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#Insta personality: Personality expression in Instagram accounts, impression formation, and accuracy of personality judgments at zero acquaintance

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Abstract

Objective: This study examined personality expression, impression formation, and the consensus and accuracy of zero-acquaintance personality judgments that were based on people's Instagram accounts.

Method: Self- and informant reports of the Big Five personality traits, self-esteem, and narcissism were collected for 102 Instagram users. Screenshots were taken of Instagram users' profiles, including up to the 102 latest available Instagram posts. A number of Instagram cues were objectively retrieved, counted, and rated by independent trained cue coders from the screenshots. 100 unacquainted observers then judged the Big Five traits, self-esteem, and narcissism on the basis of Instagram screenshots only.

Results: We identified Instagram account characteristics that were associated with users' personality traits (measured with self-reports, informant reports, and self-informant composites) and observers' zero-acquaintance personality judgments. Personality judgments that were based on Instagram accounts demonstrated consensus and significantly converged with Instagram users' Big Five traits, self-esteem, and narcissism across all three personality criteria. Averaged-observer accuracy correlations for self-informant composite scores ranged from $r = .44$ ($p < .001$) for extraversion to $r = .25$ ($p = .013$) for conscientiousness.

Conclusions: Our findings provide insight into cue processes of online self-portrayal and impression formation on Instagram and the level of zero-acquaintance accuracy.

KEYWORDS

accuracy, cues, impression formation, Instagram, lens model, personality expression

1 | INTRODUCTION

With over a billion users worldwide (Dean, 2022), Instagram (http://instagram.com), the popular social media platform for sharing images and videos, provides vast opportunities for online self-expression and impression formation as part of people's daily lives (Sheldon & Bryant, 2016).[1] Instagram use, enhancing social

interconnectivity by allowing people to track who they are following and their followers, has been shown to influence users' affective well-being (e.g., Weinstein, 2018), body image (e.g., Vandenbosch et al., 2021), and mental health (e.g., Faelens et al., 2021) and may portray current and upcoming trends (e.g., beauty, fashion; Instagram, 2021). Often, the features and content of Instagram accounts (i.e., digital footprints), which may reflect aspects of individuals' personality traits (Cooper et al., 2020), are the sole basis on which judgments of other users are formed at zero acquaintance.

In recent years, a large number of psychological studies have investigated the role of personality traits, which can be defined as "patterns of thought, emotion, and behavior that are relatively consistent over time and across situations" (Funder, 2012, p. 177) in social networking site (SNS) use (for meta-analyses, see, e.g., Gnambs & Appel, 2018; Huang, 2019; Liu & Baumeister, 2016; Liu & Campbell, 2017; McCain & Campbell, 2018). With regard to the most well-researched and widely accepted trait taxonomy, the Five-Factor model, which comprises the so-called Big Five traits (neuroticism vs. emotional stability, extraversion, openness to experience, conscientiousness, and agreeableness; John et al., 2008; John & Srivastava, 1999), meta-analyses have shown that neuroticism and extraversion have small positive relationships with overall SNS use, and all Big Five traits are significantly associated with more specific SNS behaviors and content shared on social media (Huang, 2019; Liu & Campbell, 2017). Specifically, neuroticism is positively correlated with status updates; extraversion is positively associated with interactions, photo posting, and total number of online friends; openness is positively related to information seeking, photo posting, and status updates; agreeableness is positively correlated with photo posting; and conscientiousness is negatively correlated with information seeking (see Liu & Campbell, 2017).

Recent meta-analyses have also provided evidence that the personality traits self-esteem (referring to subjective evaluations of personal worth; Donnellan et al., 2011) and narcissism (reflecting a grandiose and inflated self-concept; Buffardi & Campbell, 2008; Miller et al., 2021) are significantly related to both overall and specific SNS behaviors (Gnambs & Appel, 2018; Liu & Baumeister, 2016; McCain & Campbell, 2018). Whereas overall SNS use has been shown to be higher among people low in self-esteem, self-esteem was positively correlated with number of online friends (Liu & Baumeister, 2016). Grandiose narcissism was positively related to time spent on social media and to number of online friends/followers, interactions, photo posting, number of selfies, and frequency of status updates (Gnambs & Appel, 2018; Liu & Baumeister, 2016; McCain & Campbell, 2018).

In addition, research has shown that personality traits can be predicted from users' digital footprints of SNS behaviors in both human-perception and computer-based studies (e.g., Hinds & Joinson, 2019; for meta-analyses, see Azucar et al., 2018; Tskhay & Rule, 2014). With regard to the Big Five traits, human judges (i.e., observers) significantly agreed with each other in their judgments (i.e., consensus) of all traits and could accurately infer all traits except for neuroticism based solely on strangers' (i.e., targets') SNS profiles, with meta-analytic accuracy correlations between observers' judgments and targets' personality scores ranging from .11 (neuroticism) to .42 (extraversion; Tskhay & Rule, 2014). Similarly, computer algorithms adopting the role of the observer in computer-based studies have been shown to successfully predict the Big Five traits using digital traces extracted from social media (Azucar et al., 2018).

In sum, the overwhelming majority of studies summarized in the presented meta-analyses examined text-based media (e.g., personal websites, Twitter) and Facebook as a social media platform, with only a few exceptions exploring visual-image-based platforms, such as Instagram (e.g., Pornsakulvanich, 2017; Skowron et al., 2016), and most often, self-reports were used to measure users' personality traits. Studies analyzing visual-image-based social media "to establish the relevance of visual digital footprints for the prediction of personality" (Azucar et al., 2018, p. 124) and research "using aggregate target and informant reports to provide more realistic and accurate personality assessment" (Hinds & Joinson, 2019, p. 208) can address current gaps in the literature and advance our understanding of personality.

For Instagram in particular, a number of studies have analyzed how self-esteem and narcissism are related to self-image posting behaviors with findings showing no associations between self-esteem and the overall frequency of selfie posting, with equivocal results for narcissism (Barry et al., 2017; Barry, Reiter, et al., 2019; McCain et al., 2016). Whereas Barry et al. (2017) and Barry, Reiter, et al. (2019) found no or only weak relationships between narcissism and selfie posting involving certain self-image themes (e.g., physical appearance, affiliation with others), McCain et al. (2016) reported significant links between narcissism and taking and posting more selfies. Moon et al. (2016) found that narcissism showed significant positive links to Instagram users' self-estimated frequency of selfie posting, profile picture updates, time spent on Instagram, and sharing of self-promotional content (i.e., physically attractive profile pictures).

Further, research using computer algorithms for visual feature and content analysis of Instagram pictures has identified the most common identifiable categories as photos with "people" or "one human face" (Y. Kim, personal

communication, May 31, 2022) and reported small significant relationships between users' self-reported personality traits and both Instagram pictures' color features and/or content categories (e.g., Ferwerda et al., 2016; Ferwerda & Tkalcic, 2018; Kim & Kim, 2018, 2019; Kim et al., 2021). Whereas these previous studies have focused on specific types (i.e., selfies) or machine-vision detected features of Instagram photos, Cooper et al. (2020) comprehensively investigated Instagram photo content assessing a large number of both machine-vision and human-detected photograph features. Of the 3,363 analyzed Instagram photos, the three most used content categories classified by trained human coders were "quote", "selfie", and "fashion." The authors analyzed relationships between Instagram users' self-reported bright and dark side personality characteristics and self-reported behavioral and affective expressions of personality as well as machine-vision and human-detected situational information in Instagram pictures (see Rauthmann et al., 2015, for the theoretical conceptualization and terminology of situational information).

Few studies have examined how personality judgments are made on the basis of Instagram accounts (Barry, McDougall, et al., 2019; Harris & Bardey, 2019). Harris and Bardey (2019) asked 65 observers to judge four profiles of female Instagram users (screenshots of 12 images for each) for the Big Five personality traits. The authors analyzed mean-level differences between Instagram users' self-ratings and observers' personality judgments, but they did not report accuracy correlations for the Big Five traits. In addition, they qualitatively analyzed aspects (cues) that influenced observers' perceptions by interviewing six of the 65 observers.

Barry, McDougall, et al. (2019) used self-images posted on Instagram to analyze the trait judgments (especially narcissism) of 30 Instagram users. Targets completed personality self-reports; then screenshots of targets' 30 most recent Instagram posts were judged by 119 unacquainted observers for 13 personality attributes (e.g., "is self-absorbed," "has low self-esteem"). For Instagram activity parameters, Instagram users' self-ratings of grandiose narcissism, extraversion, and openness were significantly linked to number of followers and number of accounts followed. Observer-rated self-absorption was positively linked to number of Instagram followers and other accounts followed, and observer-rated self-esteem was positively correlated with number of followers. Users with more selfies were judged more negatively by unfamiliar raters (e.g., as self-absorbed, with low self-esteem) and results generally showed only weak evidence of self-other agreement with small significant associations between self-rated grandiose narcissism and self-esteem and observer-rated self-absorption (Barry, McDougall, et al., 2019).

The issues investigated in previous studies on Instagram correspond to different aspects of Brunswik's (1956) lens model, the conceptual framework originally proposed to describe how humans gather information in fundamentally uncertain environments. The lens model has been adapted to describe *personality expression* and *impression formation* processes in the context of human-human personality trait judgments (e.g., Nestler & Back, 2013; Osterholz et al., 2021), and more recently, human-machine interactions (Cannata et al., 2022; Phan & Rauthmann, 2021). On the expression side of the lens model, traits have been reliably observed to have significant relationships with Instagram activity and uploaded content (*cue validity*; Barry, McDougall, et al., 2019; Cooper et al., 2020; Ferwerda et al., 2016; Kim & Kim, 2018, 2019; Kim et al., 2021; McCain et al., 2016; Moon et al., 2016). On the reception side of the lens model, judges appear to utilize a variety of Instagram cues to make personality judgments (*cue utilization*; Barry, McDougall, et al., 2019; Harris & Bardey, 2019). The lens model assumes that for humans to form accurate impressions of latent, not directly observable personality traits, they need to be sensitive to and utilize available observable cues that are indeed (valid) indicators of the latent characteristic of interest (Nestler & Back, 2013).[2]

Altogether, previous literature on the links between Instagram activity and content and personality traits has exclusively relied on self-reports capturing the unique view of the person him−/herself which may not necessarily have a strong correspondence with how we behave or how others see us (Vazire & Carlson, 2021). In addition, only a small number of studies has explored which features of Instagram accounts are linked with strangers' perceptions of users' personality traits and provided preliminary findings on the accuracy of these judgments. The present study aimed to expand the scope of the literature by comprehensively exploring associations between features and contents of Instagram accounts and personality traits assessing (a) not only users' self-reports, but also informant reports, and the combined view of the self and informant as personality criteria, and (b) personality judgments by strangers based on Instagram accounts only. This study tries to fill current gaps in the literature by conjoining both sides of the lens model (Nestler & Back, 2013) to investigate three research questions concerning (1) personality expression, (2) impression formation, and (3) the accuracy of zero-acquaintance personality judgments that are based on Instagram accounts. To this end, this study analyzes self-ratings, informant reports, and self-informant composite scores of Instagram users' personality traits for the Big Five traits, self-esteem, and narcissism, a large number of behavioral criteria derived from Instagram

accounts, and personality inferences by strangers. Our analyses are exploratory and follow recommendations for "descriptive personality research" described by Mõttus et al. (2020), which can inform personality science through uncovering unprecedented relationships between personality traits, Instagram behaviors, and personality judgments without testing hypotheses or being restrained by theoretical models.[3]

2 | THE PRESENT STUDY

In the present study, for a large number of Instagram users (i.e., targets) and human judges (i.e., observers), we investigated personality expression, impression formation processes, and the accuracy of zero-acquaintance personality judgments that are based on Instagram accounts for the Big Five traits, self-esteem, and narcissism. We applied a multimethod approach that used self-ratings, informant reports, and self-informant composite scores as criterion measures of targets' personality traits. First, we examined relationships of these personality criteria with Instagram users' actual behaviors and picture content (i.e., cues) agglomerated in digital footprints of their Instagram accounts (cue validities). Second, we explored impression formation processes by analyzing the links between zero-acquaintance personality judgments based on screenshots of targets' Instagram accounts and the accounts' features and content (cue utilizations). Third, we studied the accuracy of zero-acquaintance personality judgments by analyzing the level of consensus (interjudge agreement) and accuracy correlations of personality judgments with targets' personality criteria for the Big Five traits, self-esteem, and narcissism. Such a multimethod approach that regards targets' self-reports, informant reports, self-informant composite trait scores, actual SNS behaviors agglomerated in targets' Instagram accounts, and personality inferences by unacquainted others will allow researchers to obtain a richer understanding of personality in visual-content-based social networks. Our analyses are largely exploratory because of a lack of previous comprehensive data on the accuracy of and underlying cue processes in first impressions based on Instagram accounts in one study. Given the broad scope of our analyses of several personality criteria (self-ratings, informant reports, and self-informant composite scores) and zero-acquaintance personality judgments with a large number of individual behavioral cues and aggregated behavioral components, we refrained from articulating specific hypotheses as those would be more confusing than clarifying.

2.1 | Question 1: Personality expression: Which Instagram features and content (cues) are (valid) indicators of Instagram users' personality traits (cue validity)?

First, we analyzed which Instagram features and content are associated with Instagram users' Big Five traits, self-esteem, and narcissism. Whereas previous studies on Instagram have assessed self-reports as measures of users' personality traits when analyzing relationships with Instagram content (Barry, Reiter, et al., 2019; Cooper et al., 2020; Ferwerda et al., 2016; Kim & Kim, 2018, 2019; Kim et al., 2021; McCain et al., 2016; Moon et al., 2016), the way we judge ourselves might not necessarily have a strong correspondence with how we behave or how others see us (Vazire & Carlson, 2021). Self-reports and reports by knowledgeable informants (Vazire, 2006), which are moderately correlated (Connelly & Ones, 2010), each capture unique insights into people's personality, but also reveal limitations and blindspots (Back & Vazire, 2012; Vazire, 2010). That is, each source taps into different available information (McAbee & Connelly, 2016), with self-reports tapping into people's explicit self-views of their traits as part of their *identities*, and other reports reflecting how others see a target person as part of people's *reputations* (Hogan & Blickle, 2018). Thus, we considered both self- and informant reports as well as composite trait scores (capturing shared variance between self- and informant ratings) as using all of these provides a more complete picture of targets' "true personalities" (Funder, 1999; Kenny, 1994).

The selection and conceptualization of cues (i.e., Instagram features and content) were based on both theoretical foundations and empirical findings on personality expression and personality judgments based on Instagram and related social media platforms (Barry, McDougall, et al., 2019; Barry, Reiter, et al., 2019; Buffardi & Campbell, 2008; Christofides et al., 2009; Cooper et al., 2020; Ferwerda et al., 2016; Ferwerda & Tkalcic, 2018; Hu et al., 2014; Kim & Kim, 2018, 2019; Kim et al., 2021; McCain & Campbell, 2018; Moon et al., 2016; Stopfer et al., 2014; Vander Molen et al., 2018; Wilson et al., 2012). As Instagram is image-based, and about 20% of pictures in the study by Cooper et al. (2020) were self-images, we also took into account research on the accuracy of personality judgments based on selfies (e.g., Kaurin et al., 2018; Qiu et al., 2015) and people's physical appearance in full-body photographs (e.g., Borkenau & Liebler, 1992; Naumann et al., 2009; Vazire et al., 2008). Applying lens model terminology (Nestler & Back, 2013; Osterholz et al., 2021), we use the term *cue* to broadly refer to information perceivable by unacquainted observers and used to form personality judgments as commonly applied

in research on the accuracy of personality judgments and underlying cue processes (Back & Nestler, 2016). We aimed to assess cues that were *objectively* retrievable and *countable* from the Instagram accounts to reflect objective parameters of Instagram activity as well as aspects of design and disclosed information from Instagram posts and appearance-focused aspects of the profile owner rated by trained independent *cue coders* at the meso-level (see Breil et al., 2021).

2.2 | Question 2: Impression formation: Which Instagram features and content (cues) are associated with observers' zero-acquaintance personality judgments (cue utilizations)?

Second, we examined impression formation processes by analyzing associations between targets' Instagram account features and content (cues) and observers' zero-acquaintance personality judgments of Instagram users' Big Five traits, self-esteem, and narcissism (cue utilizations). Thereby, we aimed to explore correlations of assessed cues with the averaged personality judgments of all observers separately for traits reflecting impression formation processes based solely on Instagram accounts for the "average" observer.

2.3 | Question 3: Accuracy: How accurate are zero-acquaintance personality judgments of Instagram users based solely on their Instagram accounts?

Third, we examined the extent to which unacquainted observers can accurately judge Instagram users' Big Five traits, self-esteem, and narcissism. We assessed *consensus* (i.e., level of agreement between two or more observers in their personality judgments of another person) and *self-other agreement* (i.e., the correlation between targets' self-reports and observers' personality judgments) as accuracy criteria (Connelly & Ones, 2010; Funder, 2012). Extending previous research examining self-other agreement of personality inferences based on Instagram (Barry, McDougall, et al., 2019), we further defined accuracy as the extents to which observers' personality judgments correspond with reports from well-acquainted informants (i.e., reflecting a reputation standpoint) and self-informant composite scores (i.e., reflecting what is known to the self *and* the informant; e.g., Naumann et al., 2009).

In our analyses, we applied a *trait-based approach* and computed both averaged-observer and single-observer accuracy across targets for each specific trait (Back & Nestler, 2016). *Averaged-observer accuracy* reflects the correspondence between the common (i.e., averaged) judgments of all observers and targets' personality criterion measures. Please note that averaged-observer results depend on the number of observers, whereas single-observer values represent accuracy for the typical (i.e., average) single observer (Nestler & Back, 2017). To this end, accuracy correlations are first computed for each single observer and then averaged into a mean single-observer accuracy correlation. Accuracies at the level of single observers have been included in only a few previous studies (e.g., Back et al., 2010; Naumann et al., 2009) and are not represented in meta-analytic results (Tskhay & Rule, 2014).

3 | METHOD

3.1 | Self- and informant reports of Instagram users

To obtain our sample of Instagram users, we used Instagram direct messages to contact 1,488 people with a public profile who had used the hashtag #I. We included a description of the study's purpose and a link to an online questionnaire. We chose the very general hashtag #I to avoid preselecting any specific communities or groups of Instagram users. Before answering the online questionnaire in SoSci Survey (Leiner, 2019), participants provided informed consent and agreed that their Instagram profile could be viewed and rated for research purposes. No monetary compensation was given.

Instagram users answered questions about their demographics (age, gender, relationship status, education level) and Instagram use (i.e., Instagram name, start date, and frequency of use). They then indicated which of seven motives for Instagram use (e.g., for entertainment/consumption of photos and videos, for communication/interacting with others, to create one's own profile/upload images) applied to them (1) or not (0). Next, they completed items for assessing the Big Five personality traits, self-esteem, and narcissism. The Big Five were assessed with the GSOEP Big Five-Inventory Short (BFI-S; Gerlitz & Schupp, 2005; Hahn et al., 2012), which consists of 15 items and was extended by one additional item measuring openness in 2009 in the German Socio-Economic Panel (GSOEP; Richter et al., 2017). Big Five items were answered on a scale ranging from 1 (*does not apply to me at all*) to 7 (*applies to me perfectly*). Self-esteem was assessed with four items: a single item ("I have a positive attitude toward myself") from the GSOEP (Richter et al., 2017, p. 62), rated on the same scale as the Big Five items; the Single Item Self-Esteem Scale (SISE; Robins et al., 2001), rated on a scale ranging from 1 (*not very true of me*) to 5 (*very true of*

me); and the two items with the highest item-subscale correlation (i.e., Items 3 and 9) from the German version of the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965; Roth et al., 2008), both rated on a scale ranging from 1 (*does not apply at all*) to 4 (*applies perfectly*). Narcissism was measured with the six-item Narcissistic Admiration and Rivalry Questionnaire short scale (NARQ-S; Leckelt et al., 2018), with ratings ranging from 1 (*not agree at all*) to 6 (*agree completely*). Users were finally asked to indicate whether they had answered all questions honestly and to provide the Instagram names or email addresses of up to three potential informants who knew them well. In total, 292 of the contacted Instagram users completed the self-report online questionnaire, 165 of whom named one or more informants.

Informants were contacted via Instagram direct messages or email with a description of the study's purpose and a link to an informant online questionnaire. For 119 Instagram users, one of the informants they had identified completed a third-person version of the same Big Five, self-esteem, and narcissism items used for the self-reports.[4] Self-report and informant-report data for 17 Instagram users were excluded from all further analyses because the Instagram users were younger than 18 years or were psychology students at the University of Mainz, Germany, where the observer sample was recruited. All analyses are reported for this final sample of 102 Instagram users (76 women, 25 men, 1 third gender) with a mean age of 22.92 (SD = 3.38) years.

Informant reports by 102 informants (79 women, 23 men; M_{age} = 23.04, SD = 4.31) were completed 3.92 (SD = 5.44) days, on average, after the Instagram users' self-reports. Informants had known the Instagram users for an average of 110.16 (SD = 81.60, Mdn = 100.00) months and reported knowing them quite well (M = 4.68, SD = 0.66) on a scale ranging from 1 (*not well*) to 5 (*very well*). Of the informants, 70 (68.6%) reported being a friend, 17 (16.7%) a partner, 13 (12.7%) a family member, and two (2.0%) another kind of acquaintance (work colleague, incidental acquaintance).[5]

3.2 | Screenshots of Instagram profiles

After the Instagram users had completed the self-reports, screenshots of their Instagram profiles were saved by one of the authors to ensure that all observers would view the same unaltered profiles. Screenshots included the profile picture, username, total number of posts, numbers of followers and accounts followed, and if available, profile name (i.e., bold text below the profile picture), Instagram bio (i.e., written description up to 150 characters), and story highlights (i.e., icons marking one or several stories that can be viewed permanently) at the top of the profile as well as up to a maximum of 102 images. The total number of Instagram posts for each of the 102 Instagram users ranged from three to 1,317 posts (M = 151.66, Mdn = 76.50, SD = 214.15). To reduce observers' rating efforts, we limited the number of posts to a maximum of the newest 100 posts (Reece & Danforth, 2017). However, because Instagram's design employs a grid layout with three images in each row, screenshots of an account holder's profile included up to 102 posts (a maximum of 34 lines with three images side by side), which included icons marking "video" uploads and "multiple posts" (i.e., up to 10 images or videos can be uploaded at one time) in the image visible in the screenshot.

3.3 | Cue measures

The selection of cues assessed in this study was based on previous work (e.g., Barry et al., 2017; Barry, McDougall, et al., 2019; Borkenau & Liebler, 1992; Buffardi & Campbell, 2008; Christofides et al., 2009; Cooper et al., 2020; Ferwerda et al., 2016; Ferwerda & Tkalcic, 2018; Hu et al., 2014; Kaurin et al., 2018; Kim & Kim, 2018, 2019; Kim et al., 2021; Naumann et al., 2009; McCain & Campbell, 2018; Mehdizadeh, 2010; Moon et al., 2016; Qiu et al., 2015; Stopfer et al., 2014; Vander Molen et al., 2018; Vazire et al., 2008; Wilson et al., 2012) and discussions in the research group following initial observations of targets' Instagram profiles (see Table 1, for an overview, and Tables S3 and S4 in the online Supporting Information).

For cue assessment, screenshots of the 102 Instagram profiles were edited to include either (a) the top of the profile only (i.e., profile picture, username; if available, the profile name, bio, and story highlight icons) or (b) the Instagram posts without the top of the profile. Twelve cues were objectively retrieved or counted by one female research assistant: five cues based on the top of the profile only and seven cues based on the Instagram posts only. The cue "profile photo shows user's face" was coded as 0 (*no*) or 1 (*yes*). The number of posts in the Instagram screenshots did not differ by more than 2 *SD*s from the average number of posts for any of the 102 targets (see Table 1, M = 66.40, SD = 33.75), and the number of posts in the screenshots was significantly correlated with users' total number of posts (r = .51, p < .001). Additionally, 12 cues were rated by two independent trained cue coders (two female research assistants) on a scale ranging from 1 (*not at all*) to 6 (*very much*) on the basis of Instagram posts only. Cronbach's alphas for cue ratings ranged from .66 ("Aesthetic posts") to .81 ("Sexiness"; mean α = .74, SD = 0.12). Cue ratings were averaged across the two cue coders and were

TABLE 1 Descriptive statistics and reliabilities of individual cues and respective cue aggregates

Cues and respective cue aggregates	Min	Max	*Mdn*	*M*	*SD*	α	Source
Objectively retrieved and counted cues							
Instagram activity						**.75**	
Number of followers	96.0	31,000.0	441.00	1,570.90	3,853.50	obj.	Top
Number of accounts followed	55.0	7,485.0	393.50	517.10	751.83	obj.	Top
Number of lines Instagram bio	0	10.0	2.00	2.82	2.12	count	Top
Number of story highlight icons	0	7.0	1.00	2.21	2.61	count	Top
Profile photo shows user's face	0	1.0	1.00	0.86	0.35	count	Top
Number of posts in screenshot	3.0	102.0	73.00	66.40	33.75	obj.	Posts
Number of multiple posts icons	0	35.0	3.50	5.31	6.28	obj.	Posts
Number of video icons	0	17.0	1.00	2.19	3.61	obj.	Posts
Number of posts with user	0	102.0	36.50	40.17	28.52	count	Posts
Number of posts of others	0	80.0	9.50	13.85	12.98	count	Posts
Number of posts without people	0	76.0	10.00	18.75	20.93	count	Posts
Number of posts with embedded text	0	75.0	0	1.65	8.37	count	Posts
Cues rated by independent trained cue coders							
Aesthetic professional posts						**.77**	
Aesthetic posts	1.5	6.0	3.50	3.42	1.01	.66	Posts
Professional photo quality	1.0	6.0	3.50	3.61	1.03	.78	Posts
Diverse private posts						**.71**	
Diversity of posts	1.0	6.0	3.50	3.40	0.94	.72	Posts
Disclosed privacy	1.0	5.5	3.50	3.34	1.01	.76	Posts
Colorful active positive posts						**.72**	
Colorfulness of posts	1.0	5.5	3.50	3.58	0.86	.67	Posts
Outside photos	1.0	6.0	4.25	4.21	1.06	.73	Posts
Activity level	1.0	5.5	3.50	3.37	0.94	.67	Posts
Positive affect	1.0	5.5	3.50	3.44	0.90	.73	Posts
Self-promotional appearance-focused posts						**.87**	
Self-promotion	1.0	6.0	3.50	3.56	1.04	.73	Posts
Physical attractiveness	1.0	6.0	3.50	3.51	0.96	.80	Posts
Sexiness	1.0	6.0	3.50	3.47	1.04	.81	Posts
Refined fashionable appearance	1.0	6.0	3.50	3.58	1.07	.78	Posts

Note: Cues were either objectively (obj.) retrieved from the 102 Instagram profiles, counted (count) by one research assistant, or rated on a scale ranging from 1 (*not at all*) to 6 (*very much*) by two trained research assistants on the basis of the Instagram user's "top" of the profile or Instagram "posts" only. The cue "profile photo shows user's face" was binary coded as 0 (*no*) or 1 (*yes*). Alphas of cues reflect the degree of interobserver agreement between the cue coders. Ratings were averaged across the number of trained cue coders, and *z*-standardized cue values were aggregated for the respective cue aggregates (in bold). Alphas for the cue aggregates reflect the level of correspondence between the cues and the respective cue aggregate.

z-standardized. In addition, *z*-standardized cue values were aggregated on the basis of theoretical reasons and results from principal component analyses (see Tables S3 and S4 in the online Supporting Information) to form five cue aggregates reflecting Instagram activity, aesthetic professional posts, diverse private posts, colorful active positive posts, and self-promotional appearance-focused posts (for alpha coefficients of cue aggregates, see Table 1).[6] The mean intercorrelation of cue aggregates was $r = .28$ ($SD = 0.21$).

3.4 | Observer ratings

Observers were 100 psychology students from the University of Mainz, Germany who participated in a laboratory session (up to 10 participants on individual personal computers separated by privacy shields) in exchange for research participation credit. One observer did not report demographic information. Observers (83 women, 15 men, 1 third gender) had a mean age of 23.94 ($SD = 4.62$) years, and 71% of the observers indicated using Instagram themselves. Those who did not use Instagram still knew the platform and its layout. Observers gave written informed consent and read a list of definitions of the personality traits to be judged, including descriptions of low and high levels of the respective trait manifestations. All 100 observers viewed all 102 Instagram users' screenshots in a fixed random order, one profile after another, without time limitations. Observers rated Instagram users' personality traits on a paper-and-pencil questionnaire, taking, on average, approximately 2.5 h to rate all 102 Instagram profiles. The Big Five personality traits (in this order: emotional stability, extraversion, openness, agreeableness, and conscientiousness), self-esteem, and narcissism were all rated on single-item scales naming the respective trait and ranging from 1 (*very weak manifestation*) to 7 (*very strong manifestation*). Ratings were excluded from all analyses if observers reported that they knew an Instagrammer. This occurred in a total of 10 cases.

4 | RESULTS

4.1 | Descriptive statistics

Table 2 presents descriptive statistics for Instagram users' self-reported personality traits (for self-reported Instagram use, see paragraph on p. 1 in the online Supporting Information), informant reports of users' traits, self-informant composites, self-informant correlations, and descriptive statistics for observer judgments. Reliabilities (Cronbach's alphas) of users' self-reports ranged from .56 (agreeableness) to .84 (extraversion). For informant reports, reliabilities ranged from .56 (narcissism) to .86 (extraversion). Self- and informant reports of Instagram users' personality traits were aggregated to form self-informant composites. Self-informant correlations for the personality traits ranged from $r = .58$ ($p < .001$; extraversion) to $r = .33$ ($p < .001$; narcissism; see Table 2; mean $r = .46$, $p < .001$, $SD = 0.10$; for intercorrelations of self-reports, informant reports, self-informant composites, and observer judgments, see Tables S5 and S6 in the online Supporting Information).[7]

TABLE 2 Descriptive statistics for self- and informant-reported personality traits of Instagram users, self-informant composites, and self-informant correlations, and descriptive statistics of observer judgments

	Self-report			Informant report			Self-informant composite		Self-informant correlation	Observer judgments	
Traits	***M***	***SD***	α	***M***	***SD***	α	***M***	***SD***	***r (p)***	***M***	***SD***
Emotional stability	3.82	1.38	0.77	4.23	1.24	0.63	4.02	1.10	**.42** (<.001)	4.30	0.50
Extraversion	5.52	1.15	0.84	5.73	1.20	0.86	5.62	1.04	**.58** (<.001)	4.54	0.71
Openness	5.63	0.82	0.70	5.45	0.96	0.70	5.54	0.76	**.45** (<.001)	4.73	0.76
Agreeableness	5.55	0.96	0.56	5.68	1.14	0.77	5.62	0.88	**.41** (<.001)	4.62	0.63
Conscientiousness	5.11	0.98	0.64	5.58	0.99	0.66	5.35	0.86	**.52** (<.001)	4.57	0.70
Self-esteem	0.00	0.78	0.77	0.00	0.75	0.73	0.00	0.66	**.48** (<.001)	4.86	0.53
Narcissism	2.12	0.74	0.69	2.88	0.72	0.56	2.50	0.59	**.33** (<.001)	2.74	0.86

Note: $N_{self} = 102$, $N_{informants} = 102$, $N_{self\text{-}informant\ composite} = 102$, $N_{observers} = 100$. Big Five items were rated on a scale ranging from 1 to 7, self-esteem was averaged across *z*-standardized items with different response scales, and narcissism items were rated on a scale ranging from 1 to 6. The self-informant composite was calculated as the average of self-reports and the informant reports. Significant self-informant correlations are in bold. Observer judgments were given on a scale ranging from 1 to 7. All *p*-values are two-tailed.

4.2 | Personality expression

For personality expression correlations (i.e., cues' associations with Instagram users' personality traits; cue validities), we correlated targets' personality criteria separately for each trait with Instagram users' cue values for the 24 individual cues and five cue aggregates, respectively. We log-transformed the cue values for the 12 objectively retrieved and counted cues reflecting Instagram activity to account for skewed distributions before computing the cue correlations. Table 3 (first three lines) presents the cue validity correlations with self-ratings, informant reports, and self-informant composite scores for the cue aggregates. As we conducted a large number of exploratory analyses, we focus on the directions of associations and overall trends across personality criteria for the five cue aggregates (for cue validity correlations for the individual cues, see Table S7 in the online Supporting Information).

Across all three personality criteria, extraversion, openness, and narcissism were significantly positively linked with Instagram activity. Openness was also positively correlated with aesthetic professional posts and more diverse private posts across all three personality criteria. Self-ratings, informant reports, and self-informant composite scores for extraversion were significantly positively associated with Instagram users' diverse private posts and colorful active positive posts. None of targets' personality criteria for the Big Five traits, self-esteem, or narcissism (except for the self-informant composite) were significantly correlated with the cue aggregate reflecting self-promotional appearance-focused posts of Instagram users (all $ps > .05$).

4.3 | Impression formation

Correlations reflecting impression formation processes (i.e., cues' associations with observers' personality judgments; cue utilizations) were computed by correlating the aggregated judgments of the 100 observers separately for each personality trait with Instagram users' cue values for individual cues and cue aggregates. For the 12 objectively retrieved and counted cues, we used log-transformed cue values to compute cue utilization correlations. Cue utilization correlations are presented for the cue aggregates in the fourth line of Table 3. Due to the large number of exploratory analyses, we focus on cue utilization results for cue aggregates (for cue utilization correlations for individual cues, see Table S7 in the online Supporting Information).

Observers' extraversion judgments were positively correlated with four of the five cue aggregates (not aesthetic professional posts). Similarly, openness judgments were positively linked to four cue aggregates (not self-promotional appearance-focused posts). Agreeableness judgments were positively correlated with cue aggregates reflecting diverse private posts and colorful active positive posts and negatively correlated with self-promotional appearance-focused posts. Judgments of emotional stability were linked to colorful active positive posts, and conscientiousness judgments were linked to aesthetic professional posts. Observers' judgments of self-esteem and narcissism were both positively correlated with the cue aggregates Instagram activity, aesthetic professional posts, and self-promotional appearance-focused posts. In addition, self-esteem judgments were positively linked to Instagram users' colorful active positive posts, and narcissism judgments were negatively correlated with diverse private posts.

4.4 | Consensus and accuracy of observers' personality judgments

Table 4 presents observer judgment consensus values, which were computed using intraclass correlations (Shrout & Fleiss, 1979) for the averaged observer, ICC(2, k), and for the single observer, ICC(2, 1). In addition, Table 4 presents correlations of self-reports, informant reports, and self-informant composites with both averaged-observer and single-observer judgments based on screenshots of targets' Instagram accounts. That is, for averaged-observer accuracy results, we correlated the aggregated personality judgments of the 100 observers with the personality criteria of Instagram users' Big Five traits, self-esteem, and narcissism. The averaged-observer judgments corresponded significantly with targets' self-reports for five of the seven traits (the exceptions were agreeableness and conscientiousness; see Table 4). For all of the Big Five traits, self-esteem, and narcissism, informant ratings significantly converged with averaged observers' zero-acquaintance personality judgments of the respective traits. Similarly, averaged observer judgments significantly corresponded with self-informant composites for all the personality traits, and the correlations ranged from $r = .25$ ($p = .013$) for conscientiousness to $r = .44$ for extraversion ($p < .001$; for correlations of personality criteria with averaged observer judgments across all personality traits, see Table S8 in the online Supporting Information). Single-observer accuracy results were obtained by correlating each individual observer's personality ratings of the Instagram users with the respective personality criteria separately for each trait, which were then averaged to attain an understanding of the typical observer's level of accuracy (see Table 4). To test each of these mean correlations against zero, we computed one-sample t tests

TABLE 3 Cue correlations with personality criteria (i.e., cue validities) and averaged observer judgments (i.e., cue utilizations)

Cue aggregates	Criteria	ES	E	O	A	C	SE	NAR
Instagram activity	Self	.14 (.175)	**.25** (.011)	**.34** (<.001)	−.08 (.424)	.14 (.150)	.11 (.271)	**.21** (.034)
	Informant	.01 (.892)	**.36** (<.001)	**.34** (<.001)	−.06 (.573)	−.09 (.359)	.02 (.872)	**.31** (.002)
	Composite	.09 (.356)	**.35** (<.001)	**.40** (<.001)	−.08 (.425)	.03 (.771)	.07 (.458)	**.32** (.001)
	Observers	.06 (.522)	**.51** (<.001)	**.34** (<.001)	−.10 (.330)	−.03 (.732)	**.42** (<.001)	**.37** (<.001)
Aesthetic professional posts	Self	−.06 (.570)	−.06 (.546)	**.23** (.020)	.08 (.397)	.11 (.256)	.01 (.911)	.03 (.740)
	Informant	.01 (.940)	−.10 (.317)	**.30** (.003)	.00 (.985)	.01 (.910)	.04 (.700)	.08 (.400)
	Composite	−.03 (.754)	−.09 (.364)	**.31** (.001)	.04 (.656)	.07 (.476)	.03 (.775)	.07 (.475)
	Observers	.14 (.171)	.10 (.314)	**.31** (.002)	.01 (.895)	**.24** (.014)	**.33** (<.001)	**.22** (.030)
Diverse private posts	Self	.05 (.614)	**.33** (<.001)	**.24** (.015)	.04 (.676)	.01 (.889)	.11 (.277)	.01 (.932)
	Informant	.04 (.680)	**.29** (.003)	**.20** (.039)	**.23** (.019)	−.01 (.907)	.11 (.254)	.11 (.266)
	Composite	.05 (.584)	**.35** (<.001)	**.26** (.008)	.17 (.083)	.00 (.990)	.13 (.196)	.07 (.469)
	Observers	.12 (.228)	**.27** (.006)	**.40** (<.001)	**.35** (<.001)	−.04 (.700)	.02 (.838)	**−.25** (.011)
Colorful active positive posts	Self	−.02 (.854)	**.21** (.030)	.02 (.818)	.01 (.905)	.11 (.255)	.13 (.190)	.01 (.882)
	Informant	**.23** (.019)	**.29** (.003)	.04 (.666)	**.20** (.044)	.11 (.253)	**.29** (.003)	−.03 (.754)
	Composite	.12 (.232)	**.28** (.004)	.04 (.690)	.14 (.173)	.13 (.190)	**.24** (.014)	−.01 (.922)
	Observers	**.61** (<.001)	**.48** (<.001)	**.48** (<.001)	**.53** (<.001)	.19 (.053)	**.46** (<.001)	−.15 (.130)
Self-promotional appearance-focused posts	Self	−.04 (.675)	.17 (.087)	.07 (.471)	−.14 (.151)	.05 (.603)	.07 (.484)	.14 (.154)
	Informant	.12 (.238)	.14 (.149)	.18 (.073)	−.04 (.691)	−.19 (.055)	.09 (.390)	.19 (.060)
	Composite	.04 (.690)	.18 (.076)	.15 (.127)	−.10 (.300)	−.08 (.425)	.09 (.366)	**.20** (.043)
	Observers	.15 (.121)	**.52** (<.001)	.05 (.607)	**−.28** (.005)	.00 (.980)	**.63** (<.001)	**.68** (<.001)

Note: $N_{self} = 102$, $N_{informants} = 102$, $N_{self\text{-}informant\ composite} = 102$, $N_{observers} = 100$. Cue validities were calculated as the correlation between targets' respective trait criterion measure and cue aggregates. Cue utilizations were calculated by correlating cue aggregates with averaged observer judgments of the 100 observers. Significant correlations are in bold. All *p*-values are two-tailed and presented in parentheses.

Abbreviations: A, agreeableness; C, conscientiousness; E, extraversion; ES, emotional stability; NAR, narcissism; O, openness; SE, self-esteem.

TABLE 4 Consensus of observer judgments and accuracy correlations with target personality criteria

Traits	Consensus		Averaged-observer accuracy			Single-observer accuracy					
			Self	Informant	Composite	Self		Informant		Composite	
	ICC(2, *k*)	ICC(2, 1)	*r* (*p*)	*r* (*p*)	*r* (*p*)	Mean *r* (*p*)	*SD*	Mean *r* (*p*)	*SD*	Mean *r* (*p*)	*SD*
Emotional stability	.94 (<.001)	.14 (<.001)	**.33** (<.001)	**.27** (.006)	**.36** (<.001)	**.15** (<.001)	0.15	**.12** (<.001)	0.13	**.16** (<.001)	0.15
Extraversion	.97 (<.001)	.27 (<.001)	**.38** (<.001)	**.39** (<.001)	**.44** (<.001)	**.22** (<.001)	0.10	**.23** (<.001)	0.09	**.25** (<.001)	0.10
Openness	.98 (<.001)	.28 (<.001)	**.38** (<.001)	**.30** (.002)	**.40** (<.001)	**.23** (<.001)	0.10	**.19** (<.001)	0.09	**.24** (<.001)	0.10
Agreeableness	.97 (<.001)	.24 (<.001)	.19 (.055)	**.29** (.003)	**.29** (.003)	**.10** (<.001)	0.08	**.16** (<.001)	0.09	**.16** (<.001)	0.09
Conscientiousness	.97 (<.001)	.26 (<.001)	.19 (.052)	**.24** (.017)	**.25** (.013)	**.11** (<.001)	0.11	**.14** (<.001)	0.10	**.14** (<.001)	0.10
Self-esteem	.95 (<.001)	.17 (<.001)	**.26** (.007)	**.36** (<.001)	**.36** (<.001)	**.13** (<.001)	0.10	**.18** (<.001)	0.10	**.18** (<.001)	0.10
Narcissism	.96 (<.001)	.21 (<.001)	**.23** (.023)	**.36** (<.001)	**.36** (<.001)	**.15** (<.001)	0.07	**.23** (<.001)	0.08	**.23** (<.001)	0.08

Note: N_{self} = 102, $N_{informants}$ = 102, $N_{self\text{-}informant\ composite}$ = 102, $N_{observers}$ = 100. ICC(2, *k*) = averaged-observer consensus. ICC(2, 1) = single-observer consensus. Averaged-observer accuracy refers to results computed for the averaged judgments of the 100 observers. Single-observer accuracy was computed for judgments of each individual observer, which were then averaged to mean single-observer estimates using Fisher's *r* to *z* formula, then tested against zero with one-sample *t* tests (df = 99). *SD* refers to the standard deviation of Fisher's *z*-transformed single-observer correlations. Significant correlations are in bold. All *p*-values are two-tailed.

($df = N_{observers} - 1$). Across the three personality criteria, all mean single-observer accuracy correlations were significantly different from zero (all $ps < .001$).

5 | DISCUSSION

The present study aimed to fill current gaps in the literature on personality traits and Instagram use by investigating three research questions concerning (1) personality expression, (2) impression formation, and (3) the accuracy of zero-acquaintance personality judgments. To this end, we collected self-reports, informant reports, and composite trait scores for the Big Five traits, self-esteem, and narcissism of 102 Instagram users as personality criteria, and personality perceptions of 100 strangers based on the Instagram accounts. We examined the associations between a number of behavioral components reflecting users' Instagram activity and contents on Instagram accounts (comprising a total of 6,773 uploaded photographs) with Instagram users' personality criteria for the seven personality traits (personality expression) and zero-acquaintance personality judgments (impression formation), respectively. Further, we studied the correlations between averaged and single observer personality judgments and Instagram users' personality criteria for the Big Five traits, self-esteem, and narcissism (accuracy).

This study identified characteristics in Instagram accounts indicative of Instagram users' Big Five traits, self-esteem, and narcissism (measured from an identity standpoint, a reputation standpoint, and a shared standpoint between the self *and* informant; McAbee & Connelly, 2016) and relationships between cue information and unacquainted observers' personality judgments, (Questions 1 and 2, respectively). Of all the traits, Instagram users' extraversion and openness were linked to the largest number of cue composites that were also associated with observers' zero-acquaintance judgments. How much a trait is expressed through observable behavioral cues is referred to as *observability* (also termed visibility; see Krzyzaniak & Letzring, 2021). Extraversion and openness were the most visible of the Big Five traits, similar to previous studies on personality expression in SNSs (e.g., Stopfer et al., 2014). Consistent with prior work (Barry, McDougall, et al., 2019; McCain et al., 2016; Moon et al., 2016), narcissism was positively correlated with Instagram activity, which was linked to observers' narcissism judgments. From a lens model perspective (Nestler & Back, 2013), cue information that was related to both Instagram users' personality criteria and observers' personality judgments (in the same direction) represents potential influences that drive trait accuracies.[8] For conscientiousness, the aggregated cue information was not

indicative of Instagram users' personality criteria. Our approach to cue assessment was theoretically driven and comprehensive, yet it could be the case that Instagram accounts contained other relevant or very subtle cue information or that nonlinear or specific combinatory cue effects that were not captured in the present study were indicative of these traits (Cannata et al., 2022; Cooper et al., 2020; Hinds & Joinson, 2019). In sum, the revealed cue-based personality expression and perception processes pertain to one time point and might not replicate in future data, and they do not reflect temporal cue aspects or the extent to which Instagram cues are indicative of personality traits over time (Bleidorn et al., 2017).

We also found that observers substantially agreed in their judgments of unacquainted Instagram users (consensus) and that zero-acquaintance personality judgments converged with users' actual Big Five traits, self-esteem, and narcissism (Question 3). Our results are in line with meta-analytic findings of significant consensus for all Big Five traits and the highest levels of self-other agreement for extraversion based on SNS profiles (Tskhay & Rule, 2014) and prior work showing that openness can be judged quite accurately from social media platforms (e.g., Back et al., 2010; Stopfer et al., 2014). Extending previous work by Barry, McDougall, et al. (2019), we found that self-esteem and narcissism judgments based on Instagram accounts converged significantly with Instagram users' personality self-reports, informant ratings, and self-informant composite scores of these traits. Emotional stability was surprisingly accurately judged in our study compared with meta-analytic results and zero-acquaintance contexts in general (Connelly & Ones, 2010; Tskhay & Rule, 2014). Instagram's visual nature, encouraging users to upload appearance-focused images (Vandenbosch et al., 2021), constitutes a context that motivates positive self-expression, which may facilitate accurate personality judgments (Human et al., 2012) of certain traits (e.g., emotional stability).

Our research has some limitations. First, our study included a self-selection approach and only a small number of Instagram users from one country (Germany) and thus cannot be generalized to Instagram users worldwide. To reduce the survey burden for Instagram users, we focused on the Big Five traits, self-esteem, and narcissism, even though other aspects of personality may have influenced both users' Instagram activity and posts and observers' personality judgments. To ensure that all observers used the same information to judge users' personality traits, we used static screenshots; however, this meant that dynamic Instagram account elements (e.g., videos, hashtags, comments) that might be relevant to impression formation were omitted. Using screenshots also prevented observers from clicking on certain posts to take a closer look, liking posts, or following users, all of which might be relevant for impression formation (e.g., Waggoner et al., 2009). The analyzed Instagram contents cover a limited time period and do not capture dynamics of Instagram use and perceptions of users which may change over time (e.g., in response to cultural, societal, or environmental influences) and with evolving Instagram features (e.g., Leaver et al., 2020). Further, the behavioral components reflect the interconnections of individual cues within our sample and may not replicate in future studies. For example, the "diverse private posts" component might not be empirically meaningful in samples of specific types of users (e.g., influencers, business accounts) that share a great amount of information which is not very personal.

Whereas static Instagram images conveyed trait-related information, future research could include the richness and temporal qualities of videos on Instagram, which may allow for even more insights into personality expression and impression formation. Future studies should also account for active processes in online impression formation by examining cue processes and accuracy for observers who are able to dynamically engage (i.e., actively choose the type and amount of information) when making personality judgments based on Instagram accounts. It would be fruitful to examine whether viewers' own trait manifestations (e.g., high levels of narcissism) might influence impression formation and the accuracy of personality impressions based on Instagram and how this might affect intentions to follow certain Instagram users or posts. As the extent to which behaviors indicate an individual's trait may depend on the situation (Letzring & Funder, 2021), future research would benefit from studying personality expression, impression formation, and accuracy for the same sample of targets across several situations, including not only Instagram accounts but also other online contexts and their appearances and behaviors in the lab and in real-life situations (Kaurin et al., 2018) to connect knowledge about personality in online and offline contexts.

In addition, future studies on cue processes and the accuracy of personality judgments based on Instagram could be complemented by advances in Big Data, machine learning, and personality computing approaches (i.e., technologies dealing with human personality; Phan & Rauthmann, 2021; Stachl et al., 2021). Cannata et al. (2022) proposed how such an integrative approach, combining accuracy and personality computing research, can overcome current limitations in answering open key questions and addressing important challenges of each of the disciplines. Challenges for future psychological work on personality expression and impression formation include, for example, detecting objectively relevant new cues and capturing complexity in behavioral cues and judgments. Features automatically extracted from visual

content uploaded on Instagram could be compared with theoretically derived and human-coded cues with regard to their validity (i.e., indicativeness) for personality traits (Cannata et al., 2022), and the accuracy of human judgments could be compared with computer-based personality judgments (Hinds & Joinson, 2019) to advance knowledge about personality.

6 | CONCLUSION

In our study, we examined relationships between characteristics of Instagram activity and uploaded images with Instagram users' (self- and informant-reported) personality traits and with observers' zero-acquaintance personality judgments based on Instagram accounts only. Our findings give insight into various aspects of online self-portrayal and online impression formation. Future research should continue to illuminate the mechanisms of trait expression, accuracy, and consequences of first impressions based on online photo-sharing platforms.

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CONFLICT OF INTEREST

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AUTHOR CONTRIBUTIONS

All authors contributed to the manuscript substantially and approved the final version of the manuscript for submission and publication.

ETHICS APPROVAL STATEMENT

This study was approved by the local scientific ethics committee of the Department of Psychology at the University of Mainz, Germany.

DATA AVAILABILITY STATEMENT

Data availability statement: Due to privacy considerations regarding the participants in our data set, including general data protection regulations (i.e., Datenschutz-Grundverordnung, DS-GVO), we cannot make all the materials we used (i.e., Instagram names and screenshots) publicly available. However, all data sets and corresponding statistical codes are publicly available at https://osf.io/59fud

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ENDNOTES

[1] Video-sharing functionality was added to Instagram's image-focused design in 2013 and Instagram stories (i.e., posts that are deleted after 24 h) in 2016. Upon creating an Instagram account, one can upload and edit various features, including a username, profile picture, bio (i.e., a brief written description), and story highlights (marking one or several stories that can be viewed permanently) at the top of the profile and all posted images and videos below (for an overview of Instagram features, see Meta, 2022).

[2] The Realistic Accuracy Model (RAM, Funder, 1999; Letzring & Funder, 2021) broke down lens model processes into a four-stage process necessary to achieve accurate personality judgments and has described four moderators of accuracy pertaining to aspects of the judge, target, information, and trait being judged.

[3] Please note that the lens model, which is not a psychological theory per se, is used in our study as a conceptual framework (a) to structure and narrate these descriptive findings and (b) to enable future dialogue and collaborations between researchers studying personality research on human-human trait judgments and personality computing.

[4] For one of the 119 Instagram users, a second informant report was available. We chose to include only one informant report to keep the results comparable to the other users; here, we included only the report from the informant who had known this user the longest.

[5] As we assessed one informant report per target and subsamples of informant types were of different sizes (see Tables S1 and S2 in the online Supporting Information) because targets appointed informants themselves, our data are not very well-suited for analyzing the influence of informant types (for detailed accounts of how *information quantity* and *quality* and the specific *relationship* between the target and judge can influence accuracy, see Beer, 2021; Letzring & Funder, 2021; for meta-analytic evidence on how accuracy for specific traits differed across acquaintance types, see Connelly & Ones, 2010).

[6] For Instagram activity, we included two cues with very low loadings (i.e., profile photos shows user's face, number of posts with embedded text) into a more comprehensive cue aggregate in terms of content for theoretical reasons. Values for the cue aggregate computed with versus without the two cues correlated $r = .97$ ($p < .001$). The two cue aggregate versions did not differ substantially in terms of alphas (.75 vs. .78), and cue validity correlations and cue utilization correlations computed for the cue aggregate without the two cues were almost identical to the results reported in the paper.

[7] Throughout the article, correlations were averaged using Fisher's *r*-to-*z* transformation.

[8] Influences other than cue processes, such as observers' utilization of valid stereotypes (instead of observable cues, see, e.g., Gosling et al., 2002), can affect trait accuracy.

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