



## Research article

## Neuromarketing as a strategic tool for predicting how Instagramers have an influence on the personal identity of adolescents and young people in Spain

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## ABSTRACT

Instagram is the fastest growing social network and has an audience that shares lifestyles related to their interest in beauty and fashion. However, the exposure of adolescents to images that promote the slender beauty ideal can lead to body dissatisfaction, as they place a lot of importance on the likes and comments they receive regarding the comparison of their appearance with that of other users. The popularity of influencers and their opinion leadership has resulted in the convergence of a given body image with the promotion of products and brands. Through the use of neuromarketing techniques –attention through eye tracking, and emotion using galvanic skin response–, the objective of this research is to determine the cognitive perception that Spanish adolescents and young people have of the stimuli transmitted by influencers on Instagram, surpassing classic content analysis of social networks and offering the innovative technique of registering unconscious reactions of the audience, both toward the body image as well as toward the brands promoted by influencers who are akin to the audience. The results suggest that adolescents place greater attention and emotional intensity on the nude body appeal of influencers compared to young adults, and show only scarce interest in brands.

## 1. Introduction

Instagram is the second most widely used and fastest growing social network in Spain. Its main audience is composed of urban youth between 16 and 30 years of age who have an interest in beauty, fashion, travel and leisure. While 68% follow influencers, 72% follow brands in social networks (IAB, 2019). Instagram has a very strong influence on the lives of these young people, as the network's users share lifestyles, experiences and feelings (Shumaker et al., 2017), and are followed by thousands or even millions of people.

However, the characteristically young audience of Instagram makes this group of viewers particularly vulnerable to certain types of risks, such as exposure to the display of ideal images that might foretell a negative relationship with food and health (Targhi, 2017). Images published on Instagram may also predict some signs of depression (Reece and Danforth, 2017), as well as body dissatisfaction when users compare themselves to other people who publish their images, which are usually associated with a tendency toward slenderness (Hendrickse et al., 2017).

When Instagram users publish photos of themselves, at times they are looking for self-approval, which is a result of low self-esteem; they are searching for a feeling of belonging to the social network, which implies

new experiences and communicating the image of a person with an extroverted and kind disposition (Etgar, and Amichai-Hamburguer, 2017). Although greater narcissism and lower self-esteem foster a lack of privacy in the dissemination of images published on Instagram, changes in social standards are likely to reduce their impact on privacy settings (Nardis and Panek, 2019).

Instagram users are exposed daily to the ideal presentation of people who publish their photographs (Harris and Bardey, 2019). Fashion photography has historically conveyed an ideal of beauty through images that seek perfection, and today most fashion influencers have continued with this ideal (De-Perthuis and Findlay, 2019). In spite of being neither models nor influencers, young Instagram users strive to select the best images of themselves in their publications, and they value receiving likes and comments. They also try to respond to ideals of beauty, comparing themselves with other users and showing concern for how others will perceive their appearance, which often leads to dissatisfaction with their own body image (Baker et al., 2019).

In social networks, likes that are generated by publications are considered a sign of social approval, especially during the period of adolescence, which can become a risk moderator of an individual's own self-esteem, especially if previous self-esteem was low (Martínez-Pecino

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and García-Gavilán, 2019). It seems obvious that adolescents who use social networks such as Instagram more intensely than others will increase body awareness and a feeling of bodily shame in seeking the approval of their own bodies, especially adolescent girls (Salomon and Brown, 2019).

On Instagram there is a higher probability that the images with many previous likes will be the most popular, especially if they come from peers among the audience, with more frequency noted among adolescents, who are exposed to greater influence by their peers (Sherman et al., 2016). Therefore, it is recommended that research based on social network stimuli should isolate the effect that likes might have on results. Due to the fact that Instagram has been growing, new pernicious effects have emerged that researchers have begun to analyse, such as content related to suicide in which a discrepancy has already been detected between inner sadness and joy transmitted publicly through the social network (Arendt, 2019).

On the positive side, Instagram has excelled in raising awareness and sensitivity about certain prejudices that particularly affect women, such as self-acceptance of the curvy girl body image movement (Webb et al., 2017), the acceptance of all types of bodies and appearances (Cohen et al., 2019), and publicly showing and sharing the act of breastfeeding (Marcon et al., 2019). Although this social network usually promotes the ideal of slender beauty, especially among women, it has also allowed this ideal to be challenged with unprecedented success in terms of greater body satisfaction and a more positive mental state (Slater et al., 2019). Viewing self-acceptance images of other Instagram users decreases the negative impact of social networks on body satisfaction (Clayton et al., 2017; Slater et al., 2017), and is useful in fighting the influence that models and celebrities might have on eating disorders (Turner and Lefevre, 2017).

Within this context, we must analyse the popularity of influencers on Instagram, which is based on a narrative that starts with their personal life and continues with empathy toward their audience by way of everyday experiences they communicate (Abidin, 2016). Their popularity appeals to new followers and increases their perceived opinion leadership (De-Veirman et al., 2017). This growth has led to the widespread use of influencers by brands (Voorveld, 2019), who want to reach their audiences with more naturalness and credibility (Schouten et al., 2019) as opposed to the use of classic brand content or celebrities (Domingues-Aguiar and Van-Reijmersdal, 2018). Some research has already confirmed that audiences exposed to brand publications by influencers on Instagram show a more positive attitude toward the brand than toward traditional celebrities (Jin et al., 2019), despite the fact that the unethical attitude of not stating explicitly the paid promotion of a brand –which should always be identified as brand promotion (Griggs and Freilich, 2017)– is not perceived as advertising in most cases (Stubb and Colliander, 2019). However, the fact that influencers usually cover market niches (De-Veirman et al., 2017) raises the question of how effective they are for large global brands.

It seems clear that collaboration with influencers on Instagram is a communication and marketing strategy of interest to brands (Rosenthal and McKeown, 2017), but it must be ensured that influencers do not transmit a body image that could lead to body dissatisfaction and the risk of setting an ideal standard for adolescents and young people who are in the process of shaping their personal identity.

## 2. Materials and methods

The aim of this research is to determine through neuromarketing techniques the cognitive perception that Spanish adolescents and young people between 16 and 21 years of age have toward influencers on Instagram. The development of personal identity is considered in relation to body image and the influence on brand marketing. To do this, we have used neuromarketing techniques that have allowed us to analyse the

attention of the subjects to the stimuli (eye tracking) and the emotional intensity experienced (Galvanic Skin Response).

### 2.1. Objectives

The main objective of the research is to analyse the attention and emotional intensity of the Instagram audience toward the projection of body images and the endorsements made by influencers related to their tastes and preferences on this social network. The specific objectives are as follows:

- Analyse the attention and emotional intensity that influencers generate among their followers, who are adolescents and young adults.
- Verify differences between the attention and emotional intensity directed toward body image as compared to that of the brands they promote.
- Determine which differences occur between adolescents and young adults, as well as between male and female.

### 2.2. Research instrument

Neuromarketing is the research technique that has been used in this study. Its purpose is to measure the cognitive processing of stimuli published by influencers on social networks. It is a combination of Neuroscience, Psychology and Economics (Madan, 2010). Despite being an emerging field that appeared in 2002, it has rapidly gained credibility in recent years (Morin, 2011). Neuromarketing has expanded its scope beyond measuring the effectiveness of brand advertising campaigns and the psychology of consumer behaviour (Lee et al., 2007; Plassmann et al., 2012). Hence, some authors consider that the most appropriate term is Neurocommunication (Cuesta-Cambra et al., 2017). Conventional research methods are constrained by participants' difficulty in consciously reporting certain behaviours, perceptions or attitudes, while neuromarketing facilitates the study of this information (Ariely and Berns, 2010).

Cognitive perception research implies limitations in applying methods initially typical of behavioural science to the decisions that audiences and consumers make about products and brands (Baron et al., 2017). By simulating a natural viewing environment, the use of non-intrusive equipment takes precedence, but the consequence is inferiority in the detail of the results when compared to other studies that are more related to health sciences in which the use of electroencephalography (EEG), magnetoencephalography (MEG), and functional magnetic resonance imaging (fMRI), are not drawbacks when approaching brain activity in order to understand cognitive processes focused on attention, memory, emotion and decision making (Ariely and Berns, 2010; Vul and Kanwisher, 2010; Berns and Moore, 2012). However, in the study of brain activity applied to consumers and brand followers, the correlations do not imply causality (Vul et al., 2009; Plassman et al., 2015), hence the importance of combining attention with emotion data through the neuromarketing techniques applied in this study (Gabrieli et al., 2015; Plassmann and Karmarkar, 2016). In short, the ability to predict advertising effectiveness using neuroscience methods is between 70% and 80% (Varan et al., 2015), with the academic area of neuromarketing being the place from which the most relevant information is obtained (Spence, 2019).

Eye tracking and galvanic skin response (GSR) are the two specific neuromarketing techniques used in this paper. Eye tracking is a biometric technique that records the visual attention of subjects based on their ocular movements, which are directed toward areas that are of interest to the subject, otherwise known as areas of interest (AOIs), as opposed to areas that the attention merely scans, or even ignores (Duchowski, 2013). GSR, also known as electrodermal activity (EDA), collects the phasic

changes that are produced within sympathetic neuronal activity as a result of changes in the electrical conductance of the skin. Changes in the emotional arousal state collected by GSR have an influence on the cognitive perception of stimuli (Critchley, 2002). When the subjects place their attention on a stimulus, it is recorded by the eye tracking system and initiates cognitive and affective processing (partially recorded by GSR), thereby producing an influence on the preferences of the audience or consumer (Bornstein and D'Agostino, 1992; Pieters et al., 2002; Goodrich, 2011).

2.3. Sample

A total of 60 people (50% men and 50% women) participated randomly and voluntarily as subjects of the study after fulfilling the requirements of being a student, urban, and adolescent or young adult, as well as an habitual user of Instagram with a stated frequency of use of several times per week on this network, which was the main profile of this social network identified in the review of the literature. The fieldwork was carried out between March and June of 2019. Three groups were created, according to age, in order to compare the differences between minors and adults: high school students aged 16–17 (Group 1), young people aged 18–19 who were undergraduates in their first two years of a degree programme (Group 2), and university students aged 20–21 in their last two years of a degree (Group 3). Madrid was chosen for the sample due to its status as the capital of the country, as well as the fact that the city has adolescents and young adults from diverse backgrounds. The sample size was suitable for a neuromarketing study, which

in scientific literature is between 15 and 50 subjects for the purpose of ensuring validity (Kerr-Gaffney et al., 2018; Zhang et al., 2018; Cuesta-Cambra et al., 2019).

2.4. Data collection and analysis

The research was conducted by using the eye tracker model Gazepoint GP3HD, with a 150 Hz sampling rate, and a GSR model Gazepoint Biometrics, integrated for data collection in Gazepoint Analysis UX Edition software, v.5.3.0. Statistical analysis of the data was performed using SPSS software, v.25. The subjects were exposed to 8 random stimuli from the Spanish influencers @manurios (4.5 million followers on 22 July 2019), and @paulagonu (1.9 million followers on 22 July 2019), which were interspersed with other comparable stimuli regarding beauty, fashion and travel. Each stimulus had a maximum time limit of 5 s –with 3 s of separation between stimuli– in order to prioritize the areas of interest that captured the most attention and emotion, bearing in mind that young audiences have the highest level of skill in quickly focusing their attention on the information in a stimulus that is relevant and of interest to them (Añaños-Carrasco, 2015). Four stimuli were selected for each influencer, with the stimuli being similar to each other in displaying comparable situations and lifestyles. AOIs were defined (Figure 1) that reflected the action prescribed by influencers in terms of body image, brands, and differences when presenting similar situations and lifestyles between male and female influencers.

The independent variables were the age and gender of participants, with the socio-cultural profile similar in all participants and determined

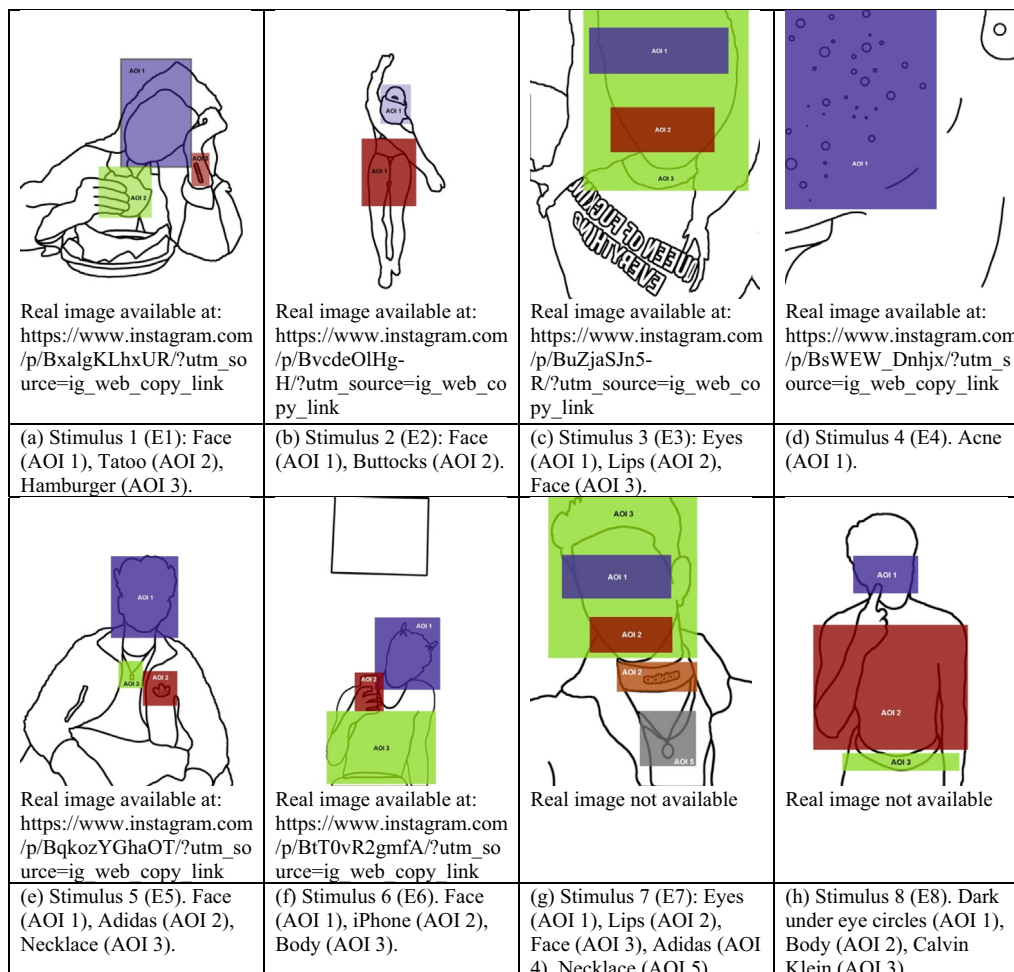


Figure 1. Areas of interest (AOIs) of the stimuli. Source: created using @paulagonu and @manurios. Note: the tests were carried out using with real images.

by the main profile of the Instagram audience. The dependent variables were the attention level and emotional arousal peaks recorded in response to the stimuli viewed.

Quantitative analysis of the data was used to evaluate the seconds that elapsed between the appearance of the stimulus and the first fixation, or Time From Fixation (TFF), the number of eye fixations, or Fixation Count (FC), and the total number of seconds of attention to each area of interest, or Total Fixation Duration (TFD), in addition to the GSR peaks—which can occur up to 3 s after the onset of emotional activation—for each pair of maximum and minimum peaks to determine emotional arousal. The qualitative evaluation was carried out using heat maps of the attention registered by the eye tracker.

### 2.5. Ethics statement

This study was reviewed and approved by the Research Ethics Committee of the Department of Applied Communication Sciences in the Faculty of Information Sciences of Complutense University of Madrid (UCM). All participants gave informed consent in writing, and in the case of minors who were 16–17 years of age, their parents did so in accordance with the Declaration of Helsinki. The subjects were informed of their voluntary involvement and anonymous contribution, as well as the possibility of withdrawing from the study at any time without reason.

## 3. Results

### 3.1. Comprehensive analysis of attention

The heat maps produced by the attention of the subjects (Figures 2 and 3) reflected qualitatively that the most intense attention was focused on the attractiveness of the influencers' bodies and faces, as well as the imperfections they voluntarily displayed, and to a lesser extent on the brands they were advertising.

In the first comprehensive quantitative analysis of the attention that the entire group of subjects showed toward the stimuli (Table 1), it was observed that the face of the influencers attracted the attention of all participants (100%), except when the female influencer was seen from behind, in which case the subjects' attention to the head fell to 61.67%. The brands they prescribed registered the least attention from all of the subjects as a whole (81.67% and 70.00% Adidas; 83.33% iPhone; and 78.33% for Calvin Klein), although it was much higher than the attention registered by the influencers' pendants (70.00% in E5 and 43.33% in E7). The AOIs in which the influencers displayed attractive parts of their bodies showed a concentration in all cases that reached an attention rate of close to 100% for all of the subjects.

### 3.2. Body image attention analysis

The comparison between AOIs with similar content in the stimuli allowed us to identify differences between the groups analysed. The face of the influencers in the various stimuli showed (Table 2) significant differences in attention ( $p < 0.001$ ). Moreover, the first attention was recorded more quickly when they appeared with a more pronounced smile, the female significantly sooner than the male. (E1-AOI 1, TFF = 0.14; E5-AOI 1, TFF = 0.43). Both stimuli were similar as far as the total duration of attention and the number of eye fixations (E1-AOI 1, TFD = 2.64, FC = 6.23; E5-AOI 1, TFD = 2.69, FC = 6.30). However, the faces that reported the longest total duration and the highest number of eye fixations with regard to attention were those of the made-up and well-groomed female who appears in close up (E3-AOI 3, TFD = 4.29; FC = 10.38), and the well-dressed male with the use of a medium shot in which his face does not occupy as much space (E7-AOI 3, TFD = 3.34; FC = 8.25). The face that took the longest time to register attention with shorter total duration and fewer fixations was that of the male with the stimulus showing his attractive nude body (E6-AOI 1, TFF = 2.70; TFD = 2.11; FC = 5.47).

There were also significant differences ( $p < 0.001$ ) when comparing AOIs of the eyes with those of the lips of the influencers when their faces occupied a prominent place within the stimulus (Table 3). The eyes of the female influencer registered faster attention (TFF = 0.69), of longer duration (TFD = 2.09), and with more fixations (FC = 5.33) than the eyes of the male influencer (TFF = 0.86; TFD = 1.51; FC = 3.90). On the other hand, only the lips of the female influencer registered longer attention duration (TFD = 1.23) than those of the male influencer (TFD = 0.97), but the first attention placed on the female's lips was slower and of shorter duration (TFF = 2.01 vs. TFF = 1.06; FC = 2.68 vs. FC = 2.80). Previous data showed that the eyes in all cases registered faster attention and was longer lasting with more fixations than the lips, regardless of whether the influence was male or female.

When comparing the face portrayed in an ideal way using makeup and good grooming, with that of the face with an imperfection that the influencer wanted to highlight (acne, in the case of the female and dark under eye circles on the male), in the case of the male influencer (Table 4) there were no significant differences in the time it took to place attention on the ideal face compared to that of face with the dark circles (TFF = 0.47 vs. 0.51;  $p = 0.217$ ), but there were significant differences ( $p < 0.001$ ) in the attention duration (TFD = 3.34 vs. 1.56) and in the number of eye fixations (FC = 8.25 vs. 3.23).

With regard to the female influencer (Table 5), there were no significant differences in the time it took to receive the first fixation on the ideal face compared to the acne face (TFF = 0.14 vs. 0.16;  $p = 0.756$ ), but the former significantly monopolized ( $p < 0.001$ ) more attention duration (TFF = 3.52 vs. 2.64) with a greater number of fixations (FC = 11.05 vs. 6.23).

The specific comparison between the AOI of the female's acne and the AOI of the male's dark circles (Table 6) confirmed that the acne, the most obvious imperfection and also in the foreground, registered faster attention (TFF = 0.16 vs. 0.51;  $p < 0.001$ ), was of longer duration (TFD = 3.52 vs. 1.56;  $p = 0.009$ ), and received a greater number of fixations (FC = 11.05 vs. 3.23;  $p < 0.001$ ) than the dark circles of the male.

The attention received by stimuli in which body attractiveness was shown (Table 7) revealed significant differences between the female and male ( $p < 0.001$ ), highlighting the buttocks of the female influencer (E2-AOI 2), who obtained the fastest attention (TFF = 0.34), of longer duration (TFD = 3.91), and with a highest number of ocular fixations (FC = 7.32) than those recorded by the male showing his naked torso in two of the stimuli (E6-AOI 3, TFF = 2.48, TFD = 1.36, FC = 3.32; E8-AOI 2, TFF = 1.23, TFD = 1.56, FC = 4.69).

By delving deeper into the differences between the attractiveness of these nude body parts by pairs of stimuli (Table 8), the buttocks of the female influencer obtained significantly more attention ( $p < 0.001$ ) than the naked torso of the male influencer, with the former having registered faster attention (TFF = 0.34 vs. 2.48), longer duration (TFD = 3.91 vs. 1.36), and more ocular fixations (FC = 7.32 vs. 3.32).

When comparing the attractive parts of the male influencer's body when shown in an ideal photo compared to the photo in which he highlighted the imperfections of the dark circles with a gesture (Table 9), the naked torso in the image with dark circles captured attention earlier (TFF = 1.23 vs. 2.48), was of longer duration (TFD = 1.56 vs. 1.36), and obtained more fixations (FC = 4.69 vs. 3.32), which seems to confirm the tendency of his audience to avoid imperfections and seek only attractive stimuli, since in the ideal photo the influencer's face registered the first attention, then the eyes moved down to the naked torso and abdominals in a natural order of visualization in which the influencer in his entirety is attractive to the audience.

When analysing the differences between the participants by age, there were only significant differences in the first attention (Tables 10, 11, and 12) placed on the stimulus in which the female influencer showed her buttocks (E2). Consequently, adolescents were the last to register the first attention to the head (TFF = 2.11;  $p = 0.035$ ), and instead were the first to place attention on the buttocks (TFF = 0.28;  $p = 0.463$ ). However, the difference in total duration of the attention shown



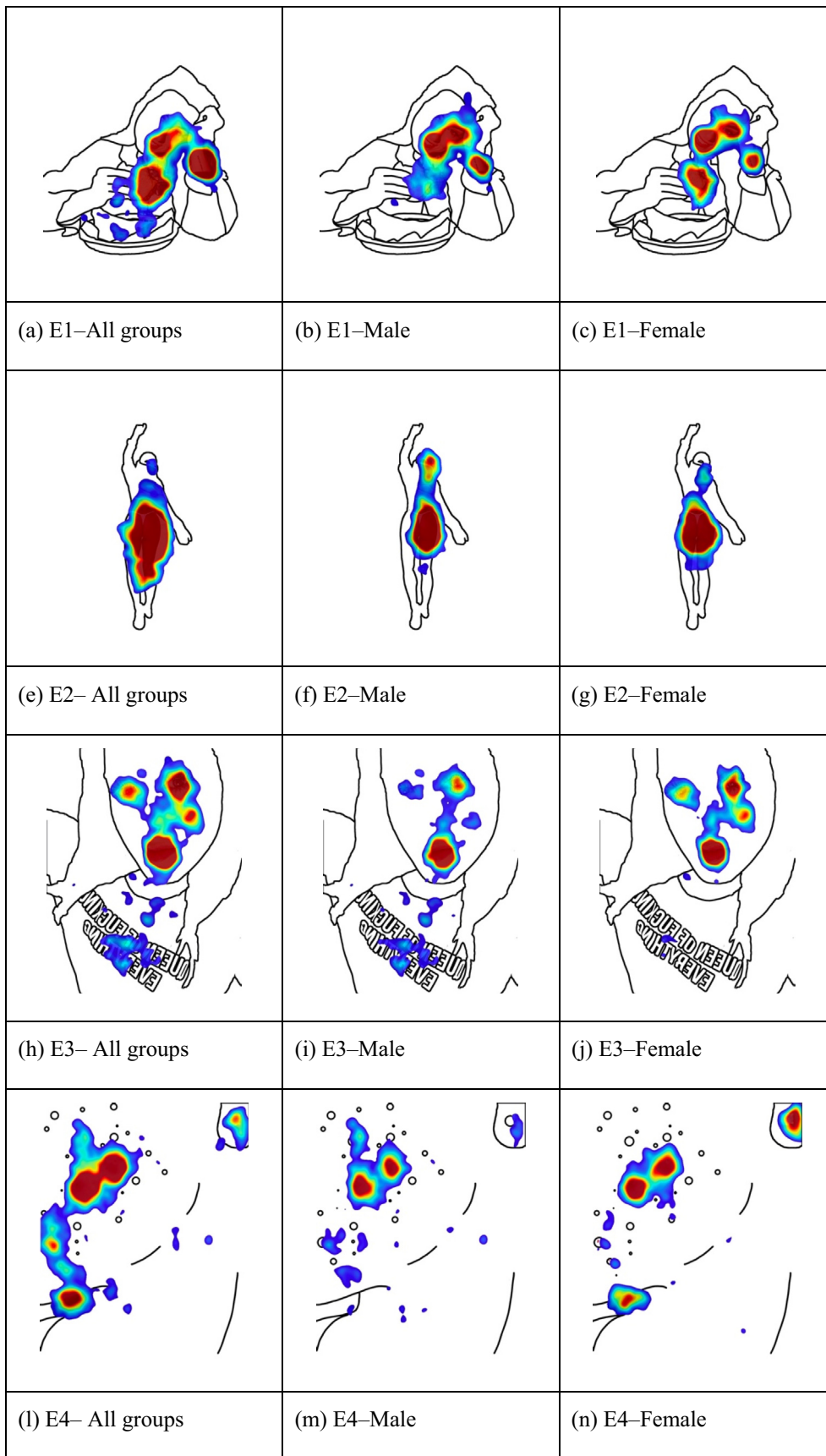


Figure 2. Heat maps of the stimuli. Source: created using @paulagonu.

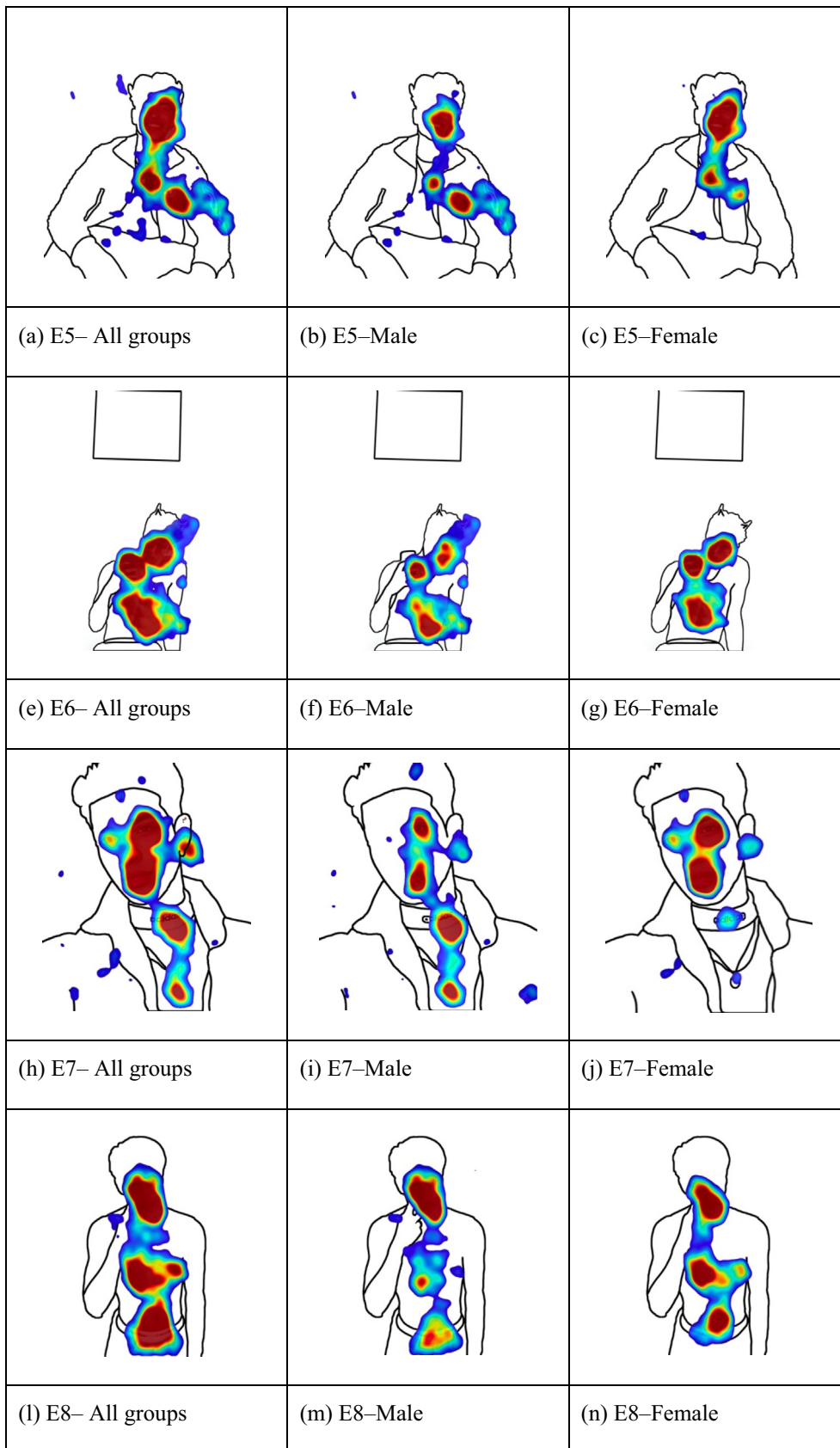


Figure 3. Heat maps of the stimuli. Source: created using @manurios.

**Table 1.** Percentage of attention of the total number of participants to each AOI.

E1		E2		E3		E4	
AOI	Attention Rate (%)	AOI	Attention Rate (%)	AOI	Attention Rate (%)	AOI	Attention Rate (%)
AOI 1	100.00	AOI 1	61.67	AOI 1	100.00	AOI 1	100.00
AOI 2	83.33	AOI 2	100.00	AOI 2	98.33		
AOI 3	81.67			AOI 3	100.00		
E5		E6		E7		E8	
AOI 1	100.00	AOI 1	100.00	AOI 1	100.00	AOI 1	100.00
AOI 2	70.00	AOI 2	83.33	AOI 2	98.33	AOI 2	98.33
AOI 3	73.33	AOI 3	98.33	AOI 3	100.00	AOI 3	78.33
				AOI 4	81.67		
				AOI 5	43.33		

**Table 2.** Kruskal–Wallis test between similar AOIs.

Fixation	E1-AOI 1	E3-AOI 3	E5-AOI 1	E6-AOI 1	E7-AOI 3	p-value
Average TFF	0.14	0.71	0.43	2.70	0.47	*<0.001
Average TFD	2.64	4.29	2.69	2.11	3.34	*<0.001
Average FC	6.23	10.38	6.30	5.47	8.25	*<0.001

Note: \* $p < 0.05$ .

**Table 3.** Kruskal–Wallis test between similar AOIs.

Fixation	E3-AOI 1	E3-AOI2	E7-AOI 1	E7-AOI 2	p-value
Average TFF	0.69	2.01	0.86	1.06	*<0.001
Average TFD	2.09	1.23	1.51	0.97	*<0.001
Average FC	5.33	2.68	3.90	2.80	*<0.001

Note: \* $p < 0.05$ .

**Table 4.** U Mann-Whitney test between similar AOIs.

Fixation	E7-AOI 3	E8-AOI 1	p-value
Average TFF	0.47	0.51	0.217
Average TFD	3.34	1.56	*<0.001
Average FC	8.25	3.23	*<0.001

Note: \* $p < 0.05$ .

**Table 5.** U Mann-Whitney test between similar AOIs.

Fixation	E1-AOI 1	E4-AOI 1	p-value
Average TFF	0.14	0.16	0.756
Average TFD	2.64	3.52	*<0.001
Average FC	6.23	11.05	*<0.001

Note: \* $p < 0.05$ .

**Table 6.** U Mann-Whitney test between similar AOIs.

Fixation	E4-AOI 1	E8-AOI 1	p-value
Average TFF	0.16	0.51	*<0.001
Average TFD	3.52	1.56	*0.009
Average FC	11.05	3.23	*<0.001

Note: \* $p < 0.05$ .

by adolescents and young adults between 18 and 19 years of age when compared to older young adults is also significant, both in the attention to the face (TFD = 0.29 vs. 0.31 vs. 0.63;  $p = 0.012$ ), as well as to the buttocks (TFD = 4.03 vs. 4.08 vs. 3.62;  $p = 0.015$ ), with a similar number of ocular fixations to the buttocks among all of them (FC = 6.95 vs. 7.35 vs. 7.54;  $p = 0.367$ ).

Though in an insignificant way, this behaviour of later attention and shorter duration by adolescents was repeated in the other stimuli associated with the face of influencers, except in the case of the more ideal female influencer's face in close-up (E3-AOI 3, TFF = 0.49,  $p = 0.499$ ; TFD = 4.37,  $p = 0.623$ ), where young people aged 20–21 registered later attention (TFF = 0.55), though with a similar total duration (TFD = 4.27). Adolescents were also the first to pay attention to the naked torso of the male influencer in one of the stimuli in which he appears as such, and with a longer duration and a greater number of fixations (E8-AOI 2, TFF = 0.82,  $p = 0.161$ ; TFD = 0.70,  $p = 0.286$ ; FC = 5.15,  $p = 0.419$ ), although in the second similar stimulus, the group of adolescents ranked second. (E6-AOI 3, TFF = 2.58,  $p = 0.505$ ; TFD = 1.36,  $p = 0.076$ ; FC = 3.10,  $p = 0.022$ ).

With regard to the imperfections, adolescents were the ones who looked at the female influencer with acne a significantly greater number of times and with longer duration (FC = 12.05,  $p = 0.008$ ; TFD = 4.09,  $p$

**Table 7.** Kruskal–Wallis test between similar AOIs.

Fixation	E2-AOI 2	E6-AOI 3	E8-AOI 2	p-value
Average TFF	0.34	2.48	1.23	*<0.001
Average TFD	3.91	1.36	1.56	*<0.001
Average FC	7.32	3.32	4.69	*<0.001

Note: \* $p < 0.05$ .

**Table 8.** U Mann-Whitney test between similar AOIs.

Fixation	E2-AOI 2	E6-AOI 3	p-value
Average TFF	0.34	2.48	*<0.001
Average TFD	3.91	1.36	*<0.001
Average FC	7.32	3.32	*<0.001

Note: \* $p < 0.05$ .

**Table 9.** U Mann-Whitney test between similar AOIs.

Fixation	E6-AOI 3	E8-AOI 2	p-value
Average TFF	2.48	1.23	*<0.001
Average TFD	1.36	1.56	0.272
Average FC	3.32	4.69	*<0.001

Note: \* $p < 0.05$ .

**Table 10.** Kruskal–Wallis test. Time from Fixation (TFF) means by stimulus, age, and AOI.

E1				E2				E3				E4								
AOI	Average TFF			p-value	AOI	Average TFF			p-value	AOI	Average TFF			p-value	AOI	Average TFF			p-value	
	16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years		
AOI 1	0.16	0.13	0.11	0.555	AOI 1	2.11	0.90	0.88	*0.035	AOI 1	0.56	0.72	0.69	0.268	AOI 1	0.23	0.11	0.14	0.435	
AOI 2	3.02	3.57	3.61	0.304	AOI 2	0.28	0.33	0.41	0.463	AOI 2	2.14	2.26	1.61	0.289						
AOI 3	2.61	3.08	2.55	0.368						AOI 3	0.49	0.55	0.11	0.499						
E5				E6				E7				E8								
AOI	Average TFF			p-value	AOI	Average TFF			p-value	AOI	Average TFF			p-value	AOI	Average TFF			p-value	
	16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years		
AOI 1	0.46	0.40	0.43	0.597	AOI 1	0.47	0.35	0.49	0.587	AOI 1	0.82	0.91	0.86	0.796	AOI 1	0.48	0.46	0.58	0.415	
AOI 2	2.80	2.65	3.16	0.260	AOI 2	2.88	2.70	2.52	0.591	AOI 2	1.03	1.10	1.06	0.881	AOI 2	0.82	1.52	1.35	0.161	
AOI 3	2.87	2.55	2.36	0.532	AOI 3	2.58	2.26	2.58	0.505	AOI 3	0.56	0.42	0.42	0.059	AOI 3	2.93	3.43	3.48	0.283	
										AOI 4	0.96	0.89	0.75	0.804						
										AOI 5	1.72	3.15	2.31	0.245						

Note: \* $p < 0.05$ .

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**Table 11.** Kruskal–Wallis test. Total Fixation Duration (TFD) means by stimulus, age, and AOI.

E1				E2				E3				E4							
AOI	Average TFD			p-value	AOI	Average TFD			p-value	AOI	Average TFD			p-value	AOI	Average TFD			p-value
	16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years	
AOI 1	2.47	2.75	2.70	0.454	AOI 1	0.29	0.31	0.63	*0.012	AOI 1	2.19	2.08	2.01	0.686	AOI 1	4.09	2.81	3.65	*0.001
AOI 2	1.08	0.78	0.76	0.275	AOI 2	4.03	4.08	3.62	*0.015	AOI 2	1.36	1.11	1.22	0.467					
AOI 3	1.20	1.35	1.18	0.753						AOI 3	4.37	4.22	4.27	0.623					
E5				E6				E7				E8							
AOI	Average TFD			p-value	AOI	Average TFD			p-value	AOI	Average TFD			p-value	AOI	Average TFD			p-value
	16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years	
AOI 1	2.68	2.74	2.65	0.990	AOI 1	1.89	2.24	2.21	0.126	AOI 1	1.64	1.49	1.41	0.577	AOI 1	1.49	1.50	1.69	0.632
AOI 2	0.74	0.66	0.52	0.250	AOI 2	1.07	0.61	0.73	*0.017	AOI 2	1.11	0.94	0.84	0.217	AOI 2	1.65	1.38	1.65	0.546
AOI 3	0.35	0.38	0.29	0.804	AOI 3	1.36	1.57	1.16	0.076	AOI 3	3.33	3.45	3.25	0.681	AOI 3	0.70	0.60	0.45	0.286
										AOI 4	0.76	0.64	0.66	0.827					
										AOI 5	0.32	0.34	0.50	0.206					

Note: \* $p < 0.05$ .



**Table 12.** Kruskal–Wallis test. Fixation Count (FC) means by stimulus, age, and AOI.

E1				E2				E3				E4								
AOI	Average FC			p-value	AOI	Average FC			p-value	AOI	Average FC			p-value	AOI	Average FC			p-value	
	16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years		
AOI 1	6.10	5.75	6.85	0.359	AOI 1	1.25	1.00	1.46	*0.030	AOI 1	5.15	5.15	5.70	0.710	AOI 1	12.05	9.45	11.65	*0.008	
AOI 2	1.53	1.31	1.41	0.763	AOI 2	6.95	7.35	7.65	0.367	AOI 2	2.75	2.50	2.79	0.648						
AOI 3	2.69	2.75	2.53	0.974						AOI 3	10.10	10.20	10.85	0.456						
E5				E6				E7				E8								
AOI	Average FC			p-value	AOI	Average FC			p-value	AOI	Average FC			p-value	AOI	Average FC			p-value	
	16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years			16–17 years	18–19 years	20–21 years		
AOI 1	6.25	6.00	6.65	0.564	AOI 1	4.90	5.70	5.80	0.129	AOI 1	3.85	3.75	4.10	0.864	AOI 1	2.85	3.15	3.70	0.085	
AOI 2	2.38	1.77	1.81	0.286	AOI 2	1.72	1.47	1.59	0.380	AOI 2	2.85	2.58	2.95	0.756	AOI 2	5.15	4.45	4.47	0.419	
AOI 3	1.40	1.36	1.60	0.920	AOI 3	3.10	3.89	3.00	*0.022	AOI 3	7.45	8.25	9.05	*0.044	AOI 3	2.32	1.88	1.73	0.229	
										AOI 4	2.21	2.13	2.29	0.644						
										AOI 5	1.14	1.57	1.42	0.404						

Note: \* $p < 0.05$ .**Table 13.** U Mann-Whitney test. Time from Fixation (TFF) means by stimulus, sex, and AOI.

E1				E2				E3				E4			
AOI	Average TFF		p-value	AOI	Average TFF		p-value	AOI	Average TFF		p-value	AOI	Average TFF		p-value
	Male	Female			Male	Female			Male	Female			Male	Female	
AOI 1	0.15	0.12	.994	AOI 1	0.78	1.56	*.007	AOI 1	0.72	0.66	*.019	AOI 1	0.11	0.22	.064
AOI 2	3.54	3.28	.326	AOI 2	0.33	0.34	.994	AOI 2	1.73	2.31	.124				
AOI 3	3.21	2.45	*.007					AOI 3	0.87	0.55	.512				
E5				E6				E7				E8			
AOI	Average TFF		p-value	AOI	Average TFF		p-value	AOI	Average TFF		p-value	AOI	Average TFF		p-value
	Male	Female			Male	Female			Male	Female			Male	Female	
AOI 1	0.39	0.48	*.019	AOI 1	0.55	0.32	*.015	AOI 1	0.92	0.81	.801	AOI 1	0.71	0.31	*<.001
AOI 2	2.77	3.17	.118	AOI 2	2.22	3.11	*.008	AOI 2	1.24	0.89	.275	AOI 2	0.94	1.51	.080
AOI 3	2.54	2.69	.334	AOI 3	2.84	2.10	*.004	AOI 3	0.43	0.51	.204	AOI 3	2.91	3.53	.079
								AOI 4	1.29	0.33	*.003				
								AOI 5	2.59	1.64	.248				

Note: \* $p < 0.05$ .

**Table 14.** U Mann-Whitney test. Total Fixation Duration (TFD) means by stimulus, sex, and AOI.

E1			E2			E3			E4						
AOI	Average TFD		p-value	AOI	Average TFD		p-value	AOI	Average TFD		p-value				
	Male	Female			Male	Female			Male	Female					
AOI 1	3.36	1.92	*<.001	AOI 1	0.36	0.45	.171	AOI 1	1.68	2.51	*<.001	AOI 1	3.56	3.48	.451
AOI 2	0.73	0.99	.037	AOI 2	3.99	3.84	.204	AOI 2	1.45	1.00	*.003				
AOI 3	0.66	1.62	*<.001				*<.001	AOI 3	4.01	4.56	*<.001				
E5			E6			E7			E8						
AOI	Average TFD		p-value	AOI	Average TFD		p-value	AOI	Average TFD		p-value	AOI	Average TFD		p-value
	Male	Female			Male	Female			Male	Female			Male	Female	
AOI 1	2.14	3.24	*<.001	AOI 1	1.96	2.27	.074	AOI 1	0.98	2.04	*<.001	AOI 1	1.76	1.36	*.006
AOI 2	0.68	0.53	.355	AOI 2	0.87	0.76	.741	AOI 2	0.63	1.29	*<.001	AOI 2	1.02	2.08	*<.001
AOI 3	0.26	0.46	.046	AOI 3	1.14	1.58	*.001	AOI 3	2.60	4.08	*<.001	AOI 3	0.45	0.75	*.014
								AOI 4	0.86	0.46	*.003				
								AOI 5	0.42	0.37	.484				

Note: \* $p < 0.05$ .**Table 15.** U Mann-Whitney test. Fixation Count (FC) means by stimulus, sex, and AOI.

E1			E2			E3			E4						
AOI	Average FC		p-value	AOI	Average FC		p-value	AOI	Average FC		p-value				
	Male	Female			Male	Female			Male	Female					
AOI 1	7.57	4.90	*<.001	AOI 1	1.08	1.33	.087	AOI 1	4.50	6.17	*.001	AOI 1	11.03	11.07	.911
AOI 2	1.61	1.26	.094	AOI 2	7.33	7.30	.898	AOI 2	3.07	2.28	*.009				
AOI 3	1.84	3.17	*<.001					AOI 3	10.00	10.77	.118				
E5			E6			E7			E8						
AOI	Average FC		p-value	AOI	Average FC		p-value	AOI	Average FC		p-value	AOI	Average FC		p-value
	Male	Female			Male	Female			Male	Female			Male	Female	
AOI 1	5.70	6.90	*.003	AOI 1	5.13	5.80	.103	AOI 1	2.93	4.87	*<.001	AOI 1	3.57	2.90	*.028
AOI 2	2.00	1.92	.536	AOI 2	1.52	1.67	.734	AOI 2	2.41	3.17	.063	AOI 2	3.62	5.73	*<.001
AOI 3	1.23	1.78	*.027	AOI 3	3.07	3.59	.075	AOI 3	7.30	9.20	*<.001	AOI 3	2.00	2.04	.814
								AOI 4	2.54	1.76	*.003				
								AOI 5	1.40	1.33	.884				

Note: \* $p < 0.05$ .

= 0.001), followed by young adults aged 20–21 (FC = 11.65; TFD = 3.65), while the dark eye circles of the male influencer received the lowest number of fixations and total duration from adolescents (FC = 2.85,  $p = 0.085$ ; TFD = 1.49,  $p = 0.632$ ) and the highest number of fixations from young adults 20–21 years of age (FC = 3.70; TFD = 1.69).

The differences shown by the subjects according to gender (Tables 13, 14, and 15) were more significant than those shown by age. Attention by gender to body attractiveness of the influencers was confirmed when it was verified that males placed faster attention (TFF = 0.33;  $p = 0.994$ ), of longer duration (TFD = 3.99;  $p = 0.204$ ), and with a higher number of fixations (FC = 7.33;  $p = 0.898$ ), on the buttocks of the female influencer; the attention by females was partially significant with regard to the stimuli in which the male influencer showed his naked torso (E6-AOI3; TFF = 2.10,  $p = 0.004$ ; TFD = 1.58,  $p = 0.001$ ; FC = 3.59,  $p = 0.075$ ), with the greatest differences being seen in E8-AOI 2 (TFD = 2.08,  $p < 0.001$ ; FC = 5.73,  $p < 0.001$ ).

In all of the faces shown in the male influencer's stimuli, women registered more attention than men, and this was especially noteworthy when the influencer appeared in a more ideal way (E7-AOI 3; TFD = 4.08,  $p < 0.001$ ; FC = 9.20,  $p < 0.001$ ), and when he was smiling (E5-AOI 1; TFD = 3.24,  $p < 0.001$ ; FC = 6.90,  $p = 0.003$ ). In the case of the female influencer, however, attention was greater in men who visualized the ideal smiling image of the female influencer (E1-AOI 1; TFD = 3.36,  $p < 0.001$ ; FC = 7.37,  $p < 0.001$ ), but it was greater in women when visualizing the ideal female influencer in close-up (E3-AOI 3; TFD = 4.56,  $p < 0.001$ ; FC = 10.77,  $p = 0.118$ ).

Attention recorded to the lips also clearly reflected the importance of body attractiveness to influencers on Instagram, with some significant differences between genders. Men showed faster attention (TFF = 1.73;  $p = 0.124$ ), longer duration (TFD = 1.45;  $p = 0.003$ ) and more fixations (FC = 3.07;  $p = 0.009$ ) than women to the lips in the stimulus in which the female influencer appears in an ideal way in close-up (E3-AOI 2). In contrast, women showed faster attention (TFF = 0.89;  $p = 0.275$ ), longer duration (TFD = 1.29;  $p < 0.001$ ) and more fixations (FC = 3.17;  $p = 0.063$ ) than men in the stimulus in which the male influencer appeared with an ideal face in close-up (E7-AOI 2).

Imperfections shown voluntarily by influencers attracted more attention from men than from women, although the difference was only significant in the case of the male influencer with dark eye circles. Although women visualized the dark circles under the eyes earlier (TFF = 0.31;  $p < 0.001$ ), it was men who showed longer duration of attention (TFD = 1.76;  $p = 0.006$ ), with a greater number of fixations (FC = 3.57;  $p = 0.028$ ).

### 3.3. Analysis of the attention to brands

The attention to brands was significantly higher ( $p < 0.001$ ) in all cases compared to that of fashion accessories (pendants) when both of

these AOI appeared in the same stimulus (Table 16), but with a somewhat later first attention to the brands, but only occasionally. The tattoo that the female influencer showed on her arm, despite being of a smaller size than the brand insignia, received more attention (TFD = 0.87) than all of the brands and fashion accessories, though with fewer fixations (FC = 1.42) and with a longer time duration until the first fixation (TFF = 3.40). In spite of not being a fashion element, the attention received by the hamburger with a bite that the smiling female influencer seemed to be eating was monitored, and this was the AOI with the most attention in this analysis (TFD = 1.24; FC = 2.65), despite not being one of the first elements to be seen within the images (TFF = 2.74). This issue will be analysed in the Discussion section below, since the attention was significantly faster in the case of women (TFF = 2.45;  $p = 0.007$ ), of longer duration (TFD = 1.62;  $p < 0.001$ ), and with a greater number of fixations (FC = 3.17;  $p < 0.001$ ).

The comparison among the four brands promoted by the male influencer (Table 17) showed that the Adidas brand on the sweater neck was the one that registered the fastest attention of the four that appeared in the stimuli (TFF = 0.88;  $p < 0.001$ ), with the highest number of eye fixations (FC = 2.20;  $p = 0.028$ ), without significant differences in the total duration of the attention registered (TFD = 0.69;  $p = 0.189$ ), which in all cases were below one second. This seems to indicate scarce interest in the brands being promoted by the influencers, except when they appeared in a prominent place and close to the point of maximum attention, which in this case was the ideal face of the male influencer.

The presence of brands in the stimuli in which the male influencer exhibited his body attractiveness (Table 18) showed significant differences. While the iPhone X obtained a first attention that was significantly faster than that of the Calvin Klein briefs (TFF = 2.70 vs. 3.24;  $p = 0.006$ ), and of longer attention duration (TFD = 0.82 vs. 0.61;  $p = 0.048$ ), it was the briefs brand that registered a greater number of fixations (FC = 1.60 vs. 2.02;  $p = 0.026$ ).

When the Adidas brand appeared on the jacket of the smiling male influencer in comparison to the appearance of the same brand on the sweater neck in the stimulus in which he appeared with the ideal face that was made-up and well-groomed (Table 19), the greatest attention was focused on the latter, although the only significant difference was on the speed of the first attention (TFF = 2.89 vs. 0.88;  $p < 0.001$ ) when compared to the longer duration of attention (TFD = 0.63 vs. 0.69;  $p = 0.696$ ) and the number of fixations (FC = 1.98 vs. 2.20;  $p = 0.340$ ).

There were no significant differences among participants by age (Tables 10, 11, and 12). Adolescents were those who paid more attention and displayed more fixations on the brands in all of the stimuli in which the brands appeared, although they were not the ones who paid the first attention to the brands due to the influence exerted on their attention by the physical attractiveness of the influencer. In spite of this, there were no significant differences regarding this point. Moreover, the existence of

**Table 16.** Kruskal–Wallis test between similar AOIs.

Fixation	E1-AOI2	E1-AOI3	E5-AOI2	E5-AOI3	E6-AOI2	E7-AOI4	E7-AOI5	E8-AOI3	p-value
Average TFF	3.40	2.74	2.89	2.60	2.70	0.88	2.37	3.24	* < 0.001
Average TFD	0.87	1.24	0.63	0.34	0.82	0.69	0.41	0.61	* < 0.001
Average FC	1.42	2.65	1.98	1.45	1.60	2.20	1.38	2.02	* < 0.001

Note: \* $p < 0.05$ .

**Table 17.** Kruskal–Wallis test between similar AOIs.

Fixation	E5-AOI 2	E6-AOI2	E7-AOI 4	E8-AOI 3	p-value
Average TFF	2.89	2.70	0.88	3.24	* < 0.001
Average TFD	0.63	0.82	0.69	0.61	0.189
Average FC	1.98	1.60	2.20	2.02	* 0.028

Note: \* $p < 0.05$ .

**Table 18.** U Mann-Whitney test between similar AOIs.

Fixation	E6-AOI 2	E8-AOI 3	p-value
Average TFF	2.70	3.24	*0.006
Average TFD	0.82	0.61	*0.048
Average FC	1.60	2.02	*0.026

Note: \* $p < 0.05$ .

**Table 19.** U Mann-Whitney test between similar AOIs.

Fixation	E5-AOI 2	E7-AOI 4	p-value
Average TFF	2.89	0.88	* $<0.001$
Average TFD	0.63	0.69	0.696
Average FC	1.98	2.20	0.340

Note: \* $p < 0.05$ .

differences appearing repeatedly across all brands among the two older groups of youth could not be verified. The only significant difference occurred in longer total duration of the attention paid by adolescents to the iPhone X being carried by the male influencer in the stimulus in which he showed his naked torso (E6-AOI 2, TFD = 1.07;  $p = 0.017$ ). In addition, the iPhone was the only brand that reached a total duration of attention greater than one second. The Calvin Klein brand attracted clearly differentiated attention among the groups, although the difference was not significant. Thus, the adolescents showed more attention (TFF = 2.93,  $p = 0.283$ ; TFD = 0.70,  $p = 0.286$ ; FC = 2.32,  $p = 0.229$ ) than the young adults aged 20–21, who registered the lowest level (TFF = 3.48; TFD = 0.45; FC = 1.73), yet more than those from 18-19 years of age, who were in an intermediate position (TFF = 3.43; TFD = 0.60; FC = 1.88).

The analysis of the subjects by gender (Tables 13, 14, and 15) showed that men displayed greater attention than women to brands, with some exceptions. This greater attention was clear in the case of Adidas, both in the stimulus of the smiling male influencer (E5-AOI 2, TFF = 2.77,  $p = 0.118$ ; TFD = 0.68,  $p = 0.355$ ; FC = 2.00,  $p = 0.536$ ), as well as in its appearance on the neck of the sweater next to the ideal face (E7-AOI 4; TFD = 0.86,  $p = 0.003$ ; FC = 2.54,  $p = 0.003$ ). Attention was more dispersed in the case of the iPhone X, which was seen significantly sooner

by men (TFF = 2.22;  $p = 0.008$ ) with longer duration (TFD = 0.87;  $p = 0.741$ ) though with fewer fixations (FC = 1.52;  $p = 0.734$ ).

However, women showed longer duration of attention to the Calvin Klein brand (TFD = 0.75;  $p = 0.014$ ) with more fixations (FC = 2.04;  $p = 0.814$ ), which could have been a consequence of the body attractiveness shown by the male influencer with the naked torso wearing the briefs brand.

### 3.4. Analysis of emotional intensity

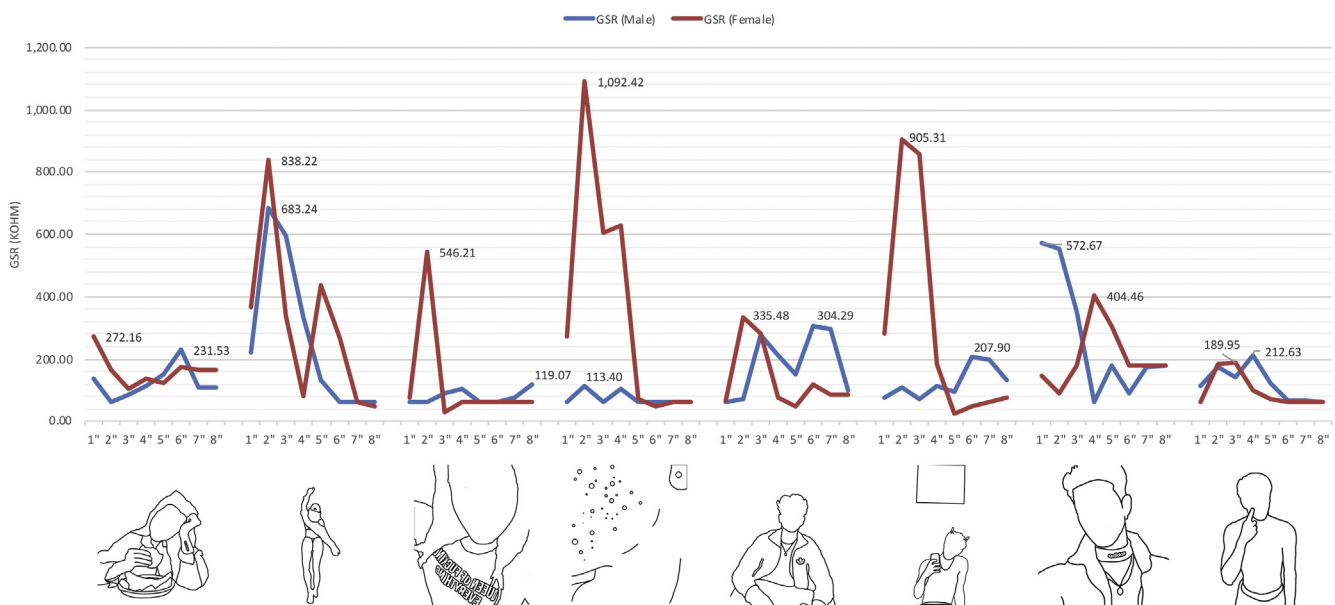
The GSR peaks (Figure 4) showed remarkable emotional intensity as a result of nude body attractiveness displayed in the most ideal way, in addition to the most obvious imperfection. The highest GSR peak of all stimuli was recorded with the acne of the female influencer, which for men was only a shock (113.40 KOhm.) when compared to the response given by women (1,092.42 KOhm.). In the stimulus of the dark under-eye circles, which were less evident due to the attention being distracted by the torso of the naked male influencer, GSR peaks were low, and there was almost no difference between men (212.63 KOhm.) and women (189.95 KOhm.).

The most ideal nude body attractiveness also stood out in emotional intensity, especially among women as compared to men, whose GSR peaks stood out in the stimulus in which the female influencer showed her buttocks (838.22 KOhm. for women vs. 683.24 KOhm. for men) and in which the male influencer showed his naked torso (905.31 vs. 207.90 KOhm.).

The third block of stimuli with striking emotional intensity was that of the influencers' images in which they appeared in an idealised pose in the foreground. While the female influencer obtained the overwhelming majority of emotion from women (546.21 vs. 119.07 KOhm.), the male influencer received greater emotional intensity from men (572.67 vs. 404.46).

## 4. Discussion

Although the overall attention of participants was high due to the fact that they were asked to visualize stimuli of interest to them, the attractive parts of the body of the influencers, both female and male, captured the attention of all subjects, while the brands captured the attention of between 70.00% and 83.33% of participants. Less attention was paid to



**Figure 4.** GSR peaks of the stimuli. Source: created using @paulagonu and @manurios.

fashion accessories, which fell to 43.33% of the participants who noticed them. The attitude of adolescents toward influencers is generally not judgmental, so they are more likely to accept the messages communicated (Van-Dam and Van-Reijmersdal, 2019), an issue that affects both personal identity and brand content.

The faces of the influencers received faster attention when they smiled, but when the made-up and well-groomed face occupied most of the screen surface it obtained more total attention duration and a greater number of eye fixations, both on the male and the female, with very similar registers. The face of the male influencer received the least attention, intensity and repetition of fixations when his attractive nude body appeared in the same image. When the influencers showed some attractive nude body parts, the female received significantly more attention in terms of first attention recorded, duration of each attention, and the number of eye fixations as compared to the male. The eyes captured more attention, this occurred faster, and the duration was longer compared to the lips, regardless of the influencer's gender. However, the eyes of the female received more attention than those of the male, while there were no clear differences regarding the lips according to gender.

The fact that the ideal photographs had the best attention scores and that the acne on the girl's face registered the highest peak of emotion might support the conclusion that the younger audience remains somewhat superficial in its perception of beauty stereotypes, with greater intensity among teenagers and men toward the body nude (De-Perthuis, and Findlay, 2019; Harris, and Bardey, 2019).

Neuroscience has found that photographs published by others with a large number of likes, as occurs in the publications of influencers, are those preferred by the audience (Sherman et al., 2017). Moreover, adolescents place more value on retouched self-photographs because of their proximity to ideal beauty (Sheldon and Bryant, 2016). This issue is especially harmful since continued exposure to ideal photographs increases the negative effects of body dissatisfaction (Sherman et al., 2017; Bauer et al., 2017). Nude parts of the body have received the most attention in similar research (Freeman et al., 1991), whether it is the chest, buttocks, or abdominal area (Von-Wietersheim et al., 2012; Horndasch et al., 2012). This is either due to the interest generated by the attractiveness of these areas, or to body dissatisfaction with these regions resulting from eating disorders (Mulgrew and Hennes, 2015; Rodgers and DuBois, 2016).

The attractive nude parts of the female influencer's body obtained the best attention registers, significantly greater than the naked torso of the male. When imperfections (dark eye circles) appeared together with the naked torso in the same stimulus, the attention was focused on attractive body parts rather than imperfections (which are not truly imperfections), unlike other influencers who want to raise awareness about the self-acceptance of body image, such as curvy girl influencers (Mañas-Viniegra et al., 2019). This implies that the audience of these influencers are more superficial and look for attractiveness in content, which is especially harmful for the development of personal identity, especially at an early age when social approval is sought and one's body image is constantly being compared to that of other people who have a high level of activity on social networks (White et al., 2016). More attention was also paid to the ideal face that was made-up and well-groomed rather than to imperfections, which were dark circles in the case of the male influencer. This is contrary to what happened with the acne of the female influencer, though it is true that the imperfection was highlighted by a close-up in this case.

The results also show that brands promoted by young influencers among the youngest audiences attract scant interest, in contrast to the widespread use of influencers by brands (Voorveld, 2019), with the estimate that in 2019, 59% of marketers would spend more than \$10,000 in marketing by influencers (MediaKix, 2019). Thus, despite the fact that influencers' narratives draw the brands closer to audiences in a more natural way (Schouten et al., 2019), it seems that influencers gather all of

the attention when they do not expressly interact with the brand for its promotion, an issue that must be taken into account in brand promotion and communication strategies, especially when considering the affinity of products and brands with an influencer's profile.

In relation to brands promoted by the influencers, these aroused little interest –TFD was always less than 1 s– in comparison to body attractiveness of the influencers, although they significantly outperformed with regard to attention in the area of fashion accessories (pendants) that the influencers wore. The fact that the Adidas brand registered the most attention on the sweater neck position next to the influencer with the ideal face seems to reinforce this point. Ahead of all brands, the total duration of attention received by the influencer's tattoo stood out, which seems to be a consequence of the interest among the young public in fashion, despite the small size of the tattoo within the image. Despite the boom in brand promotion by influencers, these results cast doubt on the effectiveness of the promotional activities of major global brands carried out with influencers who have a niche audience with specific interests (De-Veirman et al., 2017).

The results also highlighted the attention to the hamburger that was presumably being eaten by the influencer together with her ideal smiling image, with a total duration and number of fixations much higher than those obtained by all brands and by the tattoo itself. This attention was significantly higher among women than men. The fact that this was not one of the first components to be visualized seems to suggest that the attention arrived to that point through a type of natural visualisation that went lower, step by step, to that particular feature, but at the moment when the vision arrived to that point it captured the viewers' attention, which could signify a contradictory perception between a female influencer with an ideal body image in which the audience did not expect to see her eating this type of food, and the desire by viewers to eat the hamburger. Such an act of consumption tends to contradict the lifestyle of these ideal image influencers, an ideal that is shared by the audience. The relationship between social networks, personal identity, body image and eating disorders allows Instagram users to utilise this social network to promote nutritional behaviour as an expression of personality in their interaction with others (Riesmeyer et al., 2019). Hence, it is important to raise awareness on this issue in order to prevent adolescents from following unhealthy eating trends, which they often do in order to attain the body image expected of them in this social network.

Adolescents displayed the slowest attention to the face but were the first in placing attention on attractive body parts, which was similar to that of young adults aged 18–19. Both groups stood out in the attention they paid to the buttocks of the female influencer, and to a lesser extent to the naked torso of the male influencer. With regard to the imperfections, adolescents paid the greatest attention to the acne of the influencer, yet this group paid the least amount of attention to the male influencer's dark eye circles, which was monopolized by the young adults.

Adolescence is a time when girls are at greater risk than boys of suffering from depression and anxiety (Alloy et al., 2016). Moreover, this age coincides with a higher rate of consumption of body image content on social networks. From the time that people started using Facebook, social networks have demonstrated that the high level of use by adolescents increases the need for belonging and popularity (Beyens et al., 2016), with the associated risks of how adolescents try to achieve these goals.

Men paid more attention to the attractive nude body of the female influencer, though without significant differences, while women did the same with the male influencer's nude torso, but with significant differences. These results are consistent with the attention paid to the face or lips of the influencers based on their gender. Imperfections attracted more attention from men than from women, though without convincing results that would indicate greater interest by gender. Other eye tracking research has shown that greater attention to imperfections is a way of comparing one's own bodily imperfections with those of others (Svaldi



et al., 2011; Tuschen-Caffier et al., 2015; Svaldi et al., 2016; Blechert et al., 2019).

Although the differences between men and women occur at irregular intervals, they are complementary to other investigations related to body dissatisfaction, which generally study only the female audience regarding their exposure to stimuli registered through eye tracking. The reason for this focus on the female audience is that the researchers have not found significant differences between men and women with regard to the level of attention exerted (Zajonc, 1968; Phillipou et al., 2016).

GSR peaks showed striking emotional intensity in the appeal of the most ideally presented nude body, as well as the most evident imperfection, with women expressing the highest level of emotion. Therefore, the results of attention are consistent with those of emotional intensity. Emotional expression in neuroscientific studies has shown that emotion, and the recognition of emotion, are generally higher among women (Wingenbach et al., 2018), that these aspects improve as women age (Lawrence et al., 2015), and that this group also shows more empathy (Baez et al., 2017). Although differences have been shown by gender, the shared influences of interactive factors that are neurobiological, environmental and sociocultural in origin must not be forgotten (Pavlova, 2017) in order to avoid contributing to the spread of harmful gender stereotypes (Mendrek, 2015).

Other studies with eye tracking have pointed out that visual attention paid to the product and brand elements are related to the effectiveness of the particular promotion being carried out (Zhang et al., 2018). Adolescents are the ones who paid more attention and displayed more fixations on brands in all of the stimuli in which these brands appeared during this research, although they were not the age group who first noticed them due to the influence of physical attractiveness on their attention. The significantly increased attention paid to the iPhone by teenagers reflects the importance of technology as a means of expressing body appeal and personal identity, as well as the interest in fashion among Instagram users, as teenagers showed a strong preference for high-end brands such as Calvin Klein—as well as the iPhone—compared to the sports brand Adidas. Although men showed greater attention than women to brands in most stimuli, it should be noted that famous brands of underwear on a nude body attracted more attention from women. The iPhone X mobile phone brand was the one that received the most widespread attention from both genders.

## 5. Conclusions

This research has contributed to the change taking place in scientific literature in relation to the creation of identity on social networks, and has considered the effects that these may have on body dissatisfaction and the risky behaviour of those seeking social acceptance in a digital environment.

When the influencers showed an ideal image, participants displayed greater attention and emotional intensity, especially in response to close-up facial stimuli and to attractive nude parts of the body. This ideal beauty draws more attention than the imperfections, which in a not-so-convincing way attempted to display these influencers within some isolated stimulus, in spite of the shock that was caused by showing the acne in a close-up. In stimuli with nude body images, each gender showed the most attention to the opposite gender, and adolescents were the age group with the strongest reactions to these stimuli. The poor results obtained by brands promoted by influencers cast doubt on their ability to publicize global brands. This research has also demonstrated that women exhibit greater emotional expressiveness than men when exposed to content published by influencers.

The main recommendation from this research for the management of global brands is to consider whether certain influencers respect social responsibility policies in their handling of body image photographs, and whether niche influencers can provide the magnitude of range that a global brand requires.

Although the sample was similar in size to that of other neuro-marketing research, ranging from 15 to 50 participants, a second study with greater scope that goes beyond this limitation is needed. Another limitation lies in the simulation of the real world that a neuromarketing laboratory tries to replicate, which prevents the unconscious response from being exactly the same as it would be in a 'real world' situation (Mileti et al., 2016). If one considers that in the application of marketing decisions in the real world it is more important to predict behaviour than to understand 'why' (Berns et al., 2010), this investigation could delve deeper into these causes by means of qualitative research that might extend the study carried out here.

Furthermore, the cultural bias present among Spanish people must be overcome in future research. Previous investigations regarding Instagram have pointed out the importance of cross-cultural differences when comparing the results obtained in more inclusive societies such as those of Europe with others that are more individualistic, such as the United States (Tiggemann and Zaccardo, 2016; Alsaleh et al., 2019). Therefore, future research must broaden these results. As a future line of research, we also plan to investigate differences between the marketing of brands carried out by micro influencers compared to that of influencers who have already achieved the status of being celebrities.

## Declarations

### Author contribution statement

L. Mañas-Viniegra: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

P. Núñez-Gómez, V. Tur-Viñes: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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### Additional information

No additional information is available for this paper.

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