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Italian validation of the Instagram Addiction Scale and association with psychological distress, social media addiction, smartphone addiction, and internet use disorder

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Abstract: The problematic use of *Instagram* in the form of addiction has gained increasing credibility and attention in recent years, leading to the development of several psychometric instruments to assess the behavior. One recently developed tool is the 15-item Instagram Addiction Scale (IAS-15). The IAS-15 comprises two subscales assessing social effect and compulsion. In the present study, the IAS-15 was translated into Italian, and its reliability and validity were tested among 398 Italians (101 males, 297 females) aged 18 to 78 years (mean age $M=37$ years; $SD=11$). Confirmatory factor analysis supported the original two-factor solution. Furthermore, the scale showed good internal consistency. Additionally, *Instagram* addiction was positively associated with social phobia, depression, anxiety, stress, social media addiction, smartphone addiction, and internet use disorder while being negatively associated with age, perceived quality of life, and quality of sleep. Based on the findings, the IAS-15 is a valid and reliable psychometric instrument to assess *Instagram* addiction among Italian adults.

Keywords: Instagram Addiction; Instagram Addiction Scale; Italian Validation; Psychometrics; Problematic Social Media Use; Social Media Addiction

Introduction

Social networking sites (SNSs) have the primary function of providing their users with a platform to communicate with a wide range of individuals. Initially, they simply allowed users to create their own profile, have a list of contacts, publish their content, and view the content of their connections. However, the possibilities offered have evolved over time. SNSs now provide many more benefits to users than simply staying in touch with family and friends (Huang & Su, 2018). In fact, its use for professional purposes has increased (including recruiting and personal branding), allowing users to form relationships with others who share common interests (personal and/or professional) or have fun playing together (Khalili, 2015).

Problematic internet use

Over the past two decades, internet addiction has become a topic of interest for researchers in the field of behavioral addictions. The first research began by focusing on similarities in terms of negative impact on individuals' lives (e.g., Griffiths, 1995, 1996; Young, 1998, 1999, 2004). While the question of whether researchers are overly pathologizing every day behaviors is ongoing (Billieux, Schimmenti, Khazaal, Maurage & Heeren, 2015), there are now hundreds of studies highlighting the negative consequences of excessive internet use and internet addictions (e.g., Xu et al., 2021; Li et al., 2021; Talis, 2022).

Internet addiction includes many of the same symptoms found in any behavioral addiction (Griffiths, 2005). Such symptoms include: mood modification (internet use leads to favorable changes in mood state), salience (cognitive and behavioral preoccupation with internet use), tolerance (increasing internet use over time), symptoms of withdrawal (the experience of unpleasant physical and emotional symptoms when internet use is limited or interrupted), conflict (interpersonal and intrapsychic problems resulting from internet use) and relapse (tendency to quickly revert to excessive internet use after a period of abstinence) (e.g., Echeburúa & Corral 2010; Griffiths, 2005; Kuss & Griffiths 2011).

In addition, some individuals use the Internet to cope with negative life events. Since dysfunctional coping behavior is associated with both substance and behavioral addictions, it is not surprising that there is an association between dysfunctional coping and problematic Internet use. (e.g., Yiğitoğlu & Keskin, 2019). Griffiths (2005) states that any individual who engages in a behavior that meets the six aforementioned criteria (i.e., mood modification, salience, tolerance, withdrawal, conflict, and relapse) should be operationally defined as addicted to that behavior.

Specific internet addictions

Griffiths (1998, 1999) also argued that the internet is a medium where addictive behavior can occur and that individuals have addictions *on*

the internet rather than *to* the internet. In fact, developments in internet technologies have fostered many different online applications in individuals' lives, leading to multiple different forms of online gratification (Montag et al., 2015). Recent cross-cultural studies have supported this argument by reporting that individuals have distinct forms of specific internet-related addictions, such as online addictions to gambling, video gaming, smartphone use, shopping, social media use, and pornography use (e.g., Király et al., 2014; Montag et al., 2015; Soraci et al., 2020a). Consequently, individuals' motivations for internet use have become increasingly varied and specific over time, leading to the need for research on many different online behavioral addictions.

However, it should be noted that, despite the evidence that many of these dysfunctional behaviors can be potentially addictive (i.e., Alavi et al., 2012; Griffiths, 2005), on the whole, they are not recognized in the official international diagnostic manuals such as the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) and the eleventh revision of the *International Classification of Diseases* (ICD-11; World Health Organization, 2019). This is due to several reasons, including (i) the lack of agreement among different researchers on the terminology to be used and (ii) the lack of empirical evidence, particularly in relation to internationally representative epidemiological and neurobiological research (Griffiths, 2022). At the time of writing, only gaming disorder (ICD-11), gambling disorder (DSM-5 and ICD-11), and internet gaming disorder (DSM-5) have been included as addictive disorders in international diagnostic manuals.

Problematic social media use

Research has shown that moderate use of social media can lead to many benefits, including improving the quality of human interaction and psychological well-being as well as specific uses such as providing a platform for long-distance learning on educational topics; Baumer, 2013; Garrett & Cutting, 2012; Baumöl et al., 2016; Schultz, 2016; Hutter et al., 2013). However, a growing number of studies have reported the more negative consequences of social media use (e.g., Griffiths, Kuss & Demetrovics, 2014; Kuss & Griffiths, 2017; Mäntymäki & Islam, 2016).

In these studies, it has been reported that problematic social media use (PSMU) can lead to negative effects psychologically, physiologically, and socially. For example, PSMU has been found to be associated with higher levels of depression, anxiety, and stress (e.g., Kircaburun, 2016), sleep-related problems (Vernon, Barber, & Modecki, 2015), lower psychological well-being (Satici & Uysal, 2015), lower life satisfaction (Satici, 2019; Satici & Uysal, 2015; Błachnio, Przepiorka & Pantic, 2016), greater loneliness (Błachnio et al., 2016; Ryan & Xenos, 2011; Ponnusamy, Iran Manesh, Foroughi & Hyun, 2019), poor real-life interactions (Savci & Aysan, 2017), lower academic achievement (Al-Yafi et al., 2018; Junco & Cotten, 2012), higher social anxiety (Foroughi et al., 2021), and low self-

esteem (Hawi & Samaha, 2017). In the aforementioned studies, the research focused on social media in general, but there has also been research examining the addictive potential of specific SNSs such as *Facebook*, *Twitter*, *Tinder*, and *YouTube* (Balakrishnan & Griffiths, 2017; Orosz, Toth-Király, Bőthe, & Melher, 2016).

***Instagram* addiction**

The most popular SNSs include *Facebook*, *Twitter*, *Tumblr*, *Flickr*, *Snapchat*, and *Instagram*, the latter being the subject of the present study. *Instagram* is a virtual platform created by Kevin Systrom and Mike Krieger and was launched in October 2010. Through *Instagram*, users can take personal photos and videos and share them with followers, who show approval by commenting or placing a ‘heart’ (Kim, Sally & Jung, 2017). Users can also edit their pictures through a built-in editor, *Instagram’s Filters*, which are effects that have proven to be very important and particularly popular with users and have contributed to *Instagram* becoming the world’s most used photo-sharing app.

Instagram is a strictly image-based SNS. Among the functions added after its launch (in addition to instant messaging) there are *Instagram Stories* (photos and videos available online for only 24 hours) and the *Instagram Live* function (allowing users to live-stream videos alongside live chat). At present, there are more than one billion active *Instagram* users worldwide (Statista Research Department, 2022b), which means *Instagram* has more average interactions per post than *Facebook* and *Twitter* (Cucu, 2022; Casalo, Flavian & Ibanez-Sanchez, 2017). Therefore, *Instagram* is one of the fastest-growing and most popular SNSs among young adults, with over 59% of its users between the ages of 18 and 29 years (Statista Research Department, 2022a; Cucu, 2022; Alhabash & Ma, 2017).

Several theories and factors can help explain the mechanisms of behavioral addictions, including personality factors (Katz et al., 1973; Rubin, 1993; Ryan, Chester, Reece & Xenos, 2014; Wegmann & Brand; 2016), family influences (Wampler et al., 1993), theories of uses and rewards (Armstrong et al., 2000; Cain et al., 2008; Campbell et al., 2007; Dambrun & Ricard, 2011; Ghassemzadeh et al., 2008; Goffman, 1956; Katz et al., 1973; Widyanto & Griffiths, 2011), neurophysiological influences (Nestler, 2013), operant conditioning (Delfabbro & Winefield, 1999; Dixon et al., 2006; Haw, 2008; Skinner 1974), and social learning theory (Bandura, 1986; Shaahmadi et al., 2021; Sherman et al., 2016; 2018).

Few specific studies in the literature relate *Instagram* addiction to these theories or factors (Kircaburun & Griffiths, 2018). Although they may represent important insights into explaining *Instagram* addiction, they need to be further tested through more detailed empirical research (Sharifi Fard et al., 2021). According to Kircaburun and Griffiths (2018), *Instagram* addiction is likely to be the result of several predisposing factors (e.g., internal motivations, cultural values, personality traits, genetic factors), sociocultural experiences (e.g., social learning, culture emphasizing

competence and competition), and behavioral reinforcers (e.g., financial gratification by sponsoring commercial products and advertising) and is, therefore, the result of complex biopsychosocial factors (Kircaburun & Griffiths, 2018). In accordance with this perspective, several researchers have suggested that a combination of biological, psychological, and social factors contribute to the etiology of addiction (Griffiths 2005; Shaffer et al. 2004). Consequently, *Instagram* addiction is likely to be a multifactorial construct that needs to be analyzed in multidisciplinary settings (Griffiths, 2005; Shaffer et al., 2004; Kircaburun & Griffiths, 2018).

Recent studies have determined that *Instagram's* engagement capabilities can pose a risk of addiction for a minority of users (Kuss & Griffiths, 2017). Concerns about the addictive use of social media have led to many studies investigating the causes and consequences of SNS addiction, particularly addiction to *Facebook* (e.g., Brailovskaia, Margraf & Köllner, 2019; Kenat-Maimon et al., 2018; Soraci et al., 2020a) and *Twitter* (e.g., Dwyer & Fraser, 2016). However, only a few studies examine *Instagram* addiction (e.g., Kircaburun & Griffiths, 2018; Ballarotto et al., 2021; Guizzo et al., 2021; Yurdagül et al., 2019; Yesilyurt et al., 2020).

These studies have shown that *Instagram* addiction is associated with excessive time spent daily on the internet and personality traits (i.e., agreeableness, conscientiousness are negatively linked to *Instagram* addiction) and self-liking (Kircaburun & Griffiths, 2018), psychopathological risk (Ballarotto et al., 2021), and negative mood, depression, stress, anxiety, and emotional fatigue (Sanz-Blas et al., 2019; Yurdagül et al., 2019). Other studies have reported relationships between *Instagram* addiction and poor mental health, low life satisfaction (D'Souza & Hemamalini, 2018, Jovic, Corac & Ignjatovic-Ristic, 2019; Yesilyurt et al., 2020; Yurdagül, et al., 2021), sexualized female pictures and body dissatisfaction (Guizzo et al., 2021), social anxiety, negative social comparison, impairments in an individual's real-life social relationships, and loneliness (Lopez & Polletta, 2021; Yurdagül et al., 2019; Yurdagül, et al., 2021) poor academic performance (Foroughi et al., 2021), lower self-esteem, low quality of sleep, bullying, fear of missing out, cyber aggressions, and sexual disorders (Sholeh & Rusdi, 2019; Longobardi et al., 2020).

The present study

In Italy (where the present study was carried out) there were over 28 million active users of *Instagram* as of March 2020 (Digital Italia, 2021). Despite the popularity of *Instagram* in Italy, only a few in-depth studies on problematic *Instagram* use have been conducted (e.g., Ballarotto et al.; 2021; Longobardi et al., 2020). One of the reasons could be the lack of translated and validated instruments using international guidelines (Boateng et al., 2018; Krach et al., 2017) to assess *Instagram* addiction in Italian territory. Ballarotto et al. (2021) developed the Italian Bergen Instagram Addiction Scale, a modified version of the six-item of Bergen Social Media

Addiction Scale which simply replaced the words ‘social media’ with the word ‘Instagram’). Although the authors claimed the scale had adequate psychometric properties there was no validation study and no description of the translation and adaptation process from English into Italian. In short, there has been no in-depth examination of the psychometric properties that are normally expected in developing a new scale (see: Boateng et al., 2018; Krach et al., 2017; Raykov et al., 2011). These shortcomings mean that from a psychometric point of view, it is not entirely suitable for assessing the risk of *Instagram* addiction in Italy.

In the international literature, there are a couple of psychometric instruments that assess *Instagram* addiction but neither have been translated or validated in Italian. These are the 15-item Instagram Addiction Scale (IAS-15; Kircaburun & Griffiths, 2018), and the 20-item Instagram Addiction Scale (IAS-20; Sholeh & Rusdi, 2019). Having a specific, valid, and reliable instrument to assess *Instagram* addiction would be helpful for a deeper understanding of the behavior in the Italian context. Consequently, the purpose of the present study was to translate and validate the IAS-15 into Italian context. In choosing which scale to validate in Italian, the present authors wanted a scale to have (i) a good factorial structure, (ii) good validity and reliability, (iii) a good balance between the number of items and the dimensions assessed (Diamantopoulos et al., 2021; Netemeyer et al., 2003) (iv) already been validated in other countries, and (v) a good theoretical basis featuring the core features of addiction (Griffiths 2005). Consequently, the 15-item Instagram Addiction Scale (IAS-15; Kircaburun & Griffiths, 2018) best fitted the aforementioned requirements.

The Instagram Addiction Scale (IAS-15; Kircaburun & Griffiths, 2018) was developed using a modified version of the Internet Addiction Test (Young, 1998) and was found to be a valid and psychometrically robust and reliable instrument (Kircaburun & Griffiths, 2018). The IAS-15 consists of a higher-order factor, which assesses *Instagram* addiction. In addition, two sub-factors can be derived. The first sub-factor is called ‘social affect’ (consisting of eight items, e.g. "*How often do you prefer the excitement of Instagram instead of spending time with your close friends?*"). The second sub-factor is called ‘compulsion’ (consisting of seven items, e.g. "*How often do you try to reduce the time you spend on Instagram and fail?*"). The social effect sub-factor refers to the negative effects of excessive *Instagram* use on individuals' relationships (e.g., family) and real-life social situations (e.g., ignoring friends in favor of staying connected on *Instagram*; Kircaburun & Griffiths, 2018). The compulsion sub-factor refers to the increasing need to use *Instagram* more and more over time, to avoid real-life problems by using *Instagram* as an escape tool and to the frequency of forgetting the time spent while connected on *Instagram*. These two factors comprise the six core components of addiction (mood change, salience, tolerance, withdrawal, conflict, relapse; for details see Griffiths, 2005).

In addition to the original study, the validation of the psychometric properties of the IAS-15 has been obtained in a couple of languages. In a

Greek sample of youth (18-24 years), Zarenti et al. (2021) reported satisfactory reliability indexes. Moreover, the results of the exploratory factor analyses were in line with the hypothesized structure. Sharifi Fard et al. (2021) investigated the factor structure and psychometric properties of the Persian version of the IAS-15 among Iranian students. Results of the confirmatory factor analysis, Cronbach's alpha, and test-retest methods showed adequate validity and reliability. Furthermore, correlation coefficients obtained from divergent validity with psychological well-being and life satisfaction scales were significant.

In addition to assessing the psychometric properties of the IAS-15, it was hypothesized that the IAS-15 would (i) positively correlated with stress, anxiety, depression, and social anxiety (e.g., D'Souza et al., 2018; Lopez & Polletta; 2021; D'Souza et al., 2018; Firestone, 2017), and the number of daily hours of *Instagram* and internet use (Kircaburun & Griffiths, 2018; Yesilyurt et al., 2020), and (ii) negatively correlate with self-esteem (Błachnio et al., 2016a; Firestone, 2017), perceived sleep quality (e.g. Alimoradi et al., 2019), and life satisfaction (Faelens et al., 2021; Firestone, 2017; Yurdagül et al., 2019; Yesilyurt et al., 2020). In addition, to evaluate the convergent and concurrent validity of the IAS-15, the present study incorporated the Bergen Social Media Addiction Scale (BSMAS), Internet Disorder Scale-Short Form (IDS9-SF), and Smartphone Application-Based Addiction Scale (SABAS) tests, which assess addictions to social networking, internet use, and smartphone use.

Methods

Participants and procedure

Participants were recruited on different Italian online forums and social media communities (e.g., *Facebook*, *WhatsApp*, *Telegram*, *Instagram*), via a link that advertised a survey hosted and completed on the *Google Forms* platform. The link was distributed by the research team, inviting individuals to participate voluntarily and anonymously. No reward was given to individuals for their participation. During a 30-day period (from February 2022 to March 2022), 405 individuals responded to the online survey, which took around 15-20 minutes to complete. The inclusion criteria were that participants had to be (i) at least 18 years old and (ii) Italian-speaking citizens. All the participants completed the survey anonymously after providing their informed consent online. Although 405 individuals started the survey, only 398 completed all the items.

Ethics

The study was approved by the ethics committee of the Istituto di Psicoterapia PsicoUmanitas, Rome, Italy and was in accordance with the 1975 Helsinki Declaration. Informed consent was obtained from all participants and they all participated voluntarily.

Measures

Socio-demographics, life habits, and general questions related to social networking and internet use: The survey included questions concerning the socio-demographic aspects of the participants (e.g., sex, age, educational level, relationship, work). These were followed by questions concerning the number of hours that participants spent daily on the internet, social media, and *Instagram*, the perceived importance of these online activities in their lives, and general online behavioral styles (such as how they established friendships or romantic relationships in these online settings). Furthermore, one question was asked about their perceived quality of sleep (i.e., “*How would you rate your perceived sleep quality taking into account the last 12 months?*” rated on a scale from 1 [very poor] to 5 [very good]) and their perceived quality of life (i.e., “*How would you rate your perceived quality of life taking into account the last 12 months?*” rated on a scale from 1 [very poor] to 5 [very good]). Examining these variables, in particular their perceived quality of sleep and quality of life, was important to strengthen the construct validity of the Italian version of the IAS-15 given that online addiction is frequently associated with a lower quality of life and a lower quality of sleep (Alimoradi et al., 2019).

Instagram Addiction Scale (IAS-15): The 15-item IAS (Kircaburun & Griffiths, 2018) was used to assess the risk of *Instagram* addiction. Items (e.g., “*How often do you try to cut down the amount of time you spend on Instagram and fail?*”) are rated on a six-point Likert scale from 1 (*never*) to 6 (*always*) with scores ranging from 15 to 90. The higher the score, the greater the risk of *Instagram* addiction. The scale comprises two sub-factors: social effect (eight items: e.g., “*How often do you prefer the excitement of Instagram instead of being with your close friends?*”) and compulsion (seven items: e.g., “*How often do you try to cut down the amount of time you spend on Instagram and fail?*”). The social effect subfactor refers to negative consequences of addictive *Instagram* use in relation to individuals’ real-life social relationships. The compulsion subfactor refers to the increasing need for *Instagram* use, the frequency of forgetting about time while on *Instagram*, and the avoidance of real-life troubles using *Instagram* (Shahada et al., 2021).

The scale was translated from English into Italian in the present study following the protocol described by Beaton et al. (2000). More specifically, the scale was translated from English into Italian by a native speaker. Subsequently, the authors of the present study, independently translated the items from English into Italian. Then, the items and translations were compared with each other and with the original version of the scale in English (i.e., back-translation). No significant discrepancies were found between the compared versions. Finally, the items that best reflected the original meaning were kept, following the supervision and agreement of all authors. Additionally, the Italian IAS-15 (see Appendix A) was piloted on 10 participants of different ages and education levels to

investigate if there were any problems in understanding the items. No text comprehension problems were detected.

Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965): The RSES (Rosenberg, 1965; Italian version: Prezza et al., 1997) was used to assess self-esteem. Items (e.g., “*On the whole, I am satisfied with myself*”) are rated on a four-point Likert type scale from 0 (*strongly disagree*) to 3 (*strongly agree*). Scores range between 0 and 30 and higher scores indicate greater self-esteem. Cronbach's alpha in the present study was excellent ($\alpha=.913$). We used this measure because of research evidence (e.g., Hawi & Samaha, 2017; Satici, 2019; Satici & Uysal, 2015; Błachnio, Przepiorka & Pantic, 2016) suggesting that greater dependence on *Instagram* generally corresponds to lower self-esteem.

Depression Anxiety Stress Scale-21 (DASS-21): The 21-item DASS-21 (Henry & Crawford, 2005; Italian version: Bottesi et al., 2015) was used to assess depression, anxiety, and stress (and psychological distress more generally). Items refer to the previous week and are rated on a four-point scale from 0 (*not at all*) to 3 (*very much*) on the three constructs: depression (e.g., “*I felt like I had nothing to look forward to*”), anxiety (e.g., “*I felt close to a panic attack*”), and stress (e.g., “*I found it difficult to relax*”). Scores on each subscale range from 0 to 21. A higher score indicates greater anxiety, stress and depression on each subscale. Cronbach's alpha in the present study was excellent ($\alpha=.941$ for the total DASS-21 score, $\alpha=.935$ for the depression subscale, $\alpha=.934$ for the anxiety subscale, and $\alpha=.940$ for the stress subscale). We used this measure because research evidence (e.g., Vernon, Barber, & Modecki, 2015) has suggested that a greater dependence on *Instagram* generally corresponds to a greater level of anxiety, depression, and stress.

Bergen Social Media Addiction Scale (BSMAS): The six-item BSMAS (Andreassen et al., 2016; Italian version: Monacis et al., 2017) was used to assess the risk of social media addiction over a period of 12 months. The six items (e.g., “*Over the past 12 months, have you spent a lot of time thinking about social media or have you planned to use them?*”) are rated on a five-point scale from 1 (*never*) to 5 (*very often*) with scores ranging from 6 to 30. A higher score indicates a greater risk of social media addiction. Cronbach's alpha in the present study was excellent ($\alpha=.917$). This scale was used to establish convergent validity.

Severity Measure for Social Anxiety Disorder (Social Phobia)–Adult (SMSADSP-A): The 10-item SMSADSP-A (LeBeau et al., 2016; Italian version: Fossati et al., 2015) was used to assess the severity of social anxiety symptoms. Items (e.g., “*During the last 7 days, I distracted myself to avoid thinking about social situations*”) are rated on a five-point scale from 0 (*never*) to 4 (*all the time*). The total score can range from 0 to 40, with higher

scores indicating greater severity of social anxiety disorder. Cronbach's alpha in the present study was excellent ($\alpha=.937$). This scale was used because social anxiety correlates with the construct of *Instagram* addiction (e.g., Savci & Aysan, 2017; Foroughi et al., 2021).

Internet Disorder Scale–Short Form (IDS9-SF): The nine-item IDS9-SF (Pontes & Griffiths, 2016; Italian version: Soraci et al. 2020b) was used to assess internet use disorder. The nine items were adapted from the nine criteria for IGD in the latest (fifth) edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association, 2013). Items (e.g., “*Do you have difficulties in trying to control, cut down, and/or cease your Internet online usage?*”) are rated on a five-point scale from 1 (*never*) to 5 (*very often*). Scores range from 9 to 45 with higher scores indicating a greater risk of internet use disorder. The Cronbach's alpha in the present study was excellent ($\alpha=.954$). This scale was used to establish convergent validity.

Smartphone Application-Based Addiction Scale (SABAS): The six-item SABAS (Csibi et al. 2018; Italian version: Soraci et al., 2021) was used to assess the risk of smartphone application-based addiction. Items (e.g., “*If I cannot use or access my smartphone when I feel like, I feel sad, moody, or irritable?*”) are rated on a six-point scale from 1 (*strongly disagree*) to 6 (*strongly agree*). Scores range from 6 to 36 with higher scores indicating a greater risk of smartphone addiction. The Cronbach's alpha in the present study was excellent ($\alpha=.927$). This scale was used to establish convergent validity.

Statistical analysis

In the present study, as a first step, the univariate normality of the data was examined using the guidelines proposed by Muthén and Kaplan (1985), which outline an asymmetry and a kurtosis in the interval from -1 to $+1$ as the ideal range of items and the Shapiro-Wilk normality test is not significant at $p<0.01$ (Mishra et al., 2019). Then, the following statistical analyses were performed: (i) descriptive statistics of the IAS-15 items (i.e., means [M], standard deviations [SD]); (ii) criterion, convergent, and concurrent validity of the IAS-15; (iii) reliability of the scale, examined by internal consistency (i.e., Cronbach alpha [Cronbach, 1951] or McDonald's omega [McDonald, 1999]). Finally, the factorial structure of the Italian IAS-15 was tested using confirmatory factor analysis (CFA). Furthermore, the indices recommended by Kline (2015) and Lei and Wu (2007) for the CFA were used in the following way to indicate a good factorial model: NNFI (non-normed fit index $\geq .95$), CFI (comparative fit index $\geq .95$), GFI (goodness of fit index ≥ 0.95), AGFI (adjusted goodness of fit index $\geq .95$), RMSEA (root mean square error of approximation $\leq .08$), and RMSR (root mean square of residuals $\leq .08$) and with acceptable saturation on all items ($\lambda_{ij} \geq .50$ in the absence of a secondary factor loading and $\lambda_{ij} \geq .30$ in the

presence of secondary factor loadings: Costello & Osbourne 2005; Ferguson & Cox, 1993).

Furthermore, the average extracted variance (AVE) was calculated ($\geq .50$ for AVE were considered adequate, Hair et al. 2006). The extraction of the factors for CFA was carried out utilizing the diagonal weighted least squares estimation (DWLS) method. Additionally, to investigate the quality and replicability of the construct, several indicators were used: H coefficient ($\geq .70$ for H is considered acceptable; Hancock & Mueller 2001); overall reliability of fully informative prior oblique N-EAP scores (ORION $>.80$ are adequate: Ferrando & Lorenzo-Seva; 2016), and the factor determinacy index (FDI $>.80$ are adequate: Ferrando & Lorenzo-Seva; 2016). Moreover, to check the difference between the mean of two or more groups, *t*-tests and ANOVAs were used in case of normal distributions, and Mann-Whitney and Kruskal-Wallis tests in case of non-normal distributions. For correlations, Pearson's correlation coefficients were used for normal distributions and Spearman's coefficients for non-normal distributions.

Mundfrom et al. (2005) suggested the minimum for sample sizes include from 3 to 20 times the number of variables for a CFA. In the present study, there were 15 IAS items. With a sample size of 398 in the present study, it was deemed acceptable. The analyses were performed using JASP version 0.16 (JASP Team, 2021) and “R” software (R Core Team 2014) with the lavaan package (Yves Rosseel, 2011).

Results

Main sociodemographic characteristics

Of the 398 participants 74.62% were female ($n=297$) and 25.38% were male ($n=101$). Although the sample was imbalanced regarding gender, it had an adequate number of participants to ensure robust data analysis. The mean age of participants was 37.20 years ($SD=11$). In relation to education level, 60.5% had a university-level degree or higher ($n=242$), 37% had a high school degree ($n=147$), and 2.5% had a lower secondary degree ($n=10$). Most of the sample comprised employees (50.49%, $n=201$). For further socio-demographic characteristics and the main tests used, see Tables 1 and 2.

Table 1. Main socio-demographic characteristics of the participants (n=398).

	Frequency	Percentage
<i>Gender</i>		
Female	297	74.62
Male	101	25.37
<i>Educational qualification</i>		
High school diploma	147	36.93
University degree	166	41.70
Elementary school diploma	1	0.25
Middle school diploma	8	2.01
Postgraduate/PhD	76	19.09
<i>Principal occupation</i>		
Unemployed	44	11.54
Employed	201	50.49
Self-employed	84	21.10
Retired	7	1.75
Student	44	11.05
Other*	18	4.52
Total	398	100.00

* Note: Type of work that does not fall into the other categories

Smartphone, internet and social media use

The majority of participants (61%) used their smartphones to carry out both professional and personal activities ($n=246$). The time spent on their smartphones was mainly for chatting excluding social networking (43%, $n=173$), followed by social networking (34%, $n=134$). Most of the sample (50%, $n=199$) used social networking for entertainment purposes. The average daily use of (i) the internet was 4.90 hours ($SD=3.168$); social networking was 3.10 hours ($SD=2.757$), and *Instagram* use was 1.737 hours ($SD=2.305$). Regarding the perceived importance of the internet and social networking in their lives, the average score (out of 5) for the internet was 3.87 ($SD=.932$), social networking was 2.917 ($SD=1.013$), and *Instagram* use was 2.08 ($SD=1.146$).

Table 2. Descriptive statistics of the main psychometric scales and their subscales

	Mean	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
IAS Total score	26.54	18.35	2.02	0.12	3.29	0.24
IAS Social effect score	19.55	13.42	2.01	0.12	3.28	0.24
IAS Compulsive score	6.99	5.11	1.94	0.12	2.78	0.24
DASS21 Total score	46.77	21.50	0.80	0.12	-0.46	0.24
DASS21 Anxiety score	13.65	7.40	1.19	0.12	0.30	0.24
DASS21 Depression score	15.13	7.78	0.82	0.12	-0.55	0.24
DASS21 Stress score	17.98	7.80	0.34	0.12	-1.07	0.24
SABAS Total score	12.78	7.24	1.25	0.12	0.71	0.24
IDS9-SF Total score	16.36	8.99	1.41	0.12	0.89	0.24
SMSAD Total score	8.59	10.00	1.28	0.12	0.48	0.24
BSMAS Total score	11.86	5.83	1.23	0.12	0.64	0.24
RSES Total score	20.72	7.15	-0.62	0.12	-0.45	0.24

Note: BSMAS=Bergen Social Media Addiction Scale, IAS=Instagram Addiction Scale, SABAS=Smartphone Application-Based Addiction Scale, IDS9-SF=Nine-item Internet Disorder Scale–Short Form, SMSAD= Severity Measure for Social Anxiety Disorder (Social Phobia), RSES= Rosenberg Self Esteem Scale

Confirmatory factor analysis (CFA) of the Italian Instagram Addiction Scale (IAS-15)

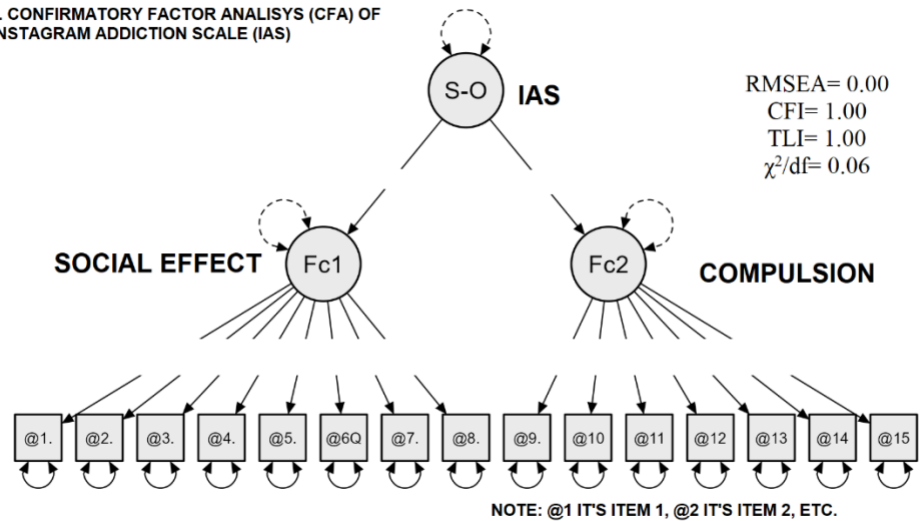
As a first step, the distribution of the items in the IAS-15 was analyzed. Most of the items (see Table 3), were distributed asymmetrically (i.e., a positive asymmetric distribution, with the highest frequencies in the lowest values). Inspecting for skewness and kurtosis, most of the items were distributed in a non-normal way (i.e., the items did not fall within the range of ± 1). Given the non-normality of the items of the IAS-15, all the subsequent analyses (i.e., CFA, reliability, validity) were carried out using an approach adapted to this situation (i.e., using appropriate indexes adapted to non-normality, such as Spearman's r coefficient for correlations, McDonald's Omega [ω] for reliability, and non-parametric tests [i.e., Kruskal-Wallis Test], etc.). In order to analyze the factorial structure of the IAS-15 (Figure 1), since there is no consensus in the literature (i.e., Boomsma, 2000), different goodness of fit indexes was used. Given the non-normal distribution of the items, diagonal weighted least squares estimation method (bias-corrected and accelerated [Bca] with 95% confidence interval, 500 random sample, polychoric correlation) was used for the CFA (Mindrila, 2010). The results indicated that: $\chi^2 = 5.717$ ($df = 88$; $\chi^2/df = .06$ [$\chi^2/df < 3$ or less indicate a good fit model, Hu & Bentler, 1999]), $p = 1.00$ (i.e., not significant at $p < .05$), CFI=1.00, TLI=1.00, NNFI=.99, RMSEA=.00 (CI 90% Upper Bound=.00, Lower Bound=.00, $p = 1.00$, i.e. not significant for $p < .05$), SRMR=.020, GFI=.99, AVE=.91 (i.e. 91% for both factor take together), ECVI=.176 (lower ECVI value [i.e. near to zero] indicates better mode fit; see Browne et al., 1992).

In addition, to investigate the general stability, replicability, and cross-validation stability of the factor, the following indices were obtained: H-coefficient=.980 (for Factor 1) and .996 (for Factor 2), ORION=.980 (for Factor 1) and .996 (for Factor 2), FDI=.990 (for Factor 1) and .998 (for factor 2). Furthermore, all factor loadings (standardized) were high on all items (λ_{ij} min = .72, λ_{ij} max = .95) and all items had a statistically significant factor loading ($p < .01$). Furthermore, all items were positively related to each other (Spearman's r correlation, min = .53, max = .80; see Table 4 for details).

Table 3. Descriptive statistics of the 15 Instagram Addiction Scale items

	Mean	Std. Deviation	Skewness	Std. Error of Skewness	Kurtosis	Std. Error of Kurtosis
Item 1	1.69	1.29	1.98	0.12	2.93	0.24
Item 2	1.76	1.33	1.83	0.12	2.30	0.24
Item 3	1.97	1.54	1.42	0.12	0.67	0.24
Item 4	1.76	1.36	1.73	0.12	1.82	0.24
Item 5	1.66	1.30	1.99	0.12	2.83	0.24
Item 6	1.69	1.30	1.89	0.12	2.50	0.24
Item 7	1.59	1.26	2.17	0.12	3.62	0.24
Item 8	1.58	1.27	2.24	0.12	3.87	0.24
Item 9	1.84	1.45	1.63	0.12	1.42	0.24
Item 10	2.01	1.48	1.31	0.12	0.47	0.24
Item 11	1.95	1.44	1.38	0.12	0.73	0.24
Item 12	1.74	1.36	1.78	0.12	1.97	0.24
Item 13	1.55	1.26	2.31	0.12	4.17	0.24
Item 14	1.72	1.32	1.86	0.12	2.36	0.24
Item 15	1.96	1.45	1.48	0.12	1.02	0.24

FIGURE 1. CONFIRMATORY FACTOR ANALYSIS (CFA) OF ITALIAN INSTAGRAM ADDICTION SCALE (IAS)



Reliability and validity

Different types of reliability (i.e., internal consistency) and validity (i.e., construct, convergent, and concurrent validity) were investigated. McDonald's omega (ω) in the present study was $\omega=.982$ for the overall scale (all 15 items taken together, CI 95% lower bound=.979 - upper bound=.985) and could not be improved by removing any items ($\omega=.970$ for Factor 1 and $\omega=.964$ for Factor 2). Also, the composite reliability (CR, a measure of internal consistency in scale items [Netemeyer, 2003]) produced the following results: CR =.985 (a reasonable threshold being > .80). Subsequently, the correlation matrix between the IAS-15 and the other divergent, concurrent, and convergent constructs considered in the present study were investigated to confirm whether the observed correlation path confirmed the construct validity of the IAS-15. The strength and direction were assessed following the guidelines of Cohen (1988).

The correlations between the IAS-15 and the main scales used are described in Table 4. The IAS-15 score was positively and significantly associated with scores on the Bergen Social Media Addiction Scale ($r=.563$, $p<.001$), Depression Anxiety Stress Scale-21 ($r=.458$, $p<.001$), Depression Anxiety Stress Scale-21–Depression factor ($r=.446$, $p<.001$), Depression Anxiety Stress Scale-21–Anxiety factor ($r=.446$, $p<.001$), Depression Anxiety Stress Scale-21–Stress factor ($r=.391$, $p<.001$), Smartphone Application-Based Addiction Scale ($r=.565$, $p<.001$), Internet Disorder Scale-Short Form ($r=.578$, $p<.001$), and Severity Measure for Social Anxiety Disorder (social phobia) ($r=.563$, $p<.001$). The IAS-15 score was negatively and significantly associated with the score on the Rosenberg Self Esteem Scale test ($r=-.413$, $p<.001$). Then, the correlations between the IAS-15 score and the other variables were examined. The IAS-15 score was positively and significantly associated with average daily hours of internet

use ($r=.228$), average daily hours of social networking ($r=.493$), and average daily hours of *Instagram* use ($r=.772$), perceived importance of social networking ($r=.354$), perceived importance of *Instagram* use ($r=.669$), establishing friendships on social networks ($r=.376$), establishing romantic/loving relationships on social networks ($r=.432$), and frequency of checking daily updates on *Instagram* ($r=.758$). The IAS-15 score was negatively and significantly ($p<0.05$) associated with age ($r=-.540$), perceived sleep quality ($r=-.160$), and perceived quality of life ($r=-.245$).

Table 4. Spearman's rho correlations between the Instagram Addiction Scale (total score) and the main scales used

	Instagram Addiction Scale	
Instagram Addiction Scale	—	
Depression Anxiety Stress Scale-21	0.45	***
Depression Anxiety Stress Scale-21 – Anxiety	0.44	***
Depression Anxiety Stress Scale-21 – Depression	0.46	***
Depression Anxiety Stress Scale-21 – Stress	0.39	***
Smartphone Application-Based Addiction Scale	0.56	***
Internet Disorder Scale–Short Form	0.57	***
Severity Measure for Social Anxiety Disorder	0.54	***
Bergen Social Media Addiction Scale	0.56	***
Rosenberg Self-Esteem Scale	-0.41	***

Note: * $p<.05$, ** $p<.01$, *** $p<.001$.

Group differences on the Instagram Addiction Scale

Next, the mean group differences on IAS-15 score were examined. Regarding gender, the results showed that the difference was significant ($W=12031$, $p<.01$, effect size=.198; (absolute value, rank biserial correlation), with the males ($M=33.762$ $SD=23.235$) showing a higher mean IAS-15 score compared to females ($M=24.101$ $SD=15.705$). Regarding the level of education, the results indicated a significant mean difference (Kruskal-Wallis statistic=9.255, $df=3$, $p<.05$). More specifically, the highest mean IAS-15 score was among the group of graduates (mean Higher Diploma $M=29.245$, $SD=20.210$) (see Table 5 for other mean scores).

Table 5. Difference between IAS mean averages and education level

Education Level	Mean	SD
Elementary/middle school	19.37	4.74
High school Diploma	29.24	20.21
University degree	26.82	18.73
Postgraduate/PhD	21.53	13.00

Discussion

The present study investigated the psychometric properties of the Italian version of the 15-item Instagram Addiction Scale (IAS-15). The results indicated a stable factorial structure (all the good fit indices were adequate), confirming the findings of the original validation study by Kircaburun and Griffiths (2018). The analysis of the Italian IAS-15 reliability and validity coefficients showed good and consistent psychometric properties. More specifically, comparing the goodness of fit indices (GOFs) with the other validation studies (i.e., Greek [Zarenti et al., 2021] and Persian [Sharifi Fard et al., 2021] versions), the present study found similar or better values (i.e., RMSEA, GFI). These results demonstrate that the Italian IAS-15 is very robust from a factorial structure

point of view and the factor loadings of the items were all significant and high.

The two sub-factors constituting the IAS-15 were positively and significantly correlated with each other, and the results provided evidence that the Italian IAS-15 has excellent internal consistency and a very good level of AVE and CR. All the hypotheses were confirmed. More specifically, a positive and significant association was found between *Instagram* addiction and anxiety, depression, and stress. This confirms what has already been found in previous research on the IAS-15 (e.g., Zarenti et al., 2021) and underlines how a behavioral addiction, in this case *Instagram* addiction, may negatively and significantly affect a person's mental and physical health (although the present study is unable to determine the direction of the association).

The relationship between anxiety, depression, stress, and *Instagram* addiction is complex and multifaceted and may be explained by several factors. Regarding the levels of stress, Sanz-Blas et al. (2019) reported a similar finding in a study comprising 345 *Instagram* users. In fact, stress and emotional fatigue were associated with *Instagram* addiction. Elevated scores on the anxiety subscale might be caused by several intrinsic elements of the *Instagram* use, such as the fear of losing followers, the fear of missing out, as well as the preoccupation toward physical appearance. Finally, the high rates of depression may be explained by multiple factors regarding individuals' quality of life and relationships. For instance, Błachnio et al. (2018) observed that individuals affected by loneliness and social isolation are more likely to develop behavioral addictions.

IAS-15 scores were negatively associated with perceived quality of life and sleep quality which is in accordance with previous research (Lowe-Calverley et al., 2019; Sanz-Blas et al., 2019). For instance, *Instagram* users have access to the flow of updates over the day and night, regardless of the working and sleeping hours. The struggle for individuals to keep themselves tuned to these rhythms may result in the feeling of inadequacy, as well as in the misuse of social media. The attempt to gather as much information as possible (Zarenti et al., 2021) may increase the levels of anxiety, stress, and depression. Furthermore, *Instagram* can be used as a temporary escape from real life and/or as a coping strategy, from those life events that are perceived as stressful, depressing and/or uninspiring, by those individuals who feel susceptible to such triggers (Zarenti et al., 2021).

A negative association between IAS-15 scores and self-esteem has previously been found (i.e., Ardiana & Tumanggor, 2020), confirming the present study's hypothesis. As reported by Błachnio et al. (2016a), users with low self-esteem might be pushed to publish their images more often to increase their self-esteem, in order to receive positive 'likes' and comments, which can increase, momentarily and relative to the "context of *Instagram*", person's self-esteem. A low self-esteem is associated with behavioral addictions, and the present study appears to confirm this is the case with *Instagram* addiction. In addition, individuals with low self-esteem tend to

consider social media a safer place to express themselves than individuals with high self-esteem (Ardiana & Tumanggor, 2020; Forest & Wood, 2012).

In the present study, positive and significant associations were found between problematic smartphone use, *Instagram* addiction, internet addiction, and social media addiction. This indicates that (i) different types of behavioral addictions can probably be present simultaneously within person (comorbid behavioral addictions) although there is mutual overlap among all these behaviors, and (ii) different addiction constructs can be interconnected and associated with each other (Starcevic & Khazaal, 2017; Tang et al., 2020). Furthermore, these findings strengthen the convergent validity of the IAS-15 in the present study.

Although *Instagram* addiction appears to be associated with other constructs (e.g., smartphone, addiction, internet addiction, and social media addiction), they do not correspond perfectly. This confirms that the Instagram Addiction Scale can be employed to assess the users' behavior on *Instagram* more accurately than other similar tools (such as the BSMAS, which assesses the risk of social media addiction in general). Scores on the IAS-15 scores were positively associated with (i) the perceived importance of social media (such as *Instagram*), (ii) the opportunity to create friendships or romantic relationships on social network sites, and (iii) frequent daily checking of *Instagram* updates. These results reflect what has been reported in previous research (e.g., Sanz-Blas et al., 2019). As reported in other studies, establishing friendships and romantic relationships can be facilitated by *Instagram* (see Sharifi Fard et al., 2021). In addition, establishing romantic relationships and friendships via *Instagram* (and social networks more generally) can lead an individual to perceive the social network (and in this case *Instagram*) as the main or unique tool for the satisfaction of basic social needs, and for this reason increases in importance over time. Moreover, it may lead an individual to check updates on the social network more frequently, waiting, for example, for a message or an update from other individuals with whom they have established friendships or romantic relationships.

A positive and significant association was found between IAS-15 scores and the hours spent daily on *Instagram*. This finding is unsurprising because many users spend a lot of time on *Instagram*, for fun or to promote their image and increase their number of followers. However, excessive time spent on the internet, social network sites, and *Instagram* may be predictive of a behavioral addiction (Sanz-Blas et al., 2019) as well as being associated with higher levels of stress (Sanz-Blas et al., 2019). A significant and negative association between users' age and *Instagram* addiction was found. This result confirms the already existing literature (e.g., Perrin, 2015) and indicates that younger individuals are more likely to use *Instagram* for more hours a day and, for this reason, a small minority may develop addictive behaviors.

Furthermore, the findings of the present study confirm those of Foroughi et al. (2021) who reported a positive relationship between *Instagram* addiction and social anxiety. More specifically, previous studies (e.g., Frost & Rickwood, 2017) have shown that social anxiety can result from a fear of being judged in a negative way by others and this can exacerbate the dynamics that drive social media users to keep themselves logged-in (Joffres et al., 2015; Foroughi et al., 2021).

Regarding educational level, a significant difference was found between the categories of education. More specifically, a higher level of education was associated with a lower severity level of *Instagram* addiction, in accordance with previous research (e.g., Pekpazar et al., 2021). Moreover, a significant difference was found in relation to gender, with males showing higher mean IAS-15 score than females. This result is partially unexpected and may be due to several factors, including, (i) the inherent characteristics of the sample that participated in the study and (ii) the imbalanced number of males and females (this is probably because the survey was mainly disseminated in psychology faculties, where the percentage of females is much higher than that of males)

Limitations and future research

There are some limitations in the present study. More specifically, the cross-sectional research design, in addition to the convenience sample and self-reported data, can result in biased outcomes (e.g., content sensitive response bias such as social desirability). Although the survey was anonymous, participants may have been ashamed to report their problems. Regarding the non-random and voluntary sample, it cannot be considered representative of the entire population (and therefore generalizability of the findings is limited). Additionally, the sample included a higher proportion of females, and this imbalance can lead to high variability in the results. Another limitation lies in the use of single-item questions, such as those concerning perceived quality of life and sleep quality. Another limitation is that of having considered, in the confirmatory factor analysis, all participants, without having divided them into categories of social network use.

Although the results appear consistent with what has already been found in the literature, future studies will need to use more robust and valid psychometric tests to further confirm the findings of the present study. Future research could investigate and extend other psychometric characteristics with a larger and more representative sample of the Italian population (including a more adequate gender balance). For example, further interesting results may come from performing a confirmatory factor analysis using measurement invariance for gender and/or education level. Future studies would deepen the knowledge of the phenomenon of *Instagram* addiction in the Italian territory, taking into consideration other factors and variables, such as personality factors, social factors, and other factors not considered in the present study. Moreover, future research

should be planned, preferably to investigate the cause-and-effect link between social anxiety, anxiety, stress and depression and *Instagram* addiction using longitudinal and experimental designs. Given that the present study did not analyze the stability of the psychometric characteristics (e.g., test–retest reliabilities), the study should be replicated adopting longitudinal designs to test the stability of the IAS-15. Additionally, a longitudinal design would be useful in examining the causal relationship among the different behavioral addictions that are likely to be present in comorbidity (e.g., Internet addiction, smartphone addiction, and *Instagram* addiction).

Conclusion

The present study translated and validated the IAS-15 in the Italian context and investigated the association between the construct of *Instagram* addiction and the main (convergent and divergent) constructs associated with it (e.g., anxiety, stress, depression, self-esteem, social anxiety). The analysis demonstrated that the IAS-15 yielded strong psychometric properties in terms of factor structure with indices of good adaptation that make it a robust and reliable instrument. The findings here are in line with those obtained in the original study (Kircaburun & Griffiths, 2018) and two other validation studies (i.e. Greek [Zarenti et al., 2021] and Persian [Sharifi Fard et al., 2021] versions) demonstrating: (i) the stability and coherence of the IAS-15 (ii) the replication of the scale’s factorial structure, (iii) items with high and significant factor loadings, and (iv) the adequate indices of fit between the data and the proposed model (as demonstrated in the CFA). This makes the Italian IAS-15 a valuable tool for assessing the severity of *Instagram* addiction among Italian adults, especially in the context of epidemiological research.

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Declaration of conflict of interest

None.

Availability of data and material

The data is available below via a reasonable request.

Author’s contributions

All authors contributed to the drafting of the manuscript

Ethics and informed consent

Informed consent was obtained from all participants, and they all participated voluntarily.

Ethics Approval

The study was approved by the ethics committee of the *Istituto di Psicoterapia PsicoUmanitas*, Rome, Italy and was in accordance with the 1975 Helsinki Declaration.

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