THE LINK BETWEEN PROBLEMATIC INSTAGRAM USE AND BODY-IMAGE INVESTMENT DIMENSIONS: THE MEDIATING ROLE OF SOCIAL COMPARISON ON INSTAGRAM AND THE NEED TO CONCEAL BODY FLAWS

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Abstract

Objective: The negative effects of Problematic Instagram Use (PIU) on self-evaluations of one's appearance (i.e., body-image satisfaction-dissatisfaction) are well-known, whereas less explored is its role on body-image investment dimensions. By adopting the Social Comparison and the Self-discrepancies theories as the framework, the present study hypothesized that PIU negatively affects body investment and appearance management behaviours through the serial mediating role of actual appearance comparison on Instagram (IG) and the need to conceal body flaws. Gender, age and trait appearance comparison were controlled for.

Method: A convenience sample of 323 participants (F = 70.3%; M_{age} = 28.92 + 10.96) was recruited, and well-known self-report measures were administered online.

Results: The structural model produced good fit indices [$\chi 2/df$ = 2.36, RMSEA = 0.065 (0.053 - 0.077), CFI = 0.962, SRMR = 0.038], and the variables accounted for 79% and 32% of the variance in body investment and appearance management behaviours, respectively. PIU was associated with body investment both directly and indirectly, whereas it affected appearance management behaviours only via appearance comparison on Ig. The tested alternative model has a poorer fit than the hypothesized model, and the former fitted significantly worse than the proposed one.

Conclusions: The present study represents a step toward a better understanding of the psychological mechanisms underlying the link between PIU and body image investment dimensions.

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Introduction

Instagram (Ig) is one of the most widely used social media platform with 1.35 billion monthly active users, making up over 28 percent of the world's Internet users (Statista, 2023). As is well-known, Ig is a photo-sharing social networking service that enables users to take pictures and enhance them with filtering and editing tools and broadcast live streams. For such unique features, it has been suggested that Ig use may become "problematic" because of the urge to share photos and videos, check the number of likes and comments for them (Balakrishnan & Griffiths, 2018), and/or excessively checking others' profiles (Mateo, 2014). Problematic Instagram use (PIU) has been defined as the excessive and impulsive use of Instagram which in turn leads to negative consequences for one's life

(see Kircaburun & Griffiths, 2018), and the present study will adopt this expression for the sake of consistency with previous studies in the field. Yet, it is noteworthy to say that since the end of the last century, it has been highlighted that the Internet represents an ideal environment for the expression and potential fulfillment of specific needs (see Caplan, 2002; Davis, 2001). The underlying perspective is that when it comes to Internet uses, "the use of the term "problematic" may enhance our ability to better understand the numerous transformative phenomena, both normal and pathological, that the Internet continues to contribute to in our lives" (Schimmenti, 2023, p. 471). In particular, it has been suggested that excessive/problematic use of Internet services should be understood by adopting a motivational perspective that centers on the role that online behaviors may play for a particular individual

(Schimmenti, 2023).

It has been suggested that PIU leads to various negative psychological health outcomes. Whereas some studies have shown the detrimental effect of high engagement in Ig use on occupational and/or educational responsibilities (Foroughi et al., 2022), social anxiety (Foroughi et al., 2022; Yurdagül et al., 2021), loneliness and dissatisfaction with life (e.g., Rogowska & Libera, 2022), the vast majority of studies have focused on its link with body image-related variables due to Ig image-driven nature. Ekinci and Akat (2023) revealed that PIU predicts social appearance anxiety in research carried out on 508 high school students. Yurdagül et al. (2021) found that PIU was indirectly associated with general and social anxiety via body dissatisfaction among female adolescents. Results of this study indicate that PIU has different negative psychological effects on male and female adolescents and that body dissatisfaction appears to be one explanatory factor only among females. The effect of PIU on body image dimensions among females has also been confirmed by a recent study which involved a mixed sample of 234 community women and 152 women diagnosed with eating disorders. In this study, PIU predicted psychological investment in physical appearance, which in turn predicted ED psychopathology and interpersonal difficulties via body uneasiness (Fioravanti, Cassioli et al., 2023). A similar result was highlighted by a study conducted with young Korean women (Lee, 2022) which showed that PIU is positively associated with a drive for thinness and that this relationship is mediated by body dissatisfaction. Among young women, it has also been shown that PIU is associated with appearance-based rejection sensitivity (Pitiruṭ et al., 2023). Finally, Simon and colleagues (2022) recruited 902 undergraduate students and found that PIU affects body esteem by increasing the worries about physical appearance flaws, even after controlling for the effects of sex. Overall, the evidence provided above suggest that PIU affects body image dimensions, especially among young women.

Theoretical framework of the present study

Social comparison theory is one of the most used theoretical frameworks adopted to explain the link between social media use and negative effects on body image-related variables. Social comparison theory asserts that individuals determine their standing in the world by engaging in upward, downward, and lateral comparisons with others. Since social media can be accessed at any time on electronic devices, those focused on photos sharing – e.g., Instagram – provide the opportunity for numerous appearance-based comparisons (Tiggemann & Miller, 2010). Appearance comparisons, in detail, account for the relationship between social media use and body image dissatisfaction (e.g., Hendrickse et al., 2017; Sherlock & Wagstaff, 2019; Tiggemann & Anderberg, 2020; Tiggemann & Zaccardo, 2015), since upward social comparisons (i.e., comparisons to individuals perceived as superior or better than oneself) are likely to occur due to exposure to images that are often heavily edited and/or filtered. A recent systematic literature review (Fioravanti et al., 2022) has concluded that exposure to idealized images on social media leads to increased body dissatisfaction via state appearance comparison (i.e., engaging in social comparison while viewing images), and this link is moderated by trait appearance comparison (i.e., the relatively stable general tendency to engage in social comparison). In other words, body satisfaction may

be negatively impacted by a heightened awareness of one's own bodily flaws because of the comparison with idealized body images in one's social media feed, especially among individuals who generally use their physical appearance to evaluate themselves against unrealistic cultural ideals.

Since appearance comparison on Ig is supposed to increase body dissatisfaction via the internalization of physical attractiveness standard and subsequent increased awareness of one's flaws, it has also suggested that this constant comparison with idealized images might cause an increase in physical appearance perfectionism (Simon et al., 2022). The constant exposure to idealized images might contribute to a push towards a self-presentational style wherein individuals attempt to defensively conceal their perceived flaws from others. There are, at present, several empirical studies suggesting a link between perfectionistic self-presentation and body dissatisfaction (Penkal & Kurdek, 2007; Rudiger et al., 2007; Sherry et al., 2009), and the mediating effect of physical appearance perfectionism in the relationship between PIU and body esteem was also highlighted (Simon et al., 2022). Yet, to the best of our knowledge, only one study provided initial evidence that appearance comparison is related to both physical appearance perfectionism and body esteem (Yang et al., 2017). Moreover, when it comes to the effects of PIU on body image, scientific attention has been focused on body satisfaction and/or body esteem, and less is known of the consequences of PIU via social comparison on other body-image related variables. However, research (e.g., Argyrides, 2013; Rousseau et al., 2017) has shown that comparisons with media appearance ideals and/or internalization of the proposed ideal significantly relate not only to body dissatisfaction but also to increased psychological investment in one's own appearance (henceforth named body investment) and the degree to which one attends to and manages it (henceforth named appearance management behaviours). This is consistent with the Self-discrepancy theory (Higgins, 1987), which suggests that humans are motivated to act to reduce the eventual discrepancy between the perception of themselves (i.e., their actual self) and the perception of who they want to be (i.e., their ideal self). In our view, the Social comparison theory leads us to suppose that Instagram use might facilitate appearance-social comparison, and the Self-discrepancy theory suggests that, since comparisons on Ig are mainly made with idealized images, they are expected to result in a discrepancy between one's perception of how the body looks and how one wants to look thereby increasing the need to conceal one's perceived bodily flaws. This constant exposure to idealized images and the consequent need to present a perfect body should, in turn, increase body investment and appearance management behaviours to reduce the perceived discrepancy between actual and ideal self (i.e., behaviours done to enhance one's physical appearance).

Aims

Since Instagram images are often maximized via digital image editing, we hypothesized that individuals who compulsively use Instagram are at risk owing to an increased tendency to compare their physical appearance, even after controlling for trait general tendency to engage in social comparison. We then hypothesize that appearance comparison on Ig will cause an increase in the need to hide one's own imperfections and present one's own body as perfect

because the internalization of unrealistic standards leads to discrepancies between the actual self and the ideal self. Previous evidence suggests that the research on the link between PIU and body image should extend beyond body satisfaction to the whole front of body-image dimensions to which Instagram use might be associated to gain a comprehensive understanding of this link. We hypothesize that the need to hide one's own imperfections and present one's own body as perfect will, in turn, affect body investment and the importance of looking attractive through grooming behaviours (i.e., appearance management behaviours). In other words, the present study tested a serial mediation model, whereby it was hypothesized that appearance comparison on Ig (i.e., state appearance comparison) and the need to conceal one's own body imperfections would be serial mediators of the relationship between PIU and both appearance investment and appearance management behaviours, after controlling for trait appearance comparison (**figure 1**). Since gender differences in the link between PIU and body-image related variables have been often highlighted (e.g., Yurdagül et al., 2021) we will also control for the effect of sex. Moreover, since PIU is more widespread among young people (e.g., Kircaburun & Griffiths, 2018), and the importance of body appearance tends to decrease as individuals age (Tiggemann, 2004), we also controlled for age in the model.

Methods

Participants

Participant recruitment was conducted online in the Spring of 2023 by sharing the questionnaire link in various online communities and groups. Three-hundred and fifty-eight individuals were recruited (F = 69.3%; M_{age} = 29.97 $\pm$ 12.05). Thirty-five individuals reported they do not use Instagram and consequently were not included in the analyses. The final sample comprised 323 individuals (F = 70.3%; M_{age} = 28.92 $\pm$ 10.96). The majority of the sample (98.80%) self-reported as Caucasian. Participants were informed that participation was voluntary and anonymous, and written consent was obtained by each participant. No payments were made for participation. The study protocol was approved by the institutional review board.

Measures

The Physical Appearance Comparison Scale (PACS; Thompson et al., 1991). The PACS was used to measure the trait tendency to compare one's overall appearance with that of others (e.g., "At parties or other social events, I compare my physical appearance to the physical appearance of others"). This five-item scale asks participants to indicate the frequency with which they engage in five behaviours involving comparison with others in social settings on a five-point Likert scale from 1 (never) to 5 (always). Higher PACS scores indicate a higher frequency of social comparisons in the appearance domain. The internal consistency for the current sample, as indicated by Cronbach's alpha, was α = .64.

Instagram use. First, participants were asked to report the average amount of time they actively use Instagram in minutes/hours in a typical day (1=less than 30 min, 2=31-60 min, 3=1–2 h, 4=2-3 h, 5=3-4 h, 6=more than four hours). Second, typical Instagram use was measured with one question "Which is your more typical Instagram use?" on a dichotomous response format (i.e., "I use Instagram mainly to share photos and videos" versus "I use Instagram mainly to check other people's profiles"). Finally, motivations for Instagram use were assessed through the question "Which is your main driving motivation for using Instagram?" with the following single-choice format based on previous studies (Romero Saletti et al., 2022): "I use Instagram to distract and relax", "I use Instagram to stay connected with others", "I use Instagram to preserve good memories of past moments", "I use Instagram to show my creative skills to others", and "I use Instagram to post photos of myself and get likes".

Problematic Instagram Use. Problematic Instagram Use was assessed using the Italian version (Monacis et al., 2017) of a modified version of the unidimensional Bergen Facebook Addiction Scale (Andreassen et al., 2012). In the present study, we replace the word 'Facebook' with 'Instagram' as in previous studies (e.g., Yurdagül et al., 2021). This scale comprises six items (e.g., "How often in the past year have you become upset or troubled if you have been prohibited from using Instagram?") on a 5-point Likert scale from "very rarely" to "very often" that assess six components of addiction (i.e., salience, conflict, withdrawal, mood modification, tolerance, and relapse;

Figure 1. *The proposed model*
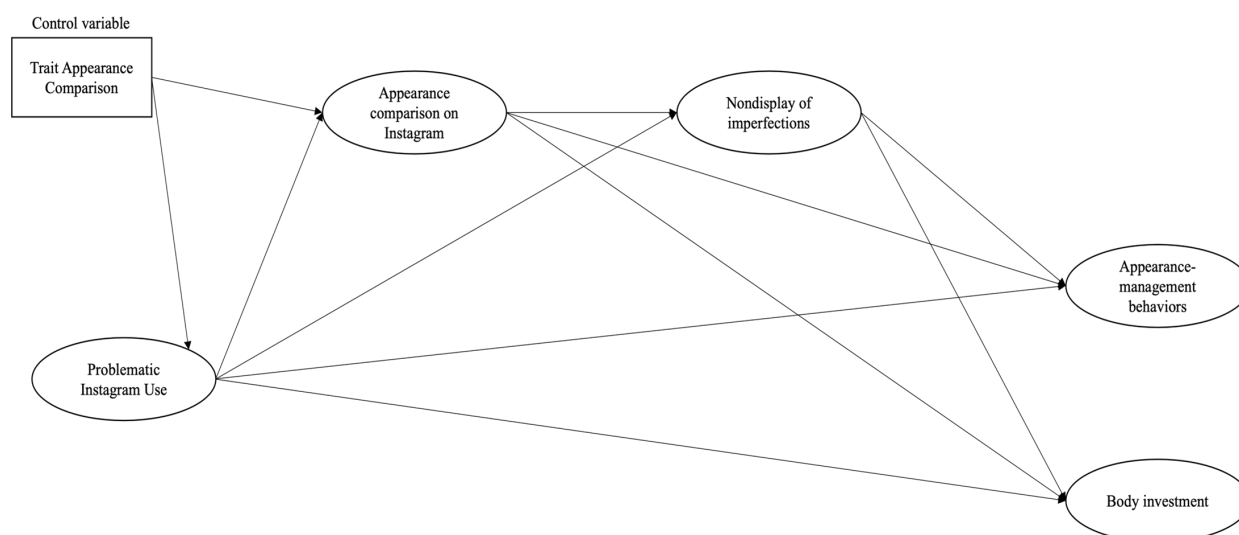
Griffiths 2005). The internal consistency coefficient was also high in the present study (Cronbach's α = .78; McDonald's Omega =.78).

The State Appearance Comparison Scale (SACS; Tiggemann & McGill's, 2004). The Italian version (Fioravanti, Svicher et al., 2023) of the SACS was used to assess participants' level of appearance comparison when viewing Instagram. This short self-report is composed by three items assessing the amount of actual appearance processing and comparison in which participants engaged. Using 7-point Likert scales, participants rated the extent to which they thought about their appearance when viewing Instagram (1= no thought about my appearance, 7 = a lot of thought). The internal consistency was good in the present study (Cronbach's α = .89; McDonald's Omega =.89).

Appearance-based self-schema (Cash, 2009). The Italian version of the Appearance Schemas Inventory-Revised (Casale et al., 2021) was used to assess body investment and appearance management behaviours. The former was assessed through the Self-Evaluative Salience subscale, which assesses the degree to which one bases his or her perceived social worth and sense of self on physical appearance (a sample item is "My physical appearance has had little influence on my life"). Appearance management behaviours were assessed through the Motivational salience subscale, which refers to the degree to which individuals attend to and manage their appearances (a sample item is "Before going out, I make sure that I look as good as I possibly can"). The internal consistency of these two scales was good in the present study (Cronbach's α = .85 and McDonald's Omega = .85; Cronbach's α = .79 and McDonald's Omega =.79, respectively).

Perfectionistic Self-Presentation Scale – Body Image (PCPS-BI; Ferreira et al., 2018). The subscale concealment of body imperfections scale was used to assess the need to present a perfect body image to others by displaying a flawless physical appearance and by concealing perceived imperfections in a public context. A sample item is "It is very important for me that others do not see my body defects". The internal consistency was good in the present study (Cronbach's α = .95; McDonald's Omega =.95)

The Italian versions of the PACS and the PCPS-BI were obtained using a back-translation method in which one bilingual translator translated the test in Italian and a second translator translated the new version of the test back to the source language (i.e., English). The original versions were compared with the back-translated versions and judgments were made about their equivalence.

Data analyses

Descriptive statistics and bivariate correlations between the study variables were calculated. The normal distribution of each variable was investigated using the accepted ranges of ± 2 for skewness and kurtosis (George & Mallery, 2021). Gender differences were preliminary investigated through a series of univariate analyses of variance (ANOVA), in order to confirm that sex should have been controlled for (Yurdagül et al., 2021). Structural Equation Modeling (SEM) was performed using the lavaan package (Rosseel, 2012) for the R statistical software (version 4.2.0) with the Maximum Likelihood (ML) estimation method. All variables were modelled as latent variables except for the control variable (i.e., Physical Appearance Comparison), which were modelled as an observed

variable. The item-parcelling method was used to develop the indicators of the latent variables (Little et al., 2002). Parcels were created using an empirically equivalent method, which ensures that each parcel had equal means, variances, and reliabilities (Landis et al., 2000). To evaluate the model's goodness of fit, we used and relied on robust estimations of the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI), and the Standardized Root Mean Square Residual (SRMR). Values ≤ 0.08 for RMSEA, ≥ 0.95 for CFI and ≤ 0.08 for SRMR were considered indicative of a good model fit (Hu & Bentler, 1999). Furthermore, the χ^2 test was reported and, since it is sensitive to sample size, we relied on the χ^2/df value ratio which must be less than three to indicate a reasonable fit (Kline, 2011). The indirect effects were tested using the bootstrapping method with 5,000 bootstrap samples (MacKinnon et al., 2004), and CIs that did not include zero was indicative of statistically significant mediation effects (Shrout & Bolger, 2002).

Finally, when using structural equation modelling it is appropriate that the investigations of predicted models include comparison to hypothesized alternative equivalent models (Kline, 2011). Therefore, we tested an alternative model in which the appearance comparison on Instagram and the tendency to non-display imperfections were the predictors and the problematic Instagram use the outcome. Self-Evaluative Salience and Motivational Salience were considered parallel mediators. The fits of the hypothesized theoretical model and the alternative model were then compared, and this allows us to argue that one model is more plausible than the other, rather than just preferring one model over the other.

Results

There were no missing data since all survey fields were required. Almost all the participants were Italian (98.80%). The vast majority of the participants had a middle or high educational level, with 35.90% having a high school diploma and 60.30% a bachelor's degree or higher. Furthermore, 39.30% of the participants were workers, 38.70% students, 17.00% working students, 2.80% unemployed, 1.20% retired, and 0.90% housewife/househusband. With regard to relationship status, 84.50% of participants were unmarried, 11.80% were married, 3.40% were divorced or legally separated, and 0.30% widowed.

Regarding the use of Instagram by participants, 46.4% of the sample spent more than 1 hour per day on Ig. When it comes to motives, 66.90% declared that they use Instagram as a form of distraction and to relax, 19.20% to stay connected with others, 8% for the chance to preserve good memories of past moments, 4.60% for the ability to show their creative skills to others, and the remaining 1.20% for the ability to post photos of themselves and get likes. Regarding the type of use, 83.6% of the sample declared that they use Instagram mainly to share photos and videos (i.e., active users), whereas 16.4% mainly to check other people's profiles (i.e., passive users). We did not find significant differences between active and passive users on the study variables (Trait appearance comparison: M =14.00 ± 3.64 and M=13.79 ± 4.06 respectively, $F_{(1,321)}$ = 0.138, p = 0.71; State appearance comparison: M = 9.81 ± 4.96 and M = 11.21 ± 5.28 respectively, $F_{(1,321)}$ = 3.46, p = 0.064; Self-evaluative Salience: M = 36.47 ± 8.71 and M = 37.81 ± 8.42 respectively, $F_{(1,321)}$ = 1.07, p = 0.30; Non display of body imperfections: M

= 43.77 $\pm$ 18.88 and M = 43.06 $\pm$ 19.62, $F_{(1,321)}$ = 0.06, p = 0.80; PIU: M = 11.73 $\pm$ 4.78 and M = 12.67 $\pm$ 4.67 respectively, $F_{(1,321)}$ = 0.38, p = 0.54).

Table 1 shows the descriptive statistics and bivariate correlations among the study variables. Significant low-to-moderate correlations in the expected direction were found. Significant gender differences were found with men reporting lower levels than women in all the study variables (Trait Appearance Comparison: M = 13.07 $\pm$ 3.84 and M = 14.34 $\pm$ 3.59, $F_{(1,321)}$ = 8.10 respectively, p <.05, η^2 = .025; Problematic Instagram Use: M = 10.94 $\pm$ 4.51 and 12.17 $\pm$ 4.83 respectively, $F_{(1,321)}$ = 4.56, p = .003, η^2 = .014; Appearance Comparison on Instagram: M = 8.30 $\pm$ 4.22 and M = 10.77 $\pm$ 5.17 respectively, $F_{(1,321)}$ = 17.06, p <.001, η^2 = .050; Non display of body imperfections: M = 35.59 $\pm$ 16.19 and M = 47.06 $\pm$ 19.03 respectively, $F_{(1,321)}$ = 26.66, p <.001, η^2 = .077; Appearance Management Behaviors: M = 25.59 $\pm$ 5.81 and M = 27.81 $\pm$ 5.24 respectively, $F_{(1,321)}$ = 11.36, p <.001, η^2 = .034; Body investment: M = 33.48 $\pm$ 7.80 and M = 38.04 $\pm$ 8.67

respectively, $F_{(1,321)}$ = 19.83, p <.001, η^2 = .058).

Since age correlated significantly with all the study variables – except with non-display of imperfection – and gender differences were found, the statistical model has been adjusted for both age and gender. The proposed structural model produced good fit indices [χ^2 = 193.462, df = 82, p < .001; χ^2/df = 2.36; RMSEA = 0.065 (90% C.I. = 0.053 - 0.077), CFI = 0.96, SRMR = 0.04]. The variables in the model accounted for 79% and 32% of the variance in self-evaluative salience (i.e., appearance investment) and motivational salience (i.e., appearance management behaviours), respectively, controlling for age and gender. Age negatively predicted PIU (β = -.31, p < .001), appearance comparison on Ig (β = -.17, p < .05) and non-display of imperfections (β = .11, p < .05), whereas gender (F = 0; M = 1) negatively predicted appearance comparison on Instagram (β = -.16, p < .05) and non-display of imperfections (β = -.11, p < .05). The standardized estimates are shown in **figure 2**, and all indirect effects are in **table 2**. PIU is

Table 1. *Descriptive statistics and bivariate correlations for all variables*

Variables	M	DS	Skewness	Kurtosis	1	2	3	4	5	6	7
1. Age	28.92	10.96	-	-	-						
2. Trait Appearance Comparison	13.97	3.71	-0.094	-0.214	-.15*	-					
3. Problematic Instagram Use	11.80	4.76	0.748	-0.121	-.31*	.38*	-				
4. Appearance Comparison on Instagram	10.04	5.03	0.237	-1.043	-.30*	.54*	.40*	-			
5. Nondisplay of imperfections	43.65	18.95	0.361	-0.692	-.11	.51*	.29*	.59*	-		
6. Appearance-management behaviors	27.15	5.50	-0.293	0.073	-.17*	.33*	.21*	.48*	.39*	-	
7. Body investment	36.69	8.66	0.018	-0.453	-.17*	.56*	.37*	.68*	.73*	.53*	-

Note. * = p < .001

Figure 2. *Effects of PIU on body image controlling for age, gender and trait appearance comparison*
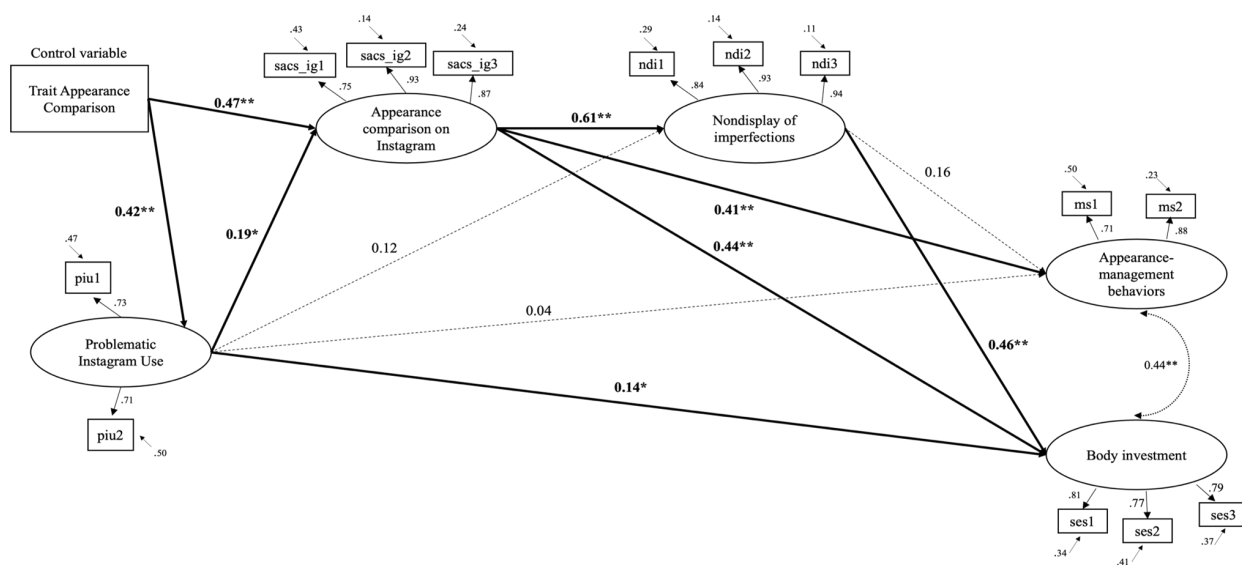
Note. piu1, piu2 = Problematic Instagram Use parcels; sacs_ig1, sacs_ig2, sacs_ig3 = items of the State Appearance Comparison Scale – Instagram form; ndi1, ndi2, ndi3 = Nondisplay of imperfections parcels; ms1, ms2 = Motivational Salience parcels; ses1, ses2, ses3 = Self-Evaluative Salience parcels; * = p < .05; ** = p < .001

Table 2. *Indirect Effects of Problematic Instagram Use on body image dimensions*

	β	95% CI	
		Lower	*Upper*
Problematic Instagram Use → Appearance comparison on Instagram → Nondisplay of imperfections → Appearance-management behaviors	0.02	-0.001	0.047
Problematic Instagram Use→ Appearance comparison on Instagram → Appearance-management behaviors	0.08	0.017	0.167
Problematic Instagram Use → Nondisplay of imperfections → Appearance-management behaviors	0.02	-0.008	0.064
Problematic Instagram Use → Appearance comparison on Instagram → Nondisplay of imperfections → Body investment	0.05	0.023	0.196
Problematic Instagram Use → Appearance comparison on Instagram → Body investment	0.08	0.037	0.308
Problematic Instagram Use → Nondisplay of imperfections → Body investment	0.05	-0.038	0.260

associated with self-evaluative salience both directly and indirectly via the two hypothesized mediators. An effect of PIU on appearance investment only mediated by appearance comparison was also highlighted. PIU affected appearance management behaviours only via appearance comparison on Ig (i.e., we did not find a serial mediation).

The alternative model has a poorer fit than the hypothesized model [χ^2 = 345.476, df = 84, p < .001; χ^2/df = 4.11; RMSEA = 0.098 (90% C.I. = 0.088 - 0.109), CFI = 0.91, SRMR = 0.16], and when the structural models were compared, it fitted significantly worse than the proposed one ($\Delta\chi^2$ = 152.01; Δdf = 2; p <.001). Therefore, the proposed model was confirmed as the most plausible representation of the phenomenon under investigation.

Discussion

Decades of studies have documented the negative effects of exposure to idealized images on body image (Grabe et al., 2008), and the quite robust role of state appearance comparison as a mediator in this link has also been demonstrated through experimental studies (Fioravanti et al., 2022). By positioning itself within this research field, the present study supports the above-mentioned previous evidence and advances it in various respects. The present study confirms the key role of state appearance comparison when it comes to body image distortions since comparing one's own body with others' appearance on Ig was found to mediate the link between Problematic Instagram Use (PIU) and both body investment and appearance management behaviours. We also extended this already well-established result by showing that (*i*) the overuse of this specific online platform (i.e., Instagram) is associated with negative effects on body image; (*ii*) these negative consequences are not limited to the effect on self-evaluations of one's appearance (i.e., body-image satisfaction-dissatisfaction), but rather are extended to body-image investment dimensions; (iii) this effect is significant after controlling for the stable general tendency to engage in social comparison. The latter is an important result in that previous studies concerning the effects of Ig overuse on body image did not control for trait appearance comparison (Ekinci & Akat, 2023; Yurdagül et al., 2021; Simon et al., 2022), which is a fundamental moderator of the link between exposure to idealized image on social media and negative body dissatisfaction (Fioravanti et al., 2022). Non-controlling for trait appearance comparison does not allow us to unravel the unique effect of social media engagement on body image since both state appearance comparison and the negative effects on body image might be due to a general and stable tendency to engage in appearance comparison. Parenthetically, from a theoretical point of view, this result also supports the importance of distinguishing between trait and state appearance comparison (Tiggemann & McGill, 2004).

The present study also contributes to the literature by highlighting that the well-established link between appearance comparison on Ig and body image disturbances is mediated by the need to hide one's own bodily flaws, supporting our hypothesis that the constant exposure to others' idealized bodies might put some individuals in the position to feel the need to avoid appearing imperfect to others. That is, PIU is conducive to a dysfunctional cognitive pattern that focuses attention on physical imperfections and biases perceptions of one's body (and perhaps other people's views of one's body). Specifically, we found that PIU increases appearance comparison on Ig, which plays a role in generating distorted assumptions about the meaning, importance, and influence of one's physical appearance (i.e., body investment) by promoting a defensive self-presentational style involving a strong need to conceal one's own perceived imperfections from others. Overall, this result advises that the effects of PIU are not limited to a reduction of body satisfaction but involves other and more significant body image dimensions. Body investment is a body image component that has more adverse consequences than body dissatisfaction in terms of risk for developing psychiatric symptoms (e.g., Cash, Melnik et al., 2004; Cash, Phillips et al., 2004), poor quality of life and symptoms of eating disorders above and beyond body dissatisfaction (Jakatdar et al., 2006).

Our results also showed that PIU might also exacerbate the behaviours enacted to enhance one's physical appearance. Since appearance comparisons on Ig are supposed to be upward in the direction (Tiggemann & Miller, 2010), the discrepancies between perceptions of one's own body and others' bodies may lead some individuals to place more emphasis on maintaining and enhancing their appearances through grooming behaviours. Interestingly, we failed to find a serial mediation through the need to avoid appearing imperfect. That is, PIU seems to increase the intensity of appearance management behaviours only via the actual amount of comparison on Ig. One possible explanation is that social comparison affects the need to display an attractive physical appearance rather than the concealment of body imperfections (Ferreira et al., 2018).

Overall, we found that PIU is negatively associated with body image, and the comparison of the two models suggests that there is more robust evidence for the role of PIU in predicting body investment and appearance management (via appearance comparison and the need to hide body imperfections) rather than the opposite. Yet, testing an alternative model does not resolve the adoption of a cross-sectional design. Longitudinal studies are needed since it is plausible that a bidirectional or reciprocal effect exists, thus that individuals with body image disturbances and/or appearance comparison tendencies are more at risk of developing PIU, which in turn strengthens negative attitudes towards the body. The present study has other limitations that need to be considered. The data was solely based on self-report questionnaires, which may be subject to social desirability and self-report biases. Most important, we used the modified version of the Bergen Facebook Addiction Scale to assess PIU, which is based on the addiction framework like all the other available measures to assess PIU. Yet, as briefly described, it is risky to equate problematic Internet use with addictive Internet use (Schimmenti, 2023), and future studies should move forward from measures assessing problematic Internet uses as behavioural addictions to measures able to capture the balance between adaptive and maladaptive uses. Second, preliminary Italian versions of the Physical Appearance Comparison Scale (PACS) and the Perfectionistic Self-Presentation Scale – Body Image were used and further testing is necessary to ensure the reliability of these instruments. The PACS, in particular, should undergo careful psychometric testing since the Cronbach's alpha in the present study was low. Finally, the convenience sampling limits the generalizability of the results.

Notwithstanding the above-stated limitations, we found that PIU had an effect on appearance comparison on Ig (which, in turn, predicted the other variables) controlling for trait comparison, which seems to suggest that over-engagement on Ig has a detrimental effect on body image, which is in part independent of the tendency to compare one's own body with other people's appearance. Moreover, the model fits the data well, also considering the influence of age and gender. Future studies may want to consider the potential role of passive and active Instagram use. Active users are exposed to others' photos and videos and positive/negative comments about their body image, while passive users are only exposed to the former. We did not find significant differences in the study variables depending on the main type of use, but this does not imply that the tested model is invariant by type of use. Unfortunately, the sample size of passive users was too small to test the invariance in the present study.

In terms of clinical implications, our results suggest that providing interventions to people with PIU might be important not only for directly targeting the maladaptive use of social networks but also indirectly for preventing perfectionistic tendencies and body image disturbances. Given the well-established role of body image distortions in the development of eating disorders (Jakatdar et al., 2006), providing interventions for people with PIU might also be helpful in reducing the risk of eating disorder symptoms. Yet, when it comes to interventions, clinicians should be informed that PIU may be an expression of pre-existing psychopathology (e.g., social anxiety or depression) or a temporary coping strategy to face everyday problems rather than a primary clinical problem. This implies that, in some cases, PIU may not need to be the primary focus of the intervention. In any case, previous studies

provided preliminary evidence of the role of positive expectancies and metacognitions in problematic Internet uses (e.g., Casale et al., 2020), which is in keeping with the motivational framework (Schimmenti, 2023). In this regard, the concerns regarding people's use of the Internet are contrasted with findings that digital technology brings various opportunities as well. This implies that the use of digital technologies can either support or slow down psychological growth and adjustment, and educational programs should improve a self-determined use of Instagram, which supports psychological growth and well-being while also shielding potential threats (i.e., digital maturity; see Laaber et al., 2023) such as those related to body image disturbances.

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