the effects of AR-try-ons on the self. We provide support that AR mirrors are associated with positive effects for those low in self-esteem (reduced actual-ideal gap or increased self-related variety-seeking when customisation options are provided). However, they give rise to negative effects for high-esteem individuals (wider actual-ideal gap, lowered ideal congruence, reduced self-related variety-seeking). Our data supports a fundamental difference in the way consumers' self-concepts react to an augmented image. High-esteem people *resist* the augmentation, which challenges perceptions of their appearance they are already confident in. As an act of self-affirmation, they establish greater distance to the augmentation (Hepper, Gramzow, & Sedikides, 2010). Low-esteem individuals though, as Study 2 and 3 show, *welcome* the augmentation as it diminishes the aspiration for faraway idealised attractiveness and offers the potential for change. These contrasting effects are supported by prior work that shows increased/decreased preference for self-enhancement tools for low/high esteem consumers respectively (Robertson, Fieldman, & Hussey, 2008; Aydinoglu & Krishna, 2012). Notably, this understanding related to the self-concept sheds further light on recent important work that examined the moderating role of self-esteem related to the evaluation of AR technology (Yim & Park, 2019). Furthermore, our findings support the existence of two schools of thought on self-related stimuli, i.e., the self-related stimuli being external or directly enhancing the self. We affirm AR-mirrors as a technology that directly enhances the self as opposed to others that are simply external self-related stimuli with no direct self-enhancement (e.g., mannequins, other consumers). While such external stimuli were shown to have a

negative effect on low self-esteem consumers (Dahl, Argo, & Morales, 2011; Argo & Dahl, 2018), we show that direct self-enhancement with AR has the opposite effect and can negatively impact those high in self-esteem. This further highlights the differences between these two research streams and emphasises that consumers react to self-related stimuli differently, also depending on their personal trait such as self-esteem.

Third, to studies on self-congruence with brands and products (Huber, Eisele, & Meyer, 2018; Confente et al., 2020), we contribute the need to consider ideal self-congruence as a mediator between usage and self-related effects in the context of AR. Our examination of ideal self-congruence explains the contrasting effects across different self-esteem levels. High esteem users felt the AR image was less congruent with their ideal selves, which additionally explains their resistance to it. No such responses were recorded for low self-esteem individuals. This again suggests that for the latter, augmentation does not represent a platform of beauty ideals – at least not any more than a regular mirror would. Additionally, Study 4 shows positive effects of ideal congruence, not only on product level in terms of making consumers confident of their choice, but also on seeking variety in the self-domain. This contributes to prior work investigating how consumers integrate self-congruent stimuli as part of their self (Hollenbeck & Kaikati, 2012). Scholars focused on AR try-ons should attend to this concept to better understand how self-congruence with virtual elements influences one's identity.

Finally, we contribute knowledge on downstream effects of AR-mirror usage. Foremost, we provide the first examination of variety-seeking in the context of AR and how this technology can enable consumers to seek more variety in the self-domain (de Kerviler & Rodriguez, 2019), as augmentation allows consumers' imagination to enlarge. However, we found these positive effects only associate with low self-esteem individuals and, importantly, only when customisation features were enabled (as shown in Study 3). Conversely, high self-esteem individuals consistently demonstrated preference for less variety-seeking in an AR

mirror (Study 2 and 3). We explain that the difference in variety-seeking across low vs. high self-esteem is due to their levels of plasticity and in doing so extend this notion to be important in the study of AR. Specifically, low self-esteem individuals are known to be more plastic and, therefore, more malleable and open to the changes that AR instigates than those who are high in self-esteem (Brockner, 1983). The ability for the augmented self to initiate self-related variety-seeking is therefore gated by the plasticity of the consumer, which is intrinsically linked to self-esteem. Through these findings, our study again extends previous work on self-esteem or self-comparison as key moderators of effects of AR try-on on the experience with the technology (Yim & Park, 2019; Huang, Mathews, & Chou, 2019) or brand-related responses (Baek, Yoo, & Yoon, 2018). Following self-concept studies that examine well-being effects of self-related phenomenon (Marder et al., 2019), we also provide initial insights into the impact of AR try-ons on self-compassion. We show that AR usage may indirectly raise self-compassion through diminishing the ideal-actual gap; however, as we have shown, the latter is dependent on self-esteem. We urge scholars to use these findings as a platform to raise discussion and carry out subsequent research into the well-being effects of AR try-ons.

Beyond our contributions, it is important we discuss an interesting disparity within our results, which accounts for complexity in the notion of the augmented self. Though the overarching aim of Study 1 and Study 2, which was to examine an effect of augmentation on ideal-actual gap, was indeed met, the attribution of this effect differed and therefore our findings should be interpreted with caution. In Study 1, the change in the gap was observed for those with high self-esteem and attributed to decreases in the actual self. Similarly, in Study 3, the indirect effect of the AR mirror on the gap (through ideal congruence) was associated with diminished actual self for high self-esteem people. Whereas in Study 2, the difference in the gap was observed for those with low self-esteem and attributed to a decrease in the ideal self. Although providing an in-depth understanding of the attribution of changes in the gap is beyond

the scope of the study, the differences in results found here raises an important point for discussion and further research. We believe the difference in findings on actual vs. ideal attribution is due to the priming (or a lack thereof) of actual self-focus across the three studies. In Study 1 and 3 the participants were instructed to focus attentively on their present facial appearance, which arguably made their actual selves more directly salient than ideal selves. This caused an increased ideal-actual gap for those with high self-esteem, as the focus on the actual appearance that was realistically and virtually modified, directly diminishing their belief about their attractiveness. Whereas in Study 2, participants were asked more casually to look at the mirror without a specific attention-guiding task. We interpret the lack of effect on high self-esteem individuals to be a consequence of the fact that they were not instructed to pay high levels of attention to the virtually modified image. It was thus easier for them to avoid cognitive processing of the potential change to the self. As the actual self was less primed, it allowed low self-esteem individuals more space and attention for imagination and exploration, moving their attention away from the beauty standards and ideals usually prompted by external stimuli (Samper, Yang, & Daniels, 2017; Argo & Dahl, 2018). We explain this by acknowledging that the observed augmented image diminished the pressure for unachievable high ideal attractiveness and focused the attention on the potential change– this was possible because the augmentation occurred on the self. Our explanation is supported by prior work in psychology on priming and the salience of self-guides, which states that stimuli characteristics have the ability to draw attention to certain guides more than others, also because the attention is rather finite (Carver and Scheier, 2001). We encourage subsequent work to directly unravel the attribution of changes in self-discrepancies that emerge from AR mirrors. Specifically, further work should assess different forms of instructions as a moderator of effects on ideal vs. actual selves and considered salience or attention as mediators, while accounting for differences in self-esteem.

Limitations, managerial implications and conclusion

The majority of our studies were lab-based and had highly controlled mirror interactions. While this allows for high internal validity, future field and in-the-wild studies (Rogers & Marshall, 2019) would provide greater external validity by examining real-world AR interactions. Also, researchers could examine other marketing consequences, such as purchase behaviour. There is also space to further examine negative aspects of AR technology - in line with Rauschnabel, He and Ro (2018), who show that AR can be perceived as a risk to privacy. Moreover, Studies 1, 3 and 4 were all conducted in the UK, while Study 2 was conducted in Norway. We deemed it appropriate as the two countries are culturally similar in many aspects, and we did not find an a priori reason to assume major cultural differences between the two countries in the traits and experiences we measure. We attribute the differential results in Study 1 and Study 2 to task differences and did not investigate the effect of cultural differences, which would be beyond the study scope. It would nevertheless be relevant in the future to examine the effect of culture on augmented self.

AR technologies are of great interest to the field of human-computer interaction, which focuses on design and user experience (Preece, Rogers & Sharp, 2011), as well as to marketing practitioners concerned with the commercial outcomes (Hilken et al., 2017). Both fields can benefit from the insights about the psychological process that consumers undergo when interacting with an AR mirror. Our findings about users' self-esteems urge designers to develop flexible interfaces that would dynamically allow for different experiences. Users could be offered the choice between an interface to explore completely new looks, emphasising the transformational nature of makeup (more suitable for low self-esteem people desiring change) or, conversely, to examine looks that will highlight and enhance the "real" you (more appropriate for high self-esteem consumers). Also, choices should be given between full vs. partial looks to allow for varying degrees of change.

Overall, we encourage managers to acknowledge that consumers respond differently to the same AR features and that more resources should be deployed into enabling more customised AR experiences. Furthermore, the psychologically negative reactions (widened gap, decreased self-compassion) urge brands to deploy AR in socially responsible manner to minimise negative effects and raise awareness around such issues. Consumers with low self-esteem can benefit from AR as it reduces their otherwise wide ideal-actual gap, but it also makes them susceptible to self-change. While this can have negative effects, it can also drive positive changes. Future research could examine how vulnerable consumers, such as teenagers who privately experiment with their appearance (Gentina et al., 2012), can make use of AR tools to creatively express themselves. AR could serve as a mechanism to visualise oneself as an inspiring role-model and therefore create positive social impact. Brands should explore such possibilities – not only as a way of reinforcing their brand image, but also to contribute to progressive social change and consumer well-being (Albrecht et al., 2017; Marder et al., 2019).

Finally, we envision the augmented self to be a widely-applicable phenomenon, reaching well beyond solely makeup applications. For instance, AR face filters are also used as a self-expression tool on social media (Farace et al., 2017) and the fashion sector continues to invest in AR clothes try-ons that augment the whole body (Pantano & Vanucci, 2019). It was out of scope of this study to study other formats or uses of augmentation. There are exciting opportunities ahead to examine how such technologies might alter the way we relate to ourselves – and to others - and would shed further light on the notion and complexity of *augmented self*. These are relatively uncharted territories. Exploring them could allow for more personalised, and thus commercially viable, AR experiences. Perhaps even more importantly, it would urge societies to acknowledge and consider the relevance of human identity as a core value in the design of multi-sensory and immersive technologies.

Bibliography

Aaker, J. L. (1999). The Malleable Self: The Role of Self-Expression in Persuasion. *Journal of Marketing Research*, *36*(1), 45–57.

Ahadzadeh, A. S., Sharif, S. P., & Ong, F. S. (2017). Self-schema and self-discrepancy mediate the influence of Instagram usage on body image satisfaction among youth. *Computers in Human Behavior*, *68*, 8-16.

Albalooshi, S., Moeini-Jazani, M., Fennis, B. M., & Warlop, L. (2019). Reinstating the Resourceful Self: When and How Self-Affirmations Improve Executive Performance of the Powerless. *Personality and Social Psychology Bulletin*, *46*(2), 189-203.

Albrecht, C. M., Stokburger-Sauer, N. E., Sprott, D. E., & Lehmann, D. R. (2017). Adolescents' perceived brand deprivation stress and its implications for corporate and consumer well-being. *Psychology & Marketing*, *34*(8), 807-822.

Alicke, M. D., & Sedikides, C. (2009). Self-enhancement and self-protection: What they are and what they do. *European Review of Social Psychology*, *20*(1), 1–48.

Argo, J. J., & Dahl, D. W. (2017). Standards of Beauty: The Impact of Mannequins in the Retail Context. *Journal of Consumer Research*, *44*(5), 974-990.

Aron, A., & Aron, E. N. (1996). Self and self-expansion in relationships. *Knowledge structures in close relationships: A social psychological approach*, 325-344.

Askegaard, S., Gertsen, M. C., & Langer, R. (2002). The body consumed: Reflexivity and cosmetic surgery. *Psychology & Marketing*, *19*(10), 793–812.

Aydinoğlu, N. Z., & Krishna, A. (2012). Imagining thin: Why vanity sizing works. *Journal of Consumer Psychology*, *22*(4), 565-572.

Barhorst, J. B., McLean, G., Shah, E., & Mack, R. (2021). Blending the real world and the virtual world: Exploring the role of flow in augmented reality experiences. *Journal of Business Research*, *122*, 423-436.

Baumgardner, A. H. (1990). To know oneself is to like oneself: Self-certainty and self-affect. *Journal of Personality and Social Psychology*, *58*(6), 1062-1072.

Bearden, W. O., Hardesty, D. M., & Rose, R. L. (2001). Consumer self-confidence: Refinements in conceptualization and measurement. *Journal of consumer research*, *28*(1), 121-134.

Bekk, M., Spörrle, M., Völckner, F., Spieß, E., & Woschée, R. (2017). What is not beautiful should match: how attractiveness similarity affects consumer responses to advertising. *Marketing Letters*, *28*(4), 509-522.

Bloch, P. H., & Richins, M. L. (1992). You look "Marvellous": The pursuit of beauty and the marketing concept. *Psychology & Marketing*, *9*(1), 3–15.

Brockner, J. (1983). Low self-esteem and behavioral plasticity: Some implications. *Review of Personality and Social Psychology*, *4*, 237-271.

Campbell, J. D., & Lavallee, L. F. (1993). Who am I? The role of self-concept confusion in understanding the behavior of people with low self-esteem. In *Self-esteem* (pp. 3-20). Springer, Boston, MA.

Carrozzi, A., Chylinski, M., Heller, J., Hilken, T., Keeling, D. I., & de Ruyter, K. (2019). What's Mine Is a Hologram? How Shared Augmented Reality Augments Psychological Ownership. *Journal of Interactive Marketing*, *48*, 71-88.

Carver, C. S., & Scheier, M. F. (2001). *On the self-regulation of behavior*. Cambridge University Press.

Cash, T. F., Dawson, K., Davis, P., Bowen, M., & Galumbeck, C. (1989). Effects of cosmetics use on the physical attractiveness and body image of American college women. *Journal of Social Psychology*, *129*(3), 349–355.

Confente, I., Scarpi, D., & Russo, I. (2020). Marketing a new generation of bio-plastics products for a circular economy: The role of green self-identity, self-congruity, and perceived value. *Journal of Business Research*, *112*, 431-439.

Dahl, D. W., Argo, J. J., & Morales, A. C. (2011). Social information in the retail environment: The importance of consumption alignment, referent identity, and self-esteem. *Journal of Consumer Research*, *38*(5), 860-871.

de Kerviler, G., & Rodriguez, C. M. (2019). Luxury brand experiences and relationship quality for Millennials: The role of self-expansion. *Journal of Business Research*, *102*, 250-262.

Duval, S., & Wicklund, R. A. (1973). Effects of objective self-awareness on attribution of causality. *Journal of Experimental Social Psychology*, *9*(1), 17–31.

Dweck, C. S., Hong, Y., & Chiu, C. (1993). Implicit Theories - Individual differences in the Likelihood and Meaning of Dispositional Inference. *Personality and Social Psychology Bulletin*, *19*(5), 644–656.

Dwivedi, Y. K., Ismagilova, E., Hughes, D. L., Carlson, J., Filieri, R., Jacobson, J., Jain, V., Karjaluoto, H., Kefi, H, Krishen, A., Kumar, V., Rahman, M. M., Raman, R., Rauschnabel, P., Rowley, J., Salo, J., Tran, G., & Wang, Y. (2020). Setting the future of digital and social media marketing research: Perspectives and research propositions. *International Journal of Information Management*, 102-168.

Epley, N., & Whitchurch, E. (2008). Mirror, mirror on the wall: Enhancement in self-recognition. *Personality and Social Psychology Bulletin*, *34*(9), 1159–1170.

Etcoff, N. L., Stock, S., Haley, L. E., Vickery, S. A., & House, D. M. (2011). Cosmetics as a feature of the extended human phenotype: Modulation of the perception of biologically important facial signals. *PloS one*, *6*(10), e25656.

Farace, S., van Laer, T., de Ruyter, K., & Wetzels, M. (2017). Assessing the effect of narrative transportation, portrayed action, and photographic style on the likelihood to comment on posted selfies. *European Journal of Marketing*, *51*(11/12), 1961-1979.

Festinger, L. (1954). A Theory of Social Comparison Processes. *Human Relations*, 7 (2), 117–40.

Finkelstein, S. R., Xu, X., & Connell, P. M. (2019). When variety is not the spice of life: The influence of perceived relational self-threat on variety seeking in snack choices. *Appetite 136*, 154-159.

Flynn, L. R., & Goldsmith, R. E. (1999). A short, reliable measure of subjective knowledge. *Journal of Business Research*, *46*(1), 57-66.

Franke, N., & Schreier, M. (2010). Why customers value self-designed products: The importance of process effort and enjoyment. *Journal of Product Innovation Management*, *27*(7), 1020-1031.

Gao, L., Wheeler, S. C., & Shiv, B. (2009). The "Shaken Self": Product choices as a means of restoring self-view confidence. *Journal of Consumer Research*, *36*(1), 29–38.

Gaustad, T., Samuelsen, B. M., Warlop, L., & Fitzsimons, G. J. (2019). Too much of a good thing? Consumer response to strategic changes in brand image. *International Journal of Research in Marketing*.

Gentile, B., Grabe, S., Dolan-Pascoe, B., Twenge, J. M., Wells, B. E., & Maitino, A. (2009). Gender differences in domain-specific self-esteem: A meta-analysis. *Review of General Psychology*, *13*(1), 34-45

Gentina, E., Palan, K. M., & Fosse-Gomez, M. H. (2012). The practice of using makeup: A consumption ritual of adolescent girls. *Journal of Consumer Behaviour, 11*, 115-123

Goukens, C., Dewitte, S., & Warlop, L. (2009). Me, myself, and my choices: The influence of private self-awareness on choice. *Journal of Marketing Research*, *46*(5), 682–692.

Govern, J. M., & Marsch, L. A. (2001). Development and validation of the situational self-awareness scale. *Consciousness and Cognition*, *10*(3), 366-378.

Grewal, L., Hmurovic, J., Lamberton, C., & Reczek, R. W. (2019). The self-perception connection: Why consumers devalue unattractive produce. *Journal of Marketing*, *83*(1), 89-107.

Grill-Spector, K., & Kanwisher, N. (2005). Visual recognition: As soon as you know it is there, you know what it is. *Psychological Science, 16*(2), 152-160.

Harrison, K. 2001. Ourselves, our bodies: Thin-ideal media, self-discrepancies, and eating disorder symptomatology in adolescents. *Journal of Social & Clinical Psychology,* 20, 289–323

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis*. Prentice Hall, Upper Saddle River, NJ: Pearson

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford publications.

Heatherton, T. F., & Polivy, J. (1991). Development and validation of a scale for measuring state self-esteem. *Journal of Personality and Social Psychology*, *60*(6), 895.

Heine, S. J., & Lehman, D. R. (1999). Culture, self-discrepancies, and self-satisfaction. *Personality and Social Psychology Bulletin*, *25*(8), 915-925.

Heller, J., Chylinski, M., de Ruyter, K., Mahr, D., & Keeling, D. I. (2019). Let me imagine that for you: Transforming the retail frontline through augmenting customer mental imagery ability. *Journal of Retailing*, *95(2)*, 94-114.

Hepper, E. G., Gramzow, R. H., & Sedikides, C. (2010). Individual differences in Self-enhancement and Self-protection strategies: An integrative analysis. *Journal of Personality*, *78*(2), 781–814. http://doi.org/10.1111/j.1467-6494.2010.00633.x

Higgins, E. T. (1987). Self-discrepancy: A theory relating Self and affect. *Psychological Review*, *94*(3), 319–340.

Hilken, T., de Ruyter, K., Chylinski, M., Mahr, D., & Keeling, D. I. (2017). Augmenting the eye of the beholder: Exploring the strategic potential of augmented reality to enhance online service experiences. *Journal of the Academy of Marketing Science*, *45*(6), 884-905.

Hinsch, C., Felix, R., & Rauschnabel, P. A. (2020). Nostalgia beats the wow-effect: Inspiration, awe and meaningful associations in augmented reality marketing. *Journal of Retailing and Consumer Services*, *53*, 101-987.

Hollenbeck, C. R., & Kaikati, A. M. (2012). Consumers' use of brands to reflect their actual and ideal selves on Facebook. *International Journal of Research in Marketing*, *29*(4), 395-405.

Huang, T. L., Mathews, S., & Chou, C. Y. (2019). Enhancing online rapport experience via augmented reality. *Journal of Services Marketing*, *33*(7), 851–865

Huber, F., Eisele, A., & Meyer, F. (2018). The role of actual, ideal, and ought self-congruence in the consumption of hedonic versus utilitarian brands. *Psychology & Marketing*, *35*(1), 47-63.

Jansen, A., Voorwinde, V., Hoebink, Y., Rekkers, M., Martijn, C., & Mulkens, S. (2016). Mirror exposure to increase body satisfaction: Should we guide the focus of attention towards positively or negatively evaluated body parts? *Journal of Behavior Therapy and Experimental Psychiatry*, *50*, 90-96.

Japutra, A., Ekinci, Y., & Simkin, L. (2019). Self-congruence, brand attachment and compulsive buying. *Journal of Business Research*, *99*, 456-463.

Javornik, A. (2016). 'It's an illusion, but it looks real!'Consumer affective, cognitive and behavioural responses to augmented reality applications. *Journal of Marketing Management*, *32*(9-10), 987-1011.

Javornik, A., & Pizzetti, M. (2017). Mirror mirror on the wall, who is real of them all? The role of augmented self, expertise and personalisation in the experience with augmented reality mirror. In A., Gneezy, V., Griskevicius, & P. Williams. *ACR North American Advances* (Vol. 45, pp. 423-427). Duluth, MN : Association for Consumer Research.

Javornik, A., Rogers, Y., Moutinho, A. M., & Freeman, R. (2016). Revealing the shopper experience of using a "magic mirror" augmented reality makeup application. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems* (pp. 871–882). Brisbane: ACM.

Javornik, A., Rogers, Y., Gander, D., & Moutinho, A. (2017). MagicFace: Stepping into character through an augmented reality mirror. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 4838-4849). Denver: ACM.

Kim, H. S., & Drolet, A. (2003). Choice and self-expression: A cultural analysis of variety-seeking. *Journal of personality and social psychology*, *85*(2), 373.

Ko, D. W., & Park, J. (2020). I am you, you are me: game character congruence with the ideal self. *Internet Research*. Forthcoming.

Lee, H. H., Kim, J., & Fiore, A. M. (2010). Affective and cognitive online shopping experience: Effects of image interactivity technology and experimenting with appearance. *Clothing and textiles research Journal*, *28*(2), 140-154.

Lenggenhager, B., Tadi, T., Metzinger, T., & Blanke, O. (2007). Video ergo sum: manipulating bodily self-consciousness. *Science*, *317*(5841), 1096-1099.

Mafra, A. L., Varella, M. A. C., Defelipe, R. P., Anchieta, N. M., de Almeida, C. A. G., & Valentova, J. V. (2020). Makeup usage in women as a tactic to attract mates and compete with rivals. *Personality and Individual Differences*, *163*.

Maimaran, M., & Wheeler, S. C. (2008). Circles, squares, and choice: The effect of shape arrays on uniqueness and variety seeking. *Journal of Marketing Research*, *45*(6), 731-740.

Malär, L., Krohmer, H., Hoyer, W. D., & Nyffenegger, B. (2011). Emotional brand attachment and brand personality: The relative importance of the actual and the ideal Self. *Journal of Marketing*, *75*(4), 35–52.

Mandel, N., Rucker, D. D., Levav, J., & Galinsky, A. D. (2017). The compensatory consumer behavior model: How self-discrepancies drive consumer behavior. *Journal of Consumer Psychology*, *27*(1), 133-146.

Marder, B., Archer-Brown, C., Colliander, J., & Lambert, A. (2019). Vacation posts on Facebook: A model for incidental vicarious travel consumption. *Journal of Travel Research*, *58*(6), 1014-1033.

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, *41*(9), 954–969.

Martenson, R. (2018). Curiosity motivated vacation destination choice in a reward and variety-seeking perspective. *Journal of Retailing and Consumer Services*, *41*, 70-78.

McAlister, L., & Pessemier, E. (1982). Variety seeking behavior: An interdisciplinary review. *Journal of Consumer Research*, *9*(3), 311-322.

Merle, A., Senecal, S., & St-Onge, A. (2012). Whether and how virtual try-on influences consumer responses to an apparel web site. *International Journal of Electronic Commerce*, *16*(3), 41-64.

Miniard, P. W., Bhatla, S., Lord, K. R., Dickson, P. R., & Unnava, H. R. (1991). Picture-based persuasion processes and the moderating role of involvement. *Journal of consumer research*, *18*(1), 92-107.

Mueller, F. F., Lopes, P., Strohmeier, P., Ju, W., Seim, C., Weigel, M., Nanayakkara, S., Obrist, M., Li, Z., Delfa, J., Nishida, J., Gerber, E, Svanaes, D., Grudin, J., Greuter, S., Kunze, K., Erickson, T., Greenspan, S., Inami, M., Marshall, J., Reiterer, H., Wolf, K., Meyer, J., Schiphorst, T., Wang, D., & Maes, P. (2020, April). Next Steps for Human-Computer Integration. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (pp. 1-15).

Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and identity*, *2*(3), 223-250.

Olsen, S. O. (2002). Comparative evaluation and the relationship between quality, satisfaction, and repurchase loyalty. *Journal of the Academy of Marketing Science*, *30*(3), 240-249.

Pantano, E., Pizzi, G., Scarpi, D., & Dennis, C. (2020). Competing during a pandemic? Retailers' ups and downs during the COVID-19 outbreak. *Journal of Business Research*, *116*, 209-213.

Pantano, E., & Vannucci, V. (2019). Who is innovating? An exploratory research of digital technologies diffusion in retail industry. *Journal of Retailing and Consumer Services*, *49*, 297-304.

Park, L. E., & Maner, J. K. (2009). Does self-threat promote social connection? The role of self-esteem and contingencies of self-worth. *Journal of Personality and Social Psychology*, *96*(1), 203.

Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology*, *885*(879), 10-1037.

Raes, F., Pommier, E., Neff, K. D., & Van Gucht, D. (2011). Construction and factorial validation of a short form of the self-compassion scale. *Clinical psychology & psychotherapy*, *18*(3), 250-255.

Rauschnabel, P. A. (2018). Virtually enhancing the real world with holograms: An exploration of expected gratifications of using augmented reality smart glasses. *Psychology & Marketing*, *35*(8), 557-572.

Rauschnabel, P. A., He, J., & Ro, Y. K. (2018). Antecedents to the adoption of augmented reality smart glasses: A closer look at privacy risks. *Journal of Business Research*, *92*, 374-384.

Rauschnabel, P. A., Felix, R., & Hinsch, C. (2019). Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. *Journal of Retailing and Consumer Services*, *49*, 43-53.

Rauschnabel, P. (2021). Augmented reality is eating the real-world! The substitution of physical products by holograms. *International Journal of Information Management*, *57*, 102-279.

Riis, J., Simmons, J. P., & Goodwin, G. P. (2008). Preferences for enhancement pharmaceuticals: The reluctance to enhance fundamental traits. *Journal of Consumer Research*, *35*(3), 495–508. http://doi.org/10.1086/588746

Robertson, J., Fieldman, G., & Hussey, T. (2008). " Who wears Cosmetics?" Individual Differences and their Relationship with Cosmetic Usage. *Individual Differences Research*, *6*(1), 38-56.

Rogers, Y., & Marshall, P. (2017). Research in the wild. *Synthesis Lectures on Human-Centered Informatics*, *10*(3), i-97.

Roggeveen, A. L., Grewal, D., & Schweiger, E. B. (2020). The DAST framework for retail atmospherics: The impact of in-and out-of-store retail journey touchpoints on the customer experience. *Journal of Retailing*, *96*(1), 128-137.

Rosenberg, M. (1979). *Conceiving the Self.* New York: Basic Books.

Samper, A., Yang, L. W., & Daniels, M. E. (2017). Beauty, effort, and misrepresentation: How beauty work affects judgments of moral character and consumer preferences. *Journal of Consumer Research*, *45*(1), 126-147.

Scheier, M. F., & Carver, C. S. (1985). The self-consciousness: A revised version for use with general population. *Journal of Applied Social Psychology*, *15*(8), 687–699.

Scheier, M. F., & Carver, C. S. (1980). Private and public self-attention, resistance to change, and dissonance reduction. *Journal of Personality and Social Psychology*, *39*(3), 390–405.

Scholz, J., & Duffy, K. (2018). We ARe at home: How augmented reality reshapes mobile marketing and consumer-brand relationships. *Journal of Retailing and Consumer Services*, *44*, 11-23.

Sedikides, C., & Strube, M. J. (1997). Self-evaluation: To thine own self be good, to thine own self be sure, to thine own self be true, and to thine own self be better. *Advances in Experimental Social Psychology*, *29*, 209–269. http://doi.org/10.1016/S0065-2601(08)60018-0

Sellen, A., Rogers, Y., Harper, R., & Rodden, T. (2009). Reflecting human values in the digital age. *Communications of the ACM*, *52*(3), 58-66.

Sirgy, M. J. (1982). Self-concept in consumer behavior: A critical review. *Journal of Consumer Research*, *9*(3), 287-300.

Sirgy, M.J., Grewal, D., Mangleburg, T.F., Park, J.O., Chon, K.S., Claiborne, C.B., Johar, J.S. and Berkman, H. (1997). Assessing the predictive validity of two methods of measuring self-image congruence. *Journal of the Academy of Marketing Science*, *25*(3), 229-241.

Smink, A. R., van Reijmersdal, E. A., van Noort, G., & Neijens, P. C. (2020). Shopping in augmented reality: The effects of spatial presence, personalization and intrusiveness on app and brand responses. *Journal of Business Research*, *118*, 474-485.

Sobol, K., & Darke, P. R. (2014). "I'd like to be that attractive, but at least I'm smart": How exposure to ideal advertising models motivates improved decision-making. Journal of Consumer Psychology, 24(4), 533–540.

Song, R., Moon, S., Chen, H. A., & Houston, M. B. (2018). When marketing strategy meets culture: the role of culture in product evaluations. *Journal of the Academy of Marketing Science*, *46*(3), 384-402.

Spiller, S. A., Fitzsimons, G. J., Lynch Jr, J. G., & McClelland, G. H. (2013). Spotlights, floodlights, and the magic number zero: Simple effects tests in moderated regression. *Journal of Marketing Research*, *50*(2), 277-288.

Story, A. L. (2004). Self-esteem and self-certainty: A mediational analysis. *European Journal of Personality*, *18*(2), 115-125.

Veale, D., & Riley, S. (2001). Mirror, mirror on the wall, who is the ugliest of them all? The psychopathology of mirror gazing in body dysmorphic disorder. *Behaviour Research and Therapy*, *39*(12), 1381-1393.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063.

Wedel, M., Bigné, E., & Zhang, J. (2020). Virtual and augmented reality: Advancing research in consumer marketing. *International Journal of Research in Marketing*, *37*(3), 443-465.

White, K., & Argo, J. J. (2009). Social identity threat and consumer preferences. *Journal of Consumer Psychology*, 19(3), 313–325.

Yang, A. X., & Urminsky, O. (2015). The foresight effect: Local optimism motivates consistency and local pessimism motivates variety. *Journal of Consumer Research*, *42*(3), 361-377.

Yau, A., Marder, B., & O'Donohoe, S. (2019). The role of social media in negotiating identity during the process of acculturation. *Information Technology & People*. https://doi.org/10.1108/ITP-09-2017-0305

Yim, M. Y. C., & Park, S. Y. (2019). "I am not satisfied with my body, so I like augmented reality (AR)": Consumer responses to AR-based product presentations. *Journal of Business Research*, *100*, 581-589.

Tables and figures

Authors	*Type of AR employed (device used)*	*Theoretical foundation*	*Methodology*	*Self-related concepts as moderators or as a contextual variable*	*Self- related consumer responses*	*Selected key findings*
Farace et al. (2017)	AR lens overlaid on a selfie photo	Narrative transportation	Online experiment (professional vs. silly selfie)	Perceived silliness of a selfie	n/a	Perceived silliness of the visualised narrative affects the likelihood to comment; Parody selfies (vs. snapshots) increase the silliness
Javornik & Pizzetti (2017)	AR make-up try-on (on tablet)	Psychological ownership; Augmentation; Gestalt theory	Lab experiment with AR make-up mirrors with customizable features	n/a	Self-esteem; Psychological ownership	AR mirrors with holistic and customizable superimpositions increase self-esteem, psychological ownership and purchase intentions
Scholz & Duffy (2018)	AR make-up try-on (on smartphone)	Extended self	Ethnographic study with AR make-up app for smartphone	Personal space context enables more intimacy in brand relationship	Self-experimentation and self-expression	Branded AR make-up app becomes a personal space where intimate brand relationship are formed
Baek, Yoo, & Yoon (2018)	Clothes AR try-on (on computer)	Self-referencing; Self-attention; Self-brand connection	Online experiment with AR try-on (on self vs. other)	Narcissism (moderator)	Self-brand connection	High (vs. low) narcissism leads to a stronger effect of AR try-on on self-brand connection and indirectly on purchase intention
Huang, Mathews, & Chou (2019)	Clothes AR try-on online system (on computer)	Self-determination theory; Self-evaluation; Sensory modality	Lab-based scenario-survey approach with AR try-on	Body surveillance (moderator)	Personal connection with the system as part of rapport with technology	Consumers with high body surveillance (vs. low body surveillance) achieve higher synchronous sense of technology ownership control
Yim & Park (2019)	Sunglasses AR try-on (on website)	Media experience and adoption; Body image; Self-schema	Experimental study with AR try-on vs. product on website	Body satisfaction moderator (moderator)	n/a	Unfavourable body image leads to significantly better consumer AR experience (adoption, enjoyment, usefulness) with AR technology
Rauschnabel, Felix, & Hinsch (2019)	AR apps visualising musical annotations or furniture (on smart device)	Consumer inspiration; Information integration theory	AR used in a controlled environment	n/a	Inspiration	Hedonic benefits and perceived augmentation quality increase consumer inspiration, which strengthens brand attitude
Carozzi et al. (2019)	Holograms (head-mounted display)	Psychological ownership; Socially situated cognition	Lab-based experiment with holograms	n/a	Psychological ownership	Effect of hologram customisation on psychological ownership is mediated by differentation and assimilation
Hinsch, Felix, & Rauschnabel (2020)	Lego playground AR app (on smart tablet)	Consumer inspiration; Nostalgia	AR used in a controlled environment	n/a	Inspired-by; Inspired-to	AR stimuli induce psychological inspiration and motivate consumer
Smink et al. (2020)	AR app visualising make-up try-on and furniture (on smart tablet)	Spatial presence; Personalisation ; Intrusiveness	Lab-based experiment with AR (vs. non-AR) try-on	n/a	Perceived personalisation	Personalising product trial with AR try-on increases purchase intentions and attitude towards the app
This study	AR make-up try-on (on smart tablet)	Self-schema; Behavioral plasticity; Variety-seeking	Lab-based experiment with AR mirror vs regular mirror	Appearance self-esteem (moderator)	Ideal-actual gap, Ideal congruence with augmented image	High self-esteem (vs. low) leads to increased ideal-actual gap, lower variety-seeking and lower ideal congruence in AR mirror (vs. regular mirror)

Table 1: Selected literature in marketing investigating the link between augmented reality and the self

Key concepts	Definitions (adapted specifically to appearance domain)
Related to self-concept	
Ideal self	Person's desired representation of his/her physical appearance that s/he aspires to (adapted from Sirgy, 1982)
Actual self	One's perception how s/he really looks (adapted from Sirgy, 1982)
Ideal-actual gap	The discrepancy between person's existing (actual) and desired (ideal) physical attractiveness (adapted from Sirgy, 1982)
Self-esteem	General attitude towards own physical appearance (adapted from Rosenberg, 1979)
Related to visual augmentation and self-concept	
Ideal self-congruence with augmentation	Cognitive match between a consumer's ideal self and the image in the augmented mirror (adapted from Sirgy et al., 1997; Malär et al., 2011)
Augmented self	A potential change of the self-concept (ideal, actual or gap between them) as a result viewing a visually modified representation of oneself in an AR mirror (own definition)

Table 2: Key concepts related to self-concept and augmentation

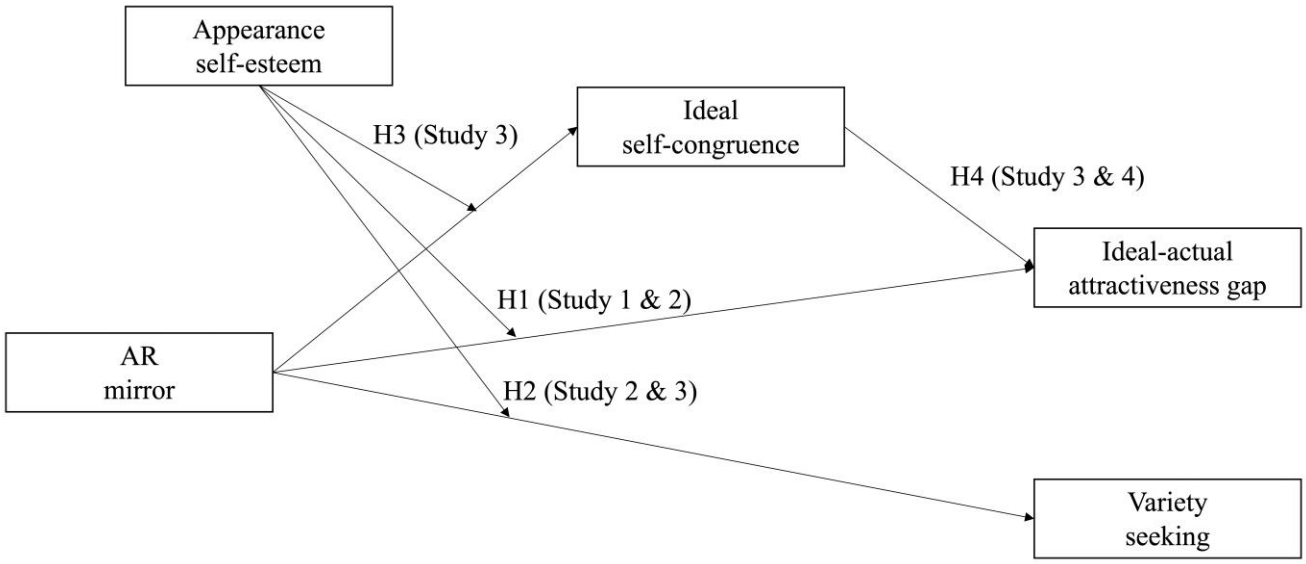

Fig. 1: Conceptual model with hypotheses tested in Study 1, 2, 3 and 4

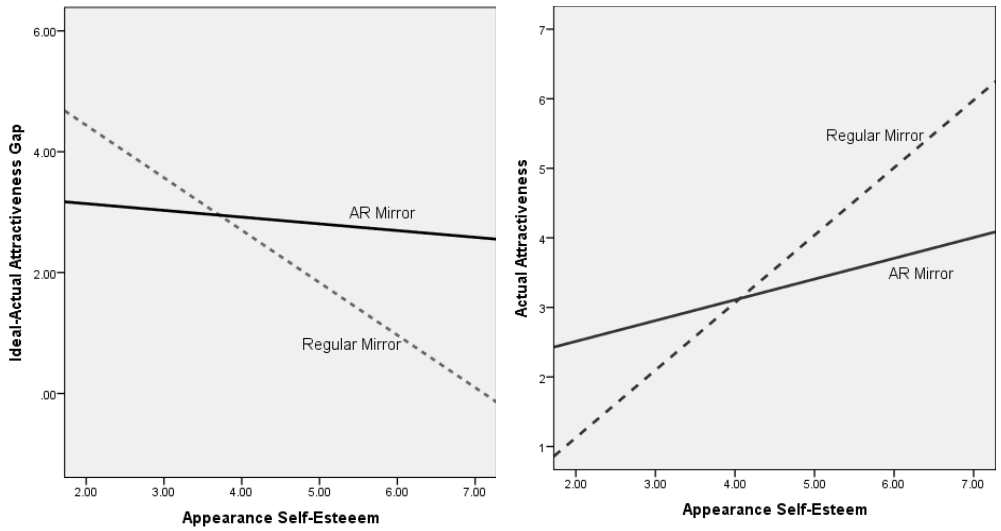

Fig. 2 – Study 1: Ideal-actual gap (left) and actual attractiveness (right) in AR vs. regular mirror with appearance self-esteem (ASE) as a moderator

	Dependent variables			
	Ideal-actual gap		*Actual attractiveness*	
Predictor	*B coef. (SE), [CI]*	*t-value*	*B coef. (SE), [CI]*	*t-value*
AR Mirror (vs regular mirror) (X)	**-2.81 (1.25), [-5.29,-.33]**	**-2.25***	**2.73 (1.07), [.60, 4.86]**	**2.55***
ASE (Moderator - M)	**-.87 (.19), [-1.24,-.49]**	**-4.62*****	**.97 (.16), [.65, 1.29]**	**6.03*****
Interaction (X*M)	**.76 (.26), [.23,1.28]**	**2.88****	**-.67 (.23), [-1.12, -.22]**	**-2.98****
Moderator value				
High ASE	**1.73 (.49), [.76,2.70]**	**3.54*****	**-1.30 (.42), [-2.14, -.47]**	**-3.11****
Low ASE	-.24 (.45), [-1.12,.65]	-.53	.44 (.38), [-.32, 1.20]	1.16

*Table 3: Study 1 - Regression output of Model 1 (PROCESS, Hayes, 2017) testing the effects of AR mirror vs. regular mirror; 5000 bootstrapping resamples; Low and high ASE are estimated at 16th and 84th percentile respectively, CI – 95% confidence interval; sig. level: *p<.05, **p< .01, ***p <.001*

	Dependent variables					
	Ideal-actual gap		*Ideal attractiveness*		*Lipstick variety-seeking*	
Predictor	*B coef. (SE), [CI]*	*t-value*	*B coef. (SE), [CI]*	*t-value*	*B coef. (SE), [CI]*	*t-value*
AR Mirror (vs. regular mirror) (X)	**-4.88 (1.88), [-8.64,-1.13]**	**-2.59***	**-4.11(1.53), [-7.16, -1.06]**	**-2.69****	7.53 (4.08), [-.59,15.66]	1.85
ASE (Moderator - M)	**-1.01 (.22), [-1.44, -.57]**	**-4.62*****	**-.60 (.18), [-.95,-.24]**	**-3.37****	.48 (.47), [-.45, 1.42]	1.03
Interaction (X*M)	**.86 (.36), [.15, 1.57]**	**2.40***	**.72(.29), [.14,1.29]**	**2.47***	**-1.56 (.77), [-3.09, -.02]**	**-2.02***
Moderator value						
High ASE	.42 (.50), [-.58, 1.42]	.83	.33 (.41), [-.49, 1.13]	.80	**-2.13 (1.09), [-4.30, .04]**	**-1.96†**
Low ASE	**-1.40(.54), [-2.48, -.34]**	**-2.62****	**-1.20 (.44), [-2.07, -.33]**	**-2.76****	1.20 (1.16), [-1.12, 3.51]	1.03

*Table 4: Study 2 - Regression output of Model 1 (PROCESS Hayes, 2017) testing the effects of AR mirror (vs. regular mirror); Low and high ASE are estimated at 16th and 84th percentile respectively; significance value: ***p <.001, **p< .01, *p<.05, †p<.10; CI: 95% confidence interval*

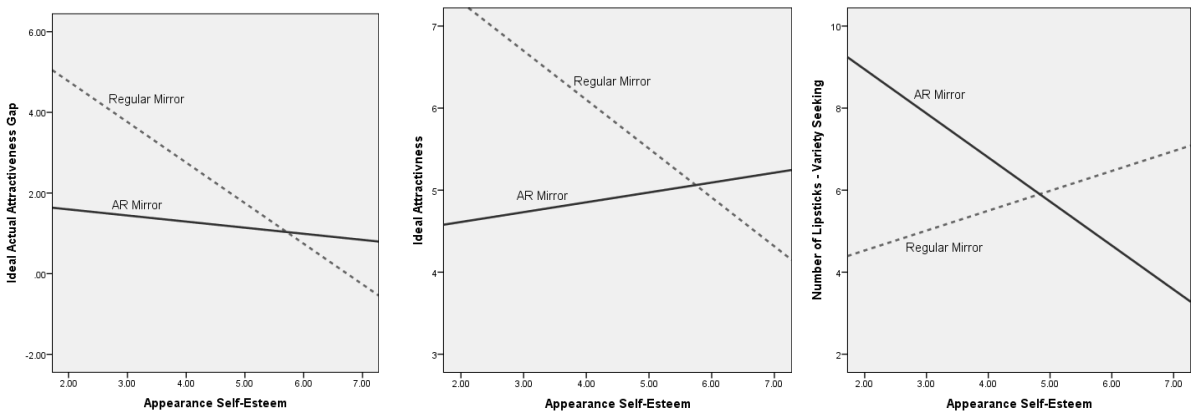

Fig 3: Study 2 - Ideal-actual gap (left), ideal attractiveness (centre) and variety seeking (right) in AR and regular mirror with appearance self-esteem (ASE) as a moderator

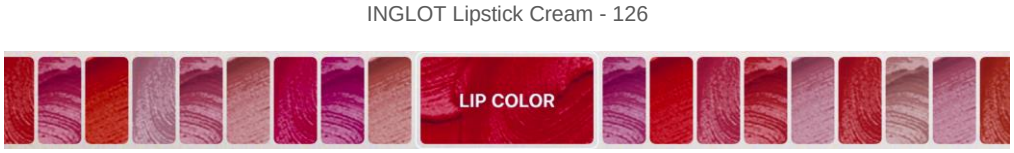

Fig. 4: Study 3 -The virtual palette that participants used to browse through lipstick colours

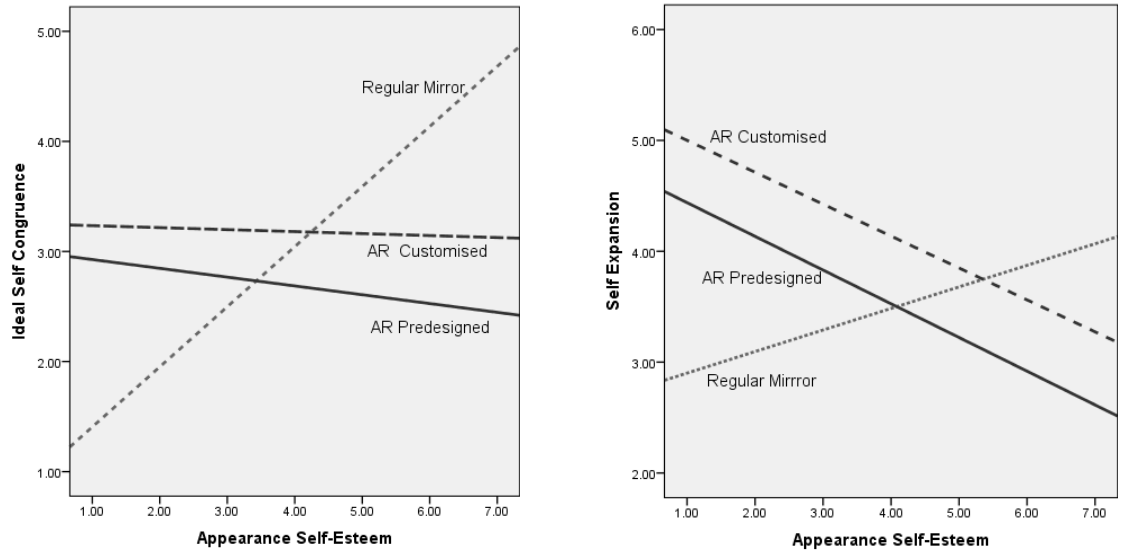

Fig. 5: Study 3 - Ideal congruence (left) and self-related variety-seeking (right) in AR Predesigned, AR Customised and regular mirror; ASE as a moderator

	AR_Predesigned vs. regular mirror		**AR_Customised vs. regular mirror**	
	B coef. (SE), [CI]	*t-value*	*B coef. (SE), [CI]*	*t-value*
Predictors on ideal self-congruence *(Model 1)*				
Mirror condition	**1.77 (1.03), [-.28, 3.82]**	**1.72†**	**1.31 (.58), [.16, 2.45]**	**2.27***
ASE	**.57 (.15), [.26, .88]**	**3.79*****	**.58 (.18), [.23-.94]**	**3.30****
(Moderator)				
Mirror condition* ASE	**-.55 (.22), [-.98, -.11]**	**-2.52***	**-.38 (.12), [-.63, -.13]**	**-3.07****
Conditional effects of moderator				
High ASE	**-1.51 (.46), [-2.43,-.58]**	**-3.25****	**-1.05 (.30), [-1.65,-.45]**	**-3.47*****
Low ASE	.13 (.46), [-.79,1.05]	.29	.17 (.26), [-.36, .69]	.64
Predictors on ideal-actual gap *(Model 7)*				
Mirror	-.18 (.44), [-1.05, .70]	-.40	-.13 (.24), [-.61, .36]	-.52
Ideal self-congruence (Mediator)	**-.68 (.14), [-.95,.41]**	**-4.94*****	**-.52 (.13), [-.77,-.27]**	**-4.06*****
Conditional effects:				
Mirror * ASE (Moderator) => Ideal self-congruence (Mediator)				
High ASE	**1.02 (.36), [.32, 1.75]**	--	**.54 (.20), [.21, .99]**	--
Low ASE	-.09 (.31), [-.70, .53]	--	-.09 (.13), [-.36, .17]	--
Predictor on variety-seeking *(Model 1)*				
Mirror	1.61 (.99), [-.36,3.58]	1.63	**1.40 (.51), [.38,2.42]**	**2.75****
ASE (Moderator)	.23 (.15), [-.07,.52]	1.54	.22 (.16), [-.09,.53]	1.41
Mirror * ASE	**-.44 (.21), [-.85, -.02]**	**-2.09***	**-.30 (.11), [-.52, -.08]**	**-2.75****
Conditional effects of moderator				
High ASE	**-1.00 (.44), [1.89,-.11]**	**-2.26***	**-.46 (.27), [-.99,.07]**	**-1.73†**
Low ASE	.30 (.44), [-.58, 1.18]	.69	**.50 (.23), [.04, .96]**	**2.15***
Predictors on variety-seeking *(Model 7)*				
Mirror	-.18(.32), [-.81, .45]	-.57	.19(.18), [-.16, .55]	1.08
Ideal self-congruence (Mediator)	**.24(.10), [.04, .44]**	**2.42***	**.26(.09), [.08, .45]**	**2.79****
Conditional effects:				
Mirror * ASE (Moderator) => Ideal self-congruence (Mediator)				
High ASE	**-.37(.20), [-.79,-.03]**	--	**-.28(.14), [-.57,-.04]**	--
Low ASE	.03 (.12), [-.20, .30]	--	.04(.08), [-.07, .23]	--

*Table 5: Study 3 - Regression output of Model 1 and Model 7 (PROCESS Hayes, 2017); Low and high ASE are estimated at 16th and 84th percentile respectively; ***p <.001, **p< .01, *p<.05; †p<.10; 95% CI*

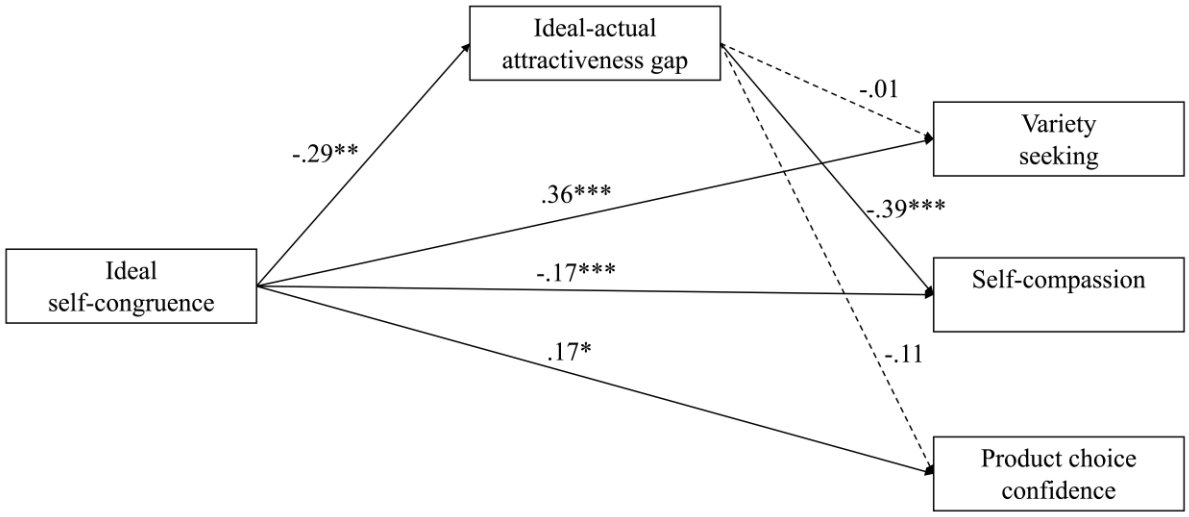

*Fig. 6: Overview of direct effects in Study 4; Coefficients with significance value:***p<.001, **p<.01, * p<.05*

	Mediator (M) and outcome (Y); Coefficient(SE), bootstrapping 95% CI			
	Ideal-actual gap (M)	Variety-seeking (Y)	Self compassion (Y)	Choice confidence (Y)
Direct effects				
Ideal self-congruence (X)	**-.29(.09)**, [-.46,-.12]**	**.36(.08)***, [.21,.51]**	**-.17**(.05), [-.31, -.03]**	**.17*(.07), [.03, .32]**
Ideal-actual gap (M)		-.01(.06), [-.14,.12]	**-.39***(.06), [-.51, -.27]**	-.11(.06), [-.24, .01]
Indirect effects				
Ideal self-congruence => Ideal-actual gap		.003(.02), [-.04, .04]	**.12(.04), [.03, .21]**	.03(.02), [-.01, .08]
Covariates				
Brand attitude	.11(.10), [-.10,.33]	**.33(.09)***, [.16,.51]**	-.06(.08), [-.23,.10]	-.13(.09), [-.30,.04]
Look satisfaction	-.02(.09), [-.18,.15]	.14(.07), [-.01,.28]	.02(.07), [-.12,.15]	**.27(.07)***, [.13,.41]**

*Table 6: Study 4 - Direct and indirect effect of ideal self-congruence (X) on ideal actual gap (M – mediator) and downstream variables responses (Y - outcome); Reported are coefficients (standard errors), significance level (***p<.001, **p<.01, * p<.05); CI: 95% confidence interval*

Appendix A – Stimuli development and cover story

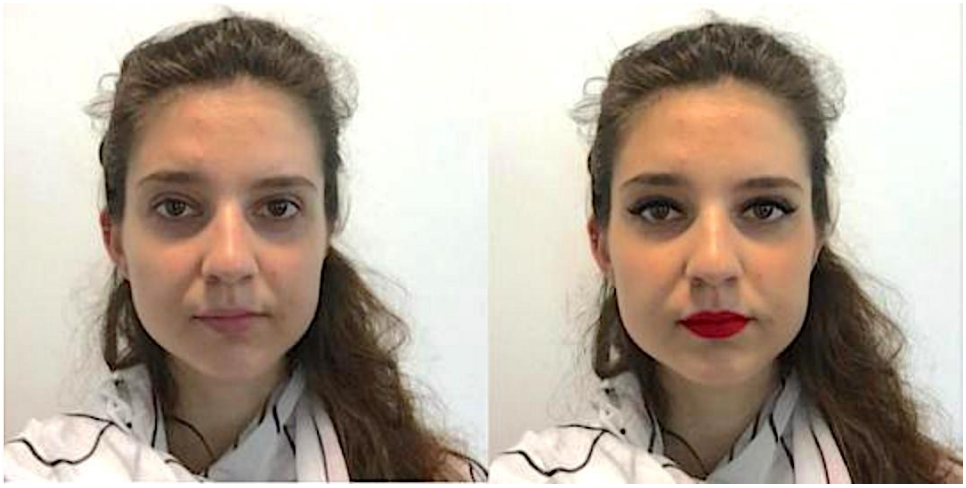

Figure A – Virtual make-up stimuli as used in the three experiments studies

Stimuli development and pretest: We pretested the stimulus to check the perception of make-up. Four pairs of pictures with different female faces were developed (see Fig. A); each pair included a face without and with the make-up look. In this pre-test, 57 MTurkers (M_{age} = 34.74) evaluated these four pairs (displayed in a random order) on beauty standards (Argo & Dahl, 2018) and on attractiveness (Bekk et al., 2017) on 7-point Likert scales. The make-up look was evaluated positively or as neutral (Table 1). We used this AR look in the lab studies.

		No Make-up	Make-up overlaid	F	sig
Picture 1	*Beauty standards*	3.46(1.70)	4.55(1.23)	7.776	p <.01
	Attractiveness	4.00(1.33)	4.65(1.23)	3.633	p =.06
Picture 2	*Beauty standards*	3.27(1.60)	3.77(1.50)	.485	p >.05
	Attractiveness	3.63(1.67)	4.23(1.50)	.254	p >.05
Picture 3	*Beauty standards*	4.32(1.61)	4.58(1.24)	1.456	p >.05
	Attractiveness	4.14(1.60)	4.34(1.60)	1.951	p >.05
Picture 4	*Beauty standards*	3.26(1.70)	5.03(1.07)	22.745	p <.001
	Attractiveness	3.48(1.34)	4.90(1.30)	16.478	p <.001

Table 1. Means (standard deviations) and ANOVA statistics per stimuli pretested

Cover story in Study 1 and Study 2: *This study examines relationship between the evaluation of faces and word recognition. Previous research has shown numerous connections between the way people assess faces and numbers, but less is known about the relation between a human ability to evaluate faces and word patterns. You will be asked questions about personality and you will also be given a set of tasks related to faces and words.*

Cover story in Study 3: *This study examines the relationship between the evaluation of faces, word recognition and product choice. Previous research has shown numerous connections between the way people assess faces, products and numbers. Less is known about the relation between a human ability to evaluate faces, word patterns and how that affects their product choice. You will be asked questions about personality and you will also be given a set of tasks related to faces, products and words.*

Appendix B - Additional analysis for Study 1

	Dependent variables			
	Ideal-actual gap		*Actual attractiveness*	
Predictor	*B coef. (SE), [CI]*	*t-value*	*B coef. (SE), [CI]*	*t-value*
Mirror conditions (X)	*-1.00 (.46), [-1.91,-.08]*	*-2.16**	*1.49 (.58), [.33,2.65]*	*2.55**
ASE (Moderator - M)	*-.24 (.07), [-.37,-.10]*	*-3.44****	*.62 (.09), [.45, .80]*	*7.18****
*Interaction (X*M)*	*.28 (.10), [.08,.48]*	*2.80***	*-.33 (.13), [-.58, -.08]*	*-2.98**
Moderator value				
High appearance self-esteem	*.68 (.20), [28,1.07]*	*3.41****	*-.46 (.25), [-.96, .04]*	*-1.84†*
Low appearance self-esteem	*-.16 (.19), [-.54,.22]*	*-.83*	*.51 (.24), [.03, 1.00]*	*2.11**

Table 2: Model 1 (PROCESS, Hayes, 2017) testing the effects of AR mirror (coded as 1) vs. regular mirror (coded as 0) vs. no mirror (coded as -1); 5000 samples for bootstrapping; Low and high ASE are estimated at $16^{th}$and 84^{th} percentile respectively, CI – 95% confidence interval; *p<.05, **p< .01, ***p <.001, †*p*<.10

The main effects on the actual attractiveness were significant across the three conditions (ANOVA: F=4.22, p<.05; $M_{Regular\_mirror}$=3.83(1.61) vs. M_{AR}=3.22(1.29) vs. M_{No_mirror}=2.81(1.56)), but not on the ideal one (F=1.34, p=.27) and marginally significant for ideal-actual gap (F=2.69, p=.07). ASE significantly moderated the effects AR mirror (vs regular mirror or no mirror) on ideal-actual gap (Table 2). High ASE participants experienced significantly higher ideal-actual gap in AR mirror and no significant differences were observed for low ASE. ASE did not significantly moderate the effects of the AR mirror (vs regular mirror or no mirror) on ideal attractiveness, but the moderating effects were significant for actual attractiveness, where the effects were significant for low ASE ones.

Appendix C – Scales

Main scales (authors, scale reliability)	**Measurement items;** **7-point Likert scale: 1 – Strongly Disagree to 7- Strongly Agree (unless specified otherwise below)**
Appearance self-esteem (Heatherton & Polivy, 1991) S1: α=.90; S2: α =.89; S3: α=.96	I feel satisfied with the way how my face looks. I am dissatisfied with my looks. I feel good about myself. I am pleased with my appearance. I feel unattractive.
Importance of physical appearance (Netemeyer, Burton, & Lichtenstein, 1995) S2: α = .89; S3: α = .85	The way I look is extremely important to me. I am very concerned about my appearance. I would feel embarrassed if I was around people and did not look my best. Looking my best is worth the effort. It is important that I always look good.
Make-up expertise (Flynn, & Goldsmith, 1999) S2: α=.92; S3: α=.93	I know how to judge the quality of a make-up. I do not feel very knowledgeable about make-up. Among my friends, I am one of the "experts" on make-up. I think I know enough about make-up to feel pretty confident when I make a purchase. I know pretty much about make-up. Compared to most other people, I know less about make-up. I have heard of most of the new make-up trends that are around. When it comes to make-up, I really don't know a lot. I can tell if a make-up item is worth the price of not.
Self-awareness (Govern & Marsch, 2001) S1: α=.77, S2: α=.82; S3: α=.84	I am conscious of my inner feelings I am concerned about the way I present myself. I am conscious about the way I look. I am reflective about my life. I am concerned about what other people think of me. I am aware of my innermost thoughts.
Actual attractiveness (Heine & Lehman, 1999) *Single-item measure in S1 and S2 **Added to the initial single item in S3: α =.97, S4: α=.97	I am extremely attractive* I am extremely beautiful** I am extremely good-looking** I am extremely pretty** (1-Not at all accurate; 7-Very accurate)
Ideal attractiveness (Heine and Lehman, 1999) *Single-item measure in S1 and S2 **Added items in S3: α =.95, S4: α=.97	Ideally, I would like to be extremely attractive* Ideally, I would like to be extremely beautiful** Ideally, I would like to be extremely good-looking** Ideally, I would like to be extremely attractive** (1-Not at all accurate; 7-Very accurate)
Accurate representation (adapted from Samper, Yang, & Daniels, 2017) S2: α =.94, S3: α=.93	The tablet mirror is showing an accurate reflection of me. The tablet mirror is representing my appearance truthfully. The image in the tablet mirror reflects who I really am. The mirrored reflection represents my appearance in a correct manner.
Ideal self congruence with mirror image (adapted from Merle, Senecal, & St-Onge, 2012) S3: α=.96; S4: α=.96	My face in the mirror is consistent with how I would ideally like to see myself The image of my face in the mirror reflects who I would ideally like to be My reflection in the mirror is the image of how I would ideally like to look
Self-related variety-seeking (de Kerviler & Rodriguez 2019) S3: α=.92; S4: α=.96	I have a new perspective on the appearance of my face I feel that I have learned new things about my looks. I feel that I have increased my knowledge about my appearance I feel a greater awareness of my appearance I have added new qualities to my sense of self in terms of my looks I have expanded my sense of the kind of appearance that I have

Self-compassion (adapted from Raes et al. 2011 and Neff, 2003) S4: α=.85	I'm tolerant of my own appearance flaws and inadequacies. When I see aspects of my appearance that I don't like, I feel down. I'm intolerant and impatient towards those aspects of my appearance I don't like. I try to be understanding and patient towards those aspects of my appearance I don't like.
Choice confidence (adapted from Bearden, Hardesty, & Rose 2001) S4: α=.85	I have doubts about the make-up look that I chose I wonder if I have chosen the right make-up look I did not choose the right make-up look for me (all three items were reverse-coded)
Task enjoyment (Franke & Schreier 2010) S3: α = .93; S4: α=.90	To which extent did you find the make-up search task: Fun Interesting Enjoyable
Task effort (Franke & Schreier 2010) S3: α = .77; S4: α=.81	To which extent did you find the make-up search task: Effortful Exhausting Complicated
Brand attitude (Miniard et al. 2011)	Negative – Positive Unfavourable – Favourable Bad - Good
AR look satisfaction (α=.93) (adapted from Olsen, 2002)	I found a make-up look that I liked I am satisfied with my chosen make-up look

Table 1: Measurement scales, reliability and