Instagram Use and Mental Well-Being

The Mediating Role of Social Comparison

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Abstract: Instagram has grown in popularity among young adults and adolescents and is currently the second-favorite social network in the world. Research on its relationship to mental well-being is still relatively small and has yielded contradictory results. This study explores the relationship between time spent on Instagram and depressive symptoms, self-esteem, and disordered eating attitudes in a nonclinical sample of female Instagram users aged 18–35 years. In addition, it explores the mediating role of social comparison. A total of 1172 subjects completed a one-time-only online survey. Three different mediation analyses were performed to test the hypotheses that social comparison on Instagram mediates the association time spent on Instagram with depressive symptoms (model 1), self-esteem (model 2), and disordered eating attitudes (model 3). All three models showed that the relationship between intensity of Instagram use and the respective mental health indicator is completely mediated by the tendency for social comparison on Instagram.

Key Words: Instagram, social comparison, disordered eating attitudes, self-esteem, depressive symptoms

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The introduction and expansion of social network sites in the recent past have altered existing relationships and created new opportunities for social relationships because these platforms are particularly suited for self-presentation and social interaction (Faelens et al., 2021a). More recently, Instagram has gained increasing popularity among young adults and adults; in fact, 18- to 24-year-olds and 25- to 34-year-olds are the most represented age groups among Instagram users (Statista, 2022). Although WhatsApp is still the world's favorite social media platform, Instagram has overtaken Facebook to claim second place in the ranking in the past year. In fact, more than a quarter of a billion new users joined Instagram in 2021, whereas its audience grew by almost 60% during the past 2 years (Kemp, 2022). Instagram uniquely focuses on image-based content and allows users to post photos and videos accompanied by a textual caption. Other users can view and interact with these image-based contents by sharing, liking, or commenting on the post.

Meta-analytic findings indicate a negative association between time spent on social networking sites and psychological mental health and well-being (Huang, 2017), including anxiety and depressive symptoms (Huang, 2017; Keles et al., 2020; Yoon et al., 2019), as well as concerns about body image and disordered eating (Holland and Tiggemann, 2016). In particular, photo-based activities (*i.e.*, posting, viewing, and commenting) are particularly important in the relationship between social networking use and body image/disordered eating (Holland and Tiggemann, 2016). Furthermore, some studies have identified psychological variables that may be involved in the relationship between social networking site use and mental health or well-being, primarily self-presentation, social comparison, and self-esteem (Bij de Vaate et al., 2020; Faelens et al., 2019; Faelens et al., 2021b; Sharma et al., 2022; Wang et al., 2017). However, because Instagram is a rather novel social networking site, it is underrepresented in the reviews and meta-analyses.

The existing research literature on Instagram is still relatively small and shows no conclusive findings. A recent systematic review of Instagram studies shows that most of the research exploring the relationship between the intensity of Instagram use and mental health varies widely depending on the specific mental health domain investigated (Faelens et al., 2021a). Most studies found a small to moderate negative association between Instagram intensity and self-esteem, and small to moderate positive associations with depressive symptoms, social and appearance comparison, negative body image, and disordered eating (Faelens et al., 2021a). Nevertheless, the positive relationship between the intensity of Instagram use and anxiety symptoms is less supported, that with life satisfaction is mixed, and no relationship has been found with happiness (Faelens et al., 2021a). Recent studies indicate that social comparison (*i.e.*, the tendency to make a physical/aesthetic comparison between themselves and others in a social context) mediates the relationships between Instagram use and body image concern or dissatisfaction (Afana et al., 2021; Yapri and Dewi, 2022), as well as depressive symptoms and self-esteem (Sherlock and Wagstaff, 2019). Furthermore, social comparison seems to be associated with abnormal eating habits and concerns about weight (Senín-Calderón et al., 2020).

Lastly, it is important to note that previous studies have found differential effects of sex (Fioravanti et al., 2020). Compared with men, women are more intensive Instagram users (Mackson et al., 2019) and more susceptible to negative effects of social media use (Marino et al., 2018; Orben et al., 2019; Yurdagül et al., 2021). At the same time, it should be noted that compared with men, women show a higher prevalence of eating disorders (Dakanalis et al., 2016; Galmiche et al., 2019), depression (Albert, 2015), and lower levels of self-esteem (McMullin and Cairney, 2004). Furthermore, female body image concerns differ from male body image concerns (Ahern and Hetherington, 2006; Dakanalis et al., 2015; Thompson and Cafri, 2007).

The aforementioned findings suggest the crucial importance of further investigating the psychological variables involved in the relation between Instagram use and mental health and well-being. Therefore, the aims of this study were 1) to explore the associations between time spent on Instagram and a) depressive symptoms, b) self-esteem, and c) disordered eating attitudes in a nonclinical sample of young adult and adult female Instagram users; and 2) to explore the mediating role of social comparison in the relationship between Instagram and these three indicators of mental well-being. Based on previous research, we formulated the following hypotheses:

- There would be no significant direct relationship between the time spent on Instagram and depressive symptoms (hypothesis 1a), but it would be completely mediated by social comparison (hypothesis 1b).

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- There would be no significant direct relationship between the time spent on Instagram and level of self-esteem (hypothesis 2a), but it would be completely mediated by social comparison (hypothesis 2b).
- There would be no significant direct relationship between the time spent on Instagram and level of disordered eating attitudes (hypothesis 3a), but it would be completely mediated by social comparison (hypothesis 3b).

METHODS

Study Design

A cross-sectional online survey was conducted between March 31 and April 20, 2021. The inclusion criteria for participating were being a female Instagram user aged between 14 and 35 years and able to read Italian. Only participants older than 18 years were considered for the statistical analyses ($N = 1172$).

Study Procedure

The study used an online survey tool (Google Forms) to collect data. A convenience sampling method was used to reach potential participants; the third author posted a recruitment invitation on Instagram. Viewers who were interested in participating could click a link directing them to an information statement about the research, and then if they agreed to join the study, they were given access to the full questionnaire.

Survey Instruments

The survey consisted of questions about a) demographic information, b) intensity of Instagram use, c) social comparison, d) depressive symptoms, e) self-esteem, and f) disordered eating attitudes.

Demographic Information

Data on age and sex were collected.

Instagram Intensity Scale

There are currently no standardized scales available to assess Instagram use. The Instagram Intensity Scale (IIS) was adapted for this study based on the Facebook Intensity Scale (Ellison et al., 2007). More specifically, the terms *Facebook* was replaced by *Instagram* and *Facebook friends* with *Instagram followers*. Although the original scale was designed to assess social media use beyond simple frequency and duration measures, integrating emotional connection and its assimilation into everyday life of people, in the present study, only the average daily time of Instagram use has been considered for analysis. In our sample, the IIS Cronbach α was 0.77.

Physical Appearance Comparison Scale

The Physical Appearance Comparison Scale (PACS) (Thompson et al., 1991) was used to assess the general appearance comparison, that is, the tendency to make a physical/aesthetic comparison between themselves and others in a social context. The scale, which was developed for use with women, consists of five statements (*e.g.*, "Comparing your 'looks' to the 'looks' of others is a bad way to determine whether you are attractive or unattractive") rated using a 5-point Likert scale (from 1 "never" to 5 "always"). Higher scores indicate higher levels of comparisons of physical appearance. Three items were adapted for this study by replacing the words "At parties or other social events" or "In social situation" with "On Instagram." In our sample, Cronbach α was 0.66, indicating an acceptable level of reliability.

Center for Epidemiologic Studies Depression Scale

The Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1977) was used to assess depressive symptoms in the past week. The scale consists of 20 items (*e.g.*, "I felt sad") rated using a 4-point Likert scale (from 1 "rarely or none of the time" to 4 "most or all of the time"). Higher scores indicate higher levels of depressive symptoms. In the present study, the CES-D showed a Cronbach α of 0.92.

Rosenberg Self-Esteem Scale

The Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 1965) was used to measure self-esteem, that is, the subject's overall evaluation of self. The scale consists of 10 global statements (*e.g.*, "I take a positive attitude toward myself") rated using a 4-point Likert scale (from 1 "strongly disagree" to 4 "strongly agree"). Five items are reverse scored. Higher scores indicate higher self-esteem. In the present study, the RSES showed a Cronbach α of 0.88.

Eating Attitudes Test

The Eating Attitudes Test (EAT) (Garner et al., 1982) was used to assess abnormal eating habits and concerns about weight. The scale consists of 26 items (*e.g.*, "I am terrified about being overweight") rated using a 6-point Likert scale (from 1 "always" to 6 "never"). Higher scores indicate more disordered eating attitudes. The Cronbach α reliability in our sample was 0.93.

Statistics

All statistical analyses were performed with R version 4.0.2 (R Foundation for Statistical Computing, Vienna, Austria). The Pearson coefficient was used to evaluate the correlations between the IIS, PACS, RSES, EAT, and CES-D questionnaires. The structural equation models (SEMs) function of the lavaan package (Rosseel, 2012) was used to calculate the effect sizes of the pathways. Bootstrapping with resampling at 5000 was used to calculate 95% confidence intervals (CIs).

RESULTS

Characteristics of the Sample

A total of 1172 women completed the survey. The age range of the participants was 18–35 years, and the mean age was 26.3 years (SD = 4.9).

Correlations

Instagram use (IIS) was found to be a) associated with a tendency to compare one's own physical appearance with that of others (PACS) ($r = 0.27$, $p < 0.001$), the level of depressive symptoms (CES-D) ($r = 0.14$, $p < 0.001$), and the presence of disordered eating attitudes (EAT) ($r = 0.14$, $p < 0.001$), and b) negatively correlated with the level of self-esteem (RSES) ($r = -0.09$, $p < 0.01$).

The remaining bivariate Pearson correlation coefficients, as well as the means and SDs of the study variables, are shown in Table 1.

TABLE 1. Means, SDs, and Intercorrelations Among the Variables IIS, PACS, CES-D, RSES, and EAT

	M	*SD*	1	2	3	4	5
1. IIS	3.1	0.7	—	0.271*	0.137*	−0.091**	0.137*
2. PACS	15.2	3.8		—	0.349*	0.292*	0.358*
3. CES-D	23.8	12.4			—	0.577*	0.332*
4. RSES	18.0	6.9				—	−0.303*
5. EAT	10.8	12.4					—

*Correlation is significant at $p < 0.001$ (2-tailed).

**Correlation is significant at $p < 0.01$ (2-tailed).

Mediation Analysis

Three distinct mediation analyses (adjusted for age) were performed to test the hypotheses that social comparison on Instagram mediates the associations between time spent on Instagram and depressive symptomatology (model 1), self-esteem (model 2), and disordered eating attitudes (model 3). Figure 1 displays standardized path coefficients for the SEMs. These three models were saturated (*i.e.*, zero degrees of freedom), and because here all variables were manifest, model fit statistics were not available.

Direct Effect

The intensity of Instagram use (IIS) was directly associated with the tendency to compare one's own physical appearance with that of others (PACS): $\beta = 0.25$, standard error (SE) = 0.16, $p < 0.001$.

Path Model 1

PACS was positively associated with the depressive symptomatology (CES-D): $\beta = 0.33$, SE = 0.09, $p < 0.001$. However, the association between IIS and CES-D was not significant: $\beta = 0.03$, SE = 0.50, $p = 0.333$. The indirect effect was shown to be statistically significant based on the 95% bias-corrected bootstrapping CIs, which do not contain zero: 1.083–1.913.

Path Model 2

PACS was negatively associated with the level of self-esteem (RSES): $\beta = -0.28$, SE = 0.05, $p < 0.001$. IIS, however, was not related to RSES: $\beta = -0.01$, SE = 0.30, $p = 0.812$. The indirect effect was statistically significant based on the 95% bias-corrected bootstrapping CIs: −0.919 to −0.495.

Path Model 3

PACS was positively associated with disordered eating attitudes (EAT): $\beta = 0.34$, SE = 0.10, $p < 0.001$. However, IIS was not related to EAT: $\beta = 0.04$, SE = 0.54, $p = 0.154$. The indirect effect was shown to be statistically significant based on the 95% bias-corrected bootstrapping CIs: 1.126–2.046.

Thus, the relationships between Instagram usage and a) depressive symptoms, b) self-esteem, and c) disordered eating attitudes were completely mediated by the tendency toward appearance comparisons on Instagram. These results confirmed our initial hypotheses.

DISCUSSION

The well-being and mental health status of young adults and adults is a major public health problem (Pitchforth et al., 2019), further complicated by excessive exposure to social media (Rideout et al., 2018) and online gaming activities (Cena et al., 2022a, 2022b). The main goal of this study was to examine the relationships between the amount of exposure to Instagram and self-reported levels of depressive symptoms, self-esteem, and disordered eating attitudes. Moreover, we tested the mediator effect/role of the tendency for appearance comparison.

A first result of our study is the absence of evidence for a direct association between time spent on Instagram and depressive symptoms. This is consistent with previous studies showing no association between intensity of Instagram use and depressive symptomatology (Fardouly et al., 2020; Lowe-Calverley et al., 2019; Vannucci et al., 2019) or major depressive disorder (compared with healthy controls) (Robinson et al., 2019), although some studies found a small to moderate positive association (Donnelly, 2017; Li et al., 2018; Lup et al., 2015; Sherlock and Wagstaff, 2019; Vannucci and McCauley Ohannessian, 2019; Yurdagül et al., 2021).

A direct association was not observed even between personal self-esteem and time spent on Instagram. This is in contrast with most of the research on the topic, which provided some evidence for a small to moderate negative association between Instagram use and self-esteem (Kircaburun and Griffiths, 2018; Martinez-Pecino and Garcia-Gavilán, 2019; Schmuck et al., 2019; Sherlock and Wagstaff, 2019), although some studies did not find any association between these two constructs (Li et al., 2018; Mackson et al., 2019; Stapleton et al., 2017).

Furthermore, no direct association was found between time investment in Instagram and disordered eating attitudes. This is in line with some previous studies (Butkowski et al., 2019; Fardouly et al., 2020), although most of the literature observed a small positive association between the intensity of Instagram use and disordered eating (Griffiths et al., 2018; Stein et al., 2021; Tamplin et al., 2018; Turner and Lefevre, 2017).

Another main finding is that the tendency to appearance comparison on Instagram mediates the relationship between Instagram use and each of the three indicators of mental health considered. This finding is consistent with previous evidence for the (partial) mediating role of social comparison in the association between the intensity of Instagram use and indicators of a) depressive symptoms (Sherlock and Wagstaff, 2019), b) self-esteem (Sherlock and Wagstaff, 2019), and c) disordered eating and body dissatisfaction (Modica, 2020; Sherlock and Wagstaff, 2019; Teo and Collinson, 2019). However, it should be noted that some studies did not find support for the role of social comparison as mediator of self-esteem (Stapleton et al., 2017).

Importantly, our findings suggest that social comparison on Instagram plays a central role in linking Instagram intensity use with depressive symptoms, self-esteem, and eating disordered attitudes. Here, the existence of evidence for a positive link between Instagram use intensity (including the frequency of checking the social media platform) and the tendency to compare yourself with others (Chae, 2018; Stapleton et al., 2017) should be recognized. Probably, by comparing themselves and their own lives with photos, videos, and stories from other persons who are presumed to have more attractive bodies and flawless lives on Instagram, people can create or reinforce the impression that the lives of others are more satisfying, exciting, and/or full. This is consistent with previous studies on Facebook (Appel et al., 2016; Faelens et al., 2019; Faelens et al., 2021a; Faelens et al., 2021b; Verduyn et al., 2017) and Instagram (Faelens et al., 2021a; Faelens et al., 2021b). Overall, our findings may imply that, although Instagram is a medium to express identities and emotions (Waterloo et al., 2018) of young adults, its use may affect psychological well-being in those people who tend to compare themselves with the image of others as posted on Instagram.

Limitations

This investigation has several limitations that must be considered in the interpretation of the results. First, this is a cross-sectional study, and thus it is not possible to infer causality in the results. Second, self-report measures were used to assess all study variables, including the time spent on Instagram, which can be prone to bias. Third, our sample was composed of young adult and adult women, and thus results cannot be generalized to male or sex-nonbinary populations. Fourth, we chose to evaluate only depressive symptoms, self-esteem, and disordered eating attitudes. Future research may broaden the investigation by also assessing different symptoms (*e.g.*, anxiety) and psychological constructs. Lastly, Instagram usage was not adjusted for confounding variables such as race, educational level, and marital and employment status.

CONCLUSIONS

In recent years, the use of Instagram has continued to increase, especially among women. The results of this study indicate the absence of a direct association between the intensity of Instagram use and a) depressive symptoms, b) self-esteem, and c) disordered eating attitudes in female young adults and adults. However, our results highlight that the relationship between Instagram intensity use and each of the three aforementioned mental health indicators is completely mediated by
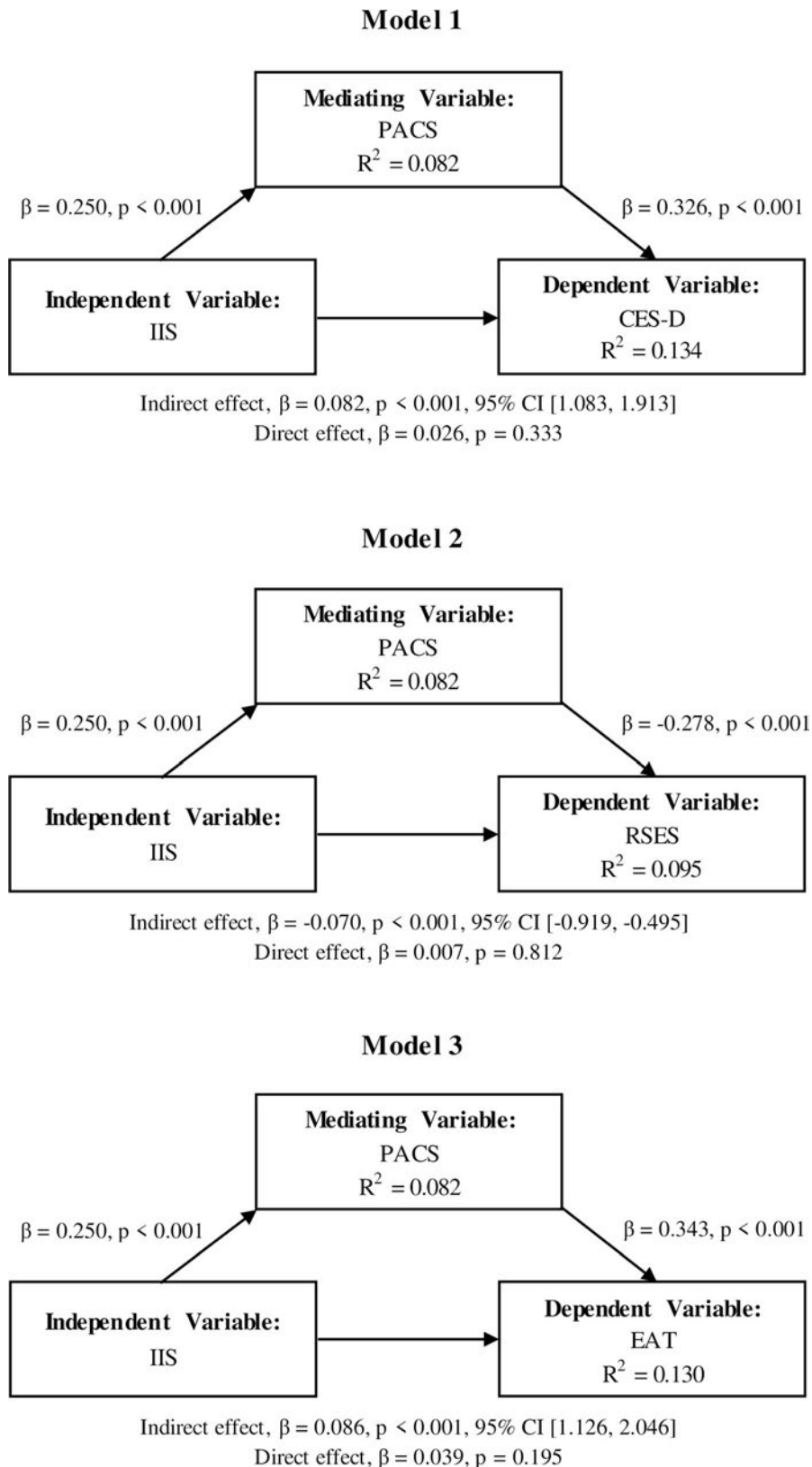
Model 1

Mediating Variable:
PACS
$R^2 = 0.082$

$\beta = 0.250$, $p < 0.001$ $\beta = 0.326$, $p < 0.001$

Independent Variable:
IIS

Dependent Variable:
CES-D
$R^2 = 0.134$

Indirect effect, $\beta = 0.082$, $p < 0.001$, 95% CI [1.083, 1.913]
Direct effect, $\beta = 0.026$, $p = 0.333$

Model 2

Mediating Variable:
PACS
$R^2 = 0.082$

$\beta = 0.250$, $p < 0.001$ $\beta = -0.278$, $p < 0.001$

Independent Variable:
IIS

Dependent Variable:
RSES
$R^2 = 0.095$

Indirect effect, $\beta = -0.070$, $p < 0.001$, 95% CI [-0.919, -0.495]
Direct effect, $\beta = 0.007$, $p = 0.812$

Model 3

Mediating Variable:
PACS
$R^2 = 0.082$

$\beta = 0.250$, $p < 0.001$ $\beta = 0.343$, $p < 0.001$

Independent Variable:
IIS

Dependent Variable:
EAT
$R^2 = 0.130$

Indirect effect, $\beta = 0.086$, $p < 0.001$, 95% CI [1.126, 2.046]
Direct effect, $\beta = 0.039$, $p = 0.195$

FIGURE 1. Path coefficients for models 1, 2, and 3.

the tendency for social comparison on Instagram. It is important that future studies consider the implications of social comparison on Instagram among nonclinical male samples as well as clinical samples. Moreover, longitudinal and experimental research need to evaluate the causal ordering of these relationships.

DISCLOSURES

Ethical Considerations statement: This research is part of a Master's Thesis that has been approved by the Council of the Department of Medicine and Surgery of the University of Milan-Bicocca, Milan, Italy, and was conducted in accordance with the Declaration of Helsinki Ethical Principles.

Author contribution statement: M. M. contributed to the study design. A. S. and A. D. ran the statistical analyses and drafted the study report. All authors reviewed the manuscript critically for important intellectual content and approved the submitted version.

The authors declare no conflict of interest.

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