Effect of the Information about the Use and Non-Use of Photoshopping of Female Ad Models on Brand Attitudes of Young Female Consumers

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There is a public debate about whether marketers should be required to provide information about photoshopping when they use idealized images of female ad models. Proponents of such information expect that this measure will counteract diminished self-esteem in young females and reduce consumer deceptions. In two experiments, we examine the effects of three factors: the depiction of female ad models in their idealized vs. authentic appearance, the presence vs. absence of information that an idealized model has been digitally retouched, and the presence vs. absence of information that a model shown in her authentic appearance has not been digitally retouched. We contribute to research as we focus on the impact on brand attitudes while previous research has mainly focused on the influence on self-esteem. We present new findings that could assist decisions in practice: For most beauty product categories, we find that non-extreme levels of model idealization result in highest brand attitudes. Information about photoshopping ad models-promoting beauty products leads to lower brand attitude. Information about the non-use of photoshopping authentic ad models tends to result in higher brand attitudes.

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1. Introduction

1.1. Authentic and idealized appearance

We investigate the effects of idealizing female beauty in advertising and information about this fact. As there is no consistent terminology, we start by the definition of some concepts. We define female beauty as the degree to which a female's physical appearance or her photographed image conforms to the beauty stereotype from the viewpoint of perceivers. The female beauty stereotype is a mental image in the sense of a widely accepted visual impression about what makes females physically attractive (Hausenblas et al. 2013) and that exists only in the mind of perceivers. It currently consists of imaginations about females who are slim, young, or young-looking, with large eyes and smooth skin, symmetry in face and body, high cheekbones, white teeth, a certain waist-to-hip ratio, a white eye background, etc. (e.g., Cohn and Adler 1992; Borges 2011, p. 6; Slater et al. 2012; Janssen and Paas 2014, p. 168). The beauty stereotype is time- and culture-contingent. Additionally, it is assumed to be affected by the over-presentation of these images in mass media such as fashion magazines, television programs, motion pictures (e.g., Wills 1981; Richins 1991; Spitzer et al. 1999; Bower and Landreth 2001, p. 2; Bandura 2002; Groesz et al. 2002; Suls et al. 2002; Sypeck et al. 2004; Borges 2011, p. 8; Harrison and Hefner 2014, p. 135) and social media (McBride et al. 2019). Moreover, the beauty stereotype has a variance, i.e., varies to some extent between perceivers, because „beauty is also in the eyes of the beholder" (Langlois et al. 2000, p. 390).

There are three sources of a female beauty, *first*, natural physical face and body features in relation to the beauty stereotype that leads to natural beauty, *second*, the application of face and body beautification measures such as embellishments by cosmetics, clothing, shapewear (formerly corset), jewelry, wigs, hairstyles, tattoos, shoes,

beauty treatments, and currently also minor plastic surgeries to create a more beautiful appearance in relation to the beauty stereotype, and *third*, measures of face and body idealization through photoshopping including the use of beauty filters to conform even better to the beauty stereotype. In our theoretical considerations and studies, we only focus on the third source.

As a typical means of embellishment, cosmetics are used to reduce features such as skin blemishes, wrinkles, pores, stretch marks, and other skin imperfections. After embellishment, female appearance is still authentic („real") in the sense that perceivers cannot recognize a difference between the appearance of the embellished face and body in reality and a portrait of that person in a photo or video. Through means of photoshopping, it is possible not only to perfectly remove wrinkles, skin blemishes, scars, and other signs of imperfection that deviate from the beauty stereotype, but also to remarkably change the skin tone and modify body parts. For instance, legs can be lengthened, breasts reshaped or enlarged, necks lengthened, and waists narrowed (Slater et al. 2012; Tiggemann et al. 2013, p. 45; Kwan et al. 2018). After photoshopping, the appearance of females can reach a level of aesthetic perfection that measures of embellishment cannot reach and exists only in virtuality. Many perceivers will see a difference between what a female looks like in real life and her strongly photoshopped image. While females can adopt for themselves embellishment measures used by other females, e.g., cosmetics and clothing, they cannot „adopt" lengthened legs, smaller waists, perfect facial symmetry, etc. for their real body (Harrison and Hefener 2014, p. 135; Cornelis and Peter 2017, p. 102; Paraskeva et al. 2017, p. 165; Schirmer et al. 2018, p. 131).

We denote the appearance of non-photoshopped models, whether in their natural beauty or after embellishment, as authentic appearance. We refer to the appearance of photoshopped models as idealized appearance. Unilever's cosmetics brand Dove (2023a, 2023b) is a pioneer in this area as a result to its famous 2004 „Real Beauty" campaign. Dove informs consumers about how it uses the term „no digital distortion" on its website. They denote female images as „authentic" if images are „real" and „accurate." They describe that authentic appearance, in their terminology, also includes measures of photoshopping to reduce „temporary marks such as blotches, pimples, rashes, blemishes, shave bumps, stray hairs, lipstick from teeth, food particles from teeth, shadows of dark eyes caused by lighting, and seams and stains from clothing." Therefore, for Dove, authentic appearance is natural beauty, improved by measures of face and body embellishment, and enhanced by *weak* applications of photoshopping. In contrast, we define the difference between authentic and idealized model appearance by not using versus using photoshopping (for different definitions of authentic models, see [1]).

1.2. Usage of photoshopping

Photo retouching was invented in 1855 by the Munich photographer Franz Seraph Hanfstaengl (Macias 1990, p. 4). Historically, the applications of this technique have focused less on the aspect of enhancing human beauty and more on image manipulation for political and propaganda purposes in the visual depicting of armed conflicts. In recent years, photoshop has been used primarily to create idealized images of persons.

Many young females use photoshopping privately to create more beautiful virtual versions of their own physical appearance. Numerous apps such as AirBrush, Everlook, FaceApp, FaceTune, Meitu, Peachy Body Editor, and YouCam enable mobile phone users to easily develop selfies to approximate the beauty stereotype. The initial motives can be entertainment and experiencing surprise and fun by looking at such images. However, many young females are beginning to post such pictures, for example, on their Instagram pages. Through submitting idealized images, they may expect more favorable reactions from friends and followers on social media – but when they themselves compare their mirror image to their idealized image, they may begin to be disappointed that they do not and cannot really look like their photoshopped selves.

In addition, in the commercial environment, photoshopping is often used by marketers who idealize models shown in advertisements (Häfner and Trampe 2009; Brown 2014; Semaan et al. 2018). To illustrate the idealized female beauty in advertisements that is the result of photoshopping, we show the image of Kim Kardashian with thin, long arms, adjusted jawline and nose, and smooth skin promoting Beats Fit Pro earbuds on the top right of *Fig. 1* (the image is a screenshot from a presentation on Facebook). Actress Jessica Alba was selected by Campari for the 2008 campaign, a year after she was voted the „Sexiest Woman in the World" by readers of the „For Him Magazine." The campaign drew a lot of attention, not because of the use of this actress to promote Campari, but mainly because of intense digital editing as the unedited photos leaked out to public; the retouched image is shown in *Fig. 1*, top left. In the top center of *Fig. 1*, we show an ad that depicts a digitally idealized face of an unknown ad model promoting carrot cream.

Photoshopping is the application of a technique. It can be used to alter images in several ways. For instance, images of people can be de-familiarized in the sense that the eyes of a person are exaggeratedly large, lips enlarged to a grotesque shape and size, etc. Beauty filters can also be used to alter appearances in an entertaining way. We only consider applications of photoshop to make models look more like the beauty stereotype, i.e., are used for face and body idealization. In our empirical studies, we investigate the effect of perceived improvements of model appearance and information about its use and non-use. Hence, we will use a manipulation-check to examine if photoshopping is recognized by the female perceivers.

1.3. Relevance of the issue due to the public debate associated with photoshopping ad models and marketers' options

This marketing practice sparked public criticism about the use of photoshopped models. *First*, opponents of using photoshopping techniques to idealize the appearance of ad models fear consumer deception. They express concern that some consumers mistakenly believe that these ad models actually look like their photoshopped versions. It is believed that these consumers will not be able to separate even heavily photoshopped images from non-photoshopped images. One reason why this might be deceptive was discussed in the UK in 2011. Joanne Swinson, a Liberal Democrat, has sparked a public debate about advertising for the beauty brand L'Oréal by articulating the suspicion that the depicted ad models did not look beautiful because they used the advertised cosmetics, but because of photoshopping (Gibson 2011; Semaan et al. 2018, p. 766; Taylor et al. 2018, p. 382). *Second*, there is concern that when consumers compare their own appearance with that of photoshopped ad models, which may be manifestations of the unattainable beauty stereotype, disappointment with one's own body is likely to be higher than in the condition when ad models are presented in their natural beauty and body diversity or as slightly embellished images. A decreased appearance-related self-esteem, i.e., body dissatisfaction, can lead to psychological and physiological problems such as eating disorders (bulimia and anorexia), the demand for plastic surgery, the use of Botox to embellish parts of one's face, etc. (Posavac et al. 2001; Markey and Markey 2009; Borges 2011, p. 7; Furnham and Levitas 2012; Tiggemann et al. 2013, p. 45; Bury et al. 2016; Association of German Aesthetic Plastic Surgeons 2018 and 2020). *Third*, Veldhuis (2014) adds the concern that some females might develop reactance, a feeling that is generally described by Brehm (1966) as a negative feeling. The rationale is as follows: Some females may strictly reject brands that promote products using photoshopped images. This reduces the number of „acceptable brands," which amounts to a reduction in product choice. The co-existing negative feeling, reactance, impairs the well-being of these females. Marketers can deal with these concerns in different ways, and some ways are outlined below.

Switch from idealized to authentic model appearance. Likely in response to the concerns articulated in the public debate, some fashion and cosmetics companies such as Aerie, Asos, CVS, Desigual, Dove, H&M, Mango, Olay, Target, and Urban Decay have stated that they will refrain from the (heavy) usage of image processing of ad models (Mosbergen 2016; Kallenbrunnen 2017; Jung and Heo 2020; Heurer and Berge 2021, p. 2). To cite another example, in recent years, mass media has informed consumers about critical events related to the lingerie brand Victoria's Secret. Most likely in response to this criticism, the company launched a „What Women Want" campaign in 2021, which aims to show more diversity and authenticity of female models' faces and bodies.

Providing information about the use of photoshopping. Marketers may include additional information, which may even appear as a warning, in advertisements that the depicted models have been photoshopped. This measure is expected by advocates in public debate to avoid the adverse consequences of photoshopping, i.e., consumer deception and reduced appearance-related self-esteem. In Australia, the National Advisory Group on Body Image (2009, p. 40) published the recommendation: „Disclose images that have been retouched" (Tiggemann et al. 2013 p. 46; Bury et al. 2017, p. 18). In the UK, the Advertising Standards Authority (2023) requires advertisers to adhere to the „guiding principle" to avoid „suggesting that an individual's happiness or emotional wellbeing (depends) on conforming to an idealized gender-typical body shape or physical features." In France and Norway, the concerns described above led to the decision that the inclusion of information about the use of photoshopping for the purpose of ad model idealization is a legal requirement. Knoll (2020) reports that such information must also be given in ads in the Argentinian metropolitan area of Buenos Aires. In France, since 2017, this information must be „retouched photograph" or „photographie retouchée" in advertising (Pounders 2018, p. 133). Violators must pay fines equal to 30 % of the costs of the advertisement, but no more than EUR 37,500 (French Public Health Code 2017). However, this information is discreetly included in ads in France and could therefore be ignored by consumers (Karsten 2021). In contrast, in Norway, marketers using photoshopped ad models are required to depict a large, logo-like symbol with the text „Retusiert Person Reklame." In the middle row of *Fig. 1*, we present examples showing what ads published in France and Norway revealing the use of photoshopping look like (two ads from France and one ad from Norway). We are not aware of any brands that have launched ad campaigns in which they voluntarily provided such information in additional countries. In Germany, in 2023, there is still an ongoing discussion about whether to require the inclusion of information in the ads per law if models are photoshopped. Each federal state of Germany is represented by a minister in the *Konferenz der Gleichstellungs- und Frauenministerinnen und -minister, -senatorinnen und -senatoren der Länder (GFMK)* which aims to harmonize regulations concerning gender equality. At the 2022 annual conference, they emphasized the concern about an „unrealistic beauty ideal among girls and women." A majority of the members of that committee decided to urge Germany's federal government to enact „legal regulations about mandatory labeling of the use of retouching ad model images and the use of beauty filters to modify the appearance of influencers who have more than 10,000 followers." They demand: „This regulation should be valid for all videos or photos in which the face, body, skin, or hair have been altered with image processing and which are to be shown on social networks or made accessible for advertising purposes."

Notes: In the advertisement for Caroll you can read „photography retouchée" in very small black letters on the bottom left. This information is also written in white of the bare foot of Irina Shayk, who is promoting Intimissimi. The Dove ad contains the information „Keine digitale Veränderung" [no digital processing] at the bottom right. Sources of the images are listed in End note [2].

Fig. 1: Use/non-use of photoshopping of ad models and information about its use/non-use

Providing information about the non-use of photoshopping ad models. In addition, when marketing practice depicts authentic images of models, they may include information about the non-use of photoshopping. In the bottom row of *Fig. 1,* an ad promoting the fashion brand Aerie is depicted which contains the information „The girl in this photo has not been retouched – The real you is sexy;" it is taken from the brand's 2014 „Aerie Real" campaign (Dockterman 2014; Rodgers et al. 2019). Additionally, we show an ad used by Dove cosmetics in 2019 that inserted the information that it depicts an unretouched model (Giorgianni et al. 2020). In 2021, cosmetics brand Olay included a logo with the words „skin promise" in its ads; the corresponding website informs consumers that the meaning of the logo indicates the non-use of photoshopping.

1.4. Objective of this study

Different criterion. There are numerous studies that have examined how the presence vs. absence of additional information about the use of photoshopping of ad models affects consumer responses. Most of these studies examined the effect of disclosure of photoshopping on appearance-related self-esteem of the ad viewers; we will summarize the results in Section 2.3.2. The use of this criterion as dependent variable makes sense since public discussion of photoshopped ad models is interested – in addition to considerations of consumer deception – in females' body satisfaction that is expected to be not decreased if a „warning" about the use of photoshopping is issued in the advertisement. In contrast, while this is the central issue in the public debate, we take the perspective of marketers and examine the impact of photoshopping and supplemental information about its usage on *brand attitude* (while considering self-esteem among other

mental processes as an antecedent of brand attitude). Marketers may not only have an interest in preventing their customers from diminished body satisfaction but also a high interest in maintaining positive attitudes toward their brands, and these goals may not lead to congruent decisions about whether photoshopped models should be depicted. Compared to the extensive research on the impact of photoshopping and disclosure of photoshopping on self-esteem, research on the impact of photoshopping and disclosure of photoshopping on brand attitude or purchase intention is scarce and results are partly contradictory [3].

Questions. We ask three research questions for which marketers may want to receive answers to overcome suboptimal decisions.

RQ1: If including information about photoshopping is not mandatory (what is the case in other countries than France and Norway at present) and brand attitude is the marketers' primary goal when designing ads, should they either present models in idealized (photoshopped) or authentic appearance? Photoshopping is a binary fact but enables idealization at different levels. Marketers therefore may additionally question if there is an optimum level of idealization that does not equal the maximum level. Can we determine a non-extreme optimum of model idealization?

RQ2: When providing information about photoshopping becomes mandatory, marketers who use photoshopped models and decide to keep showing such images might ask the question about whether brand attitude is affected when they additionally provide this information in their ads. What are the implications of this decision?

RQ3: Marketers who choose to present models in their authentic appearance might consider adding explicit information that they are not manipulating the model's appearance through photoshopping and may ask whether this information affects brand attitude. Should they inform about the non-use of photoshopping?

Contribution. Our investigations aim to contribute to knowledge by answering these three questions and to substantiate these answers with theories and insights into the underlying mental processes in young female consumers. By doing so, we close the research gap regarding the answers to these questions. We suspect that the responses with respect to brand attitude as criterion variable are contingent on the category, e.g., beauty-related vs. not beauty-related products to which the promoted product belongs. The purpose of our study is therefore also to assist such decisions by marketers depending on the product category.

Scope of our analysis. We focus on consumer responses to photoshopped unknown ad models and do not consider reactions to photoshopped celebrities or to photoshopped selfies presented on social media. Since the concerns raised in the public debate mainly relate to young female consumers, who are believed to be highly susceptive to photoshopping and therefore vulnerable to deception and body dissatisfaction, we examine responses of young females. Our goal is to help improve managerial decisions by providing results about how young female consumers *on average* react to ad versions that show models in their authentic or idealized appearance, rather than on showing how serious the impact of photoshopped models could be on an individual level. This is not to deny that erroneous belief in the authenticity of heavily photoshopped images can cause health-related problems in young females. The public debate fueled by numerous opinion leaders must also have an essential influence on the managerial decisions described above. We do not consider how marketers should take these views of opinion leaders into account when deciding about photoshopping ad models and disclosing photoshop information.

In Section 2, we propose hypotheses about the effect of ad model idealization and the presence of information about the use and non-use of photoshopping. In Sections 3 and 4, we present findings from two studies. Based on the results of the studies, we provide answers to the research questions in Section 6.

2. Hypotheses Development

2.1. Conceptual model

In accordance with the questions asked above, we divide the Theory section into three parts. *First*, we discuss effects of using ad models who are idealized through photoshopping vs. the depiction of their authentic counterparts on brand attitude. *Second*, we predict effects of providing vs. not providing information about the use of photoshopping when applied to create the idealized ad models on brand attitude. *Third*, we discuss effects of providing vs. not providing information about the non-use of photoshopping when showing ad models in their authentic appearance on brand attitude.

Mediating effects. We will consider several mediating effects, i.e., we surmise that model beauty, appearance-related self-esteem, brand trustworthiness (meant as the antonym of deception through the usage of photoshopping), and brand-self connectedness mediate the effects of model idealization and supplemental information on brand attitude. In addition, we will add findings from the analysis of qualitative data.

Moderating effect. Since we presume that these mediating effects are contingent on the product category, we explain what categories we consider. On the upper level, we separate products that are or are not associated with human beauty (Bower and Landreth 2001, p. 2). On the second level, we divide products whose benefits are somehow associated with beauty into four sub-categories [4]:

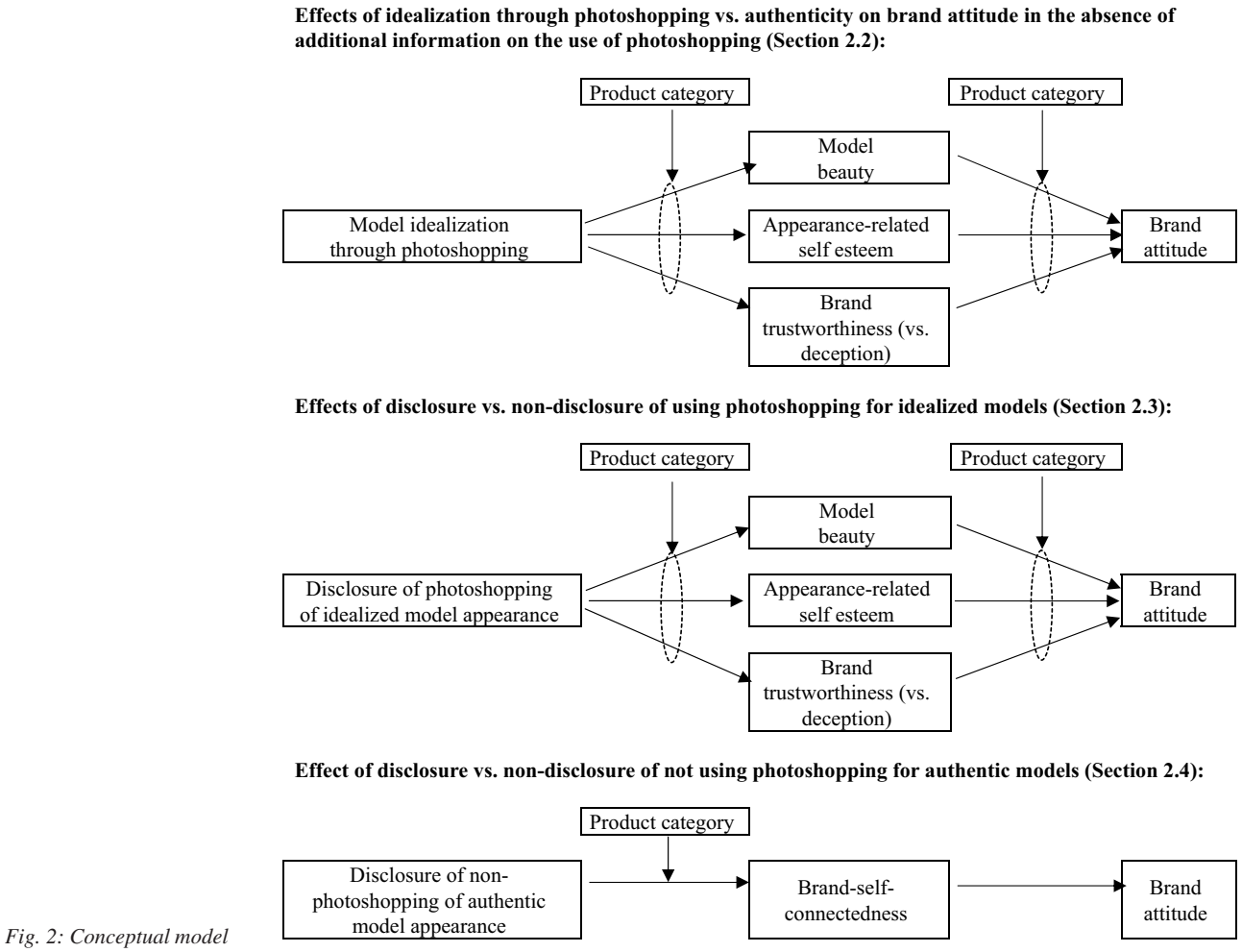

Fig. 2: Conceptual model

- Beauty-problem-solving products are products whose purpose is to correct problematic features of one's appearance such as beauty flaws. For instance, anti-spot cream and facial cream help against skin blemishes, and lip balm helps against chapped lips.
- Beauty-enhancing products are products that promise to enhance characteristics of a person's physical appearance (e.g., mascara and eyeshadow, jewelry, watches, and handbags).
- Body-revealing products are products that are suitable for consumers to demonstrate their physical attractiveness. For example, people at the beach want to enjoy sun and water. Bikinis' benefits are therefore not only to appear attractive to other visitors at the beach, but this one benefit can be an important feature when deciding on a particular bikini.
- Body-shaping products offer the benefit of optimizing body shape. This category includes, for example, some kinds of jeans and food aimed at demonstrating slimness or physical fitness (Holbrook and Hirschman 1982, p. 134; Bloch and Richins 1992, p. 6).

Models are often used to promote products that are only weakly related to consumer beauty. As a sample of subcategories, we consider technological devices (e.g., photo to cameras, hi-fi speakers, or earbuds, see Kim Kardashian in *Fig. 1*) and food and drink (e.g., biscuits, tea) that do not provide clear beauty benefits.

We would like to add the notion that we distinguish between beauty and non-beauty products in the hypotheses. We do not develop explicit hypotheses at the sub-category level. Only when deemed appropriate, within the framework of the hypotheses, we mention that there might be exceptions at the sub-category level. For example, for products designed to solve beauty problems, both idealized (visualizing the desired end state of appearance) and non-idealized models (visualizing which „starting point" of one's appearance to overcome) could be effective. In *Fig. 2*, we provide an overview of our considerations, which are detailed in the next sections.

2.2. Effects of idealization through photoshopping vs. authenticity on brand attitude in the absence of additional information on the use of photoshopping

In this section, we look at the condition in which additional information about the use or non-use of photoshopping in advertisements is absent. We compare the depiction of models who are idealized through photoshopping (idealized model appearance) to the depiction

of the same persons without appearance-optimization through photoshopping (authentic model appearance, based on natural beauty and gentle embellishment through cosmetics, textiles, hairstyle, etc.).

2.2.1. Positive effect of idealization through photoshopping through increased model beauty on brand attitude

In general, idealization is expected to increase perceptions of beauty because idealizing ad models narrows the gap between their real appearance and the beauty stereotype.

Effect of the level of model idealization on perceptions of model beauty. We surmise that viewers of ad models consider two images when making judgments about the model's *real* beauty. One of the images is the visible picture presented to viewers. i.e., the *visible* beauty of the model. We presume that there is an additional image that mentally arises from imaginations about what the model „behind this image" actually looks like, i.e., the *suspected* beauty of the person. We presume that viewers create this imagined image based on skepticism about whether the visible image is real, fueled by beliefs that the marketer has manipulative intent. We presume that viewers also use the suspected beauty to derive perceptions about the model's true beauty. *First,* in the condition in which the image is only photoshopped to a very small extent, there will be no skepticism about the realism of the visible beauty, i.e., the suspected beauty is equal to the visible beauty and the perception of the model's real beauty are comparatively low. For a mathematical analogy, we assume the existence of idealization levels between 1 (not altered image) to 6 (strongly idealized image). If the visible image's beauty is level 2, the suspected image's beauty will be level 2 as well. *Second*, in the condition of a moderate level of photoshopping (e.g., level 4), we surmise that this image elicits a moderate level of skepticism. The suspected beauty could be therefore associated with a slightly lower beauty than the visible image (e.g., level 3.5). *Third*, in the condition when an image has been very heavily photoshopped (e.g., level 6), we expect strong skepticism and contrast effect. Viewers might think, „Nobody looks like this image. It has been strongly retouched. It does not correspond to reality at all," resulting in a suspected beauty of level 3. Given such a contrast effect, which is described in the literature in other contexts (e.g., Herr et al. 1983) for large differences in co-existing impressions, we can predict an inverted U-shaped relationship between intensity of idealization by digital image processing and perceptions of the true beauty of the model.

Effects of perceptions of (true) model beauty on brand attitude. We present some arguments why advertising can benefit brand attitude when perceptions of beauty are enhanced in this way. *First*, viewing images of women that strongly conform to the beauty stereotype can satisfy females' need for aesthetics (Borges 2011, p. 7). Females might *intentionally* want to see how beautiful women *could* look like in general, which motivates them to watch ads. This need is not satisfied by watching ads that show what women actually look like. Positive feelings associated with sensory pleasure and induced by aesthetics can spill over to brand attitude. Even without cognitive control, beautiful models could influence the attitude toward the promoted brands or products if they are only „peripheral cues" in ads (Petty and Caccioppo 1980) that evoke pleasant affect that is transmitted. *Second*, observing attractive female models can remind women of their own intrasexual competitiveness, which could evoke pleasurable fantasies (Borau and Nepomuceno 2019, p. 336), and co-present favorable feelings can affect brand attitude. *Third*, perceptions of beauty can be used to infer invisible characteristics of these persons (Eagly et al. 1991; Langlois et al. 2000; Harrison and Hefner 2014, p. 135). For instance, beautiful-looking people are believed to do good things (for an analogy: fairies and Snow White in fairy tales) and less beautiful people are assumed of doing bad things (witches in fairy tales) (Berscheid 1985). Dion et al. (1972) tested this beauty-is-good heuristic in an advertising context and found a positive correlation between beauty and other invisible, but also positively valanced characteristics such as model sincerity, which can also spill over into brand attitude. In general, the beauty of ad models has been successfully tested as a factor influencing brand attitude for many decades, (e.g., Miller 1970; Baker and Churchill 1977). For a meta-analysis on the effects of beauty, see Langlois et al. (2000).

Moderating role of the product category. If highly beautiful models are shown, the attitude toward beauty-related products is presumed to benefit to a higher extent from model beauty than does the attitude toward products that are not beauty-related. This means that the beauty of models is expected to have a positive effect on both beauty-related and non-beauty-related products, but the effect is presumed to be smaller for the latter category (Praxmarer 2011), what might be explained by a generally valid beauty-is-good heuristic and the spillover of the likeability of the model to the promoted product. Idealization can be beneficial for promoting beauty-related products, as the model's beauty then better demonstrates the promised product's benefit. In other words, in beauty product advertisements, highly physically attractive models are expected to be more effective than less attractive models. This relationship is called the match-up hypothesis regarding beauty-related products (Friedman and Friedman 1979; Kahle and Homer 1985, p. 955; Kamins and Gupta 1994; Misra and Beatty 1990; Till and Busler 2000; Schirmer et al. 2018; Taylor et al. 2018) and can be explained by a process that is ongoing as follows: Applying Festinger's (1954) social-comparison theory to this issue suggests that, in the first step, looking at other people generates a comparison level for one's own physical appearance: Upward comparison in relation to highly attractive models and resulting perceptions of discrepan-

cies between the model's and one's own appearance are the sources of consumers' motivation to think about the need for improvements of one's own physical attractiveness (Gulas and McKeage 2000; Cornelis and Peter 2017, p. 103; Taylor et al. 2018). In the second step, consumers recognize the beauty-related product promoted by the highly attractive model. They may believe that its usage not only added to the beauty of the ad model, as demonstrated by her appearance; but it will – as the product's benefit – also increase their own beauty (Kamins 1990, p. 5; Lynch and Schuler 1994; Semaan et al. 2018, p. 770). In summary, it is believed that by using highly attractive models, marketers will be able to better demonstrate the benefits of beauty products. We test:

H1a: Idealization (vs. authenticity) increases perceptions of the ad model's beauty.
H1b: The validity of H1a is limited to non-extreme levels of model idealization. For very high levels of idealization, the perception of model beauty is reduced.
H1c: Perceptions of the ad model's beauty spill over positively to brand attitude.
H1d: The effect postulated in H1c is stronger for beauty-related than for non-beauty-related products.

Regarding H1d, there may be an exception. When describing different sub-categories of beauty-related products, we included products such as acne cream in the list of beauty-problem-solving products. For this sub-category, models presented in their natural appearance with skin problems might be more effective than idealized models because they attract attention to the problem that is promised to be solved.

2.2.2. Negative effect of idealization through photoshopping through diminished self-esteem on brand attitude

Females are presumed to compare their appearance not only to that of their female friends, but also to the appearance of ad models (Harrison and Hefner 2014, p. 137; Fredrickson and Roberts 1997, p. 173; Giorgianni et al. 2020; De Lenne et al. 2021). Comparison to beautiful models is likely to lead to a perceived discrepancy between these models' and their own appearance (Kwan et al. 2018, p. 1154; Convertino et al. 2019).

Effect of the level of model idealization on appearance-related self-esteem. We presume that increasing idealization of ad models through photoshopping reduces perceptions of one's own physical attractiveness and, therefore, appearance-related self-esteem (Heuer and Berge 2021, p. 1). As an exception, this effect might be inhibited at very high levels of idealization since females are less likely to compare themselves to very dissimilar others. Cash et al. (1983) and Richins (1991) argued that females may not take depictions of extremely beautiful women literally; therefore, in this condition, a discrepancy between one's own appearance and that of highly idealized models is unlikely to affect their self-esteem.

Effects of self-esteem on brand attitude. Consumers may transfer negative feelings due to reduced self-esteem to the brand.

Moderating role of the product category. Any comparison, including comparisons of one's own appearance to the beauty stereotype, is cognitively effortful, because knowledge about the beauty stereotype must be retrieved from memory and impression of the own appearance compared to that level must be derived. Consumers are presumed to get in contact with hundreds of other people (friends, colleagues, people who are also queuing at the food store, billboards, actresses in TV films, etc.) per day and therefore cannot devote cognitive resources to continuous beauty comparisons. The question therefore arises under which conditions females are willing to make such comparisons. We suspect that such comparisons are only likely when females receive explicit or implicit instructions to consider or judge their beauty. Females may interpret ads promoting products that aim at female beauty as such instructions. We therefore surmise that negative impacts of photoshopped models on appearance-related self-esteem only exist when beauty-related products are advertised. We test:

H2a: Idealization (vs. authenticity) diminishes appearance-related self-esteem.
H2b: The validity of H2a is limited to non-extreme levels of model idealization. For a very high level of idealization, model idealization does not reduce self-esteem.
H2c: Self-esteem positively influences brand attitude; in other words: reduced self-esteem deteriorates brand attitude.
H2d: The effect postulated in H2a is stronger for beauty-related than for non-beauty-related products.

2.2.3. Negative effect of idealization through photoshopping through reduced perceptions of brand trustworthiness on brand attitude

Effect of the level of model idealization on brand trustworthiness. Manifold comments on social media document that some females do not like strongly photoshopped ad models, arguing that these models do not look real, i.e., they create a virtual reality of beauty. For example, some consumers who viewed the photoshopped appearance of Kim Kardashian in the promotional clip for the SKIMS collection, which is a body-shaping garment, criticized her appearance. They stated that even Kim Kardashian cannot fulfill beauty stereotypes without digital help (Jany 2021). The lingerie brand Victoria's Secret, with its tendency for perfection of runway models, received negative comments from customers, because the models shown in the print ads were digitally altered; one reason for the decreasing attitude toward this brand in recent years is seen in the usage of photoshopping (Engeln 2020). These reactions of these female consumers toward photoshopping indicate that they want more „authenticity," meaning they want to

see the ad models in a non-photoshopped version. Or to put it another way, consumers can use lay beliefs that companies using photoshopped models remarkably agree with the „harmful beauty stereotype" and disagree with the more socially desirable „nobody-is-ideal belief." The higher the level of idealization, the lower perceptions of brand trustworthiness. The existence of lay beliefs is considered in the persuasion-knowledge model developed by Friestad and Wright (1994). Note, that we presume that this is an ambivalent opinion because they also may want to see how beautiful women can be in ads; we will denote this conflict later as „guilty pleasure." In summary, consumers might believe that using photoshopped models is a form of manipulation and they are the „victims" of that deception (Tiggemann et al. 2013; Cornelis and Peter 2017, p. 103; Lewis et al. 2020).

Effect of brand trustworthiness on brand attitude. Brand trustworthiness (e.g., beliefs that the brand delivers the promised benefits) is a part of a brand's characteristics or schema. We therefore presume that reduced brand trustworthiness has a negative impact on brand attitude (or stated in different words: brand trustworthiness and brand attitude are positively related).

Moderating role of the product category. Artist Mariah Carey received negative reactions on social media after a magazine published her retouched image on the cover (Kröll 2017). Kris Jenner received similarly negative responses after posting a photoshopped image of her face together with Gordon Ramsay when promoting a cookbook; the original appearance of the faces has also been released. From such phenomena, we conclude that even the perceptions (i.e., suspicion) of photoshopping generally cause the impression of the use of a misleading tactic, regardless of the context or product category [5]. We test:

H3a: Idealization (compared to authenticity) reduces brand trustworthiness; in other words: photoshopping increases sensations of the marketer's deceptive intentions. The higher idealization, the lower brand trustworthiness.

H3b: Brand trustworthiness positively influences brand attitude.

2.3. Effects of disclosure vs. non-disclosure of using photoshopping for idealized models on brand attitude

In this section, we consider the condition in which advertisements depict models who are idealized through photoshopping and in which perceivers recognize the application of this technique. For this condition, we examine the effect of the presence vs. absence of additional information about the use of photoshopping. As mentioned before, many previous studies focused on the impact of this information on self-esteem of the female perceivers (e.g., Borges 2011; Harrison and Hefner 2014; Cragg et al. 2019; Giorgianni et al. 2020; Lewis et al. 2020; McComb et al. 2021; Naderer et al. 2022). Semaan et al. (2012), Petrescu et al. (2019), Schirmer et al. (2018), and Semaan et al. (2018) explored the impact of this information on brand attitude and/or ad attitude and provided mixed results. Tiggemann et al. (2019b) and Atar et al. (2021) conducted eye-tracking studies to determine whether the addition of this information shifts the focus of attention on an advertisement. The results of these studies indicate that this additional information directs the focus of attention to the model's appearance.

2.3.1. Negative effect through skepticism about model beauty on brand attitude

When ads contain the information that the image of a beautiful-looking model was created through photoshopping, consumers may conclude that the model is less attractive in her natural appearance, weakening beauty-is-aesthetic associations or inhibiting the activation of the beauty-is-good heuristic.

Moderating role of the product category. Especially in the case of beauty-related products, explicit information about the usage of photoshopping can have a detrimental effect on brand attitude. The addition of the information that the model has been digitally altered emphasizes the fact that the model does not look in reality as she looks in the ad. This perceived discrepancy can lead to reduced motivation to use the promoted beauty-enhancing, body-revealing, or body-shaping products to improve one's own appearance (Kulik and Gump 1997; Bury et al. 2014; Cornelis and Peter 2017, p. 103; Heurer and Berge 2021, p. 2). Consumers may conclude that not the usage of the promoted product but photoshopping has made models appear the way they are depicted in the advertisement. Such thoughts can worsen brand attitude (Schirmer et al. 2018, p. 133; Semaan et al. 2018, p. 770; Tiggemann and Brown 2018, p. 100). As a theoretical basis, we can apply schema-incongruence theory by Mandler (1982). Consumers may not expect information about photoshopping of models in advertisements promoting beauty-related products because then beauty is revealed to be an artefact of software application. Disclosure can therefore create a condition of strong incongruence between the apparent beauty and the suspected beauty of these models. Schema-incongruence theory predicts decreased brand attitude for cases of strong incongruence. We test:

H4: Disclosure of photoshopping reduces perceptions of model beauty.

2.3.2. Positive effect through non-reduced appearance-related self-esteem on brand attitude

While all other effects of photoshopping ad models discussed in this article have received little attention in previous research, the effect of being informed that an idealized model is the result of photoshopping on appearance-related self-esteem of perceivers has received high attention. This is because this aspect is not only considered to be relevant for marketing but is also a topic in public de-

bate. This explains why most studies were published in non-marketing journals. The researchers presented idealized images, told test participants that the stimuli came from an advertising context or an Instagram environment, and tested the impact of information (present vs. absent) about the application of photoshopping on the viewers' self-esteem. Below, we look at both the advertising and Instagram context. We found 18 studies published between 2011 and 2022 on this topic.

The common reasoning of the researchers and opinion leaders in public debate is: When females receive and read information that an ad model or a person shown on social media such as Instagram is idealized through photoshopping or the use of beauty filters, they perceive on the one hand a high level of beauty, but on the other hand, they do no longer compare themselves with this image. This is supposed to protect them from a reduced appearance-related self-esteem. Researchers therefore expect higher, i.e, non-reduced self-esteem, in the condition in which the information about photoshopping is given. In these studies, self-esteem is measured, for instance, by agreement to statements such as „I feel good about who I am physically," „I have a nice-looking face," and „I am ugly" (recoded) taken from the Physical Self-Description Questionnaire by Marsh et al. (1994) or by answers to the question about „How do you feel about yourself?", anchored with „not at all satisfied with my appearance" vs. „very satisfied with my appearance," taken from the Visual Analogical Scale by Hayes and Patterson (1921).

With very few exceptions, the studies found no effect of disclosing the fact that the idealized models were created through photoshopping on the perceivers' appearance-related self-esteem (*Tab. 1*) – a surprising result when considering the multitude of studies in different scientific disciplines. The first exception out of 18 studies is the study by Harrison and Hefner (2014). They found that informing about photoshopping even reduced self-esteem. This finding would indicate a direction of the effect that is intended not at all by proponents of photoshop warnings in ads. Harrison and Hefner (2014) call it „boomerang effect," and Tiggemann et al. (2013) refer to this as „backfire effect." The second exception is reported by Borges (2011). He tested the effect of information revealing photoshopping in three sub-studies, and in one of them, he found a positive effect of such information on self-esteem when a graphic warning symbol was shown; however, he gave no details about what this symbol looked like.

Because the studies found that information about photoshop use, regardless of how that information is worded or presented, is not effective in protecting people from low self-esteem, we looked at these studies in more detail. We investigated whether a scaling artefact is the reason why null effects were reported. Null effects due to a scaling artefact would result if self-esteem scores were very high in the condition in which information about the use of photoshopping is absent. Then, scores of self-esteem cannot not be higher in the information-present condition. We therefore included the numerical results in *Tab. 1* to be able to clarify this crucial point. They show that the mean scores of self-esteem are not at the upper end of the scales. Thus, the zero effect is seemingly no scaling artefact.

We therefore looked for ex-post explanations by researchers as to why they found a null effect of disclosing information about the use of photoshopping on appearance-related self-esteem. *First*, there would be a null effect if the disclosure has not been noticed, read, or understood by test participants. Borges (2011), Borau and Nepomuceno (2019), Lewis et al. (2020), Giorgianni et al. (2020), McComb et al. (2021), and Naderer et al. (2022) report that they performed a manipulation check to determine whether the information about photoshopping was noticed by the test participants. For instance, Naderer et al. (2022) point to their finding that 25.8 % of the test participants who did not receive disclosure information incorrectly reported that the image contained disclosure information, and 54.8 % of the participants who received textual information about photoshopping and 37.1 % who received this information as a graphical warning mistakenly reported that the test stimulus did not contain this information. Borau and Nepomuceno (2019), Lewis et al. (2020), McComb et al. (2021), and Naderer et al. (2022) treated test participants who provided such wrong answers as missing values. In *Tab. 1*, we report the results of these studies after eliminating such persons from the data analysis. But even when the samples only included persons who correctly noticed the absence or presence of disclaimers, the respective studies found no effects. *Second*, there is likely to be a null effect if test participants spend rather short time looking at the idealized model. Tiggemann et al. (2019a) suspect that this might be the reason why they found a null effect. *Third*, a null effect may be due to the widespread usage of photoshopping of ad models and persons depicted on Instagram. Lewis et al. (2020, for photoshopped ad models) and Naderer et al. (2022, for photoshopped images on Instagram) explain the null effect with the preposition that young people today are very used to seeing photoshopped images and therefore such images cannot impair self-esteem. *Fourth*, Borges (2011), Lewis et al. (2020), and Naderer et al. (2022) argue that a null effect could also arise from the fact that the test participants had no personal relationship with the portrayed idealized person; they speculate that social comparisons regarding beauty are only made with peer-group members, i.e., personal friends, who have high similarity with the perceivers. *Fifth*, Kwan et al. (2018), Borau and Nepomuceno (2019), and Cragg et al. (2019) provide the following ex-post explanation why they observed a null effect: Female persons do not only want to look like women as shown in their natural beauty or authentic appearance, but they also want to look like idealized persons „no matter how painful and unrealistic it is" and therefore refuse to men-

Authors	Test stimuli	Formulation of the information about the use of photoshopping	Sample size	M_{age} (years)	Scale range for self-esteem	Self-esteem	
						Information absent	Information about photoshopping
Naderer et al. 2022	Images of girls on Instagram, no advertising context	[a] "This image has been digitally enhanced." (translated) [b] Warning triangle containing the text: "This picture does not portray reality." (translated)	186 (reduced: 113)[1) 2)]	15.3	0 = low, 100 = high	73.77	[a] 69.35^{ns} [b] 64.68^{ns}
McComb et al. 2021	Image of a young female adult on Instagram, no advertising context	[a] "I always try to be transparent with my followers, so I just want everyone to know: This image has been digitally altered." [b] "I always try to be transparent with my followers, so I just want everyone to know: This image has been digitally altered to trim fat off my stomach and arms." [c] "Because I care about my followers, I just wanted to remind everyone: Viewing thin and unrealistic images of women can make you feel bad about yourself."	348 (reduced: 311) students, Canada	19.31	1 = low, 9 = high	4.63	[a] 4.85^{ns} [b] 4.85^{ns} [c] 4.47^{ns}
Livington et al. 2020	Social media images of females	Different self-disclaimer comments like: "This photo does not reflect reality!"	201 students	18.93	0 = low, 100 = high[3)]	45.83	47.60^{ns}
Giorgianni et al. 2020	Female models, no advertising context	"Warning: Retouched image."	Approx. 300, USA	24.6	1 = low, 5 = high	3.19	3.12^{ns}
Lewis et al. 2020	Ads promoting fictitious perfume brands	"This image has been digitally altered to reduce the size of the body."	195 (reduced: 114), Israel	32.04	1 = low, 10 = high	3.77	4.27^{ns}
Borau and Nepomuceno 2019	Print ads promoting firming cream	"This image was digitally retouched with the use of an image processing software to change the physical appearance of the individual depicted in the advertisement."	200 (reduced: 170), France	27	1= low, 7 = high	4.57	4.64^{ns}
Cragg et al. 2019	Images of models from the Dove Evolution campaign	[a] "Warning, this image has been digitally altered." [b] "Warning, this image has been digitally altered to lengthen and slim whist and thighs."	Appr. 215 students, Australia	22.2	1 = low, 10 = high	5.16	[a] 4.91^{ns} [b] 4.89^{ns}
Tiggemann et al. 2019a	Print ads promoting fashion items	[a] "Note: This image has been altered to enhance appearance." [b] "Note: Viewing thin and unrealistic images of women can make you feel about yourself." [c] "Note: This model is underweight." [d] Visual depiction of a paint brush with the word "retouched."	260 students, Australia	20.1	1 = low, 100 high[3)]	51.03	[a] 49.22^{ns} [b] 52.22^{ns} [c] 48.62^{ns} [d] 51.92^{ns}
Fardouly and Holland 2018	Social media images of females	[a] Different self-disclaimer comments like: "There is nothing real about this."	164, USA	23.09	0 = low, 100 = high[3)]	54.01	52.96^{ns}
Kwan et al. 2018	Ads promoting fashion brands	"Warning: This photograph has been altered in a manner that could promote unrealistic expectations of appropriate body image."	118, USA	20.54	1 = low, 9 = high[3)]	4.91	4.33^{ns}
Tiggemann and Brown 2018	Ads promoting products such as clothes, accessories, and perfume	[a] "Note: This image has been altered to enhance appearance." [b] "Note: Viewing thin and unrealistic images of women can make you feel bad about yourself." [c] "Note: This model is underweight." [d] Visual warning symbol containing the word "retouched."	340 students, Australia	20.2	0 = low, 100 = high[3)]	51.05	[a] 49.11^{ns} [b] 50.06^{ns} [c] 48.26^{ns} [d] 49.70^{ns}
Cornelis and Peter 2017, Study 1	Ad promoting an underwear brand	"Model has been digitally retouched."	230 students, USA	21.5	0 = low, 100 = high	49.42	48.82^{ns}
Bury et al. 2016	Ads promoting fashion products	[a] "Warning: This image has been digitally altered." [b] "Warning: This image has been digitally altered to lengthen and thin legs."	378 students, Australia	20.1	0 = low, 100 = high	51.24	[a] 53.14^{ns} [b] 50.59^{ns}
Frederick et al. 2016	Images of models in bikinis (no ads)	[a] "Warning: This photo has been photoshopped." [b] Example: "This isn't my natural hair color."	1268	34	0 = low, 7 = high	3.15	[a] 3.25^{ns} [b] 3.50^{ns}
Harrison and Hefner 2014, Study 1	Images of female and male models (no ads)	"After students were photographed, professional photo retoucher refined the image using a computer photo retouching program."	Approx. 260, USA[1)]	15.46	1 = low, 6 = high	4.72	4.31*
Semaan et al. 2012	Ad promoting a perfume brand	No information about the formulation available	No information	No information	No information	4.37	5.14^{ns}
Slater et al. 2012	Images from fashion magazines (no ads)	[a] "Warning: These images have been digitally altered." [b] "Warning: These images have been digitally altered to lengthen legs and trim inner thighs."	102 students, Australia	20.31	-100 to +100[4)]	-8.25	[a] -1.88^{ns} [b] -.47^{ns}
Borges 2011, Study 1 (face)	Ad promoting a fictitious perfume brand	"This photo was enhanced by photographic editing."	125 students, France	under 20	1 = low, 7 = high	4.06	3.88^{ns}
Borges 2011, Study 2 (face and body)	Ad promoting a fictitious perfume brand	[a] "This photo was enhanced by photographic editing." [b] Graphic warning symbol (no information about this symbol available)	Approx. 85 students, France	under 21	1 = low, 7 = high	4.07	[a] 3.83^{ns} [b] 5.11*

Notes: Data are mean values of test participants' appearance-related self-esteem.

1) The sample contains female and male test participants; results are nor reported for genders separately. In the other studies, only females were test participants.

2) After the elimination of persons who mistakenly reported having seen or not having seen disclosing information, sample size was reduced from 186 to 113. Results for self-esteem are based on the reduced sample.

3) We reversed the original scale. I.e., if 0 indicated high and 100 low self-esteem, we re-calculated the values to 0 = low and 100 = high.

4) Within-subject after-before exposure design. Scale ranges from 0 = low to 100 = high. Calculation of impairment (-100) vs. improvement (+100) as difference.

* $p < .05$, ^{ns} $p > .05$

Tab. 1: Self-esteem when watching an idealized model depending on information about use of photoshopping

tally process information revealing the application of photoshop. *Sixth*, Bury et al. (2016) explains the null effect with the fact that the test participants had only one contact to the disclaimer and expect that frequent contacts with such disclaimers could be more effective in avoiding reduced self-esteem when viewing photoshopped models.

We add the presumption that the null effect found in previous studies could also be due to insufficient idealization of the model. Unless the test stimuli containing the idealized image show an exceptionally idealized woman, the disclaimer, which is sometimes expressed in the form of a warning signaling a very dangerous influence, is likely to be ineffective. The lack of knowledge about how beautiful the photoshopped models were in the studies that reported null effects warrants additional research. We therefore continue to presume that when photoshopping resulted in highly beautiful images, additional information about photoshopping can protect viewers from impaired appearance-related self-esteem. We test:

H5: Disclosure of the use of photoshopping leads to higher appearance-related self-esteem than non-disclosure.

2.3.3. Ambivalent effect through brand trustworthiness (vs. deception) on brand attitude

On the one hand, reading information disclosing the use of photoshopping could activate consumers' persuasion knowledge (O'Keefe 1990; Friestad and Wright 1994). They could ask, „Why should marketers use photoshopped models at all?" and infer a dishonest intention. A defense mechanism against the act of manipulation can be activated (Semaan et al. 2018, p. 768). Consumers may not be willing to support the practice of using photoshopped models and this could also be a reason to be suspicious of the claimed benefits of products from brands whose suppliers admit to depicting such models.

On the other hand, brands can gain trustworthiness if they associate themselves with socially preferred views. Transferred to the topic of beauty stereotypes, consumers may welcome it when companies take position in favor of the following position, „We should inform naïve consumers about our use of photoshopping and thereby prevent them from comparing the own face and body to the unrealistic image of our ad model and from suffering body dissatisfaction" (Slater et al. 2012, p. 109; Tiggemann et al. 2013, p. 46; Krawitz 2014; Selimbegovic and Chatard 2015, p. 2; Tiggemann and Brown 2018; Lewis et al. 2020, p. 2; McComb et al. 2021; Naderer et al. 2022). In addition, disclosing the use of photoshopping could be interpreted by the viewers as a kind of two-sided information. According to Semaan et al. (2018, p. 768), consumers could interpret photoshopping of the model as negative and voluntary disclosure of photoshopping as positive information.

Since we have two opposing directions of the effect, we do not infer a conclusion as to whether the disclosure photoshopping enhances or diminishes perceptions of deception. We therefore do not formulate a hypothesis on the impact of photoshop disclosure on brand trustworthiness.

2.4. Effect of disclosure vs. non-disclosure of not using photoshopping for authentic models on brand attitude

In this section, we consider the condition in which advertisements show ad models in their authentic appearance. For this condition, we examine the effect that results from the presence (vs. absence) of additional information about the non-use of photoshopping.

Information that „somebody is *not* doing something" is rare and therefore surprising. Thus, we presume that information about the fact that a depicted model is not photoshopped will attract attention. When marketer provide this information, recipients are likely to develop more intense thoughts about the fact that the model is looking like themselves, which can increase perceptions of model-self similarity. Contact with similar people can evoke spontaneous thoughts such as „Ah, this person looks like me, I like that," which is called self-referencing. In this condition, it may be cognitively easier to create a connection between the promoted brand and one's self (Burnkrant and Unnava 1995, p. 17; Meyers-Levy and Peracchio 1996, p. 408; Chang 2011), which results in „This brand is for people like me" impressions and is referred to as brand-self connectedness (Debevec and Romeo 1992; Forehand and Deshpande 2001, p. 337; Appiah 2007; Escalas 2007; Sirgy 2018). In summary, information that the model has not been photoshopped can evoke strong perceptions of similarity with the model and brand-self connectedness (Suls and Miller 1977; Wills 1981; Harrison and Hefener 2014, p. 137).

The similarity-is-good heuristic can be used as an argument in favor of the presumption that consumers appreciate the contact to highly similar other persons (Newcomb 1968; Byrne 1971). Consumers can reduce uncertainty about the benefits of products by imitating others who are similar, this is, by adopting decisions of models who look like themselves. In general, the similarity-is-good heuristic postulates that people like others who are similar to them and dislike people who are dissimilar to them.

Moderating role of the product category. The propensity to imitate similar others may be higher when purchase decisions involve social risks. Choosing the appropriate beauty-related product such as a bikini carries more social risk than choosing between non-beauty-related goods such as cookies or headphones. Therefore, we expect that information about non-using photoshopping for authentic models, which is likely to increase model-self similarity and to facilitate imitation, is more effective in improving the attitude toward beauty-related products. We test:

H6a: Disclosure of the non-use of photoshopping improves brand-self connectedness.
H6b: Brand-self connectedness spills over positively on brand attitude.
H6c: The effect postulated in H6a is stronger for beauty-related than for non-beauty-related products.

We do not expect an effect of disclosure vs. non-disclosure of not using photoshopping for authentic looking models on model beauty as this information only confirms that the model depicted in the ad looks like this in real life. For the same reason, we do not expect an effect on appearance-related self-esteem; in previous research, two studies have already examined the effect of this information on appearance-related self-esteem and reported a null effect (Giorgianni et al. 2020; Heuer and Berge 2021). Finally, we do not expect an effect on brand trustworthiness, because we do not suspect any reason why recipients feel deceived by the information that an authentic looking model has not been photoshopped.

3. Study 1

In this study, we compare the idealized with the authentic model appearance. This means that we do not additionally manipulate the degree of idealization and do not test H1b and H2b, which predict an inverted U-shaped effect of model idealization.

3.1. Experimental design

We created four ad versions showing the same female model: (1) an ad showing the model in idealized appearance (photoshopped version), (2) the same version as (1) with information about the application of photoshopping, (3) an ad showing the model in her authentic appearance (non-photoshopped version), and (4) same version as (3) with additional information about non-using photoshopping. In addition, we have created these ad versions for 22 brands that belong to different product categories.

3.2. Test objects

We developed these four versions for 22 brands that belong to different categories; note that the ad models were different across the brands. The brands for which we created the ad versions are listed in *Tab. 2*. We selected brands for the study for which a sample of female students stated that they were familiar with them (see also pilot studies).

3.3. Test stimuli

Ad versions. We compiled the ads to look like real ads of the respective brands. In addition to the images of the female models, which we purchased from the stock agency Adobe Stock or downloaded from license-free databases (e.g., Pixabay and Unsplash), we included a suitable background, the brand logo, and, if available, the brand's

Category	Product	Brand name	Model image
Beauty-problem solving product	Facial cream	Chanel	Face
	Facial cream	The Body Shop	Body and face
	Body cream	Nivea	Face
	Facial cream	Vichy	Face
	Lip balm	EOS	Face
	Sunscreen	Avène	Body and face
Beauty-enhancing products	Eye shadow	Urban Decay	Face
	Beauty mask	Garnier	Face
	Shower gel	Nivea	Body and face
Body-revealing products	Bikini	H&M	Body and face
	Sportswear	Hunkemöller	Body and face
	Vacation on the beach	Lufthansa Holidays*	Body and face
Body-shaping products	Fitness drink	Natural Mojo	Body and face
Non-beauty-related technical appliances	Photo camera	Nikon	Face
	Waterproof speakers	Ultimate Ears	Body and face
	On-ear headphones	Beats	Face
	In-ear headphones	Sony	Body and face
	Power bank	Fresh'n'Rebel	Body and face
Non-beauty-related products food and drinks	Mineral water	Überkinger	Body and face
	Dextrose gel	Dextro Energy	Face
	Tea	Messmer	Face
	Cookies	Leibniz	Face

Note: Lufthansa is the brand of an airline company. Lufthansa Holidays is a sub-brand of this company. This sub-brand launched several campaigns that show people at the beach. These people wear body-revealing products.

Tab. 2: Overview of brands for which we created ad versions

slogan in the ad. We kept these components and their arrangements constant across the four experimental conditions. The ads were created solely for this study and did not promote the brands in real advertising campaigns.

- Ad version 1: We digitally altered a model using image editing software for the condition that represents the model's idealized appearance. We removed skin blemishes, wrinkles, pimples, moles, scars, and stretch marks. We smoothed the skin, whitened the teeth, reduced or enlarged individual body parts (e.g., the nose was reduced and lips or eyes were enlarged), adjusted the skin tone, and made other adjustments depending on the model.
- Ad version 2: This version resulted from ad version 1 with additional information (translated): „The woman depicted here was altered with digital image processing."
- Ad version 3: This ad represented the authentic model appearance. The ad showed an unedited image of the ad model.
- Ad version 4: Here, ad version 3 additionally included the textual note (translated): „The woman depicted here was not altered with digital image processing."

Pilot studies. We conducted two pilot studies. In the first pilot study (N = 68 female students, M_{age} = 24.2 years), we tested the realism of the ads and assessed data such as brand awareness (agreement with „This ad is a real ad" and answer to „Do you know this brand?" Yes/no). The sample was split into four sub-samples, and each ad version was assigned to one sub-sample per brand, meaning one person did not view two ad versions of the same brand. If pilot-study participants articulated doubts that the ads were not being used in practice, the respective ad versions were revised until such problems did not arise (by presenting the ads to additional test participants). The aim of the second pilot study (N = 84 female students, M_{age} = 24.3 years) was twofold. We tested if we correctly assigned the promoted products to the product sub-categories. This was only done for the beauty-related products. The participants received a list of categories („beauty-enhancing product," „beauty-problem-solving product", „body-revealing product," and „body-shaping product") and had to select one category that described the presented product best. Moreover, we examined if the information about the use or non-use of photoshopping was recognized (the participants had to answer the question about whether there was something special in the ad). In this second pilot study, the participants were also split into four sub-samples. Participants could watch ad versions as long as they wanted and then provided information about these two topics. If we noticed that participants were having difficulty to assign products to a category correctly, we redesign of the ad versions until other participants provided data as intended. The same procedure was done when we noticed that participants had difficulty recognizing the disclaimers; we enlarged the letters or changed the color to avoid legibility problems.

Illustration of ads. We select Eos cosmetics ads to illustrate the final versions of the test stimuli (*Fig. 3*). For the other 21 brands, the ad versions were manipulated in a similar way, however, for some brands both the face and body were modified.

3.4. Procedure

The data was collected using an online survey (SoSci Survey) on a social platform aimed at students at numerous universities in Germany, Austria, and Switzerland (Studydrive.de). We collected data only among German students. We made sure that the test persons were randomly assigned to the experimental conditions per brand; a total of 64 students helped to continuously vary the links to the questionnaire. The entire data collection covered two years (2021 and 2022); however, the data for each brand was collected within a rather short time interval. The questionnaire started with the question about whether the test participant is female or male or describes the gender as non-binary. If a person indicated to be male or non-binary, that person was thanked and did not continue to fill out the questionnaire. Next, each female participant watched one of the 88 ads resulting from the combination of 22 brands with four ad versions.

Each test person could watch one ad as long as she wanted. The ad was displayed at the top of each page of the online questionnaire, i.e., while filling out the questionnaire, the persons could always see the advertisement. In the first step, the test participants were asked to write down „all thoughts and feelings that come into their mind when looking at the ad" in three lines. In the second step, the brand attitude was surveyed, which served as the dependent variable [6]. In the third step, mediator variables that have been considered in Section 2 were measured (perceptions of model beauty, appearance-related self-esteem, perceptions of brand trustworthiness, and brand-self connectedness). In the fourth step, manipulation-check variables were measured (idealization vs. authenticity, presence of additional information about the use or non-use of photoshopping). Finally, some control variables (e.g., vanity and product-category involvement), demographics (age, student status), body-related data (weight, height), and general attitude toward photoshopping ad models were assessed. The purpose of these data was to check whether the test participants' characteristics were stable across the experimental conditions per brand. At the end of the questionnaire, the test persons were thanked for their participation, and the purpose of the study was mentioned.

3.5. Measures

Tab. 3 lists the statements contained in the questionnaire that were used to assess the variables. Test participants agreed or disagreed with the statements on a seven-point

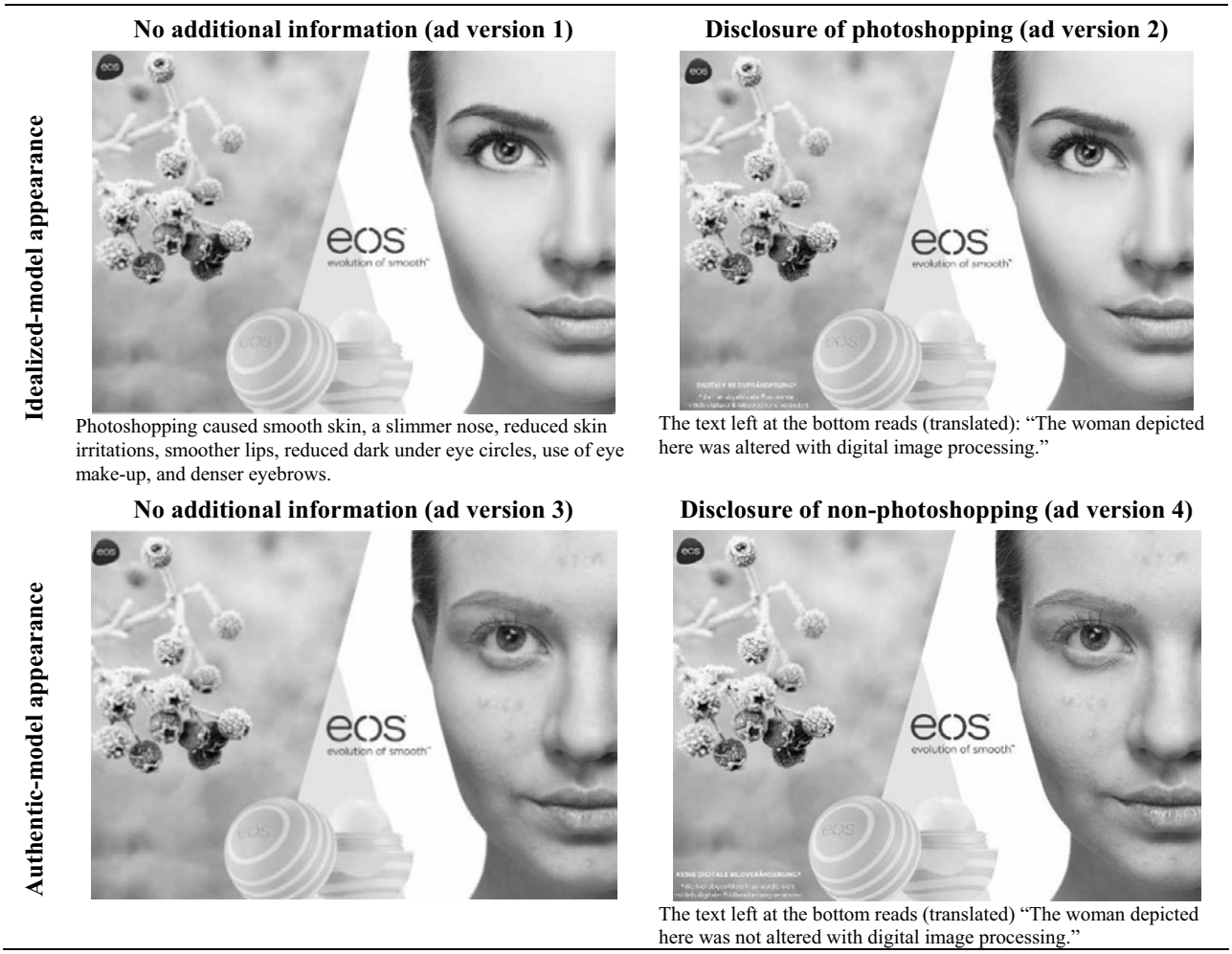

Fig. 3: Example of test stimuli (Study 1)

scale, with 1 = totally disagree and 7 = totally agree. Cronbach's alpha values exceed 0.7.

3.6. Sample

A total of 4,123 females took part in the survey (M_{age} = 23.97 years, 86.1 % students and 13.9 % alumni). The average weight was 62.04 kg, and average height was 168.5 cm. The average body-mass index (BMI = weight/height^2) equaled 22.16 kg/m^2, which indicates a normal body size. Thus, on average, there were 4,123/(4×22) = 46.9 test participants per ad × brand condition. In *Tab. 4*, we report the attitude of the test participants toward the photoshopping of ad models. The results show that young female consumers express a rather negative general attitude toward photoshopping of ad models. Most mean scores are below the scale midpoint 4, and they get worse when substantial modifications of body parts are idealized. We compare our results with those of Schirmer et al. (2018), who had collected data from a similar sample three to four years earlier (473 young females living in Germany, M_{age} = 25.3 years, 74 % students) and used the same scale. It is noticeable that our findings are almost like those of Schirmer et al. (2018) for cosmetic and substantial body modifications through photoshopping. However, the females in our sample are more skeptical with regards to minor styling changes, suggesting that overall attitude toward photoshopping of ad models is less favorable in total and has actually deteriorated over the past three or four years.

3.7. Manipulation check: Did the test participants recognize photoshopping?

To check if the test participants recognized the application of photoshopping, we included manipulation-check statements in the questionnaire (see *Tab. 3*). The results of this test are contained at the top of *Tab. 5*. The test participants believed that the models who we idealized had been photoshopped ($M_{idealized,\ no\ information}$ = 5.71, $M_{idealized,\ disclosure}$ = 5.85). This belief was lower for the authentic model images ($M_{authentic,\ no\ information}$ = 4.11, $M_{authentic,\ disclosure}$ = 3.54). It should be noted that although we objectively used non-photoshopped models in the authentic-model-appearance condition, the test participants weakly believed that the models are idealized.

In addition, we asked the test participants to indicate whether they noticed information about the use of photoshopping in the idealized-model appearance condition

Construct	Statements
Attitude toward the brand (dependent variable)	The brand is very appealing. The brand is very interesting. The brand is very good. This brand is very likeable. α = .94, source: Spears and Singh (2004)
Model beauty (mediating variable)	The depicted model looks very attractive. The depicted model looks very beautiful. The depicted model looks very pretty. α = .89, sources: Ohanian (1990), Semaan et al. (2018)
Appearance related self-esteem (mediating variable)	I am very happy with how my body looks right now. At this moment, I am very happy with my weight. At this moment, I feel very attractive. I feel very comfortable in my body. α = .91, sources: Heatherton and Polivy (1991), Cinelli and Yang (2016)
Brand trustworthiness (vs. deception by the model) (mediating variable)	The model looks very honest. Through the model, the brand aims to manipulate my decision (recoded). Through the model, the brand tries to convince me to be the exact opposite of what I am (recoded). α = .93, formulation based on Ohanian (1990), Akestam et al. (2017)
Brand-self connectedness (mediating variable)	The depicted brand reflects me very well. I can identify with the depicted brand. The depicted brand suits me very well. α = .91, source: Escalas and Bettman (2003)
Vanity (personality variable) (control variable)	The way I look is extremely important to me. I am very concerned about my appearance. I would feel very embarrassed if I was around people and did not look my best. Looking my best is worth the effort. α = .84, source: Netemeyer et al. (1995)
Product involvement (control variables)	I am very familiar with (product category). I am very interested in (product category). I often use products belonging to (product category).
Recognition of photoshopping (manipulation check)	I think that the model in the advertisement is retouched. The model is changed afterwards by means of digital software. Individual elements of the model's appearance are embellished. α = .95
General attitude toward photoshopping ad models	See *Tab. 4.* Source: La Ferle and Edwards (2013), Schirmer et al. (2018)

Tab. 3: Overview of measures

Cosmetic changes of the body		Minor styling changes		Substantial modification to body parts	
remove the appearance of cellulite or stretch marks	3.66 [S: 3.37]	change a model's outfit	3.97 [S: 5.15]	stretch a model's legs and/or torso to look taller	2.42 [S: 2.37]
erase pimples and blemishes from the face	4.14 [S: 4.67]	enhance the look of a model's clothing	4.00 [S: 4.88]	change body parts on a model to be more attractive	1.87 [S: 1.83]
reduce the appearance of wrinkles on face or neck	3.55 [S: 3.26]	change a model's hair color, style, or length	3.65 [S: 4.55]	reduce a model's arm, leg, or waist to appear smaller	2.37 [S: 2.52]
whiten the model's teeth	3.83 [S: 4.17]	change a model's make-up	3.94 [S: 4.79]	alter a women's chest size	2.30 [S: 2.34]
erase stray hairs in the picture	4.14 [S: 5.51]			remove bulges from areas such as back or stomach	2.68 [S: 2.71]
				change skin color by lightening or darkening the skin	2.96 [S: 3.11]

Note: The statements were formulated as „I feel it is ok to ... through photoshopping." The scale ranges from 1 = strongly disagree to 7 = strongly agree. We report mean values of our study. In parentheses [S: ...], we add the findings by Schirmer et al. (2018).

Tab. 4: General attitude toward photoshopping of ad models

Category	Idealized model appearance without disclaimer (ad version 1)	Idealized model appearance with disclaimer (ad version 2)	Authentic model appearance without disclaimer (ad version 3)	Authentic model appearance with disclaimer (ad version 4)
	Recognition of photoshopping (manipulation check)			
Beauty-problem solving products	6.18 (1.19)[b]	6.08 (1.36)[b]	4.18 (2.02)[a]	4.15 (1.95)[a]
Beauty-enhancing products	5.68 (1.54)[b]	5.76 (1.44)[b]	3.61 (1.73)[a]	3.38 (1.95)[a]
Body-revealing products	5.61 (1.54)[c]	5.57 (1.42)[c]	4.18 (1.80)[b]	3.58 (1.92)[a]
Body-shaping products	4.86 (1.15)[b]	5.88 (1.26)[c]	2.53 (1.42)[a]	2.11 (1.38)[a]
Non-beauty-related technological devices	5.27 (1.65)[c]	5.79 (1.34)[d]	3.98 (1.84)[b]	3.16 (1.64)[a]
Non-beauty-related food and drinks	5.98 (1.33)[b]	6.08 (1.47)[b]	4.29 (1.94)[a]	3.89 (2.19)[a]
Total	5.71 (1.47)[c]	5.85 (1.36)[c]	4.11 (1.81)[b]	3.54 (1.88)[a]
	Brand attitude (dependent variable)			
Beauty-problem solving products	3.85 (1.34)[a]	3.88 (1.44)[a]	4.05 (1.23)[a]	4.04 (1.29)[a]
Beauty-enhancing products	4.48 (1.32)[b]	3.94 (1.16)[a]	4.00 (1.32)[a]	4.26 (1.59)[ab]
Body-revealing products	5.23 (1.33)[c]	4.10 (1.61)[a]	4.67 (1.23)[b]	4.76 (1.32)[b]
Body-shaping products	4.82 (1.26)[b]	4.01 (1.32)[a]	3.57 (1.43)[a]	3.14 (1.45)[a]
Non-beauty-related technological devices	3.70 (1.47)[a]	3.72 (1.48)[a]	3.68 (1.51)[a]	3.77 (1.53)[a]
Non-beauty-related food and drinks	3.81 (1.52)[b]	3.78 (1.51)[b]	2.44 (1.16)[a]	3.49 (1.52)[b]
Total	4.24 (1.52)[c]	3.88 (1.45)[ab]	3.75 (1.50)[a]	4.06 (1.52)[bc]
	Perceptions of model beauty (mediating variable)			
Beauty-problem solving products	5.24 (1.12)[b]	5.05 (1.33)[b]	3.98 (1.21)[a]	3.85 (1.18)[a]
Beauty-enhancing products	4.98 (1.05)[b]	4.85 (1.33)[b]	4.27 (1.30)[a]	4.07 (1.24)[a]
Body-revealing products	5.47 (1.24)[b]	5.41 (1.22)[b]	4.80 (1.43)[a]	4.67 (1.65)[a]
Body-shaping products	5.09 (1.25)[b]	5.13 (1.25)[b]	4.00 (1.68)[a]	3.91 (1.34)[a]
Non-beauty-related technological devices	4.78 (1.21)[b]	4.86 (1.22)[b]	3.90 (1.34)[a]	3.86 (1.29)[a]
Non-beauty-related food and drinks	4.87 (1.35)[b]	4.96 (1.45)[b]	3.74 (1.31)[a]	4.02 (1.56)[a]
Total	5.09 (1.22)[b]	5.02 (1.31)[b]	4.13 (1.39)[a]	4.08 (1.39)[a]
	Appearance-related self-esteem (mediating variable)			
Beauty-problem solving products	3.96 (1.28)[a]	4.70 (1.32)[b]	4.69 (1.30)[b]	4.79 (1.33)[b]
Beauty-enhancing products	3.63 (1.09)[a]	5.07 (1.24)[b]	4.83 (1.30)[b]	4.96 (1.23)[b]
Body-revealing products	3.99 (1.18)[a]	4.78 (1.39)[b]	4.82 (1.34)[b]	4.66 (1.49)[b]
Body-shaping products	3.69 (1.21)[a]	5.03 (1.13)[b]	4.87 (1.33)[b]	5.05 (1.23)[b]
Non-beauty-related technological devices	4.51 (1.36)[a]	4.58 (1.42)[a]	4.59 (1.44)[a]	4.54 (1.57)[a]
Non-beauty-related food and drinks	4.58 (1.47)[a]	4.56 (1.31)[a]	4.53 (1.40)[a]	4.55 (1.78)[a]
Total	4.12 (1.32)[a]	4.75 (1.35)[b]	4.69 (1.36)[b]	4.71 (1.42)[b]
	Perceptions of brand trustworthiness (mediating variable)			
Beauty-problem solving products	2.88 (1.33)[a]	3.12 (1.54)[a]	4.34 (1.39)[b]	4.18 (1.61)[b]
Beauty-enhancing products	3.34 (1.79)[a]	3.95 (1.56)[b]	4.56 (1.60)[c]	4.94 (1.61)[c]
Body-revealing products	3.99 (1.70)[a]	4.04 (1.74)[a]	5.26 (1.48)[b]	5.28 (1.56)[b]
Body-shaping products	3.28 (1.46)[a]	3.42 (1.53)[a]	4.73 (1.12)[b]	4.55 (1.49)[b]
Non-beauty-related technological devices	3.10 (1.66)[a]	2.97 (1.45)[a]	4.37 (1.50)[b]	4.00 (1.66)[b]
Non-beauty-related food and drinks	2.90 (1.40)[a]	2.82 (1.45)[a]	3.60 (1.53)[b]	4.12 (1.75)[c]
Total	3.24 (1.62)[a]	3.39 (1.63)[a]	4.43 (1.58)[b]	4.51 (1.70)[b]
	Brand-self connectedness (mediating variable)			
Beauty-problem solving products	2.72 (1.44)[a]	2.68 (1.47)[a]	2.89 (1.39)[a]	3.71 (1.44)[b]
Beauty-enhancing products	3.45 (1.52)[a]	3.61 (1.59)[a]	3.82 (1.66)[a]	4.56 (1.50)[b]
Body-revealing products	3.25 (1.53)[a]	3.37 (1.69)[a]	3.28 (1.63)[a]	4.31 (1.56)[a]
Body-shaping products	2.64 (1.63)[a]	2.71 (1.06)[a]	2.71 (1.34)[a]	3.59 (1.45)[a]
Non-beauty-related technological devices	2.88 (1.62)[a]	2.87 (1.35)[a]	2.94 (1.48)[a]	3.09 (1.43)[a]
Non-beauty-related food and drinks	2.42 (1.38)[a]	2.35 (1.43)[a]	2.32 (1.13)[a]	2.33 (1.42)[a]
Total	2.93 (1.57)[a]	3.00 (1.56)[a]	2.99 (1.52)[a]	3.65 (1.64)[b]

Notes: Scales range from 1 (low agreement, negative) to 7 (strong agreement, positive). Different letters indicate significantly different mean values at the .05 level in a Scheffé test per product category.

Tab. 5: Mean values of variables depending on the ad version (Study 1)

and about the non-use of photoshopping in the authentic-model-appearance condition. However, as explained above, the ad image was always visible in the top half of the screen while completing the questionnaire that was contained in the bottom half of the screen. Thus, the participants could easily verify this information and had no difficulty in providing the correct yes/no answer.

3.8. Description of results

We started data analyses by examining brand attitude for the ad versions at the brand level. These results indicated that there are rather similar data patterns per brand for each product category. For the sake of simplicity, we therefore decided to collapse data across the brand factor for each category and present these aggregated findings in *Tab. 5*. If mean scores differ significantly per row in this table, we highlight the highest score(s) in gray color.

If we refrain from looking at brand level details and look at the aggregated data cross the brands, the results indicate that ads showing photoshopped ad models without disclaimer (ad version 1, $M = 4.24$) and ads showing non-photoshopped models with disclaimer (ad version 4, $M = 4.06$) resulted in higher brand attitude than the two remaining ad versions (ad version 2: $M = 3.88$, ad version 3: $M = 3.75$). Photoshopped models are associated with higher perceptions of model beauty. Photoshopped models who are not combined with a disclaimer result in lower self-esteem. Brand trustworthiness is higher when perceivers watch non-photoshopped models. Brand-self connectedness is highest in the condition in which an authentic looking model is combined with a disclaimer. In total and at first glance, the findings for the mediating variables are largely as expected, with one exception. We had expected that by providing consumers with information that the image of an idealized model was created through photoshopping, the perceptions of the beauty of the advertising model would be reduced, but this disclaimer has not diminished perceptions of beauty.

3.9. Hypotheses tests

In the next step, we tested the hypotheses using the procedure suggested by Hayes (2013, model 4). We analyzed the data at the product (sub-)category level. The findings are included in *Tab. 6*.

First, we used the idealized vs. authentic model appearance (1 = ad version 1, 0 = ad version 3) as binary independent variable, perceptions of model beauty, appearance-related self-esteem, and brand trustworthiness as mediating variables, and brand attitude as dependent variable in the mediation model. Consistent with H1a, we found a positive effect of idealization through photoshopping on model beauty, and in accordance with H1c and H1d, these perceptions translated to brand attitude for beauty-related products. As expected in H2a and H2d, idealization through photoshopping reduced appearance-related self-esteem when beauty-related products were promoted. As presumed in H2c, reduced self-esteem impaired brand attitude; however, we did not find this effect for body-shaping products; we explain this finding with the use of a small sample size in this case. As presumed in H3a, photoshopping reduced brand trustworthiness, which affects, as predicted in H3b, brand attitude. In summary, hypotheses were broadly supported. The results also reveal a significant positive residual direct effect (*c'*) of photoshopping on brand attitude. We will look at the data we obtained in the thought-listing task to find reasons for this.

Second, we examined the effect on brand attitude of providing information about the use of photoshopping to idealize models (1 = ad version 2, 0 = ad version 1) via beauty, self-esteem, and trustworthiness. In contrast to H4, which postulated that information about photoshopping reduces perceptions of model beauty, we did not find this effect. As a possible explanation for the missing effect, we refer to a sequence of information processing as follows: Test participants probably first watched the model and created beauty impressions before reading the text about photoshopping and thus did not revise beauty impressions after reading this text. As expected in H1c and H1d, model beauty positively affects brand attitude for beauty related products. In line with H5 and H2d, we found that the textual reference to photoshopping improved self-esteem when beauty-related products were promoted, and as expected in H2c, self-esteem positively affected brand attitude. In addition, data show that information about photoshopping increases brand trustworthiness and as predicted in H3b, the latter variable spills over to brand attitude. Obviously test participants interpreted this information as a signal of trustworthiness. However, the mediating effect only existed for beauty-problem-solving and beauty-enhancing products. Furthermore, we found a significantly negative residual direct effect (*c'*) for some of the categories, indicating that the list of mediating variables should be supplemented by factors that exerts a negative effect of disclosure information. Again, we will consult the results from the thought-listing task for additional information about *c'*.

Third, we tested if information about the non-use of photoshopping (1= ad version 4, 0 = ad version 3) in the condition in which a model with authentic beauty is depicted influences brand attitude through increased brand-self connectedness. Consistent with H6a and H6c, this information improves brand-self connectedness for beauty related products, and in line with H6b, brand-self connectedness contributes to brand attitude. In addition, we found a significant negative residual direct effect (*c'*) for the beauty-related products. We tested if beauty, self-esteem, or trustworthiness used as additional mediators could eliminate *c'*, which was unsuccessful. Hence, we will look at the thought-listing-task data to see if we find an additional mediator that could explain the negative residual direct effect.

Overall, the mediation analyses broadly provide support to the hypotheses, with the exception of H4, which pos-

	Beauty-problem solving products	Beauty-enhancing products	Body-revealing products	Body-shaping products	Non-beauty-related technological devices	Non-beauty-related food and drinks
Effects of idealization through photoshopping vs. authenticity on brand attitude in the absence of additional information on the use of photoshopping (photoshopping: 1 = ad version 1, 0 = ad version 3):						
$a_{\text{photoshopping} \rightarrow \text{beauty}}$ **(H1a)**	1.27^{***}	$.71^{***}$	$.67^{***}$	1.09^{**}	$.87^{***}$	1.14^{***}
$b_{\text{beauty} \rightarrow \text{attitude}}$ **(H1c, H1d)**	$.23^{**}$	$.19^{***}$	$.25^{***}$	$.37^{**}$	$.05^{ns}$	$.07^{ns}$
$a_{\text{photoshopping} \rightarrow \text{beauty}} \times b_{\text{beauty} \rightarrow \text{attitude}}$	.29 (.14; .45)	.13 (.04; .24)	.17 (.10; .26)	.40 (.18; 1.20)	.04 (-.05; .14)	.08 (-.04; .22)
$a_{\text{photoshopping} \rightarrow \text{self-esteem}}$ **(H2a, H2d)**	$-.73^{***}$	-1.20^{***}	$-.84^{***}$	-1.18^{***}	$-.08^{ns}$	$.05^{ns}$
$b_{\text{self-esteem} \rightarrow \text{attitude}}$ **(H2c)**	$.09^{*}$	$.12^{*}$	$.12^{*}$	$.12^{ns}$	$.01^{ns}$	$-.05^{ns}$
$a_{\text{photosh} \rightarrow \text{self-esteem}} \times b_{\text{self-esteem} \rightarrow \text{attitude}}$	-.06 (-.14; -.01)	-.14 (-.25; -.02)	-.10 (-.25; -.02)	-.14 (-.27; .04)	-.03 (-.01; .04)	.01 (-.04; .07)
$a_{\text{photoshopping} \rightarrow \text{trustworthiness}}$ **(H3a)**	-1.45^{***}	-1.31^{***}	-1.27^{***}	-1.46^{***}	-1.27^{***}	$-.70^{***}$
$b_{\text{trustworthiness} \rightarrow \text{attitude}}$ **(H3b)**	$.25^{***}$	$.26^{***}$	$.13^{***}$	$.22^{*}$	$.40^{***}$	$.29^{***}$
$a_{\text{photosh} \rightarrow \text{trustworthiness}} \times b_{\text{trustw} \rightarrow \text{attitude}}$	-.35 (-.55; -.21)	-.34 (-.53; -.22)	-.17 (-.27; -.10)	-.32 (-.77; -.01)	-.51 (-.86; -.41)	-.20 (-.34; -.10)
$c'_{\text{photoshopping} \rightarrow \text{attitude}}$	$-.06^{ns}$	$.84^{***}$	$.65^{***}$	1.31^{***}	$.52^{*}$	1.47^{***}
Total effect on brand attitude	$-.19^{ns}$	$.48^{**}$	$.55^{***}$	1.25^{***}	$.02^{ns}$	1.36^{***}
Effects of disclosure vs. non-disclosure of using photoshopping for idealized models (disclosure of photoshopping: 1= ad version 2, 0 = ad version 1):						
$a_{\text{disclosure of photoshopping} \rightarrow \text{beauty}}$ **(H4)**	$-.19^{ns}$	$-.14^{ns}$	$-.06^{ns}$	$.04^{ns}$	$.09^{ns}$	$.09^{ns}$
$b_{\text{beauty} \rightarrow \text{attitude}}$ **(H1c, H1d)**	$.30^{***}$	$.16^{***}$	$.32^{***}$	$.29^{*}$	-.03	$-.14^{ns}$
$a_{\text{disclosure photosh} \rightarrow \text{beauty}} \times b_{\text{beauty} \rightarrow \text{attitude}}$	-.06 (-.15; .01)	-.02 (-.09; .04)	-.02 (-.10; .05)	.01 (-.13; .30)	-.00 (-.08; .02)	-.01(-.24; .07)
$a_{\text{disclosure photosh} \rightarrow \text{self-esteem}}$ **(H5, H2d)**	$.74^{***}$	1.44^{***}	$.79^{***}$	1.34^{***}	$.07^{ns}$	$-.02^{ns}$
$b_{\text{self-esteem} \rightarrow \text{attitude}}$ **(H2c)**	$.13^{**}$	$.13^{**}$	$.14^{**}$	$.20^{ns}$	$.07^{ns}$	$-.06^{ns}$
$a_{\text{disclosure photosh.} \rightarrow \text{self-est.}} \times b_{\text{self est} \rightarrow \text{attitude}}$	.09 (.03; .18)	.19 (.12; .29)	.09 (.05; .15)	.27 (-.07; .74)	.00 (-.10; .01)	.00 (-.09; .03)
$a_{\text{disclosure of photoshopping} \rightarrow \text{trustworthiness}}$	$.24^{*}$	$.70^{***}$	$.05^{ns}$	$.14^{ns}$	$-.13^{ns}$	$-.09^{ns}$
$b_{\text{trustworthiness} \rightarrow \text{attitude}}$ **(H3b)**	$.40^{***}$	$.27^{***}$	$.24^{***}$	$.30^{**}$	$.33^{***}$	$.39^{***}$
$a_{\text{disclosure photosh.} \rightarrow \text{trustw.}} \times b_{\text{trustw.} \rightarrow \text{attitude}}$	.09 (.01; .22)	.19 (.12; .36)	.01 (-.06; .08)	.04 (-.19; .35)	-.04 (-.24; .05)	-.04 (-.23; .05)
$c'_{\text{disclosure of photoshopping} \rightarrow \text{attitude}}$	$-.11^{ns}$	$-.91^{***}$	-1.19^{***}	-1.13^{***}	$.06^{ns}$	$-.00^{ns}$
Total effect on brand attitude	$.02^{ns}$	$-.55^{***}$	-1.13^{***}	$-.81^{**}$	$.02^{ns}$	$-.03^{ns}$
Effect of disclosure vs. non-disclosure of not using photoshopping for authentic models (disclosure of non-photoshopping: 1= ad version 4, 0 = ad version 3):						
$a_{\text{discl\_non-use ph.} \rightarrow \text{self-br.-con.}}$ **(H6a, H6c)**	$.81^{***s}$	$.74^{***}$	1.03^{***}	$.88^{**}$	$.15^{ns}$	$.00^{ns}$
$b_{\text{self-brand-connectedness} \rightarrow \text{attitude}}$ **(H6b)**	$.45^{***}$	$.68^{***}$	$.42^{***}$	$.79^{***}$	$.66^{***}$	$.63^{***}$
$a_{\text{discl\_non-use phot.} \rightarrow \text{self-brand-connectedness}} \times b_{\text{self-brand-connectedness} \rightarrow \text{attitude}}$	.36 (.21; .51)	.50 (.29; .75)	.43 (.30; .59)	.69 (.11; 1.23)	.10 (-.05; .28)	.00 (-.16; .16)
$c'_{\text{disclosure of non-photoshopping} \rightarrow \text{attitude}}$	$-.37^{***}$	$-.24^{*}$	$-.35^{***}$	-1.12^{***}	$-.01^{ns}$	1.05^{***s}
Total effect on brand attitude	$-.00^{ns}$	$.26^{*}$	$-.08^{ns}$	$-.43^{ns}$	$.09^{ns}$	1.05^{***}

Notes: a: Mean differences of the mediating variables (brand attitude) depending on the two levels of the independent variable. *b*: Slopes of multiple OLS regressions of the mediating variables on brand attitude. $a \times b$: Product of *a* and *b*; besides that, the .95 confidence interval of $a \times b$. If 0 lies outside the CI, there is evidence for a mediating effect. *c':* Residual direct effect of OLS regressions: E.g., the *first* regression equation is: brand attitude = intercept + $b_{\text{beauty} \rightarrow \text{attitude}} \times$ perceptions of beauty + $b_{\text{self-esteem} \rightarrow \text{attitude}} \times$ self-esteem + $b_{\text{trustworthiness} \rightarrow \text{attitude}} \times$ trustworthiness + $c'_{\text{photoshopping} \rightarrow \text{attitude}} \times$ photoshopping + ε (with photoshopping: 1 = present, 0 = absent). $^{***}p < .001$, $^{**}p < .01$, $^{*}p < .05$, $^{ns}p > .05$ (one-tailed tests).

Tab. 6: Results of mediation analyses

tulated that adding information about photoshopping reduces perceptions of an idealized model's beauty.

3.10. Explaining residual direct effects with an analysis of the qualitative data

We examined the texts provided by the test participants in immediate response to the ad image to identity reasons for the sign of the significant residual direct effects *c'* shown in *Tab. 6*. [7]

First, we looked for additional positive comments in the idealized-model-appearance condition (ad version 1) that were missing or rare in the authentic-model-appearance condition (ad version 3) or for additional negative comments in the authentic-model-appearance condition that were not or rarely articulated in the idealized-model-appearance condition. From this analysis, we conclude that perceptions of model beauty, which we have treated as a one-dimensional variable, can consist of four components. (1) Comments describing physical characteristics: In the idealized-model-appearance condition, many test participants described face and body as „flawless" and „perfect," and in the authentic-model-appearance condition, there were many comments regarding face and body such as „unkempt." (2) Comments describing sexiness: Other test participants described the idealized model as „sexy, „seductive," and „alluring" and the authentic model as „tired „or „stressed." (3) Comments describing healthiness: There were many persons stating that the idealized model looks natural, vital, and healthy and that the authentic model appeared unhealthy. (4) Comments describing sportiness: In addition, the idealized model was often associated with „sporty" and „athletic." We believe that our quantitative measure of model beauty did not cover all these components in detail. In addition, in the idealized-model-appearance condition, many persons stated that the model is a beauty goal they want to achieve. In summary, ad model sexiness, healthiness, sportiness, and the higher suitability as role model whose appearance one should approach are favorable connotations that are more often evoked in the idealized than the authentic-model-appearance condition what could explain the *positive c'* effect of photoshopping.

Second, we looked for additional negative comments when photoshopping was disclosed (ad version 2) compared to the condition in which the use of photoshopping to create an idealized ad model was not mentioned (ad version 1). The texts written down by the test participants indicate that the disclaimer (ad version 2) was perceived as unfamiliar and that unfamiliar information causes irritation. Moreover, some test participants also mentioned in the disclaimer condition (ad version 2) that by providing this information, marketers would doubt their intelligence, which means that they could recognize the fact of photoshopping without explicit information about the usage of this technique and that the disclaimer is „superfluous." Sensation of irritation and the belief that redundant information is being given could explain the *negative c'* effect of disclosure of photoshopping.

Third, we examined the data from the thought-listing task to identify reasons why revealing the non-use of photoshopping additionally produced a negative residual direct effect. Test participants often responded to this information (ad version 4) with thoughts about the unusualness of this comment („irritating"). Many persons also stated that the disclaimer drew their attention to the topic of photoshopping, with the result that they invested effort to check if really nothing in the model's appearance was photoshopped despite the marketer's promise. They stated that this check left them in a state of uncertainty as to whether the model in fact was not idealized by photoshopping and raised concerns about the credibility of the disclaimer. Therefore, the believability of the disclaimer *per se* has been questioned. In summary, irritation and low credibility of the disclaimer could explain the *negative c'* effect of disclosing nonuse of photoshopping.

3.11. Supplementary investigation for textual versus graphic disclaimers

If a disclaimer of photoshopping is required by law in Germany, this information can be given as a logo-type disclaimer (as in Norway) or as a verbal notice (as in France). Companies who avoid photoshopping, could also adopt this logo but cross it out with an X. For idealized models, Borges (2011 Study 2) already compared the use of a textual warning to a graphic warning about the use of photoshopping on purchase intent regarding fragrances. He found that the graphic version generated a lower purchase intent than the textual version (level of significance not specified). Additionally, there are studies that analyzed the effect of these pieces of information about photoshopping on self-esteem. Tiggemann and Brown (2018) and Naderer et al. (2022) found no significant effect. To gain additional insights, we conducted a supplementary study to validate the reasoning of Tiggemann et al. (2019a, p. 93) who state that viewers „might respond more readily, and automatically to a graphic that does not require the degree of cognitive processing inherent in reading text, as in a verbal label." The rationale for this supplementary study is therefore the proposition that people like to watch advertisements and images in magazines, billboards, or on the Internet but do not want to read them (besides the brand name and a short slogan) due to the limited cognitive resources they are willing to spend on processing advertising. Therefore, graphic disclaimers about the use of photoshopping (which are likely to be processed more fluently) might result in less self-esteem impairment and therefore higher brand attitude than textual disclaimers.

Test stimuli. We selected two brands of beauty-problem-solving products (Vichy and EOS) and two brands of beauty-enhancing products (Garnier and Nivea) and, for these brands, we adopted the ad versions 1 to 4 from the main part of Study 1 (1 = idealized/no information, 2 =

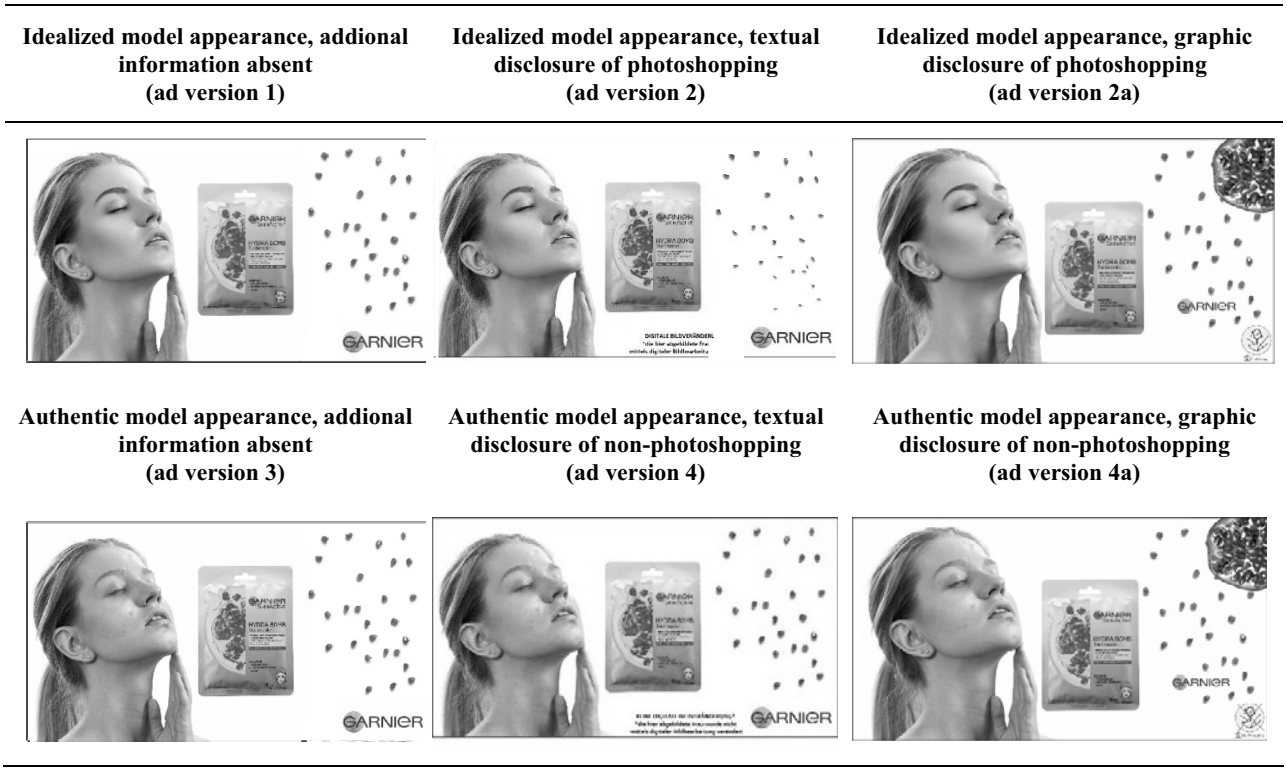

Fig. 4: Example of test stimuli (Supplementary investigation of Study 1)

idealized/textual disclosure of photoshopping, 3 = authentic/no information, and 4 = authentic/textual disclosure of non-photoshopping). We supplemented them by two ad versions: ad version 2a (idealized/graphic disclosure of photoshopping) and ad version 4a (authentic/graphic disclosure of non-photoshopping). For the design of the graphic logo, we created a symbol similar to that used by Olay or Dove. We show the versions for the Garnier brand in *Fig. 4*.

Procedure, measures, sample. The data for the ad versions 1 to 4 for the four brands (Vichy, EOS, Garnier and Nivea) were taken from the main part of Study 1 (N = 601, M_{age} = 23.68 years, M_{BMI} = 22.30 kg/m^2). This data was supplemented by collecting data from females who viewed ad version 2a (idealized appearance, visual disclaimer) or ad version 4a (authentic appearance, visual disclaimer) for the selected four brands at the time when data for the main part of Study 1 have also been collected. The measures were adopted from the main part of this study. In total, N = 248 females responded to the eight additional ad versions (M_{age} = 24.32 years, M_{BMI} = 21.98 kg/m^2). The total sample thus consist of 849 female students and 849/(6 ad versions × 4 brands) = 35.25 persons per condition. The added sample does not differ significantly in terms of age and BMI from the data adopted from the main part of Study 1.

Results. The results are shown in *Tab. 7*. We expected that a graphic disclaimer about the use of photoshopping results in lower impairment of self-esteem than a textual disclaimer. For beauty-problem-solving products, this presumption is supported ($M_{\text{ad version 2}}$ = 4.37, $M_{\text{ad version 2a}}$ = 4.80, $p < .05$). However, for the beauty-enhancing products, we do not find a difference in self-esteem depending on whether a textual or graphic disclaimer informs about the use of photoshopping. This partly supports the presumption that a graphic signal is beneficial in terms of self-esteem. Moreover, we find – as predicted by the presumption of Tiggemann et al. (2019a) – that brand attitude is higher if a graphic rather than a textual signal is used to inform about photoshopping (for all considered brands: $M_{\text{ad version 2}}$ = 3.58, $M_{\text{ad version 2a}}$ = 4.31, $p < .05$).

This supplemental investigation adds the insight for beauty products that if disclosure of photoshopping will become mandatory by law or marketers consider this option voluntarily, a (small) graphic disclaimer does not harm brand attitude. If they are considering the depiction of models in their authentic appearance, they might also use a small graphic logo to inform about the non-use of photoshopping.

4. Study 2

In Study 1, we compared two ad model images: an objectively non-photoshopped image (authentic-model appearance) vs. a photoshopped image (idealized-model appearance). However, idealization is not a fixed category, because images can be edited with photoshop to a lower or a higher degree. The results presented above therefore depend on the amount to which the idealized ad model has been photoshopped. To deal with this aspect, we conducted Study 2. This allows us to test H1b and

	Idealized model appearance without disclaimer (ad version 1)	Idealized model appearance with disclaimer (ad version 2, textual)	Idealized model appearance with disclaimer (ad version 2a, graphic)	Authentic model appearance without disclaimer (ad version 3)	Authentic model appearance with disclaimer (ad version 4, textual)	Authentic model appearance with disclaimer (ad version 4a, graphic)
	Recognition of photoshopping					
Beauty-problem-solving products	6.67 (.70)^{b}	6.50 (.81)^{b}	6.54 (.79)^{b}	4.44 (1.79)^{a}	4.57 (1.47)^{a}	4.14 (2.04)^{a}
Beauty-enhancing products	6.01 (1.19)^{b}	5.97 (1.32)^{b}	5.80 (1.42)^{b}	4.14 (1.64)^{a}	4.38 (1.74)^{a}	3.37 (1.91)^{a}
Total	6.31 (1.05)^{c}	6.21 (1.15)^{c}	6.17 (1.21)^{c}	4.29 (1.71)^{ab}	4.47 (1.61)^{b}	3.75 (1.99)^{a}
	Brand attitude					
Beauty-problem-solving products	3.93 (1.31)^{ab}	3.78 (1.47)^{a}	4.38 (1.53)^{ab}	4.07 (1.16)^{ab}	3.97 (1.44)^{ab}	4.65 (1.49)^{b}
Beauty-enhancing products	4.04 (1.19)^{ab}	3.42 (1.47)^{a}	4.18 (1.69)^{ab}	3.65 (1.48)^{a}	3.70 (1.50)^{ab}	4.46 (1.42)^{b}
Total	3.99 (1.24)^{abc}	3.58 (1.43)^{a}	4.27 (1.61)^{bc}	3.86 (1.35)^{ab}	3.83 (1.47)^{ab}	4.55 (1.45)^{c}
	Perceptions of model beauty					
Beauty-problem-solving products	5.08 (1.20)^{b}	4.86 (1.46)^{b}	5.39 (1.08)^{b}	3.83 (1.11)^{a}	3.53 (1.28)^{a}	4.75 (1.24)^{b}
Beauty-enhancing products	5.25 (1.07)^{b}	5.09 (1.18)^{b}	5.35 (1.11)^{b}	4.33 (1.47)^{a}	4.35 (.94)^{a}	4.74 (1.20)^{ab}
Total	5.17 (1.13)^{bc}	4.99 (1.32)^{bc}	5.37 (1.09)^{c}	4.08 (1.33)^{a}	4.01 (1.22)^{a}	4.75 (1.21)^{b}
	Appearance-related self-esteem					
Beauty-problem-solving products	3.83 (1.36)^{a}	4.37 (1.20)^{a}	4.80 (1.56)^{b}	4.51 (1.33)^{ab}	4.64 (1.35)^{b}	4.83 (1.29)^{b}
Beauty-enhancing products	3.39 (1.10)^{a}	4.61 (1.41)^{b}	4.63 (1.46)^{b}	4.69 (1.67)^{b}	4.65 (1.45)^{b}	4.96 (1.45)^{b}
Total	3.59 (1.24)^{a}	4.51 (1.32)^{b}	4.72 (1.51)^{b}	4.60 (1.46)^{b}	4.65 (1.49)^{b}	4.90 (1.37)^{b}
	Brand trustworthiness					
Beauty-problem-solving products	2.65 (1.41)^{a}	2.97 (1.66)^{a}	3.19 (1.42)^{ab}	4.12 (1.45)^{c}	3.99 (1.79)^{bc}	4.63 (1.43)^{c}
Beauty-enhancing products	2.96 (1.57)^{a}	2.88 (1.51)^{a}	3.94 (1.70)^{b}	4.19 (1.65)^{bc}	4.64 (1.49)^{bc}	5.00 (1.49)^{c}
Total	2.82 (1.50)^{a}	2.92 (1.57)^{a}	3.57 (1.61)^{b}	4.16 (1.55)^{c}	4.34 (1.66)^{cd}	4.82 (1.47)^{d}
	Brand-self connectedness					
Beauty-problem-solving products	2.55(1.23)^{a}	2.74 (1.43)^{a}	2.98 (1.53)^{ab}	3.18 (1.36)^{abc}	3.78 (1.33)^{bc}	3.86 (1.75)^{c}
Beauty-enhancing products	2.94 (1.66)^{ab}	2.71 (1.52)^{a}	3.63 (1.76)^{bc}	2.99 (1.52)^{abc}	3.77 (1.60)^{bc}	3.87 (1.69)^{bc}
Total	2.76 (1.49)^{a}	2.73 (1.47)^{a}	3.31 (1.68)^{ab}	3.08 (1.44)^{a}	3.77 (1.48)^{b}	3.87 (1.71)^{b}

Notes: Scales range from 1 (low agreement, negative) to 7 (strong agreement, positive).
Different letters indicate significantly different mean values at the .05 level in a Scheffé test.

Tab. 7: Mean values of variables depending on the ad version (Supplementary investigation of Study 1)

H2b, which deal with effects of different levels of idealization.

Experimental design. We created twelve ad versions for six brands that depicted the same female model per brand, in accordance with a 6 (level of image idealization) × 2 (information about measures of idealization: present, absent) design. The degree of idealization, i.e., the intensity of digital image processing, was varied in six levels and ranged from (1) no digital alteration of the image at all to (6) intensive digital image processing. In the three low-level versions of idealization, information about the non-use of photoshopping was either given or not given. In the three high-level versions of idealization, information about the use of photoshopping was either provided or not provided. In addition, we created these ad versions for different brands. We chose three beauty-problem-solving products (Vichy anti-spot cream, EOS lip balm, and Garnier anti dry-skin tissue) and three not-beauty related food and drink products (Dextra Energy liquid gel, Bahlsen Pickup cookies, and Messmer tea).

Test stimuli. The ad versions were created similarly to those in Study 1. The idea for manipulating different levels of female beauty was adopted from Sofer et al. (2015) who created a face-typicality scale. Contrary to what these authors did, our manipulation shows the same person per brand that was modified by image processing. In *Fig. 5*, we show an example of the stimuli set that we created for the Vichy brand.

Procedure, measures, sample. The procedure and the measures were adopted from Study 1. However, we added statements for perceptions of model vitality and perceptions of model-self similarity. We did this to react to the verbally provided comments to the test stimuli used in Study 1; test participants had frequently provided such comments about the models. To assess model vitality, the persons indicated agreement with „The model looks very health-conscious," „vital," „fit," and „The model looks as if she has no health problems" (α = .87, items adopted from Ryan and Frederick 1997). Participants' perceived model-self-similarity was measured by agreement with „I will never look like the model in the ad," „The model sets unattainable goals for me," and „Looking like the model seems unrealistic for me" (α = .73, statements adopted from Richins (1991) and scale

Fig. 5: Example of test stimuli (Study 2)

reversed). For the other variables, Cronbach's alpha was .93 (recognition of photoshopping), .91 (brand attitude), .90 (model beauty), .85 (appearance-related self-esteem), .94 (brand trustworthiness), and .88 (brand-self connectedness). A total of 2,797 females participated in Study 2 (M_{age} = 24.35 years, SD = 7.16, M_{BMI} = 22.14 kg/m^2, SD = 3.28, 80 % students and 20 % alumni). Average cell size is 2,797/(12 ads × 6 brands) = 38.8.

Description of results: Because the results were similar at the brand level, we report them after collapsing data across brands per category. The findings presented in *Tab. 8* indicate that perceptions of idealization (i.e., recognition of photoshopping) increased as intended. Thus, our manipulation of model idealization was successful. The main finding of Study 2 is the observation that perceptions of model beauty and partly perceptions of model vitality reach the peak at non-extreme levels of model idealization. The model-self similarity is comparatively high for low levels of model idealization. For the brand attitude, we find the peak of the idealization-attitude relationship also for a non-extreme level of model idealization. The finding that perceptions of model beauty and brand attitude are highest at idealization levels 4 or 5 (out

Category	Disclosure	Level 1 (no photo-shopping)	Level 2 (weak photo-shopping)	Level 3	Level 4	Level 5	Level 6 (intensive photoshopping)
		Recognition of photoshopping					
Beauty-problem-solving products	absent	2.52 (1.15)^{a}	3.50 (1.41)^{b}	4.06 (1.68)^{c}	5.53 (1.15)^{d}	6.13 (.76)^{e}	6.68 (.64)^{f}
	present	2.23 (1.34)^{a}	3.24 (1.33)^{b}	4.30 (1.72)^{c}	5.62 (1.30)^{d}	6.26 (.81)^{e}	6.91 (.22)^{f}
Non-beauty-related food and drinks	absent	3.08 (1.56)^{a}	3.79 (1.70)^{b}	4.45 (1.38)^{c}	5.32 (1.51)^{d}	6.18 (1.05)^{e}	6.78 (.45)^{f}
	present	2.93 (1.68)^{a}	3.75 (1.78)^{b}	4.54 (1.50)^{c}	5.27 (1.19)^{d}	6.06 (1.33)^{e}	6.70 (.56)^{f}
		Brand attitude					
Beauty-problem-solving products	absent	3.25 (1.33)^{a}	3.46 (1.39)^{ab}	3.64 (1.16)^{ab}	3.97 (1.41)^{b}	4.56 (1.08)^{c}	3.79 (1.30)^{ab}
	present	3.37 (1.29)^{a}	3.85 (1.48)^{a}	3.96 (1.39)^{a}	4.62 (1.26)^{b}	3.82 (1.42)^{a}	3.70 (1.36)^{a}
Non-beauty-related food and drinks	absent	3.13 (1.02)^{a}	2.76 (.83)^{a}	2.94 (1.33)^{a}	4.16 (1.73)^{b}	4.71 (1.22)^{b}	3.29 (1.47)^{a}
	present	4.00 (1.67)^{a}	3.93 (1.50)^{a}	3.46 (1.51)^{a}	4.06 (1.59)^{a}	3.83 (1.61)^{a}	3.91 (1.51)^{a}
		Perceived model beauty					
Beauty-problem-solving products	absent	3.49 (1.14)^{a}	3.94 (1.19)^{ab}	4.35 (1.25)^{bc}	4.68 (1.24)^{c}	5.46 (1.09)^{d}	4.72 (1.27)^{c}
	present	3.78 (1.26)^{a}	3.93 (1.26)^{a}	4.30 (1.30)^{ab}	4.92 (1.23)^{cd}	5.47 (1.20)^{d}	4.70 (1.61)^{bc}
Non-beauty-related food and drinks	absent	3.23 (1.27)^{a}	3.96 (1.30)^{b}	4.22 (1.46)^{b}	4.88 (1.53)^{c}	5.49 (1.15)^{d}	4.21 (1.65)^{b}
	present	4.17 (1.54)^{a}	4.30 (1.47)^{a}	4.37 (1.41)^{a}	5.02 (1.54)^{bc}	5.21 (1.00)^{c}	4.47 (1.67)^{ab}
		Perceived model vitality					
Beauty-problem-solving products	absent	3.29 (1.27)^{a}	3.71 (1.36)^{ab}	4.23 (1.32)^{bc}	4.71 (1.36)^{cd}	5.19 (1.19)^{d}	4.68 (1.35)^{cd}
	present	3.98 (1.45)^{a}	4.22 (1.49)^{ab}	4.31 (1.41)^{ab}	4.70 (1.23)^{bc}	5.25 (1.18)^{c}	4.15 (1.29)^{ab}
Non-beauty-related food and drinks	absent	3.71 (1.31)^{a}	4.00 (1.02)^{abc}	3.98 (1.02)^{ab}	4.52 (1.36)^{c}	5.10 (1.30)^{d}	4.35 (1.46)^{bc}
	present	4.28 (1.29)^{a}	4.39 (1.43)^{a}	4.59 (1.29)^{ab}	5.00 (1.38)^{bc}	5.26 (1.11)^{c}	4.78 (1.32)^{abc}
		Perceived model-self-similarity					
Beauty-problem-solving products	absent	4.48 (1.24)^{c}	5.30 (1.16)^{d}	4.64 (1.18)^{c}	4.37 (1.16)^{bc}	3.80 (1.65)^{ab}	3.41 (1.51)^{a}
	present	5.06 (1.31)^{c}	5.10 (1.34)^{c}	4.73 (1.42)^{bc}	4.26 (1.64)^{b}	3.50 (1.36)^{a}	3.02 (1.59)^{a}
Non-beauty-related food and drinks	absent	4.59 (1.51)^{b}	5.35 (1.04)^{c}	4.81 (1.60)^{bc}	3.89 (1.65)^{a}	3.49 (1.51)^{a}	3.30 (1.63)^{a}
	present	4.96 (1.41)^{d}	5.04 (1.26)^{d}	4.73 (1.42)^{cd}	4.21 (1.50)^{bc}	3.68 (1.57)^{ab}	3.43 (1.70)^{a}
		Appearance-related self-esteem					
Beauty-problem-solving products	absent	4.96 (1.41)^{d}	5.04 (1.26)^{d}	4.73 (1.42)^{cd}	4.21 (1.50)^{bc}	3.68 (1.57)^{ab}	3.43 (1.70)^{a}
	present	4.89 (1.36)^{a}	4.84 (1.38)^{a}	4.52 (1.15)^{a}	4.52 (1.38)^{a}	4.53 (1.11)^{a}	4.63 (1.11)^{a}
Non-beauty-related food and drinks	absent	4.80 (1.34)^{a}	4.84 (1.67)^{a}	4.63 (1.46)^{a}	4.85 (1.38)^{a}	4.62 (1.43)^{a}	4.65 (1.44)^{a}
	present	4.64 (1.43)^{a}	4.83 (1.37)^{a}	4.71 (1.47)^{a}	4.69 (1.34)^{a}	4.56 (1.35)^{a}	4.70 (1.50)^{a}
		Brand trustworthiness					
Beauty-problem-solving products	absent	4.44 (1.60)^{c}	4.24 (1.59)^{c}	4.23 (1.44)^{c}	3.80 (1.51)^{bc}	3.30 (1.46)^{ab}	3.00 (1.31)^{a}
	present	4.93 (1.55)^{c}	4.47 (1.64)^{c}	4.51 (1.51)^{c}	3.78 (1.68)^{b}	3.56 (1.54)^{ab}	3.00 (1.33)^{a}
Non-beauty-related food and drinks	absent	5.37 (1.14)^{c}	5.11 (1.29)^{c}	4.01 (1.24)^{b}	4.04 (1.62)^{b}	3.63 (1.48)^{b}	2.77 (1.35)^{a}
	present	5.25 (1.37)^{c}	4.98 (1.29)^{c}	4.34 (1.46)^{b}	4.27 (1.49)^{b}	3.79 (1.57)^{b}	2.88 (1.35)^{a}
		Brand-self-connectedness					
Beauty-problem-solving products	absent	3.22 (1.35)^{a}	3.13 (1.04)^{a}	3.30 (1.33)^{a}	3.13 (1.54)^{a}	2.87 (1.37)^{a}	2.83 (1.38)^{a}
	present	2.63 (1.47)^{a}	2.93 (1.53)^{a}	3.19 (1.55)^{a}	2.69 (1.62)^{a}	2.75 (1.48)^{a}	2.72 (1.78)^{a}
Non-beauty-related food and drinks	absent	2.74 (1.55)^{a}	2.80 (1.35)^{a}	2.66 (1.05)^{a}	2.70 (1.55)^{a}	2.51 (1.46)^{a}	2.59 (1.15)^{a}
	present	2.81 (1.61)^{a}	2.81 (1.38)^{a}	2.35 (1.38)^{a}	2.73 (1.69)^{a}	2.45 (1.49)^{a}	2.68 (1.38)^{a}

Notes: Scales range from 1 (low agreement, negative) to 7 (strong agreement, positive). Different letters indicate significantly different mean values at the .05 level in a Scheffé test per product category. Disclosure = absent: There was neither information about the use nor non-use of photoshopping. Disclosure = present: For the levels 4 to 6, information about the use of photoshopping was provided. For the levels 1 to 3, information about the nonuse of photoshopping was provided.

Tab. 8: Mean values of variables depending on the ad version (Study 2)

of six levels) is stable across the category (beauty-problem-solving products, not-beauty related food and drinks) and not dependent on whether information about the use/non-use of photoshopping is provided.

Hypotheses test: In H1b, we postulated that perceptions of model beauty do not increase with model idealization and expected an inverted U-shaped relationship. Our findings are in line with this presumption. A similar rela-

tionship was found for model vitality. These findings also underscore the presumption derived from results of the thought listing task of Study 1 that model beauty might be perceived and measured in different dimensions, e.g., healthiness. In H2b, we expected that a high level of model idealization would not be associated with impaired self-esteem, based on the argument that females would be unlikely to compare their own appearance to that of a highly idealized and thus dissimilar ad model. Contrary to this presumption, we did not find the expected relationship. For beauty-problem-solving products, appearance-related self-esteem decreased with increasing levels of model idealization. Apparently, young females compare their own appearance also to very idealized images. Moreover, the data allows testing H3a, which predicts a negative relationship between the level of model idealization and brand trustworthiness. This presumption is supported.

In summary, Study 2 adds the insight that brand attitude does not increase with increasing model idealization. Our findings show a peak of the relationship at level 4 or 5 out of six levels of model idealization. From comments made in the thought-listing task in Study 2, we received information that the highest level in idealization reminded the persons of artificial models, such as the Instagram digital model #lilmiquela, created by using artificial intelligence. If photoshopping labeling becomes obligatory and companies use idealized models, then the intensity of digital image processing should not be extremely high.

5. Summary of Hypotheses Tests

In *Tab. 9*, we summarize the findings of the tests of the hypotheses. Most of the hypotheses were supported by our research. Hence, we focus on those which were only partly nor not supported.

In Study 1, the presumption that self-esteem has a positive influence on brand attitude (H2c) was only supported for beauty-problem solving products, beauty-enhancing products, and body-revealing products. The presumption that perceptions of model beauty are reduced through the implementation of a disclosing information (H4) was not supported. We presume that the focus of attention when viewing the model was the model's appearance. Thus, the subsequent processing of the additional information did not change the impression of model's beauty. The information about the use of photoshopping was expected to enhance appearance-related self-esteem (H5). This presumption could only be supported for the beauty related products.

In Study 2, the presumption was tested that a high level of idealization would not impair self-esteem as, in this condition, the expected gap between the appearance of the depicted model and the female participants is very big (H2b); in contrast to this presumption, the participants compared themselves even to the highly idealized model resulting in diminished appearance-related self-esteem when viewing ads for beauty-related products.

6. Managerial Implications

6.1. Should marketers use images of idealized or authentic ad models if they aim to affect brand attitude? How much photoshop should be done?

Recommendation. We found an ambivalent response of young female consumers to photoshopping. On the one hand, consumers express a generally negative attitude toward photoshopped ad models (*Tab. 4*). On the other hand, comparing of ad version 1 (idealized-model appearance without disclaimer) to ad version 3 (authentic-model appearance without disclaimer) in Study 1, our results show that photoshopping increases the brand attitude toward beauty-enhancing, body-revealing, body-shaping products, and non-beauty-related food and drinks and does not impair the attitude toward beauty-problem-solving products and non-beauty-related technological devices (*Tab. 5*). Study 2 adds the insight that an extreme level of idealization should be avoided. Therefore, when brand attitude is in the center of marketing activities, idealized, but not extremely idealized models should be used for beauty-enhancing, body-revealing, body-shaping products, and non-beauty-related food and drinks if the depiction of models in their authentic appearance is the alternative.

Substantiation of the recommendation. To explain the positive effect of idealization through photoshopping (on average) on brand attitude, we *first* can refer to the mediation analyses carried out in Study 1. These analyses showed that photoshopping improves brand attitude through higher perceptions of model beauty what could satisfy the need for sensory pleasure although watching photoshopped persons also impairs brand attitude through lower appearance-related self-esteem and lower brand trustworthiness. *Second*, other positive effects of photoshopping were evident from the texts provided in the thought-listing task. Photoshopped models look healthier, sportier, and sexier. In addition, test participants often indicated that these models are more apt to be the stereotype to which their own appearance should be approached because they believe that others viewed their appearance in relation to idealized images. Moreover, additional comments provided in the thought-listing task showed that some young females were uncertain about the degree to which the ad models were photoshopped. The idealized image induces the illusion of reality because „images cannot lie." In conclusion, there seem to be more positive effects than negative effects of photoshopping ad models on brand attitude unless females do not strongly doubt the surmised beauty of the ad model what would be the case with extreme idealization.

But why do the young females indicate a generally negative attitude toward photoshopped ad models (see

	Hypothesis	Theoretical foundation (examples)	Study 1	Study 2
H1a	Idealization (vs. authenticity) increases perceptions of the ad model's beauty.	Existence of a beauty stereotype	Supported	-
H1b	The validity of H1a is limited to non-extreme levels of model idealization. For very high levels of idealization, the perception of model beauty is reduced.	Consumer skepticism, contrast-theory	-	Supported
H1c	Perceptions of the ad model's beauty spill over positively to brand attitude.	Beauty-is-good heuristic, intrasexual competitiveness, aesthetic values, inferences from beauty	Supported	-
H1d	The effect postulated in H1c is stronger for beauty-related than for non-beauty-related products.	Fit (match) between the category and the model characteristic	Supported	-
H2a	Idealization (vs. authenticity) diminishes appearance-related self-esteem.	Social-comparison theory	Supported	-
H2b	The validity of H2a is limited to non-extreme levels of model idealization. For a very high level of idealization, model idealization does not reduce self-esteem.	Social-comparison theory	-	Partly supported
H2c	Self-esteem positively influences brand attitude; in other words: reduced self-esteem deteriorates brand attitude.	Inferences from self-esteem	Partly supported	-
H2d	The effect postulated in H2a is stronger for beauty-related than for non-beauty-related products.	Social-comparison theory	Supported	-
H3a	Idealization (compared to authenticity) reduces brand trustworthiness; in other words: photoshopping increases sensations of the marketer's deceptive intentions. The higher idealization, the lower brand trustworthiness.	Existence of lay beliefs that idealization serves the purpose of deception, persuasion-knowledge theory	Supported	Supported
H3b	Brand trustworthiness positively influences brand attitude.	Existence of a brand schema	Supported	-
H4	Disclosure of photoshopping reduces perceptions of model beauty.	Schema-incongruence theory	Not supported	-
H5	Disclosure of the use of photoshopping leads to higher appearance-related self-esteem than non-disclosure.	Persuasiveness of given information	Partly supported	-
H6a	Disclosure of the non-use of photoshopping improves brand-self connectedness.	Self-referencing	Supported	-
H6b	Brand-self connectedness spills over positively on brand attitude.	Similarity-is-good heuristic	Supported	-
H6c	The effect postulated in H6a is stronger for beauty-related than for non-beauty-related products.	Existence of social risks	Supported	-

Tab. 9: Overview of hypotheses and results

Tab. 4)? From the comments, which were also given in response to the thought-listing instruction, we believe that when building an attitude toward brands, thoughts are self-centered, i.e., caused by judgements about whether the brand is relevant for oneself, meaning that this attitude provides an answer to the question „Do *I* like the brand?". However, when building and reporting a general attitude toward photoshopped ad models, the thoughts are likely mainly other-focused, i.e., caused by concerns about how other persons who presumably have little experience to deal with photoshopped models might respond to this technique, which means that this attitude reflects an answer to the question „How would *other people* react to photoshopped model?" Consumers might appreciate the fact that companies take care of such issues (Crockett and Wallendorf 2004). We therefore suspect that the ambivalent response to photoshopped ad models results from the target of thoughts – self-centered or other-centered.

Admittedly, photoshopping can be used to create images that are „overly idealized." Legs can be „too long," waists „too narrow," skin „too perfect," etc. Study 2 pointed to this aspect. The recommendation to use photoshopped models is therefore only valid for non-extreme levels of ad model idealization.

6.2. Should marketers who use photoshopped ad models continue to use such images if legal regulations demand the inclusion of a disclaimer in such advertisements?

Recommendation. Comparing ad version 1 (idealized-model appearance without disclaimer) to ad version 2 (idealized-model appearance with disclaimer) in Study 1, we found an overall negative effect of the presence of this disclaimer on brand attitude for all products except for beauty-problem-solving products and non-beauty-related food and drinks. Study 2 does not provide any further insights, since we used the categories which were just described as exceptions as test objects. We therefore recommend avoiding the use of photoshopped models in advertisements (and look for alternatives) if providing a disclaimer is required per law and if this disclaimer is readily apparent to consumers. That is, if the disclaimer must look like the big „warning logo" that is mandatory in Norway (see *Fig. 1*), then companies should stop photoshopping ad models. If disclaimers look like those used in France, consumers are likely to ignore the disclaimers (Karsten 2021). Then such a disclaimer would not harm brand attitude, but companies would act against the will of legal regulations.

Substantiation of the recommendation. First, we look at effects of the disclaimer on model beauty. As a reason why marketers should stop the usage of photoshopped models when they must include a disclaimer, we initially had hypothesized (H4) that perceptions of model beauty decrease when disclaimers are added, resulting in a less favorable attitude toward beauty-related products. Particularly beauty-enhancing products (e.g., eye shadow, beauty masks), body-revealing products (e.g., bikini, special sportswear), and body-shaping products (e.g., fitness drinks) promise increased consumer beauty through product consumption. Decreases in the perceptions of the model's beauty would be detrimental to these categories, as the depicted models demonstrate the possibilities of what one might look like when consuming the product. However, we found no negative effect of the disclaimer on perceptions of model beauty.

We can offer three explanations for why the disclaimer has not reduced beauty perceptions. The first explanation is speculative. The model depiction in advertisements is larger than the disclaimer and thereby attracts more attention. Perceivers therefore immediately develop perception of model beauty. When later the disclaimer is noticed, they are unlikely to revise beauty impressions. The second explanation is based on comments from the thought-listing task. In the disclaimer-present condition, the test participants stated that they do not know the degree of idealization of the model. Probably, some wrinkles or pimples were retouched – then, the model is idealized minimally and in reality looks very beautiful. Female consumers may be aware of how „much photoshopping" went in the image of Kim Kardashian (see *Fig. 1*) because photos showing her authentic appearance are widespread. But they do not know what unknown idealized models who we have depicted in our test stimuli look like in their authentic appearance. In addition, participants stated that beauty does not depend on reality. The third explanation is also based on test participants' comments. They pointed out that the avoidance of processing the disclaimer is like a guilty pleasure – it is wrong to ignore the disclaimer because then marketers can act deceptive, but it is also pleasant to ignore the disclaimer because otherwise the illusion about how beautiful women can be is reduced. Feeling joy when watching idealized models is guilty pleasure such as feeling joy when consuming unhealthy food or smoking – it is wrong to consume such things, but it is also pleasurable because it triggers joy.

Second, the mediation analysis supported the presumption that the disclaimer protects females from lowering their appearance-related self-esteem when idealized models promote beauty products. Our findings contrast with the results from all previous studies, which we have summarized in *Tab. 1*. In our studies, the advertisement including the image of the model and the disclaimer were always visually present until the questionnaire was completed. In the other studies, such details of the procedure were not reported, and the test participants probably first watched the ad and then completed the questionnaire without continuing to watch the ad. We believe that we enabled a more intensive contact to the image of the ad model and more intensive processing of the model characteristics in combination with the disclaimer in the condition of ad version 2, the presence of the disclaimer. Therefore, the reason for the difference between our findings and the findings of other researchers might be that we studied self-esteem depending on the presence or absence of the disclaimer in the condition of *watching* the ad model and other researchers investigated self-esteem depending on the disclaimer in the condition of *remembering* the image of ad model. For young females' self-esteem, disclaimers of photoshopping are advantageous; we found this effect for beauty-related products.

Third, brand trustworthiness benefits from providing information that the idealized model was photoshopped; in other words: sensation of deceptions were reduced. However, the overall effect of the disclaimer on brand attitude was negative despite positive effects via self-esteem and brand trustworthiness (and a null effect via beauty perceptions). We can provide the following explanation. The verbal comments collected in the disclaimer-present condition were mostly negative; the participants stated that (1) the use of such disclaimers is uncommon and confusing, and (2) when such information is provid-

ed, the marketer evidently assumes that she (the test person) is not clever enough to register photoshopping through own model viewing. We suspect that these factors explain the negative effect of revealing the use of photoshopping on brand attitude. One might expect that (3) explicit information about the use of photoshopping (compared to the condition in which this information is absent) triggers thoughts in females about problematic issues with beauty, the pressure of being beautiful, faked images in social media, their own beauty problems, and so forth, whereas without disclosure, receivers can stick to their superficial dream world of beauty (process the beautiful model superficially) and are less likely to think about the above issues. However, the verbal texts provided in response to the thought-listing task do not provide evidence for this explanation.

6.3. If marketers show ad models in their authentic appearance, should they emphasize that fact by additional information?

Comparing ad version 3 (authentic-model appearance without disclaimer) to ad version 4 (authentic-model appearance with textual disclaimer), we found a positive effect of this information on brand attitude in Study 1 only when non-beauty-related food and drinks were promoted. However, information about the non-use of photoshopping does not harm brand attitude for other categories. Therefore, such textual information seems to be unneeded in almost all categories, and therefore we recommend refraining from providing this disclaimer (while exceptions of this rule exist for non-beauty-related food and drinks). In this context, we must report that, in the disclaimer condition, i.e., when the non-use of photoshopping was highlighted, the test participants still believed that there was photoshopping to a certain extent. The results for the manipulation-check variable „recognition of photoshopping" indicate that the disclaimer failed to generate a strong belief that there really was no retouching. The disclaimer merely reduced this belief ($M_{\text{without disclaimer}} = 4.11$, $M_{\text{disclaimer}} = 3.54$; see *Tab. 5*). With the *verbal* information that we included in the ads, it seems to be difficult to credibly signal the non-use of photoshopping. However, the supplemental investigation of Study 1 showed that a *small graphic* symbol that informs about the non-use of photoshopping results in comparatively high brand attitude for beauty-problem-solving and beauty-enhancing products. We therefore recommend the use of a small graphic symbol that indicates the non-use of photoshopping when models are authentically depicted in advertisements.

7. Limitations and Ideas for Future Research

7.1. Limitations

Our studies considered a limited range of options for marketers. From our research, we have concluded that in conditions in which young females are prone to beauty comparisons (e.g., when watching ads promoting beauty-related products), intense exposure to idealized ad models impairs self-esteem. However, marketers might be interested in influencing brand attitude and photoshopped ad versions (if they are not extremely idealized) are associated with comparatively high brand attitude. Faced with this conflict, marketers may also find solutions beyond the options we have explored. Marketers could escape the discussion about disclaimers of photoshopping by depicting ad models whose natural beauty is rated very highly. Moreover, they could portray models who are not exceptional in terms of their conformity to the beauty stereotype but are exceptional in other aspects such recognizability. We did not consider such alternatives.

Limitations of our insights also result from using special test objects, test stimuli, methods, and samples. We did not systematically vary brand awareness. The brands contained in our brand sample are well-known among young female consumers. Therefore, attitudes toward these brands existed prior to our survey, and exposure to an ad version may not have a strong impact on brand attitude. We suspect that, for unknown or fictitious brands, the impact of the ad version might be higher. We focused on depicting unknown ad models and did not include images of celebrities. We suspect that idealized images of celebrities might enhance the impact of the ad version, as in this case consumers often know what the celebrity really looks like because such images are widely published on the web. Moreover, we did not investigate the effects of images shown on Instagram or TikTok where applying beauty filters is an option. In the body-shaping product category, we only considered one fitness drink. For jeans, leggings, bras, etc., which also belong to this category, we cannot provide any findings. We had refrained from including ad versions for such products because our attempts to create ad versions were considered erotic by pilot-study participants. We combined data from the thought-listing task (three text lines per participant) with data from agreement with preformulated statements. We believe that a large sample providing data from extensive qualitative interviews could increase knowledge. Finally, the use of a student sample causes concerns about the validity of the results. Underage girls and older females may report different data. Additional research is needed for the first group in particular. Results can also be country-specific, and we cannot generalize our knowledge gained in Germany.

7.2. Ideas for future research

Our analyses have not identified individuals who actually have health problems due the mere existence of the beauty stereotype, the presentation of photoshopped models in advertising, and the deviation between the mirror-image and the photoshopped self. Future research should separate two segments – young females who are vulnerable to such problems and young females who are not very sensitive to such impacts – and test the impact

of photoshopping and disclosing information separately. Future analyses should also contain ad models whose natural beauty is perceived to be very high. For instance, CVS Pharmacy, a retailer of cosmetics and makeup in the USA states that they have decided to stop using photoshop models and use authentic but very „pretty" models to promote the stores. Research could also be done when young male persons serve as test participants.

8. Concluding Remarks on the Public Debate

So far, we have taken the perspective of marketers who want to make decisions about the use of photoshopped ad models and information about the use and non-use of photoshopping. Our answers followed the rule that the option associated with the highest brand attitude should be chosen, and if that option is not available then the second-best option should be preferred. Now we are changing perspective and ask if our research can add knowledge to the public debate about „the harmful" female beauty stereotype fostered by photoshopping. At the heart of this debate is the welfare of citizens, not marketers.

We suggest distinguishing between the content of the beauty stereotype, which is primarily a social artifact, although the perceptions of what is beautiful is culturally and time-dependent and varies from person to person („beauty is in the eye of the beholder"), and the individual intensity of the desire to conform to this stereotype.

8.1. Can the beauty stereotype be shaped?

Our studies did not contribute knowledge about the malleability of the content of the beauty stereotypes. However, the aspect of whether the content of the beauty stereotype can be shaped at all should be considered in the public debate when the effectiveness of legal measures such as the obligation to provide information about the use of beauty filters or photoshopping of advertising models is discussed. Advocates of legal disclaimers may consider that all stereotypes, including beauty stereotypes, are stabile structures of human knowledge about groups of people and integral parts of the individuals' personality (Wrightsman 1972; Ashmore and Del Boca 1981, p. 3; Etcoff 1999; Tadinac 2010; Ellemers 2018, p. 276; Kim and Lee 2018) and are therefore highly resistant to change through any external measures including government actions. Female beauty has inspired mankind since millennia (e.g., as illustrated in the „Judgment of Paris," a story from ancient Greek and Etruscan mythology), and the beauty stereotype is rooted in human evolutionary history. For instance, La Dame à la capuche (head and the body of a figure older than 20,000 years found in Brassempouy, France) has similarities with a classical Barbie doll. The fresco showing the Three Graces from Pompeii has commonality with today's images of beautiful woman. The female beauty stereotype exists because females aim to conform to a stereotype of beauty to signal interest in romantic relationships with males and competitiveness among females (Darwin 1859) and because of self-serving aesthetic purposes.

8.2. Should the strength of the desire to conform to the beauty stereotype be reduced?

From our research, based on data from 7,168 young women, we must conclude that the desire to conform to the beauty stereotype is associated with benefits as well as problems.

Benefits of this desire. From numerous verbal comments written down in the questionnaires, we conclude that there is a positive side to looking at advertising models who fit the beauty stereotype: Young women have fun and receive material that shows the way (not the goal to be achieved) on how to improve appearance. In the verbal comments, four main reasons were given, often explicitly formulated, why the test participants like to look at idealized models, i.e., experience fun and feel sensual pleasure. Watching idealized models (1) distracts from everyday boredom, (2) is an escape into another (dream) world, and (3) is stimulation in the sense that it shows how beautiful women can be (when they are idealized). There was another comment: (4) Why should women be watched in their authentic appearance in advertising when they can be seen everywhere else? In addition, the young women indicated that they receive desired images to learn about the path they may take in improving appearance.

Problems of this desire. Apparently, looking at idealized models also has a dark side. *First*, women feel dissatisfaction with their bodies when looking at such models and not being able to achieve the desired stereotype; our studies provide evidence. This problem can lead to health problems in a certain part of young women. *Second*, people experience guilty pleasure. There is a concern among young women that the presence of idealized models impairs the well-being of other people (see our explanations of the results in *Tab. 4*). Therefore, it is a pleasure for oneself to see idealized models, but to be able to see them, their presence in media is necessary, and other people can suffer from their presence.

Harmful strength of the desire to conform to the beauty stereotype. Our data suggest that the desire to conform to the stereotype is not harmful *per se*. The desire may be too strong among a certain proportion of young females and then health problems are likely to arise. This means, if many young females suffer from such health problems, government measures should be considered to reduce the strength of this craving. However, our studies neither aimed to quantify the proportion of females who suffer from serious health problems because of the pursuit of the beauty stereotype, nor are they suitable to derive such a critical proportion justifying a governmental invention.

8.3. How to reduce the strength of the desire to conform to the beauty stereotype?

We believe that knowing about the negative effect of model idealization on self-esteem and knowing that this negative effect is reduced when a disclaimer informs about photoshopping provides limited insight into a very important phenomenon – solutions of the health issue.

Therefore, we recommend examining the effectiveness of additional or alternative measures aimed at gently educating young females in order to avoid harmful effects of the desire to conform to the beauty stereotype. Such studies should examine if movie-like, emotional films depicting the sad fate of individuals after overly striving to approach the beauty stereotype, e.g., the activation of the single-identified-victim effect, reduce the strength of this desire to conform to the beauty stereotype. If such studies indicate effectiveness, such films could be broadcasted in public television. Moreover, we suggest testing the effects of company measures on the strength of the desire to approach the beauty stereotype. Examples of measures that can be tested are as follows: the use of supersize models in ads to promote fashion, the offer of dolls that contradict beauty ideals (e.g., Mattel's Barbie doll with trisomy 21), and the engagement of presenters in TV channels that reflect not only the diversity of ethnicities, but also the variance of the beauty of female appearance. Additionally, celebrities and models might consider actively publishing photos that depict their authentic appearance, e.g., in a special social campaign. Thereby, young females can better learn that idealized images do not reflect the reality.

Notes

[1] This section explains how we use the dichotomy of authentic vs. idealized models. We describe this dichotomy because other researchers use different definitions. For instance, Gröppel-Klein and Spilski (2006, p. 284, translated) state that models are „authentic" if „their body dimensions are close to those of the average population, they are displayed as normal persons with their own style (...), but are perceived as attractive." In contrast, we use the term authenticity in the sense of the absence of photoshopping regardless of natural beauty of the model.

[2] Campari: https://www.welt.de/lifestyle/article2817322/Jessica-Alba-ruehrt-Drinks-fuer-halbnackte-Maenner.html; Carrot cream: https://de.aliexpress.com/item/1005003140327131.html; Beats Fit Pro earphones: https://www.facebook.com/KimKardashian/posts/622758875886275/?paipv=0&eav=Afb1u9GbzNPpfNxHrhF-WbkHxrQeuKHCYp_Fdwc5vmSciOzw9zg9DH_XW0gkIqwZgz0&_rdr; Carroll: https://www.arretsurimages.net/articles/decret-photoshop-beaucoup-de-bruit-pour-pas-grand-chose; Intimissimi: https://www.joeyshaw.com/photographie-retouchee.: Lacome: https://www.facebook.com/photo.php?fbid=603261025173660&set=pb.100064693030646.-2207520000.&type=3; Dove: https://www.facebook.com/dove.offiziell/photos/5719529361427029; Aerie: https://thenikeyaexperience.files.wordpress.com/2014/01/273708ff-fb3e-4c82; Olay: https://www.today.com/style/olay-pledges-stop-retouching-models-skin-ads-t174429.

[3] There is already evidence on the effect of idealization through photoshopping on brand attitude and purchase intent. Semaan et al. (2018) found that an idealized model leads to higher brand attitude for body lotion, and Borges (2011) reported that an idealized model leads to higher purchase intent for perfume. On the impact of information that photoshop was used to idealize a model on brand attitude, Schirmer et al. (2018) reported a null effect for cellulite oil and body lotion. Semaan et al. (2018) found a positive effect for body lotion and cellulite cream and a negative effect for perfume; for perfume, Borges (2011) reported a null effect (for a textual information) and a negative effect (for visual information). For the effect of informing that photoshop was not used to alter the appearance of an ad model, Semaan et al. (2018) showed a positive effect on brand attitude. In summary, previous research suggests that model idealization improves brand attitude and purchase intent. However, the results for the effect of disclosing the use of photoshop are conflicting, even when the effects are examined for the same product such as body lotion (null effect reported by Schirmer et al. 2018, positive effect reported by Semaan et al. 2018).

[4] By distinguishing different types of beauty-related products, we follow the suggestions and insights of Bower and Landreth (2001) who separated beauty-enhancing products (earrings, lipstick) and beauty-problem-solving products (acne-cover and acne treatment).

[5] Sometimes, consumers receive information on public or social media that images have been photoshopped and can see the difference between the true appearance (as communicated by the media) and the photoshopped appearance. In our studies, this comparison will not be possible for the test participants. We do not investigate celebrities in the role of ad models for whom such information may be available.

[6] In part of our studies, we also assessed purchase intent (agreement to „I can imagine buying the advertised product if needed." and „I can imagine preferring the advertised product to other similar products in a purchase situation." on a seven-point scale). Brand attitude and purchase intent correlate strongly (r = .693). Thus, we do not report findings for purchase intent additionally.

[7] Each test participant provided three lines of texts. In the *first* step, the parts of the texts were coded into a-priori (pre-defined) meaningful categories (e.g., category #1: Did the persons write something about model beauty? Sub-categories: #1.1 Test participants' statement to look inferior in relation to this model, #1.2 ... model looks natural, #1.3 ... model is perfect, #1.4 ...; category #2: Did the persons write something about manipulative intent? Sub-categories: #2.1 Exaggerated image, #2.2 Deception, #2.3 Artificial image...; #3 ...; '#4 ...). Categories and sub-categories also emerged while coding the texts because the coders had to write down „additional categories and sub-categories." In the *second* step, we rearranged categories and subcategories where necessary. For instance, category #1 beauty was adopted but the subcategories were revised: #1.1 comments on the physical characters of the model (#1.1.1 positive comments, #1.1.2 negative comments), #1.2 comments about sexiness (#1.2.1 positive comments, #1.2.2 negative comments), #1.3 comments about model health (#1.3.1 positive comments, #1.3.2 negative comments), #1.4 comments about sportiness (#1.4.1 positive comments, #1.4.2 negative comments), etc. After two iterations, the coders had assigned a binary variable to each „subcategory × positive/negative valence" condition. There were three coders involved on this job. In case of difference, we – the authors – have clarified this difference. Then, the frequency of the values of the binary variables was counted depending on the experimental conditions.

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