



ORIGINAL ARTICLE

The dark side of Instagram: Predictor model of dysmorphic concerns



Cristina Senín-Calderón^a, Salvador Perona-Garcelán^b, Juan F. Rodríguez-Testal^{c,*}

^a Department of Psychology, University of Cádiz, Cadiz, Spain

^b University Hospital Virgen del Rocío, Seville, Spain

^c Personality, Evaluation and Psychological Treatment Department, University of Seville, Spain

Received 3 April 2020; accepted 19 June 2020

Available online 23 August 2020

KEYWORDS

Instagram use;
Dysmorphic concerns;
Appearance-related
comparisons;
Difficulties in
emotion regulation;
Cross-sectional study

Abstract

Background/Objective: Dysmorphic concern are excessive preoccupation about one or several physical characteristics perceived as defects, usually unnoticeable by others. This study was intended to explore the relationship between Instagram use and dysmorphic concerns through appearance-related comparisons, ideas of reference and problems with emotion regulation, and find out whether this relationship is moderated by gender. *Method:* The sample was comprised of 796 participants ($M_{age} = 22.49$; $SD = 3.56$; 54% women). *Results:* The results showed a non-significant direct effect between Instagram use and dysmorphic concerns. However, the relationship between these variables was statistically significant through appearance-related comparisons, ideas of reference about “laughing, commenting” and difficulties in emotion regulation. Gender did not moderate any relationship. *Conclusions:* Men and women who made the most use of Instagram were equally vulnerable to dysmorphic concerns when they tended to compare their appearance with other users, had problems regulating their emotions, and showed interpretative biases related to the belief that others could make comments about them or laugh at them because of their imperfections. The implications of the study are discussed. © 2020 Asociación Española de Psicología Conductual. Published by Elsevier España, S.L.U. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

PALABRAS CLAVE

Uso de Instagram;
Preocupaciones
dismórficas;

El lado oscuro de Instagram: modelo predictor de las preocupaciones dismórficas

Resumen

Antecedentes/Objetivo: Las preocupaciones dismórficas hacen referencia a una preocupación excesiva por una o varias características físicas percibidas como defectos que normalmente no

* Corresponding author: Personality, Evaluation and Psychological Treatment Department, University of Seville Camilo José Cela s/n, 41018, Sevilla, Spain.

E-mail address: testal@us.es (J.F. Rodríguez-Testal).

Comparación relacionada con la apariencia;
Dificultades en la regulación emocional;
Estudio transversal

son observables por otras personas. El presente trabajo pretende explorar la relación entre el uso de Instagram y las preocupaciones dismórficas a través de la comparación de la apariencia, las ideas de referencia y las dificultades en la regulación emocional, así como analizar si esta relación está moderada por el género. Método: Participaron 796 sujetos ($M_{edad} = 22,49$; $DT = 3,56$; 54% mujeres). Resultados: Los resultados mostraron un efecto directo no significativo entre el uso de Instagram y las preocupaciones dismórficas. La relación entre estas variables fue estadísticamente significativa a través de la comparación de la apariencia, ideas de referencia sobre "risas y comentarios" y las dificultades en la regulación emocional. El género no moderó ninguna relación. Conclusiones: Hombres y mujeres que hacen un mayor uso de Instagram son igualmente vulnerables a manifestar preocupaciones dismórficas, cuando tienden a comparar su apariencia con otros usuarios, tienen dificultades para regular sus emociones, y muestran sesgos interpretativos relacionados con la creencia de que otros podrían hacer comentarios o burlarse de uno mismo por sus imperfecciones. Se discuten las implicaciones de este trabajo. © 2020 Asociación Española de Psicología Conductual. Publicado por Elsevier España, S.L.U. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Instagram is a visual interactive social network for sharing personal photographs and videos. It currently has one billion active users (Instagram by the Numbers: Stats, Demographics & Fun Facts, 2020), who are mainly adults aged 18 to 34 (Statista, 2020a), and especially women (Statista, 2020b). Unlike Facebook, Instagram has been less studied with regard to body image concerns, even though a large part of its activity is based on evaluating the physical attractiveness of oneself and others, with "likes" or comments. Instagram is a self-promotion showcase where users try to upload photos that emphasize their physical attractiveness and can be edited previously with filters provided by the application. It has been suggested that Instagram use can have more negative repercussions on body image than other social networks with more varied contents and activities (Cohen, Newton-John, & Slater 2017; Fardouly, Pinkus, & Vartanian, 2017; Fardouly & Vartanian, 2016).

Several cross-sectional, experimental and longitudinal studies have found a significant relationship between more social network activity based on sharing, seeing and commenting photographs and body image impairment (Fardouly & Vartanian, 2016; Fardouly, Willburger, & Vartanian 2018; Feltman & Szymanski, 2018; Holland & Tiggemann, 2016). This relationship could be explained by the Social Comparison Theory, which states that people often evaluate themselves and tend to compare themselves to others they think are important when they do not have objective standards for determining their progress and position in life (Festinger, 1954). Satisfaction with physical appearance could be negatively affected when appearance-related social comparisons, are made frequently and selectively with persons with physical attributes considered attractive (Vartanian & Dey, 2013).

Instagram regularly offers opportunities for comparing one's appearance with that of others, as it has a variety of models and peers who often share their idealized photographs of themselves. It has been found that regularly comparing physical appearance with others mediates the relationship between the social network user and body

image impairments (Fardouly et al., 2017; Fardouly & Vartanian, 2015, 2016; Fardouly et al., 2018; Feltman & Szymanski, 2018; Hendrickse, Arpan, Clayton, & Ridgway, 2017; Holland & Tiggemann, 2016; Kim & Chock, 2015). These studies focused mainly disordered eating (Holland & Tiggemann, 2016). However, as far as we know, no study has examined the relationship between this type of social network and another dimension of body image impairment, dysmorphic concerns. The need for studies in this area were recently shown in a systematic review (Ryding & Kuss, 2019).

Dysmorphic concern (DC) may be defined as excessive preoccupation about one or several physical characteristics perceived as defects or imperfections usually unnoticeable by others (Oosthuizen, Lambert, & Castle, 1998). They may appear as unwanted mental intrusions that a person makes an effort to suppress to reduce the distress caused by them, most often through compulsive behavior (checking physical appearance in reflective surfaces, touch the defect, camouflage it or compare oneself with others) (Pascual-Vera et al., 2019; Pascual-Vera & Belloch, 2018). DC are located on a continuum of severity where the most extreme manifestation is Body Dysmorphic Disorder (BDD), and they seem to be more frequent in women (Senín-Calderón, Gálvez-González, Perona-Garcelán, Camacho, & Rodríguez-Testal, 2019). They are usually mental acts related to comparing one's physical appearance with that of others (American Psychiatric Association APA, 2013). According to Social Comparison Theory (Festinger, 1954) and the contributions of the researchers mentioned above, it may be expected that those who make more use of Instagram tend to compare their physical appearance with others more and show more DC.

DC has been related positively to ideas of reference (Senín-Calderón et al., 2019), which is a clinical characteristic in the ICD-11 for diagnosis of BDD (World Health Organization, 2019). Ideas of reference (IR) refer to the feeling that one is the subject of attention by others, which can be construed as being observed, talked about, criticized and/or being laughed at (Lenzenweger, Bennett,

& Lilienfeld, 1997). Phillips (2004) found that at least two thirds of BDD patients experienced IR. Senín-Calderón et al. (2019) found that IR about “attention, appearance” and “laughing, commenting” mediated the relationship between DC and behavioral impairment related to body image in adolescents. In another study, IR mediated the relationship between concern for appearance and behavioral impairment related to body image (Senín-Calderón, Rodríguez-Testal, Perona-Garcelán, & Perpiñá, 2017). However, as far as we know, no study has explored the relationship between IR and Instagram use, even though this platform is framed in a social context where the user expects to receive the approval of others in response to shared personal content. Therefore, beliefs could be activated about others paying special attention to the perceived defect, making comments, laughing at them or simply not showing their approval with “likes”, which could reinforce DC. Considering the findings mentioned above, it seems that IR have an important role in body image impairments. It may therefore be expected for greater use of Instagram to be related to an increase in IR, and in turn, to greater DC.

The diversity of contents related to physical appearance in a social network makes it easier for negative emotional responses to appear which not all users know how to manage with adaptive emotion regulation strategies (ER). Hormes, Kearns, and Timko (2014) and Marino et al. (2019) found a positive relationship between problematic Facebook use and greater ER difficulties (experiential avoidance, emotional rejection, poor impulse control). Therefore, the use of a social network like Instagram could impede identifying, understanding and accepting emotional experiences derived from a setting which values and evaluates appearance. Similarly, it could involve problems controlling certain behaviors, such as modulating the intensity of emotional responses (Gratz & Roemer, 2004).

In the context of body image impairment, ER difficulties have been studied more in eating disorders (Svaldi, Griepenstroh, Tuschen-Caffier, & Ehring, 2012), although difficulties in ER have been found in BDD patients (Mohajerin, Bakhtiyar, Olesnycky, Dolatshahi, & Motabi, 2019) and in adolescents with dysmorphic symptoms (Lavell, Webb, Zimmer-Gembeck, & Farrell, 2018). Callaghan et al. (2012) and Wilson, Wilhelm, and Hartmann (2014) found that experiential avoidance was a predictor of BDD. In fact, it has been postulated that persons with DC could use appearance control behaviors or excessive personal care as maladaptive strategies for managing negative emotional states (Lavell et al., 2018), as in bingeing, purging and excessive exercise behaviors by eating disorder patients (Peñas-Lledó, Vaz Leal, & Waller, 2002). It is therefore postulated that ER difficulties could mediate the relationship between Instagram use and DC.

On the basis of previous findings, we wanted to study a theoretical model examining whether Instagram use is associated with DC through four mediator variables: appearance-related comparisons, IR about “attention, appearance” and “laughing, commenting” and ER difficulties. Considering that women compare their appearance more (Kim & Chock, 2015), show more IR (Senín-Calderón et al., 2019) and have greater difficulty in emotion regulation (Anderson, Reilly, Gorrell, Schaumberg, & Anderson, 2016), we proposed examining whether this relationship

could be moderated by gender. Our hypotheses were the following:

H1. Instagram use is associated positively with DC through appearance-related comparisons, IR about “attention, appearance” and “laughing, commenting” and ER difficulties.

H2. Gender moderates the direct effect between Instagram use and DC.

H3. Gender moderates the indirect effect of Instagram use on DC through the four mediator variables proposed. Thus, it was expected that women would make more use of Instagram, compare their physical appearance with others more often, show more IR related to “attention, appearance” and “laughing, commenting”, show more difficulties in regulating their emotions and more DC than men.

Method

Participants

The study sample was made up of 796 participants aged 18 to 35 ($M_{age} = 22.49$; $SD = 3.56$). Women made up 54% of the sample. The sample analyzed was from urban and semi-urban areas in the provinces of Cadiz and Seville. The average social class index (SCI) as per Hollingshead (1975) was 45.01 ($SD = 19.25$) (mean social class). Of the total sample, 16.33% were students, the rest were from the general population. The Body Mass Index varied from 15.43 to 48.44 ($M = 23.40$; $SD = 4.27$).

Instruments

Dysmorphic Concern Questionnaire (DCQ; Oosthuizen et al., 1998). The DCQ was translated into Spanish by Senín-Calderón, Valdés-Díaz et al. (2017). The scale, which contains seven items evaluating concerns related to physical appearance, is a screening measure for BDD. The response format is a Likert-type scale with four answer choices which vary from 0 (*Not at all*) to 3 (*Much more than most people*). With a Spanish population sample, the DCQ showed internal consistency of $\alpha = .85$ and test retest reliability of $r = .87$ (Senín-Calderón, Valdés-Díaz et al. (2017)). The Cronbach's α found with the sample in this study was .86.

Referential Thinking Scale (REF; Lenzenweger et al., 1997). Adapted to Spanish by Rodríguez-Testal, Bendala-Rodríguez, Perona-Garcelán, and Senín-Calderón (2019). This scale consists of 34 items evaluating IR in a true/false response format. The Spanish validation of the scale showed five dimensions: IR about Songs, newspapers, and books, Guilt and shame, Causal explanations, Attention and appearance, and Laughing and commenting. In this study, the last two dimensions were employed because they are related to appearance. The Spanish validation had an ordinal $\alpha = .72$ (Attention and appearance) and ordinal $\alpha = .84$ (Laughing and commenting). Our sample had an ordinal $\alpha = .69$ and ordinal $\alpha = .78$, respectively.

Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004), adapted to Spanish by Hervás and Jódar

Table 1 Descriptive information and gender differences regarding the variables.

Variables	Men (<i>n</i> = 366) <i>M</i> (<i>SD</i>)	Women (<i>n</i> = 430) <i>M</i> (<i>SD</i>)	<i>t</i>	<i>Cohen's d</i>
Instagram use	2.39 (0.69)	2.62 (0.68)	4.73**	0.34
Dysmorphic concerns	5.87 (4.35)	7.82 (4.73)	6.02**	0.45
Appearance-related comparison	9.76 (6.15)	13.70 (6.71)	8.59**	0.64
L/C ^a	0.93 (1.55)	1.16 (1.70)	1.98*	0.15
A/A ^b	1.36 (1.46)	1.66 (1.48)	2.31*	0.21
Difficulties in emotion regulation	68.17 (19.41)	74.42 (19.82)	4.48**	0.32

Note. ^aL/C: Ideas of reference about Laughing, commenting, ^bA/A: Ideas of reference about Attention, appearance. ***p* < .01, **p* < .05.

(2008). The Spanish version is made up of 28 items that evaluate emotion regulation problems in five dimensions: Lack of control, Emotional confusion, Life interference, Lack of emotional attention and Emotional rejection. The response format is a five-point Likert-type scale from *Almost never/0-10%* to *Almost always/90-100% of the times*. The total scale score was used in this study. The Cronbach's $\alpha = .93$ for the Spanish validation of the whole scale. For the sample in this study, the Cronbach's $\alpha = .93$.

Physical Appearance Comparison Scale-Revised (PACS-R; Schaefer & Thompson, 2014). Adapted to Spanish by Senín-Calderón and Rodríguez-Testal (2019). It consists of 11 items for unidimensional evaluation of the frequency of comparing one's own physical appearance with other persons in various social situations. The response format varies from 0 (*never*) to 4 (*always*). The Spanish version had a Cronbach's $\alpha = .95$. In this study the four items referring to the frequency with which the person compares their weight or body fat were not used, since DC does not refer to this type of preoccupation. The Cronbach's α with the sample in this study on the seven items related to appearance in general was .92.

Instagram Use (Feltman & Szymanski, 2018; Manago, Ward, Lemm, Reed, & Seabrook, 2015). The Instagram use was evaluated with the modified Facebook use scale (Manago et al., 2015) by Feltman and Szymanski (2018), which evaluates the general use of the social network, active and passive use, and investment in it. In the modified scale, behaviors specific to Facebook are adjusted to comparable Instagram activities. General use is evaluated with one item which asks about the minutes spent on Instagram. Instagram Investment (3 items) refers to the importance of this network to the person's social life, e.g.: "Instagram has become part of my daily routine". Active use (3 items) alludes to the extent to which the participants publish, update and upload information on Instagram (photos, comments, stories). Passive use is evaluated in two items which ask about the extent to which participants receive or consume content in Instagram (see stories and receive "likes" from other users). The answer choices vary, as the items measuring the social network investment are rated on a three-point Likert scale from 1 (*Strongly disagree*) to 3 (*Strongly agree*). The items which record active and passive use are rated on a six-point Likert-scale from 0 (*Never*) to 5 (*Several times a day*) and 0 (*None*) to 5 (*More than 15*), respectively. The mean minutes per day invested in the social network varies from 1 (less than 10 minutes) to 6 (over three hours). Feltman and Szymanski (2018) used the total scale to evaluate Instagram use and standardized the scores by the differences in item answer format. In this study, the scores were standardized to be able

to use the total measure as Feltman and Szymanski (2018) did. When the total standardized score and the unstandardized score were correlated, $r = .99$. In view of this result, the unstandardized score was used as it was considered easier to interpret. The higher the score, the greater use of Instagram. The adaptation by Feltman and Szymanski (2018) had a $\alpha = .79$. The scale was translated into Spanish following the international guidelines for translation and adaptation of evaluation tests (Muniz, Elosua, & Hambleton, 2013). The Spanish validation, which is still in preparation, with a sample of 1160 participants had a $\alpha = .81$ and test-retest reliability of $r = .83$ (mean interval of 24 days) (Senín-Calderón & Rodríguez-Testal, 2020). The Cronbach's α found with the sample in this study was $\alpha = .79$.

Procedure

The tests were filled out in an anonymous online format with an alphanumeric participant identification code. First, the tests were taken by university students studying for a degree in Psychology who were rewarded with points in one of their courses. These students, using snowballing techniques, had to administer the tests to five persons who were not psychology students. Before filling in the form, they were informed about the study and were asked for their consent. The participants had to give their consent before being able to continue taking the tests.

The Andalusia Regional Government Ethics Committee (Spain) approved the study [reference: PACS-2019]. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Results

Preliminary analyses

A comparison of means on the study variables was done for gender. Statistically significant differences were found in all the comparisons, in which women had higher scores in all the variables (Table 1). The effect size was small in all the statistical comparisons ($d < .50$) except for appearance-related comparisons which had a medium effect size.

Spearman's Correlations were performed for all the study variables. Positive statistically significant relationships were found. The strongest relationship was between appearance-

Table 2 Spearman’s Correlations between all measures.

Variables	1	2	3	4	5	6
1	-					
2	.15**	-				
3	.24**	.58**	-			
4	.12**	.36**	.32**	-		
5	.15**	.25*	.24**	.44**	-	
6	.13**	.48**	.41**	.38**	.30**	-

Note. 1. Instagram Use, 2. Dysmorphic Concerns, 3. Appearance-related comparisons, 4. Ideas of reference about Laughing, Commenting, 5. Ideas of reference about Attention, Appearance, 6. Difficulties in emotion regulation. * $p < .05$, ** $p < .01$.

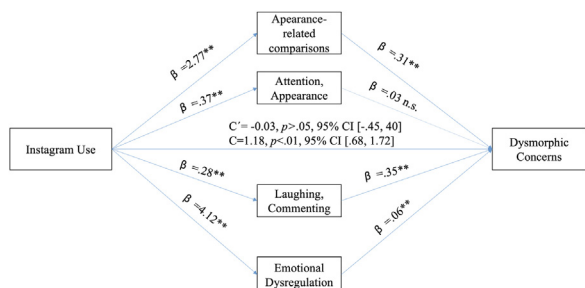


Figure 1 Mediation model in which the independent variable is Instagram Use score, the dependent variable are Dysmorphic Concerns score and mediating variables are appearance-related comparisons, ideas of reference about “attention, appearance” and “laughing, commenting”, difficulties in emotion regulation.

Note. c = total effect, c' = direct effect. β , C and C' represent unstandardized coefficients ** $p < .01$. n.s. Non-significant.

related comparisons and DC and between this and ER difficulties. Instagram use correlated with all the variables (Table 2).

Test of mediation

All the hypotheses were tested using the PROCESS macro (Hayes, 2013). Indirect effects were computed for each of 5000 bootstrapped samples. If the 95% CI for the indirect effect did not include 0, then the indirect route was significant, and therefore, mediation could be confirmed.

To test the first hypothesis, a multiple mediation analysis was done (Model 4, Hayes, 2013) between Instagram use (IV) on DC (DV) taking as the mediators the appearance-related comparisons, IR about “laughing, commenting” and “attention, appearance”, and ER difficulties. The direct effect of Instagram use on DC was not statistically significant. The mediation model was statistically significant through Appearance-related comparisons ($ab = .85$, $SE = 14$, $95\% CI [.60, 1.12]$), IR about “laughing, commenting” ($ab = .11$, $SE = .05$, $95\% CI [.03, .21]$) and ER difficulties ($ab = .24$, $SE = .08$, $95\% CI [.11, .40]$), resulting in full mediation of the relationship between Instagram use and DC (Figure 1). However, there was no mediation effect of IR about “attention, appearance” ($ab = .01$, $SE = .04$, $95\% CI [-.06, .09]$) on DC. The variables entered in the model explained 43% of the vari-

ance in DC, showing a large effect size (f^2 de Cohen = 0.75). These results partially confirm Hypothesis 1.

Test of moderated mediation

As the preliminary analyses found statistically significant gender differences in all the study variables, gender was considered a possible moderator of the direct effect between Instagram use and DC (Hypothesis 2), and as a moderator of the indirect effect the Instagram use on DC through the mediators (Hypothesis 3). Model 8 was used for the analysis (Hayes, 2013).

Contrary to Hypothesis 2, gender did not moderate the direct relationship between Instagram use and DC (conditional direct effect for men: $\beta = -.28$, $SE = 0.31$, $95\% CI [-0.90, 0.22]$; women = $\beta = .15$, $SE = 0.29$, $95\% CI [-0.43, 0.73]$). Neither was there support for our third Hypothesis, the conditional indirect effect of Instagram use on DC through appearance-related comparisons (Index of Moderation Mediation = .14, $SE = 0.23$, $95\% CI [-0.30, 0.60]$), IR about “laughing, commenting” (Index of Moderation Mediation = .01, $SE = 0.07$, $95\% CI [-0.14, 0.15]$), ER difficulties (Index of Moderation Mediation = .08, $SE = 0.14$, $95\% CI [-0.18, 0.36]$), which were not statistically significant (Table 3).

Discussion

The findings of this study suggest that Instagram use is closely related to DC through appearance-related comparisons, IR related to laughing and commenting and ER difficulties, regardless of gender. The relationship between Instagram use and DC through appearance-related comparisons support the Social Comparison Theory (Festinger, 1954), and the results are compatible with previous research which evaluated different variables related to body image impairment. For instance, Fardouly, Diedrichs, Vartanian, and Halliwell (2015), in an experimental study, found that women who compared their physical appearance more felt more dissatisfied with facial, skin and hair traits, after browsing through their Facebook account. With Instagram, Hendrickse et al. (2017) found that photographic activities published in this social network predicted bodily dissatisfaction and drive toward thinness in women through appearance-related comparisons. Feltman and Szymanski (2018) found that upward appearance comparison mediated in the relationship between the use of Instagram, self-objectification and body surveillance. The findings on the relationships explored in this study widen previous research with DC, a new variable of body image impairment not explored to date.

Our results with respect to IR as mediator variables were unexpected. Although the attention and appearance IR were related to the use of Instagram, the relationship with DC was not statistically significant, even though the correlational analyses showed a significant relationship. These results do not back the findings of Senín-Calderón et al. (2019) in a sample of adolescents. It is possible that ER difficulties and appearance-related comparison are more relevant in the relationship with DC and may have diminished the importance of attention and appearance IR to the point of not

Table 3 Regression Coefficients and Summary of the Moderated Mediation Model.

Predictor variables	<i>b</i>	<i>SE</i>	<i>t</i>	95% <i>CI</i>
Criterion: Dysmorphic Concerns				
Appearance-related comparisons	0.30	0.02	13.84**	[0.26, 0.34]
L/C ^a	0.37	0.09	4.33**	[0.20, 0.53]
Difficulties in emotion regulation	0.06	0.01	8.16**	[0.04, 0.07]
Instagram use	-0.06	0.22	-0.29 n.s.	[-0.49, 0.36]
Gender	-0.59	0.95	-0.63 n.s.	[-2.47, 1.26]
Instagram use x gender	0.43	0.42	1.01 n.s.	[-0.41, 1.26]
Criterion: Appearance-related comparisons				
Instagram use	2.26	0.38	5.95**	[1.52, 3.01]
Gender	2.48	1.70	1.46 n.s.	[-0.85, 5.81]
Appearance-related comparisons x gender	0.47	0.76	0.54 n.s.	[-1.03, 1.96]
Criterion: L/C				
Instagram use	0.27	0.10	2.80**	[0.08, 0.46]
Gender	0.16	0.43	0.37 n.s.	[-0.69, 1.01]
L/C x gender	0.01	0.19	0.04 n.s.	[-0.38, 0.39]
Criterion: Difficulties in emotion regulation				
Instagram use	3.28	1.18	2.79**	[0.98, 5.59]
Gender	2.51	5.25	0.48 n.s.	[-7.80, 12.82]
Difficulties in emotion regulation x gender	1.42	2.35	0.61 n.s.	[-.3.19, 6.04]

Note. ** $p < .01$. ^aL/C: Ideas of reference about Laughing, commenting. n.s. Non-significant.

being included in the model. However, IR related to laughing and commenting did mediate in the relationship between Instagram use and DC. These findings could be explained by the fact that persons with DC are sensitive to appearance-based rejection, which leads them to interpret ambiguous social situations or situations related to appearance in the form of self-referential ideas, maintaining these concerns (Buhlmann, Wacker, & Dziobek, 2015). According to these authors, viewing contents on Instagram may activate a self-referential interpretive bias leading them to believe that other users could be laughing at them or making comments on some characteristic of their physical appearance, and this in turn reinforces the DC.

Contrary to our predictions and even though women had higher scores on all the variables in the study, greater use of Instagram affected men the same way as women with respect to DC. These findings are consistent with the study by Kim and Chock (2015), who found that looking at and commenting on Facebook profiles was associated with the drive to thinness in men as well as in women through appearance comparison. Neither did De Vries, Peter, de Graaf, and Nikken (2016) find moderation of gender in the relationship between use of social networks and body dissatisfaction in adolescents.

The relationship between ER difficulties and DC is consistent with the study by Lavell et al. (2018). These authors found that adolescents with more BDD symptoms had more ER difficulties, and reported that they did not have adequate strategies for fighting against emotional distress, which would facilitate their use of compulsive behaviors (checking, excessive personal care or controlling appearance) to reduce distress. These findings, along with those in this study, could be explained by the principles of operant conditioning through negative reinforcement (Neziroglu, Khemlani-Patel, & Veale, 2008). The content watched in Instagram may evoke a variety of intense negative emotions

which are hard to manage for many users. Those who have difficulties in identifying, accepting and buffering unpleasant emotional experiences could increase their concerns about their body and attempts to camouflage, improve or cover up whatever upsets them as a dysfunctional strategy for controlling and avoiding the negative emotional experience. This argument is supported by the positive results found by Mohajerin et al. (2019) with the application of the transdiagnostic protocol for emotional disorders in BDD patients based on promoting emotion regulation strategies and decreasing negative affect. With this treatment, they found significant improvement in emotion regulation and reduction in BDD symptoms, which suggests that intervention in ER difficulties could be relevant in reducing DC.

The findings of this study should be taken in the context of some limitations. It is a correlational design which poses a tentative model, and therefore, it is not possible to make causal inferences. The results are consistent with the findings of longitudinal models, such as the one by De Vries et al. (2016), who found that greater use of social networks predicted body dissatisfaction 18 months afterwards in adolescents, but body dissatisfaction did not predict use of the social network. However, studies which support the relationship between the use of social networks and ER difficulties are correlated. Therefore, Instagram Use and ER difficulties could have an inverse relationship, and perhaps Instagram is used more often as an emotional avoidance strategy. The same is true of IR and DC, which may have a two-way relationship. Longitudinal and experimental studies are necessary to clarify the nature of the relationships explored in this model.

The results of this study contribute to the growing literature analyzing the negative effect of highly visual social networks on body image. Another favorable point is that the scale employed for Instagram use is not limited to evaluating the time spent or the frequency the social network is used,

relationships with body satisfaction which have been inconsistent (Fardouly et al., 2018; Kim & Chock, 2015), but other behaviors focused on appearance (looking at photographs, publishing comments or photographs, etc.) which are really those which have been related to negative body image the most (Cohen et al., 2017; Holland & Tiggemann, 2016). Furthermore, most studies have focused on samples of women (Cohen et al., 2017; Fardouly et al., 2017; Fardouly et al., 2018; Hendrickse et al., 2017), whereas this study contributes an important finding to the literature in that DC appears equally in men and women who make use of Instagram when they tend to compare themselves with others, have difficulties regulating their emotions, and show biased beliefs about whether others could be laughing at them or teasing them because of their imperfections.

This study has important clinical implications because of the relationships found which predict the appearance of DC. Since this clinical problem starts being common in adolescence (Bjornsson et al., 2013) and coincides with beginning to use Instagram (Statista, 2020a), schools should have social media literacy programs that promote a capacity for being critical of idealized and edited images in the social networks (McLean, Paxton, & Wertheim, 2013). These programs should also specifically show other contents offered by Instagram, such as photographs and videos of travel, music, crafts, news, movies, etc., so that use of this social network goes beyond consumption of contents focused exclusively on physical appearance. It would also be favorable to publicize accounts of influencers who promote wider diversity of body and physical characteristics such as "body positivity" trends. The goal of this movement is based on challenging the ideals of appearance by publishing photographs without makeup or touchup that enable other body characteristics and functionalities to be observed to improve body satisfaction and mood (Cohen, Fardouly, Newton-John, & Slater, 2019).

In conclusion, with the model presented in this study, it is suggested that DC is related to intense Instagram activity which is associated with frequent appearance-related comparisons in the belief that they could be laughed at by others because of their defects or imperfections and difficulty in regulating emotional experiences activated by contents related to physical appearance. This model provides a relationship between Instagram use and DC which has as yet not been explored. Focusing on DC may itself be useful in prevention before pathologies such as BDD or Eating Disorder develop.

References

- American Psychiatric Association APA. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Arlington, VA: American Psychiatric Association.
- Anderson, L. M., Reilly, E. E., Gorrell, S., Schaumberg, K., & Anderson, D. A. (2016). Gender-based differential item function for the difficulties in emotion regulation scale. *Personality and Individual Differences, 92*, 87–91. <http://dx.doi.org/10.1016/j.paid.2015.12.016>
- Bjornsson, A. A. S., Didie, E. E. R., Grant, J. E. J., Menard, W., Stalker, E., & Phillips, K. A. (2013). Age at onset and clinical correlates in body dysmorphic disorder. *Comprehensive Psychiatry, 54*, 893–903. <http://dx.doi.org/10.1016/j.comppsy.2013.03.019>
- Buhlmann, U., Wacker, R., & Dziobek, I. (2015). Inferring other people's states of mind: Comparison across social anxiety, body dysmorphic, and obsessive-compulsive disorders. *Journal of Anxiety Disorders, 34*, 107–113. <http://dx.doi.org/10.1016/j.janxdis.2015.06.003>
- Callaghan, G. M., Duenas, J. A., Nadeau, S. E., Darrow, S. M., Van der Merwe, J., & Misko, J. (2012). An empirical model of body image disturbance using behavioral principles found in Functional Analytic Psychotherapy and Acceptance and Commitment Therapy. *International Journal of Behavioral Consultation and Therapy, 7*, 16–24. <http://dx.doi.org/10.1037/h0100932>
- Cohen, R., Fardouly, J., Newton-John, T., & Slater, A. (2019). #BoPo on Instagram: An experimental investigation of the effects of viewing body positive content on young women's mood and body image. *New Media & Society, 21*, 1546–1564. <http://dx.doi.org/10.1177/1461444819826530>
- Cohen, R., Newton-John, T., & Slater, A. (2017). The relationship between Facebook and Instagram appearance-focused activities and body image concerns in young women. *Body Image, 23*, 183–187. <http://dx.doi.org/10.1016/j.bodyim.2017.10.002>
- De Vries, D. A., Peter, J., de Graaf, H., & Nikken, P. (2016). Adolescents' Social Network Site Use, Peer Appearance-Related Feedback, and Body Dissatisfaction: Testing a Mediation Model. *Journal of Youth and Adolescence, 45*, 211–224. <http://dx.doi.org/10.1007/s10964-015-0266-4>
- Fardouly, J., Diedrichs, P. C., Vartanian, L. R., & Halliwell, E. (2015). Social comparisons on social media: The impact of Facebook on young women's body image concerns and mood. *Body Image, 13*, 38–45. <http://dx.doi.org/10.1016/j.bodyim.2014.12.002>
- Fardouly, J., Pinkus, R. T., & Vartanian, L. R. (2017). The impact of appearance comparisons made through social media, traditional media, and in person in women's everyday lives. *Body Image, 20*, 31–39. <http://dx.doi.org/10.1016/j.bodyim.2016.11.002>
- Fardouly, J., & Vartanian, L. R. (2015). Negative comparisons about one's appearance mediate the relationship between Facebook usage and body image concerns. *Body Image, 12*, 82–88. <http://dx.doi.org/10.1016/j.bodyim.2014.10.004>
- Fardouly, J., & Vartanian, L. R. (2016). Social Media and Body Image Concerns: Current Research and Future Directions. *Current Opinion in Psychology, 9*, 1–5. <http://dx.doi.org/10.1016/j.copsyc.2015.09.005>
- Fardouly, J., Willburger, B. K., & Vartanian, L. R. (2018). Instagram use and young women's body image concerns and self-objectification: Testing mediational pathways. *New Media & Society, 20*, 1380–1395. <http://dx.doi.org/10.1177/1461444817694499>
- Feltman, C. E., & Szymanski, D. M. (2018). Instagram Use and Self-Objectification: The Roles of Internalization, Comparison, Appearance Commentary, and Feminism. *Sex Roles, 78*, 311–324. <http://dx.doi.org/10.1007/s11199-017-0796-1>
- Festinger, L. (1954). A Theory of Social Comparison Processes. *Human Relations, 7*, 117–140. <http://dx.doi.org/10.1177/001872675400700202>
- Gratz, K. L., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment, 26*, 41–54. <http://dx.doi.org/10.1023/B:JOBA.0000007455.08539.94>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A Regression-Based Approach*. New York, NY: The Guilford Press.
- Hendrickse, J., Arpan, L. M., Clayton, R. B., & Ridgway, J. L. (2017). Instagram and college women's body image: Investigating the roles of appearance-related comparisons and intrasex-

- ual competition. *Computers in Human Behavior*, 74, 92–100. <http://dx.doi.org/10.1016/j.chb.2017.04.027>
- Hervás, G., & Jódar, R. (2008). Adaptación al castellano de la Escala de Dificultades en la Regulación Emocional. *Clínica y Salud*, 19, 139–156.
- Holland, G., & Tiggemann, M. (2016). A systematic review of the impact of the use of social networking sites on body image and disordered eating outcomes. *Body Image*, 17, 100–110. <http://dx.doi.org/10.1016/j.bodyim.2016.02.008>
- Hollingshead, A. A. (1975). *Five Factor Index of Social Position*. New Haven, CT: Yale University.
- Hormes, J. M., Kearns, B., & Timko, C. A. (2014). Craving Facebook? Behavioral addiction to online social networking and its association with emotion regulation deficits: Online social networking addiction. *Addiction*, 109, 2079–2088. <http://dx.doi.org/10.1111/add.12713>
- Instagram by the Numbers: Stats, Demographics & Fun Facts. (2020, February 10). *Omnicores*. Retrieved from <https://www.omnicoreagency.com/instagram-statistics/>.
- Kim, J. W., & Chock, T. M. (2015). Body image 2.0: Associations between social grooming on Facebook and body image concerns. *Computers in Human Behavior*, 48, 331–339. <http://dx.doi.org/10.1016/j.chb.2015.01.009>
- Lavell, C. H., Webb, H. J., Zimmer-Gembeck, M. J., & Farrell, L. J. (2018). A prospective study of adolescents' body dysmorphic symptoms: Peer victimization and the direct and protective roles of emotion regulation and mindfulness. *Body Image*, 24, 17–25. <http://dx.doi.org/10.1016/j.bodyim.2017.11.006>
- Lenzenweger, M. F., Bennett, M. E., & Lilienfeld, L. R. (1997). The referential thinking scale as a measure of schizotypy: Scale development and initial construct validation. *Psychological Assessment*, 9, 452–463. <http://dx.doi.org/10.1037/1040-3590.9.4.452>
- Manago, A. M., Ward, L. M., Lemm, K. M., Reed, L., & Seabrook, R. (2015). Facebook Involvement, Objectified Body Consciousness, Body Shame, and Sexual Assertiveness in College Women and Men. *Sex Roles*, 72, 1–14. <http://dx.doi.org/10.1007/s11199-014-0441-1>
- Marino, C., Caselli, G., Lenzi, M., Monaci, M. G., Vieno, A., Nikčević, A. V., & Spada, M. M. (2019). Emotion Regulation and Desire Thinking as Predictors of Problematic Facebook Use. *Psychiatric Quarterly*, 90, 405–411. <http://dx.doi.org/10.1007/s1126-019-09628-1>
- McLean, S. A., Paxton, S. J., & Wertheim, E. H. (2013). Mediators of the relationship between media literacy and body dissatisfaction in early adolescent girls: Implications for prevention. *Body Image*, 10, 282–289. <http://dx.doi.org/10.1016/j.bodyim.2013.01.009>
- Mohajerin, B., Bakhtiyar, M., Olesnycky, O. S., Dolatshahi, B., & Motabi, F. (2019). Application of a transdiagnostic treatment for emotional disorders to body dysmorphic disorder: A randomized controlled trial. *Journal of Affective Disorders*, 245, 637–644. <http://dx.doi.org/10.1016/j.jad.2018.11.058>
- Muniz, J., Elosua, P., & Hambleton, R. K. (2013). Directrices para la traducción y adaptación de los tests: segunda edición. *Psicothema*, 25, 151–157. <http://dx.doi.org/10.7334/psicothema2013.24>
- Neziroglu, F., Khemlani-Patel, S., & Veale, D. (2008). Social learning theory and cognitive behavioral models of body dysmorphic disorder. *Body Image*, 5, 28–38. <http://dx.doi.org/10.1016/j.bodyim.2008.01.002>
- Oosthuizen, P., Lambert, T., & Castle, D. J. (1998). Dysmorphic concern: Prevalence and associations with clinical variables. *Australian and New Zealand Journal of Psychiatry*, 32, 129–132. <http://dx.doi.org/10.1046/j.1440-1614.1998.00377.x>
- Pascual-Vera, B., Akin, B., Belloch, A., Bottesi, G., Clark, D. A., Doron, G., Fernández-Alvarez, H., Ghisi, M., Gómez, B., Inozu, M., Jiménez-Ros, A., Moulding, R., Ruiz, M. A., Shams, G., & Sica, C. (2019). The cross-cultural expression and transdiagnostic nature of unwanted mental intrusions. *International Journal of Clinical and Health Psychology*, 19, 85–96. <http://dx.doi.org/10.1016/j.ijchp.2019.02.005>
- Pascual-Vera, B., & Belloch, A. (2018). Functional links of obsessive, dysmorphic, hypochondriac, and eating-disorders related mental intrusions. *International Journal of Clinical and Health Psychology*, 18, 43–51. <http://dx.doi.org/10.1016/j.ijchp.2017.09.001>
- Peñas-Lledó, E., Vaz Leal, F. J., & Waller, G. (2002). Excessive exercise in anorexia nervosa and bulimia nervosa: Relation to eating characteristics and general psychopathology: Excessive Exercise. *International Journal of Eating Disorders*, 31, 370–375. <http://dx.doi.org/10.1002/eat.10042>
- Phillips, K. A. (2004). Psychosis in body dysmorphic disorder. *Journal of Psychiatric Research*, 38, 63–72. [http://dx.doi.org/10.1016/S0022-3956\(03\)00098-0](http://dx.doi.org/10.1016/S0022-3956(03)00098-0)
- Rodríguez-Testal, J. F., Bendala-Rodríguez, P., Perona-Garcelán, S., & Senín-Calderón, C. (2019). Examining the structure of ideas of reference in clinical and community samples. *Comprehensive Psychiatry*, 93, 48–55. <http://dx.doi.org/10.1016/j.comppsy.2019.06.006>
- Ryding, F. C., & Kuss, D. J. (2019). The use of social networking sites, body image dissatisfaction, and body dysmorphic disorder: A systematic review of psychological research. *Psychology of Popular Media Culture*, <http://dx.doi.org/10.1037/ppm0000264>. Advance online publication
- Schaefer, L. M., & Thompson, J. K. (2014). The development and validation of the Physical Appearance Comparison Scale-Revised (PACS-R). *Eating Behaviors*, 15, 209–217. <http://dx.doi.org/10.1016/j.eatbeh.2014.01.001>
- Senín-Calderón, C., Gálvez-González, J., Perona-Garcelán, S., Camacho, C., & Rodríguez-Testal, J. F. (2019). Dysmorphic concern and behavioural impairment related to body image in adolescents. *International Journal of Psychology*, <http://dx.doi.org/10.1002/ijop.12646>. Advance online publication
- Senín-Calderón, C., & Rodríguez-Testal, J. F. (2019). Validation of the physical appearance comparison scale-revised (PACS-R) in a Spanish population. *European Psychiatry*, 56S, s162.
- Senín-Calderón, C., & Rodríguez-Testal, J. F. (2020). *Adaptation and validation of the Spanish version of the Instagram Use Scale Manuscript in preparation.*
- Senín-Calderón, C., Rodríguez-Testal, J. F., Perona-Garcelán, S., & Perpiñá, C. (2017). Body image and adolescence: A behavioral impairment model. *Psychiatry Research*, 248, 121–126. <http://dx.doi.org/10.1016/j.psychres.2016.12.003>
- Senín-Calderón, C., Valdés-Díaz, M., Benítez-Hernández, M. M., Núñez-Gaitán, M. C., Perona-Garcelán, S., Martínez-Cervantes, R., & Rodríguez-Testal, J. F. (2017). Validation of Spanish language evaluation instruments for body dysmorphic disorder and the dysmorphic concern construct. *Frontiers in Psychology*, 8 <http://dx.doi.org/10.3389/fpsyg.2017.01107>
- Statista. (2020a, February 14). *Distribution of Instagram users worldwide as of January 2020, by age group*. Retrieved from <https://www.statista.com/statistics/325587/instagram-global-age-group/>.
- Statista. (2020b, February 14). *Distribution of Instagram users worldwide as of January 2020, by gender*. Retrieved from <https://www.statista.com/statistics/802776/distribution-of-users-on-instagram-worldwide-gender/>.
- Svaldi, J., Griepenstroh, J., Tuschen-Caffier, B., & Ehring, T. (2012). Emotion regulation deficits in eating disorders: A marker of eating pathology or general psychopathology? *Psychiatry Research*, 197, 103–111. <http://dx.doi.org/10.1016/j.psychres.2011.11.009>
- Vartanian, L. R., & Dey, S. (2013). Self-concept clarity, thin-ideal internalization, and appearance-related social comparison as

- predictors of body dissatisfaction. *Body Image*, 10, 495–500. <http://dx.doi.org/10.1016/j.bodyim.2013.05.004>
- Wilson, A. C., Wilhelm, S., & Hartmann, A. S. (2014). Experiential avoidance in body dysmorphic disorder. *Body Image*, 11, 380–383. <http://dx.doi.org/10.1016/j.bodyim.2014.06.006>
- World Health Organization. Body dysmorphic disorder [ICD 11th Revision]. 2019. (Accessed 2 December 2019). <https://icd.who.int/browse11/l-m/en#/http%3a%2f%2fid.who.int%2fcd%2fentity%2f731724655>.