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Research Article

Italian Version of the Internet Self-Efficacy Scale: Internal and External Validation

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Online activities are a fundamental part of daily life in this digital era and Internet self-efficacy (ISE) became a central construct for the psychologists of virtual environments. The Internet Self-Efficacy Scale developed by Kim and Glassman (2013) is a recent, valid, and reliable 17-item test to assess the ISE. The aim of this research, composed by two studies, was to translate and validate the Italian version of the ISS. In study 1, we evaluated the factorial validity and internal consistency of the Italian version of the ISS on 3724 individuals. In study 2, we tested the ISS external validity relying on the Bergen Social Media Addiction Scale (BSMAS) and the Internet Addiction Scale (IAS) based on the answers of 244 participants. The findings supported the reliability and validity of the translated ISS and its use for assessing ISE on the Italian population. Implications for researchers and interventions are also discussed.

1. Introduction

Digital, mobile, and social media have become an indispensable part of everyday life for people all over the world. The use of the "domestic" World Wide Web has spread in the mid-1990s, and since that moment, it has not stopped revolutionizing the lives of those who use it. We rapidly moved from a Web 0.1 (static) to a Web 0.2 (dynamic), characterized by an active participation and a high level of interaction and communication between users [1]. Especially starting with the COVID-19 pandemic, we have witnessed an increase in the use of the internet for primary needs, e.g., remote-learning [2], remote-working [3, 4], or e-services [5]: in 2020, social media users grew at the fastest rate in three years to 4.20 billion. As for Internet users, the trend was roughly the same with 4.66 billion people around the world using the Internet at the beginning of 2021, with an increase of 7.3% [6]. Although the advantages of using the web are numerous, it has been proven how the desire to use the Internet is not sufficient per se to predict its adoption [7, 8]. Indeed, in order to use the Internet, one must also have the perceived ability to deal effectively with the challenges inherent to web activities. This includes knowing how to use technological devices, establishing and maintaining a stable Internet connection, learning how to navigate on the Internet, and searching it for relevant information [9]. That is why Internet self-efficacy (ISE), that is the belief in one's capabilities to organize and execute courses of Internet actions required to produce given attainments, is an important factor for the Internet users and for the decision to use it [9].

Self-efficacy [10], in real life, is a direct and indirect factor in willingness and ability to use new information technologies to their potential [11]. Within the social cognitive theory [10], self-efficacy is not a measure of skill but rather it reflects what individuals believe they can do with the skills they possess. Therefore, self-efficacy is defined as people's belief in their ability to reach certain levels of performance; beliefs of self-efficacy determine how people feel, think, motivate themselves, and behave [12]. When the researchers applied the concept of self-efficacy to virtual environments, different definitions were provided, each of

which highlighted different aspects. The first measurement we can find in the literature to assess online self-efficacy is related to computer usage: Computer Self-Efficacy (CSE) is "an individual perception of his or her ability to use computers in the accomplishment of a task" or "a judgment of one's capability to use computers" [13]. We can also find social media self-efficacy [14], web self-efficacy [15], or online technologies self-efficacy [16]. In this study, we focused on Internet self-efficacy (ISE), or the belief that one can successfully perform a distinct set of behaviors required to establish and maintain and utilize effectively the Internet over and above basic personal computer skills [17]. Other authors defined it as a "self-belief in one's ability to execute online-related tasks in an Internet environment, to organize and perform appropriate actions, to make achievements that individuals need, and to extend such capabilities to the future" [18].

The importance of the ISE has also been discussed in connection with its related behavioral outcomes, since Internet self-efficacy seems linked to a variety of Internet related variables and others domain-specific self-efficacy. In this sense, literature reports that ISE has relations with behavioral outcomes such as frequency and experience of Internet use [19–21], performance [22, 23], attitude toward the Internet [21, 24], Internet anxiety [25, 26], and online behaviors like online shopping [21], cyberbullying and cyber victimization [20, 27], and antiphishing behavior [18]. Moreover, Internet self-efficacy scores are related to others domain-specific self-efficacy like general self-efficacy [20], computer self-efficacy, academic self-efficacy [24], specific web self-efficacy [28], and antiphishing self-efficacy [18].

Over time, many studies and researchers have developed scales for measuring the Internet self-efficacy. Here, a small review of the most used scales:

(i) The Internet self-efficacy [17] is an eight-item measure of Internet self-efficacy (e.g., "I feel confident describing functions of Internet hardware;" "I feel confident understanding terms/words relating to Internet software") using a seven-point Likert scale (agreement-disagreement) to assess the participants' confidence in being able to use the Internet in each of the specified ways. Substantial factor loadings and a standardized Cronbach alpha of .93 were obtained, indicating adequate internal consistency

(ii) The Internet Self-Efficacy Survey [29] was modified from previous study [30], and it included two subscales, consisting of five and four items, respectively, using a six-point Likert scale (strongly confident/strongly unconfident). The two scales were the "General self-efficacy scale," measuring students' self-efficacy in general, such as using Internet-related tools (e.g., "I am good at searching information on the Internet.") and the "Communicative self-efficacy scale," assessing students' confidence and expectation of Internet based communication or interaction (e.g., "I think I can talk to others in online chatrooms."). The alpha coefficients were 0.91 for the whole scale and 0.90 and 0.85 for these two subscales, respectively; 71% variance were explained by this tool

(iii) The Internet Self-efficacy Survey [31] is based on Wu and Tsai [29] Internet Self-Efficacy Scale with the addition of new items. The tool implemented by Kao and Tsai included two subscales with 7 items in each and were presented with bipolar strongly confident/strongly unconfident statements on a seven-point Likert scale. The two subscales were the "Basic self-efficacy scale," measuring teachers' self-efficacy at a basic level of using the Internet, such as using Internet-related tools (e.g., "I feel confident of printing the content of a Website") and the "Advanced self-efficacy scale," assessing teachers' confidence and self-expectations of Internet-based interaction or advanced usages of the Internet. (e.g., "I feel confident of playing online games on the Internet"). The α values for the two subscales were 0.92 and 0.93, respectively, and 0.92 for the whole questionnaire. This instrument explains the 69.66% of the variance

(iv) The Internet Self-Efficacy Survey [32] consists of 15 items and includes two subscales. The items were expressed with bipolar strongly confident/strongly unconfident statements on a seven-point Likert scale. The two subscales were the "Basic self-efficacy scale" (9 items), evaluating nurses' self-efficacy of basic abilities when using the Internet (such as using web browsers or searching for online information), and the "Advanced self-efficacy scale" (6 items), estimating nurses' confidence and self-expectations of Internet-based interactions or advanced usage of the Internet (such as having online discussions or making payments). The alpha coefficients for these two subscales were 0.95 and 0.94, respectively, and for the entire questionnaire was 0.94; 75.33% variance were explained by this survey

(v) The Internet Self-Efficacy Scale—ISS [11] is a 17-item questionnaire, asking subjects how confident they feel about being able to perform certain tasks on the Internet, using a 7-point Likert scale (from 1 "not at all confident" to 7 "very confident"). It wants to assess the self-efficacy perception that individuals have in relations to Internet-based, goal-oriented problems at different levels of complexity. Exploratory factor analysis highlighted the presence of 5 subscales: reactive/generative self-efficacy (6 items), differentiation self-efficacy (4 items), organization self-efficacy (3 items), communication self-efficacy (2 items), and search self-efficacy (2 items). The reliability was good: the Cronbach's alphas for the subscales were, respectively 0.91, 0.90, 0.89, 0.82, and 0.77; with a total alpha of 0.91 for the entire ISS scale. The validity

was tested by analyzing the correlations between the ISS and the theoretically related concepts (Internet outcome expectancy (social and personal information outcome) and Internet anxiety).

Most of these scales, even if they were developed in the early 2000, appeared valid and used for the ISE assessment even today [18, 33–35], since they are able to answer to the needs of different times and different situations.

In this paper, we focus on the Kim and Glassman's scale for various reasons. First of all, ISS could overcome the limits of the other ISE measures [11]. Over time, Internet and online activities have changed profoundly, and previous ISE scales [30, 32] did not reflect these new Internet tasks. Compared to the early 2000s, Internet activities have become more complex, dealing with more complex activities than "surfing" or "downloading content." The new tasks require a frequently and massively organization of information from multiple sources, the discrimination between the various sources and the construction of participatory and generative virtual communities [11]. ISS tries to assess the participant self-efficacy in carrying out these tasks. Second, the scale focus is not on the management of hardware or software problems (as in the previous ISE scales) but on the social dimension of the Internet and on the management and the organizations of information. ISS takes a social and humanistic view of the Internet, not considering it as a means for the resolution of problems but as an extension of the human mind that interacts with other minds in a universe of information [36]. Lastly, the scale's items were formulated by reference to Bandura's larger self-efficacy construct [10]. For him, it was essential not only the perception of one's ability to solve the task (e.g., "I think I can do it" and "I feel confident I can" were items in other ISE scales) but also the willingness to actively engage in problem solving to complete the task (the ISS items' formulation is perception of the action "I can" + task to be carried out "writing a blog," regardless of possible obstacles "that other people will be interested in").

Although the scale is innovative compared to the others that investigate the same construct, it is also true that the rapid evolution of the technological world [37] could make it already outdated in some ways. Compared to the early 2010s, Internet and online activities have changed profoundly: for instance, the fifth-generation (5G) wireless communication is growing fast in its adoption [38], social media is widely established, especially Instagram, Pinterest, LinkedIn, Twitch, TikTok, and Snapchat [39–42], so much that social media has become a common form of communication for most people [43]. Moreover, in the last ten years, technologies have evolved [44] and are used in more fields than in the past, like in teaching [45, 46], or even more evidently in remote-learning [2] and remote-working [3, 4]. Furthermore, the services offered by the internet have changed and increased as streaming platforms [47] or e-service [5]. Nevertheless, for a lot of authors, the Kim and Glassman's scale [11] was found suitable for research purposes in the latest years [18, 33–35, 48], while others adapted some items specific topics [49–51].

In this paper, we have translated and cross-cultural validated the Internet self-efficacy scale (ISS) for the Italian population. The translation of instruments is an important way to include non-English speakers in surveys and investigations or to conduct cross-national research [52]. This could also maximize the likelihood that each instruments' version is culturally and linguistically appropriate for its target population [53]. So, the first study dealt with the translation process, the confirmatory factor analysis (CFA), and the item analysis of the scale.

The second study covers the external validation of the ISS Italian version. For this reason, it was necessary to analyze the relationship between the ISS score and those of Internet and social media addictions. We focused on this variables because they are linked to time and intensity of using the Internet and Internet literacy [54, 55], which are linked to online addictions and problematic Internet use [56–59].

2. Study 1

2.1. Methods. The scale was translated from English into Italian in the present study following the protocol described by Beaton et al. [60]. More specifically, the scale was translated by 2 Italian psychologists into Italian, and then, the Italian items were back-translated by two native English translators (who had never seen the scale before) into English. All translators compared all forward and backward translated versions to consolidate and develop an interim Italian version of the ISS. This was then piloted on 20 participants of different ages and education levels to investigate if there could be any problems in understanding the items. The ISS Italian version was administered to 3724 participants, recruited through voluntary census with dedicated messages on the web, social media, and mailing lists.

2.2. Results

2.2.1. Confirmatory Factor Analysis (CFA). Before proceeding with the CFA, the descriptive statistics for ISS Italian version were produced (see Appendix, Table 1). Then, CFA was performed on the entire sample (i.e., $N(\text{CFA}) = 3724$, $M(\text{age}) = 29.10$, $\text{sd} = 10.98$, and $M(\text{range}) = 14 - 79$) to confirm the factor structure found by Kim and Glassman [11]. The 17 items (i.e., exogenous variables) were used as indicators of the 5 latent variables as represented in Figure 1. Maximum likelihood estimation (MLE) was used for estimating the model's parameters. To evaluate the model fit, the same goodness-of-fit indices of Kim and Glassman [11] were used with the exception of the chi-square to the degree of freedom ratio $-\chi^2/df$ [61]. Therefore, we produced the Normed Fit Index—NFI [62], the comparative fit index—CFI [63], and the root mean square error of approximation—RMSEA [64] to assess the model fit in our sample. The exclusion of the χ^2/df is due to the big difference in terms of sample size between the two studies (349 vs. 3724). Indeed, the larger the sample size, the more likely the rejection of the model and the more likely a type II error (rejecting something true) using χ^2/df. In

Table 1: Descriptive statistics and item formulation of the ISS Italian version in study 1.

N°	Item	Min	Max	Mean	s.d.
1	So usare internet per trovare informazioni di qualità su argomenti che per me sono importanti	1	7	5.88	1.28
2	So usare internet per aiutarmi a trovare informazioni di qualità sui bambini e il loro sviluppo	1	7	4.96	1.62
4	So usare i link per trovare informazioni per me importanti	1	7	5.67	1.38
5	So usare i link per trovare informazioni importanti per gli altri	1	7	5.43	1.45
6	So come migliorare il mio benessere attraverso l'utilizzo dei link	1	7	4.70	1.58
7	So come migliorare il benessere degli altri attraverso l'utilizzo dei link	1	7	4.51	1.60
8	So trovare informazioni importanti e interessanti leggendo i blog di altre persone	1	7	4.84	1.65
9	So offrire agli altri informazioni importanti e interessanti postandole su internet	1	7	4.36	1.77
13	So organizzare le informazioni che trovo su internet coerentemente e in modo tale da rispondere a domande specifiche	1	7	5.18	1.54
14	So usare internet per rispondere alle domande degli altri in modo produttivo	1	7	5.20	1.51
15	So usare internet per rispondere alle mie domande in modo produttivo	1	7	4.48	1.41
17	So essere molto efficace nel comunicare per mezzo di social network come Facebook	1	7	4.25	1.80
18	So essere molto efficace nell'usare siti di blogging come un blogger	1	7	3.16	1.77
19	So scrivere post sui blog che altre persone leggeranno e troveranno interessanti	1	7	3.22	1.79
20	So usare i siti di social network come un mezzo efficace per mettermi in contatto con gli altri	1	7	4.69	1.80
21	So usare il blogging come un modo efficace per mettermi in contatto con gli altri	1	7	3.31	1.84
23	So come avere un impatto positivo sulle vite degli altri attraverso il blogging	1	7	3.14	1.81

Note: (1) the items were measure on a 7-point Likert scale (from 1 "not at all confident" to 7 "very confident"); (2) the item ID refers to the original item order presented in Kim and Glassman [11].

any case, χ^2/df would not allow a "fair" comparison between the two studies given its sensibility to sample size. For both CFI and NFI, values higher than 0.90 are acceptable whereas values above 0.95 were considered optimal. As for the RMSEA, values smaller than 0.10 are mediocre, smaller 0.08 expresses an acceptable fit, whereas an optimal fit is achieved with values close to 0.06 [64–66].

The CFA showed an acceptable fit for the model (NFI = 93; CFI = 93; RMSEA = 0.08). The model fit appeared in line with those obtained by Kim and Glassman [11]. More specifically, we obtained a slightly higher NFI (original NFI = 0.92), a lower CFI (original CFI = 0.96), and a lower but still acceptable RMSEA (original RMSEA = 0.067). Moreover, all factor loadings resulted statistically significant and higher than the conventionally acceptable threshold of >0.50 [67], as shown in Figure 1.

2.2.2. Sex and Age Invariance. We tested ISS invariance using multigroup confirmatory factor analysis considering sex and age factors. In particular, the latter variable was discretized into two categories (i.e., digital natives and digital migrants) using the following rule: if the respondent was under 10 years old when Facebook went live (i.e., February 2004) was then classified as a digital native otherwise as a digital migrant. Three levels of invariance were tested (i.e., configural, metric, and scalar) by relying on changes in RMSEA and CFI since chi-square is sensitive to sample size [68, 69]. Changes in model fit indexes should be less than 0.002 for the CFI [70] and 0.010 in the RMSEA [68]. For the sex variable, the difference between the configural and metric models was not significant (ΔCFI = <0.001; Δ RMSEA = 0.001), as the one between metric and scalar models (ΔCFI = 0.002; ΔRMSEA = 0.002). Overall, the Italian version of ISS appeared to be scalar invariant for what concerns the sex dimension. Meanwhile, concerning the difference between digital natives and migrants, the configural and metric models were not different (ΔCFI = 0.002; Δ RMSEA = 0.001), while conflicting results occurred comparing metric and scalar models (ΔCFI = 0.005; ΔRMSEA = 0.001). Thus, in a conservative way, we can only support the claim that the factor loadings are equivalent (i.e., achievement of metric invariance) across the groups (i.e., digital natives and digital migrants) for the Italian version of the ISS, which has been considered enough for proceeding with inferential analyses [71, 72].

2.2.3. Item Analysis

(1) Internal Consistency. The reliability analysis of the ISS model was performed by calculating both McDonald's omega and Cronbach's alpha given the consensus in the psychometric literature that the latter can be a suboptimal choice [73–75].

Both McDonald's omega and Cronbach's alpha values of the ISS Italian version were in line with Kim and Glassman's results (Table 2).

(2) Item-Total Correlations. As an important phase of item analysis, the corrected item-factor total correlations were also examined on the Italian sample to determine the coherency of items within the same factor. All item-factor total correlations were much greater than the threshold value of 0.30 [76, 77], ranging from 0.54 to 0.83 for reactive/

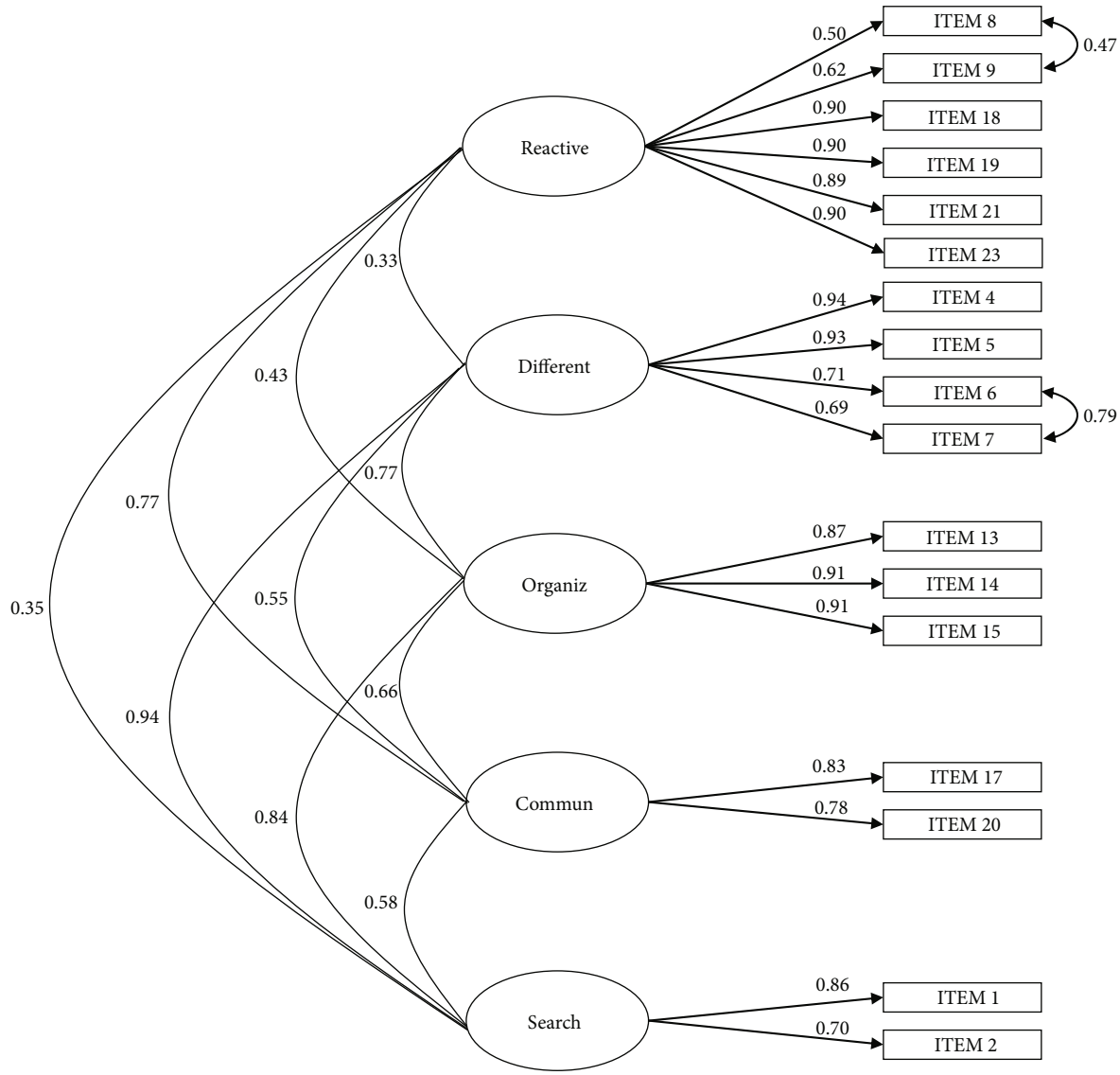

Figure 1: Results of confirmatory factor analysis of the Internet Self-Efficacy Scale (ISS) Italian version.

Table 2: Reliability analysis and comparison with the original scale Cronbach's α values.

ISS dimensions	Original α^*	Empirical α	Empirical ω
ISS—reactive/generative	0.91	0.91	0.91
ISS—differentiation	0.90	0.91	0.92
ISS—organization	0.89	0.93	0.93
ISS—communication	0.82	0.79	0.79
ISS—search	0.77	0.74	0.75
ISS—total	0.91	0.94	0.94

Note: $N = 3724$; $*$ = values coming from Kim and Glassman [11].

generative, from 0.78 to 0.83 for differentiation, and from 0.83 to 0.87 for organization. For communication and search, since these dimensions were formed by only two items, the item-total correlation was, respectively, 0.65 and 0.60.

3. Study 2

3.1. Methods

3.1.1. Participants and Procedure. This second study is aimed at evaluating the external validity of the ISS Italian version. Thus, the ISS scale was administered together with external validity measures. Before proceeding with the recruitment, power analyses were carried out to establish an adequate sample size for our research purposes. We used G∗Power software to accomplish this procedure [78, 79]. For Pearson correlation, the power analysis showed that a sample size of 205 would be required to achieve a statistical power (i.e., 0.90) assuming a typical effect size ($r = 0.20$) and a significance level of 0.05. Since we decided to test gender differences, another power analysis was performed. For each type of statistical analysis, a power analysis should be performed, and the final sample size should be evaluated based on the power analysis that requires the largest sample size.

The power analysis showed that a sample size of 226 individuals considering a gender ratio of 0.65 (i.e., 60% vs. 40%) would be enough to ensure a statistical power of 0.90, assuming a less than medium effect size ($d = 0.40$) and a significance level of 0.05, to assess gender-related differences. A total of 244 (39% males) people were recruited based on the voluntary census through dedicated messages on the web, social media, and mailing lists. These channels were used for recruiting to meet one of the inclusion criteria which required at least minimal Internet usage. The participants had an average age of 26.43 (s.d. = 7.52; age range = 18 − 61). Most of our participants had a high-school diploma or higher in terms of education. More specifically, 4.9% of them had a lower secondary school diploma, 39.8% had a high school diploma, 33.2% had a Bachelor's degree, and 22.1% had a Master's degree.

Data was collected in line with Italian law's requirements of privacy and informed consent (Law Decree DL-101/2018) and EU regulation (2016/679). The participants had the possibility to leave the session at any moment as clearly stated in the preliminary instructions.

3.1.2. Measures. Participants first responded to demographic questions on age and gender, and additionally, the following measures were used to achieve the objectives of the study.

The Bergen Social Media Addiction Scale—BSMAS [80] is a 6-item scale assessing problematic social media use with a 5-point Likert scale (from "never" to "always") yielding a composite score from 6 to 30 (having a score greater than 19 is an addiction indicator [81]. The scale asks to indicate how often "You feel an urge to use social media more and more" or "You have tried to cut down on the use of social media without success." BSMAS is a one-factor solution scale and was adapted from the previous Bergen Facebook Addiction Scale [82]. The measure has shown acceptable psychometric properties and has a good internal consistency (Cronbach's alpha = 0.88).

The Internet Addiction Scale—IAS [83] consists of 6 items, graded from 1 (never) to 5 (always), which ask some Internet addiction behaviors. The scale asks participants to indicate how often "I prefer to spend time on the Internet rather than go out with others." or "I feel anxious when I don't have an access to the Internet." The exploratory factor analysis found that the 6 items were loaded over in only one factor (Cronbach's alpha = 0.83).

3.1.3. Data Analysis. For testing the validity of the Italian version of the ISS, we relied on Pearson's correlation coefficient. Nonetheless, before proceeding, we checked for Pearson's correlation assumptions. Thus, for all the continuous variables, we assessed normality (asymmetry and kurtosis values), homoscedasticity, and linearity. We also investigated gender-related differences through the Welch's t-test since it performs better than Student's t-test whenever sample sizes and variances are unequal between groups and gives the same result when sample sizes and variances are equal [84].

3.2. Results. First, we checked and presented the descriptive statistics for all the scores involved in our validation process in the two samples (Table 3). The ISS and external validity measures appeared to be distributed normally, thus allowing for inferential parametric analyses.

Table 3: Descriptive statistics of the scales used for ISS Italian validation and normality assessment through skewness and kurtosis values.

Variables	Min	Max	Mean	s.d.	Skew.	Kurt.
ISS—reactive/generative	6	42	21.31	7.86	0.21	−0.38
ISS—differentiation	4	28	18.52	5.13	−0.51	0.43
ISS—organization	4	21	15.86	3.64	−0.66	−0.07
ISS—communication	2	14	8.84	2.97	−0.51	−0.14
ISS—search	3	14	10.62	2.21	−0.65	0.57
ISS—total	22	119	75.14	16.84	−0.13	0.47
BSMAS	6	30	13.43	5.35	0.77	0.01
IAS	6	28	12.57	4.60	0.65	−0.05

Note: $N = 244$; s.d.: standard deviation; ISS: Internet Self-Efficacy Scale; BSMAS: Bergen Social Media Addiction Scale; IAS: Internet Addiction Scale.

Table 4: Correlation matrix between ISS and Internet and social media addiction scores, as well as participants' age.

ISS dimensions and total score	BSMAS	IAS	Age
ISS—reactive/generative	0.37^{***}	0.23^{***}	0.06^{ns}
ISS—differentiation	0.18^{**}	0.13^{*}	0.10^{ns}
ISS—organization	0.15^{**}	0.10^{ns}	-0.01^{ns}
ISS—communication	0.30^{***}	0.15^{*}	0.01^{ns}
ISS—search	0.14^{*}	0.20^{**}	-0.02^{ns}
ISS—total	0.33^{***}	0.20^{***}	0.06^{ns}

Note: $N = 244$; $^{*} = p.<0.05$; $^{**} = p.<0.01$; $^{***} = p.<0.001$; ns: not significant result; ISS: Internet Self-Efficacy Scale; BSMAS: Bergen Social Media Addiction Scale; IAS: Internet Addiction Scale.

Subsequently, we investigated if gender affected ISS score in our specific case although the literature has not shown gender-related effects on Internet self-efficacy levels [55, 85], before proceeding with validity analyses through Pearson's correlation. The Welch t-test showed no statistically significant gender difference for ISS scores. We then analyzed possible gender differences in social media addiction and Internet addiction. Again Welch t-test did not highlight gender-related difference on the Internet addiction score ($t(203.38) = -0.22$; $p. = 0.83$), while it captured a quite small difference in social media addiction levels ($t(231.28) = -2.37$; $p. = 0.02$; Cohen's $d = 0.30$). Since gender did not appear to affect substantially the variables collected, we did not account for gender as a confounding variable in subsequent analyses. We then tested the relationship between participants' age and variables related to virtual environments (i.e., BSMAS, IAS, and ISS) through Pearson's correlation. The Pearson r coefficient can be interpreted considering values of 0.10, 0.20, and 0.30 as relatively small, typical, and relatively large [86]. Participants' age appeared unrelated to both ISS dimensions and the total score (Table 4), while it entertained an almost typical relationship with BSMAS ($r = -0.15$; $p. = 0.02$) and IAS ($r = 0.19$; $p. = 0.002$). Thus, also participants'

age was excluded for external validity analysis. Finally, we tested if a positive correlation between the ISS and exaggerated use of virtual environments existed.

As we can gather from Table 4, the correlations between the Italian version of the ISS are in line with our expectations. Overall, the ISS appeared to have a large correlation with BSMAS and a typical one with IAS. More specifically, the ISS organization shows the weakest correlations while reactive/generative ISS is the most intense, sharing the 5% variance with the IAS and 13% with the BSMAS.

4. Discussion and Conclusion

The main goal of our research was to translate and validate the Internet Self-Efficacy Scale (ISS) for the Italian population. In study 1, the confirmatory factor analysis (CFA) showed an acceptable model fit, and the 5-dimension structure of ISS reported by Kim and Glassman [11] was confirmed by our results. Both McDonald's omega and Cronbach's alpha values of the ISS Italian version were in line with the literature, showing high scale reliability both for the total score ($\alpha = 0.94$) and for each sub-scale (α from 0.74 to 0.93).

In study 2, based on the literature evidences, we assessed the external validity of the ISS Italian version relying on the Bergen Social Media Addiction Scale—BSMAS [80] as well as the Internet Addiction Scale—IAS [83] since people who has online addiction spend more time on the Internet or Social Network sites—SNs [87], they had more Internet literacy [57], and this may lead to have higher scores on the Internet Self-Efficacy Scale [55].

Furthermore, the analysis found positive correlations between ISS and both BSMAS and IAS. The Internet Self-Efficacy Scale appeared to have a relatively large correlation with BSMAS ($r = 0.33$) especially with the reactive/generative and communicative subscales (with 13% and 9% of the variance shared, respectively). The IAS has a typical correlation with ISS ($r = 0.20$), with the reactive/generative subscale resulting as the most strongly associated with Internet addiction score (5% of explained variance). Nevertheless, we can assert that our results are in line with the ISE literature since there is a well noted link between Internet self-efficacy/Internet literacy and problematic Internet use like addiction and the increase of online risks [57–59].

The analysis did not find any significant gender or age differences for ISS. These results are in line with the literature that reports about the same Internet self-efficacy score both in male and female, both using the ISS [11, 88] and other ISE cales [85]). This suggests that the classic gender gap in which male have more general self-confidence than females [89] does not work for online tasks, maybe due to the extensive use each person makes of the Internet, in every field of work, education, and leisure. However, some studies reported that males displayed higher Internet self-efficacy than females but they did not use the ISS scale [29, 90].

As for age differences, our results are perfectly in line with Kim and Glassman's view. They suggested that the differences in cohort, life, and educational experience and the access to the Internet portals could influence the ISE outcomes but the participants' age do not affect in this sense. As a matter of fact, they assumed that a 14-year-old user with limited resources (like homeless youth) may have higher Internet self-efficacy than a 30-year-old Ph.D. in Physics or Engineering. However, it should be noted that the ISE literature (using other instruments than ISS) shows the presence of a negative relationship between age and Internet self-efficacy [85, 91].

We live today in a society permeated by digital technologies, where our actions are frequently mediated by digital tools [6]. The PC is the omnipresent gateway to computer activity both at work and home, and it is commonly used together with other devices like smartphones, laptops, and tablets, to perform most of the actions that make us part of society [6, 92]. Exactly 27 years ago, Bill Gates claimed that the information revolution was only at the beginning and that the Internet would have had a significant impact on all aspects of society [93]. Over these years, online activities and the Internet itself have radically changed: Internet speed, data storage, and devices' memory have amazingly increased; new devices have been marketed and have become of common, everyday use (smartphones, tablets, personal computers, smartTVs, smartwatches, and so on); and new communication methods and social network sites have emerged (Whatsapp, YouTube, Instagram, TikTok, etc.). To date, after a pandemic that has made digital technologies essential, we could say that we are completely into this digital revolution. In 2022, it is essential to have literacy, for example, on how to approach Internet banking, how to use public health or education online services, how to download digital COVID certificates or certify one's online identity through digital ID systems, or simply knowing how to manage remote work or online shopping. The access and the capacity to use the Internet are nowadays so important to be considered as fundamental human rights [94] because being digitally literate means having access to cultural, economic, and political structures of society. Digital literacy and Internet self-efficacy will probably become increasingly important for everyone in the future, as current developments such as Cryptocurrencies and the Metaverse will undoubtedly change the lives of human beings [95]. So, in this digital era, that constantly evolves what the Internet is and how it functions, it is really important to have clear, valid, reliable, culture-free, and ecological instruments able to measure perceived Internet self-efficacy and thus having the possibility to take action when one or more dimensions are not developed enough for the individual to function correctly in society.

In this sense the ISS, although born in 2013, still appears as a particularly valid and used tool [18, 33, 34, 96], given the existence of interdependent subscales reflecting the complexity of the ISE construct, thus allowing an especially sensitive measurement different from other ISE measures that often only provide unidimensional structure [17] or at the most two-dimensional structure [29, 32]. The Italian version of the ISS showed a factorial structure in line with the one found by Kim and Glassman [11] as indicated by the fit indices of study 1. The instrument reliability also appeared optimal (i.e., ω range 0.75– 0.94) and in line with the other Internet self-efficacy scales [29, 31]. Finally, the

relationships that ISS entertained with the technological addiction measures (i.e., Internet and social media addiction), as shown in study 2, reassured about the external validity of the Italian version of the ISS.

Our study research had some limitations. First, the sample may not be representative of the population as no analyses have been carried out on the matter. Second, the mean age of our sample was 29.10 in study 1 and 26.43 years old in study 2, so generalizing the results toward other clusters (e.g., adolescents and older adults) may not be proper. Nevertheless, our sample characteristics are similar to the Kim and Glassman's sample (20.6 years old on average). Indeed, in both studies, the great majority of participants belonged to the digital native generation. Third, the multiethnic composition of the Italian sample was not examined, so future studies could take into account the cultural differences of the participants in order to investigate how much ISE score change.

Finally, our results cannot infer causality between the ISS and the external variables examined, as the study is not able to find a cause-effect relationship. Therefore, we observed a positive relationship among ISS and IAS but we could not tell if one was the consequence of the other or if there were some intervening variables on this. It is logical to assume that those who have Internet addiction, spending more time online, improve their Internet self-efficacy, but it is also possible that having high self-efficacy leads to increasing the time spent online and consequently increasing the likelihood of developing addiction. For these reasons, future studies could try to isolate the effect of all these variables.

Despite the limitations, these two studies demonstrated that ISS is a valid, sensible, and reliable tool to assess Internet self-efficacy even in the Italian population. The individuals' perception of their abilities to use the Internet for carrying out tasks and solving problems will become an increasingly important aspect in daily life on multiple levels. Surely, the construct deserves an update operationalization as the rapid evolution of technology requires an equally rapid update of the scales that refer to the virtual environment. In fact, the World Wide Web is recognised as the fastest growing publication medium of all time [37]. With the emergence of Web 3.0, users are helped to reach meaningful information by filtering out a lot of erroneous data for their needs in Internet searches [97]. The aim of Web 3.0 technologies is to provide a semantic web environment that allows users to access the information they need quickly and at any time [98]. All this has therefore led to a more refined tool which at the same time also implies greater skills that go beyond those required with web 1.0 (read-only form) and with Web 2.0 (read-write form) in which already the user also plays the role of author [99] web because it is an active participant in content creation and to share information online [100].

For the future, it could be interesting and useful to make the measure more adaptive and self-administering, adding, for instance, the ability to provide scoring feedback. This will allow the use of ISS also for self-training reasons as well as for research and clinical purposes. In addition, given the importance of the self-efficacy perception in handling online tasks so as to be active participants in this digital society, we can suggest that future researchers could use the Kim and Glassman's scale to create community interventions that, starting from the ISE measure of each member, will use ISS like a longitudinal test. Following this trail, it is also possible and desirable to modify and rearrange the current scale in order to build a measure of expertise for the whole community and not only for individuals.

Data Availability

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Additional Points

Highlights. (i) The factorial structure of the Italian version of the Internet Self-Efficacy Scale (ISS) was in line with the original scale. (ii) Both McDonald's omega and Cronbach's alpha values supported a high reliability of the scale. (iii) The external validity of the Italian version of the ISS appeared satisfying.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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