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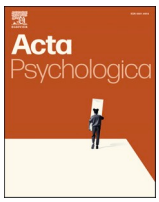

The impact of the COVID-19 pandemic on the use of social media: A cross-national comparison

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ABSTRACT

This study investigates the impact of limited interpersonal interaction due to the COVID-19 pandemic on social media usage in the USA and Italy, considering their differences in lockdown restrictions. An online survey with 1478 participants assessed social media usage, personality traits, and life satisfaction before the pandemic (2018) and during the first lockdown (April 2020). Results showed increased social media use during the pandemic, with no significant differences between countries. Personality traits like extraversion were linked to higher social media usage, while emotional stability was negatively correlated. The study highlights that while social media served as a coping mechanism, its passive use could contribute to negative emotional states, raising concerns about mental health during crises. Full-time employees showed a more pronounced increase in usage than students, likely due to increased free time and social isolation. Active engagement on social media did not significantly increase, suggesting a tendency towards passive content consumption. These findings underscore the complex interplay of demographic, psychological, and situational factors influencing social media use during the pandemic.

1. Introduction

The use of social media is ubiquitous; An estimated 5.24 billion people used social media globally in 2024, which accounts for about 64 % of the entire population of the world at the time (data extracted from https://datareportal.com/ on 3/3/2025).

There is substantial evidence that social media has both positive and negative impacts on social and psychological wellbeing. On the positive side, research shows that social media use (SMU) helps maintain long-distance friendships, as one of its main motivations is relationship maintenance (Bowden-Green, Hinds, Joinson, 2021a, 2021b). It also facilitates connections with new people, enables idea-sharing across borders, and supports collective goal achievement. Additionally, social media provides news, raises awareness of global and local issues, and promotes small businesses, philanthropy, and education (Siddiqui & Singh, 2016). Among its key benefits are ease of communication and stress relief (Giancola et al., 2023).

Conversely, research highlights the problematic aspects of social media use, linking it to lower psychological well-being (Twenge & Campbell, 2019; Marino et al., 2018). Problematic use of social media (PUSM) is characterized by excessive engagement in pursuit of gratification, diverting time and attention from other life aspects and resembling addiction (Brand et al., 2020; Kuss & Griffiths, 2017; Kardefelt-Winther, 2017). PUSM can disrupt sleep, work, studies, and relationships, potentially causing psychological distress and impairing daily functioning (Domahidi & Quandt, 2015).

The way people use social media varies based on their unique characteristics, personality traits, reasons for use, sociodemographic background, culture, and country (Kircaburun et al., 2020; Gil-Clavel & Zagheni, 2019). The frequency and the modalities of usage of social media platforms are influenced by several sociological, demographic and psychological factors. Younger people tend to use more social media than older ones (Auxier & Anderson, 2021; Gottfried, 2024). Gender is also a significant predictor of SMU, with women spending more time than men on social media platforms (Thompson & Lougheed, 2012; Gottfried, 2024). Furthermore, while we did not find a study directly

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comparing the use of social media between students and workers, considering the previously mentioned demographic metrics, it seems likely that students tend to use social media more than full-time workers. Finally, several studies suggest that personality traits can predict SMU (Correa et al., 2010; Kircaburun et al., 2020). Specifically, several studies indicate that Neuroticism, Extraversion and Openness are significant predictors of the amount of social media use (Correa et al., 2010; Kircaburun et al., 2020) with a robust effect of extraversion across studies (Bowden-Green et al., 2020)

The social compensation perspective provides a framework for understanding the relationship between psychosocial well-being and social media usage. This theory posits that individuals with psychosocial challenges are more likely to turn to social media as a means of fulfilling their social needs (Valkenburg & Peter, 2009). This perspective suggests that psychosocial issues like depression or loneliness can lead to increased social media use, as individuals facing these challenges find mediated environments more comfortable than direct, face-to-face interactions (High & Caplan, 2009; Valkenburg & Peter, 2007). Additionally, research has shown that individuals who use social media more frequently tend to experience decreased life satisfaction, increased stress levels, and elevated social anxiety. These findings align with theoretical frameworks suggesting a negative relationship between social media usage and various aspects of well-being.

On March 11, 2020, the World Health Organization declared COVID-19 a pandemic, a crisis able to impact every sector globally. One of the unprecedented aspects of such crisis was the so-called lockdown restrictions, a term used to express different forms of limitations of people's movements and activities, which included school and business closings, travel bans, closing of borders and, in several cases, a stay home executive order delivered to the general population of entire countries. Such lockdowns involved, at various points in time, more than one third of the entire population of the planet.

While the impact on people's physical and mental health are still yet to be completely understood (Wang et al., 2020; Ammar et al., 2020), studies indicate that home confinement can reduce the level of physical activity (Wilke et al., 2022; Stockwell et al., 2021) and exposure to daylight, alter sleep patterns (Trabelsi et al., 2021; Cellini et al., 2020) and increase the level of stress due to social isolation (e.g., avoiding social contact with family and friends) and the inability to engage in satisfying activities.

Several studies have shown that the ability to cope with these restrictions, along with the impact of isolation and social distancing on people's mental health, may be influenced by individual characteristics such as personality traits (Gründahl et al., 2022; Weiß, Baumeister, et al., 2022; Weiß, Rodrigues, et al., 2022) or gender (Weiß et al., 2023).

While social media platforms can offer an opportunity to mitigate social isolation, they can also have, as a side effect, the negative implication of exacerbating PUSM. The COVID-19 pandemic provided a new perspective on the above described social compensation perspective, in which mediated digital environments were not preferred as more comfortable, but often the only way to interact with people outside the household. This is why it seems interesting to verify the relationship between the intensity of the lockdown restrictions and the use of social media, while controlling for variables such as demographics and personality factors.

The use of social media increased during the COVID-19 Pandemic (Brailovskaia et al., 2021). Self-reported motivations for increased use include need for socialization, entertainment, communication, online teaching, online meetings, working from home, health improvement and so on (Gupta & DSilva, 2020). However, there is evidence that such increased use did not provide positive effects for people's well-being, while the negative associations identified before the pandemic do seem to have been confirmed during the pandemic (Ghanayem et al., 2024; Midgley et al., 2022). For example, the increased time spent on social media correlates with pandemic anxiety (Parlak Sert & Başkale, 2023) and social comparison, loneliness, development of bad habits, and lack of focus are cited as major disadvantages to social media use during the pandemic (Giancola et al., 2023). Previous studies had investigated the prevalence of the use of social media in different countries. A previous cross-national study comparing Norway, United Kingdom, USA, and Australia between November 2021 and January 2022, indicated that social media were used more frequently during the pandemic outbreak than before the outbreak in all countries. The use of social media was associated with emotional distress, in particular in terms of concerns for one's own or others' health (Thygesen et al., 2021). In another study by the same group, results showed that loneliness is associated with time spent on social media (Bonsaksen et al., 2023). However, none of the above-mentioned studies made a direct comparison between countries of the use of social media during the pandemic. We argue that different levels of strictness in lockdown national measures can have influenced the level of isolation, leading to different extents of increased use of social media in different countries. Indeed, the pandemic health crisis did not hit all the countries with the same severity at the same time. As reported by Hale and collaborators, COVID-19 Containment and Health Index, also known as the stringency index, a composite measure based on nine response indicators including school closures, workplace closures, and travel bans, rescaled to a value from 0 to 100, varies across nations and across time (Hale et al., 2021). In March, April and May 2020 the US had a stringency index of 72.7. Lockdown restrictions in the US varied across the states, but in most cases included the closing of schools and stay-home recommendations. The country with the highest stringency index in the world in April and May 2020 was Italy (93.5). The stringency map (Fig. 1) indicates the combined severity of the containment measures against the spread of Covid-19 in the USA and in Italy (Blavatnik School of Government, University of Oxford, 2023). The period in which the survey was conducted is April 2020, which is the time when the containment measures in Italy were significantly more severe than in the USA. As shown in Fig. 1, the stringency of the lockdown measures in the first months of the pandemic emergency were significantly higher in Italy than in the USA. By March 9, 2020, the Italian government had already signed a series of decrees that imposed restrictions on the movement of individuals in the entire national territory. Italians were not allowed to leave their homes except for limited and documented motives (e.g., shopping for necessities and/or to go to work if these activities could not be done from home). Several activities were closed, including schools, universities and shops selling nonessential goods.

The COVID-19 pandemic was an unprecedented event in the social media era, which caused significant disruptions of in-person relationships and prevented physical proximity in social interactions for billions of people globally. The goal of this study is to verify if there is an association between SMU and forced social isolation, lack of physical proximity with friends and family, and needs for affiliation. In order to answer our questions, we analyzed variations in SMU before and during the COVID-19 pandemic. Specifically, our research aims at investigating how the forced isolation due to lockdown practices during the Covid 19 pandemic influences the use of social media while controlling for other factors (e.g. sociodemographic, personality factors, perceived quality of life) that have been indicated to influence the use of social media. In light of the analysis of the literature, we expect that our results will support the following hypotheses:

1. The first three months of the COVID-19 pandemic led to a significant increase in the use of social media platforms.
2. During the initial three months of COVID-19 lockdown procedures, full-time workers exhibit a significant increase in social media usage, while students maintain a relatively constant rate of social media activity.
3. Because of the stricter lockdown measures in Italy, we expect to find that during the initial three months of the COVID-19 lockdown, the use of social media in Italy was higher than in the United States.

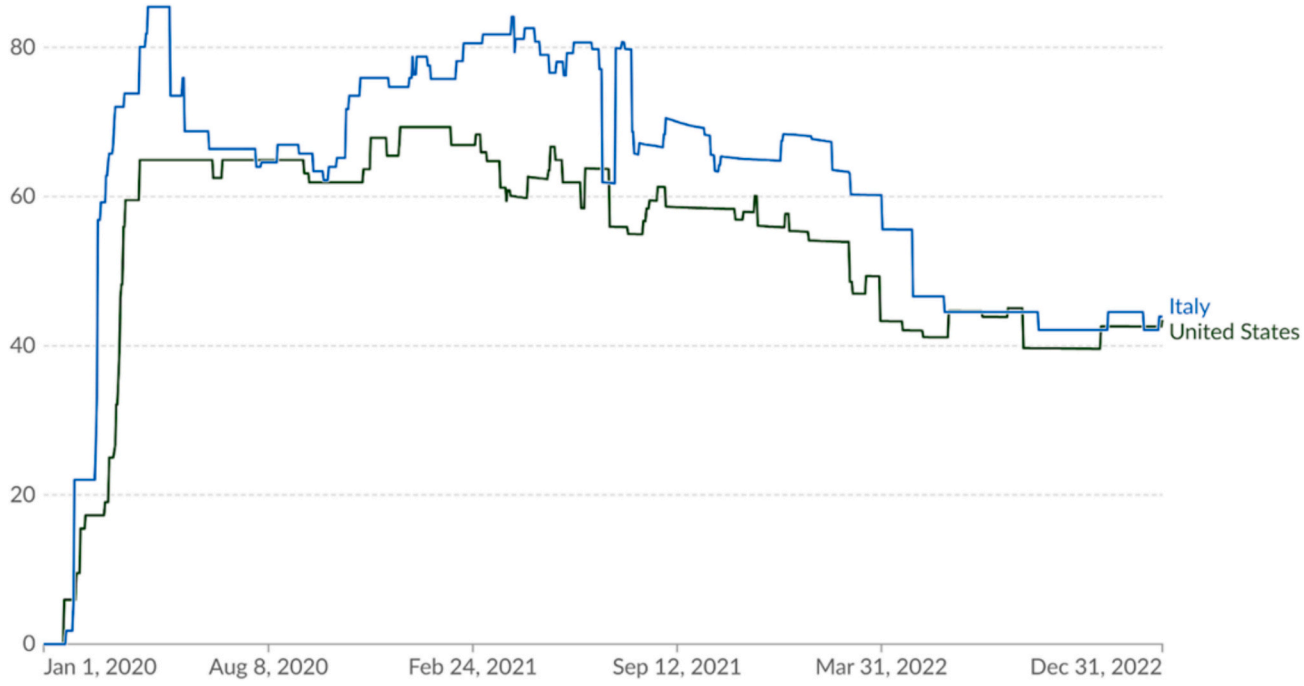

Fig. 1. COVID-19 Containment & Health Index. Stringency map of containment measures taken in the USA vs. Italy (adapted from Hale et al., 2021).

4. The isolation of the lockdown could have influenced the amount of active posting, with an increase of active users versus users who passively scroll others' contributions.

Additional attention will be given to intervening factors that are often shown to influence the use of social media. Among these factors we will consider personality traits, age, and perceived quality of Life.

2. Methods

2.1. Participants

1478 participants took part in the study in the USA and in Italy. The American participants were 768 (51.4 %) and were mostly living in south-east Michigan, where Lawrence Technological University is located. The Italian participants were 724 (48.58 %) and were likely concentrated in the areas of Rome and south Sardinia, where the Università Europea di Roma and the University of Cagliari are located. 826 (55.34 %) completed the online surveys before the COVID-19 pandemic and 666 (44.64 %) during the pandemic. 942 participants were female (63.14 %), 536 were male (35.9 %) and 14 (0.9 %) preferred not to say or expressed a non-binary gender identity. The mean age was 27.9 with a standard deviation of 13.77. 388 (26 %) reported a high school degree as their level of education, 718 (48 %) some college experience without completion of a bachelor degree, 143 (9.58 %) a bachelor degree, 130 (8.7 %) a masters' degree and 113 (7.57 %) a PhD or equivalent.

2.2. Measures

2.2.1. Satisfaction with Life Scale (SWLS)

This instrument is designed to assess a person's global judgment of life satisfaction (Diener et al., 1985; Pavot & Diener, 1993). SWLS contains five items on a Likert scale divided into 7 points (1 = Strongly disagree until 7 = Strongly agree), and appears to have high reliability, both in terms of test-retest and internal reliability (Shevlin et al., 1998). For the Italian version, we used a translation of the SWLS, developed through a back-translation technique, which has been shown to retain the psychometric properties of the original version (Di Fabio & Busoni, 2009). Also in our sample the internal consistency was high (i.e., $\alpha \geq 0.70$) with a Cronbach's alpha (Cronbach, 1951) of 0.87 for the English version and of 0.85 for the Italian version.

2.2.2. Ten Items Personality Inventory (TIPI)

The Ten-Item Personality Inventory (TIPI) is a brief instrument to assess the five-factor model personality dimensions (Extraversion, Agreeableness, Openness, Emotional Stability, and Conscientiousness). It was developed to provide a briefer assessment option in settings where using more comprehensive five-factor instruments would be impractical (Thørrisen & Sadeghi, 2023).American and Italian participants received the survey in their respective native languages. In the Italian version, we used a translation of the TIPI (Chiorri et al., 2014) developed using a back-translation technique. The scoping review by Thørrisen & Sadeghi, 2023, indicates that the Italian and English versions have acceptable test-retest reliability but low internal reliability. The low internal reliability is not unexpected, as Cronbach's alpha is highly influenced by the number of items in each subscale (Kline, 2013). Given that the TIPI includes only 10 items—two per personality dimension—it is inherently challenging to achieve high internal consistency. Nonetheless, the TIPI remains a valuable tool, particularly in studies where participants complete an extensive set of questionnaires or when individual differences are considered as covariates or control variables, as in the present study. In line with previous research, we obtained the following Cronbach's alpha values for the English and Italian scales: Extraversions (0.75 for the English, and 0.67 for the Italian version); *Agreeableness* (0.33 for the English, and 0.26 for the Italian version), *Openness* (0.52 for the English, and 0.53 for the Italian version), *Emotional Stability* (0.65 for the English, and 0.53 for the Italian version), *and Conscientiousness* (0.26 for the English, and 0.34 for the Italian version).

2.2.3. Demographic and use of social media survey

The survey has been developed by the research team and a team of student researchers within a course-based research experience in Spring 2018 with the scope of assessing how much and in which ways respondents used social media. While previous surveys have been developed to assess SMU, the previous studies focused on PUSM (Moretta et al., 2023, see also Xanidis & Brignell, 2016). We preferred to use a

new set of questions because our focus was assessing how and how much our participants used social media. The survey includes 8 demographic questions about gender, age, level and type of education, family income, political views, nationality, and ethnicity and 18 questions about different aspects of the experience of social media including preferred device, amount of time spent on social media daily, the preferred type of use, preferred social media platform, active/passive use of social media (find the list of questions in appendix 1 in the supplementary materials);

2.3. Procedure

After approval by the University's Institutional Review Board, we recruited instructors of four undergraduate courses in psychology, two at Lawrence technological University in south-east Michigan (USA), one at the Università Europea di Roma (Italy), and one at the University of Cagliari (Italy). The instructors were asked to distribute the online questionnaire to their students, with the additional request to disseminate the survey to friends and family. The same recruitment procedure was followed twice, the first time we administered the survey before the pandemic, during the Fall 2018 and the second time in April and May 2020, when the strictest measures of lockdown were adopted both in the USA and in Italy. The resulting sample included four independent groups of participants, 499 in the USA and 291 in Italy before the pandemic (2018) and 225 in the USA and 395 in Italy during the pandemic (2020).

2.4. Apparatus and materials

The study included a 42-questions questionnaire, distributed via email. The questionnaire was answered anonymously. As we did not register any email account from participants, there was no way to trace the answers back to respondents. The survey was implemented in the Google form platform, and included the following five separated sections:

1. Informed consent
2. The Demographics section
3. The Social Media Use section
4. Ten Items Personality Inventory (TIPI)
5. Satisfaction with Life Scale (SWLS)
6. Questions about lockdown experience (only during the pandemic)

3. Analysis

We ran two ordinal logistic regressions (OLRs): the first one on the responses obtained at the question concerning the number of hours spent on social media daily (Social Media Use – SMU), and the second one on the responses obtained at the question concerning the frequency of active posting on the favorite social platform (i.e., active use of social media - ASMU). Such responses were treated as ordinal categorical variables with 5 levels (i.e., for the SMU the code was as follow: 0 = <30 min, 1 = about an hour per day, 2 = about two hours per day, 3 = about three hours per day, and 4 = about or more than four hours per day; while for the ASMU the code was as follow: 0 = never, 1 = about a post per day 2 = about 2 posts per day, 3 = about 3 posts per day, 4 = about 4 or >4 posts per day). We used the same set of predictors in both analyses: *Pandemic* (pre-pandemic vs. pandemic time), *Occupation* (students vs full-time employees), *Sample* (USA vs. Italy), and gender (Male vs. Female) were categorical predictors. *Age*, Satisfaction with life scale (*SWLS*), and the five dimensions of the Big Five personality inventory (*Extraversion, Agreeableness, Openness, Emotional Stability, and Conscientiousness*) were added as continuous variables. Moreover, we added in both models the following two interactions: Pandemic*Sample, and Pandemic*Occupation, to answer the hypothesis 2 and 3, respectively (see the introduction, above). To perform these analyses, we included in the analyses only participants who reported their gender (male or female) and reported to be student or worker as their main occupation (see Table 1 for the distribution of the final sample according to the categorical variables involved in the models: i.e., gender, pandemic, sample, and occupation: total sample = 1410 participants). For the Pandemic factor, "pre-pandemic time" served as the baseline; for Occupation, "students" served as the baseline; for Sample, "USA" served as the baseline; and for gender, "female" served as the baseline.

Table 1
Demographic information of the participants included in the analyses.

			Gender	
Pandemic	Sample	Occupation	Female	Male
Pre-pandemic period (*N* = 790)	USA (*N* = 499)	Student (*N* = 329)	135	194
		Worker (*N* = 170)	87	83
	Italy (*N* = 291)	Student (*N* = 213)	171	42
		Worker (*N* = 78)	46	32
Pandemic period (N = 620)	USA (*N* = 225)	Student (*N* = 108)	85	23
		Worker (*N* = 117)	74	43
	Italy (*N* = 395)	Student (*N* = 290)	235	55
		Worker (*N* = 105)	64	41

Importantly, to avoid a potential bias caused by the unbalanced distribution of students and full-time employees in the samples from Italy and USA (see Table 1), for both dependent variables, SMU and ASMU, a more complex OLR including also the interaction term "Occupation * Sample" was performed. The ANOVA comparing (i) the OLR model with the previously described *restricted* model, and (ii) the OLR model including also the interaction "Occupation * Sample", revealed that the addition of the interaction term "Occupation * Sample" did not significantly improve the predictive power of both the *restricted* model [SMU: likelihood ratio (LR) statistics = 0.323, $p = .57$; ASMU: LR = 0.065, $p = .799$], thus showing that the despite the unbalanced occupation in the two sample, the effect of occupation was comparable in the two samples. Thus, all the reported results on the SMU and ASMU data come from the *restricted* model: i.e., SMU (or ASMU) ~ Pandemic + Occupation + Sample + Pandemic*Occupation + Pandemic*Sample + Age + Gender + *SWLS* + Extraversion + Agreeableness + Openness + Emotional Stability + Conscientiousness.

Finally, to further detail the influence of social distancing on SMU and ASMU, we assessed whether social isolation was able to predict these outcomes. Then, we ran two OLRs on all the participants who completed the survey during the pandemic lockdown ($n = 620$), with criterion variables SMU and ASMU respectively and the variables Bubble *Size* (how many people lived in physical proximity of the participant) and *Isolation* (the reported strictness with which the individual practiced social distancing, from no restrictions at all to with everyone, no one excluded). Moreover, to assess cultural and regional differences between the USA and Italy, we also included *Sample* as a predictor.

All analyses were performed with Rstudio (version 2024.12.1). For the ordinal regression we used the clm function implemented in the R package "Ordinal" (Christensen, 2014).

4. Results

Of the total sample, only 164 participants (11.6 %) of the 1410 respondents reported using social media for less than 30 min a day, while 290 participants (20.6 %) reported one hour per day use, 420 (29.8 %) two hours, 281 (19.9 %) three hours and 255 (18.1 %) four or more than four hours per day. Our data are consistent with previous findings (Riehm et al., 2019; Scott et al., 2017).

In terms of preferred social media platforms, Instagram was the preferred platform with 498 (35.3 %) preferences, followed by Facebook

348 (24.7 %), Snapchat 206 (14.6 %), and Twitter (X) 156 (11.1 %). 202 (14.3 %) reported preferring other platforms. Interestingly, the preference for platforms differed both between samples and with the presence of the pandemic, as indicated in Table 2.

On the frequency of active posting, (142) 10.1 % reported no active use of social media, 257 (18.2 %) reported of posting one time for day, 468 (33.2 %) reported of posting two times for day, 352 (25 %) reported of posting three times for day, and 191 (13.5 %) reported of posting 4 of more times for day.

4.1. Results on the time spent on social media (SMU)

To test our hypothesis about an association between the time spent on social media use (SMU) and the pandemic crisis, controlling for personality factors, life satisfaction, socio-demographic variables, sample (i.e., nation), and occupation, we conducted an OLR analysis. Results are shown in Table 3. The results are shown in terms of odd ratios (OR) and their confidence intervals. OR is a useful effect size with categorical variables since it describes the likelihood of an outcome occurring in a condition as compared with the likelihood of the outcome occurring in the other condition (Cohen, 1994; Maher et al., 2013). More specifically, in the ordinal logistic regressions, it indicates the relative changes in the odds in the different ordinal levels of the dependent variable (e.g., the 5 ordinal levels used to operationalize the time spent on social media) for each one-unit change in the predictor. That is, an OR = 1 indicates no change, i.e., no effect, instead an OR = 1.5 would indicate that for every one-unit increase in the predictor, the odds of choosing one of the levels of the responses is 1.5 times the odds of choosing any lower level.

As indicated in the last two columns of Table 3, the tests for collinearity show an average VIF lower than 2.5 (VIF = 2.0) and a tolerance higher than 0.1 (Tol. = 0.6). The two values indicate the absence of concerns for collinearity between our predictor variables (Johnston et al., 2018).

Hypothesis 1. Effect of pandemic on daily use of social network.

The hypothesis that people used social media for a longer time during the first lockdown phase of the Covid 19 pandemic than before the pandemic, was supported. Indeed, as Tables 2 and 3 show, the *Pandemic* period, as opposed to the pre-pandemic period, was associated with a higher likelihood of spending longer time on social media (OR = 1.44, 95 % CI [1.02, 2.06], $p = .038$).

Notably, the percentage of participants using social media for <30 min a day diminished from 14.7 % to 7.7 % while the percentage of participants reporting a daily use higher than 3 h per day rose from 16.6 % to 24.2 % (see Table 4).

Table 2
Social media preference in USA and Italy before and during the pandemic.

		Pandemic		
SAMPLE	Preferred media	0	1	Total
Total	Facebook	190(24 %)	158(25 %)	348(25 %)
	Instagram	222(28 %)	276(44 %)	498(35 %)
	Other	117(15 %)	85(14 %)	202(14 %)
	Snapchat	147(19 %)	59(10 %)	206(14 %)
	Twitter	114(14 %)	42(7 %)	156(11 %)
	Total	**790**	**620**	**1410**
USA	Facebook	113(23 %)	84(37 %)	197 (27 %)
	Instagram	53(11 %)	25(11 %)	78 (11 %)
	Other	86(17 %)	29(13 %)	115(16 %)
	Snapchat	146(29 %)	59(26 %)	205(28 %)
	Twitter	101(20 %)	28(12 %)	129(18 %)
	Total	**499**	**225**	**724**
Italy	Facebook	77(26 %)	74(19 %)	151(22 %)
	Instagram	169(58 %)	251(64 %)	420(61 %)
	Other	31(11 %)	56(14 %)	87(13 %)
	Snapchat	1(0.3 %)	0(0 %)	1(0.1 %)
	Twitter	13(4 %)	14(4 %)	27(4 %)
	Total	**291**	**395**	**686**

Hypothesis 2. Effect of employment on daily use of social network during the pandemic.

The same OLR model was able to provide insights about our second hypothesis, which states that employed people would exhibit a significant increase in social media usage during the pandemic, while students will maintain a relatively constant rate of social media activity. This hypothesis was supported by the data (see Table 3). Specifically, as revealed by Fig. 2, the model predicted that, holding constant all other variables, the full-time employees as compared to the students, would have a higher likelihood of using social media for a longer time, i.e., "response: 4 or more than 4 hours", during the pandemic, as compared to the pre-pandemic period (OR = 1.73, 95 %[1.14, 2.63], $p = .010$). The OLR also confirmed that being a student, as compared to being a worker, is associated with a higher likelihood of spending longer time on social media (OR = 0.68, 95 % CI [0.48, 0.98], $p = .038$). Indeed, the percentage of students reporting using social media for <30 min and 1 h per day was respectively 7.13 % and 15.53, as compared to 20.64 % and 30.64 % of the full-time employees. On the contrary, the percentage of students reporting using social media for 3 h and 4 h was respectively 23.94 % and 22.98 %, as compared to 11.91 % and 8.30 % of the full-time employees (see Table 5).

Hypothesis 3. Effect of country on daily use of social network during the pandemic.

Our third hypothesis states that the increased use of social media during the pandemic was stronger in Italy as a consequence of the severity of the lockdown regulations in the country during the first months of the international health crisis. This hypothesis was not supported by the data. While both the Italian and the American samples showed increased use of social media during the first months of the lockdown, the two samples did not differ neither in their general SMU nor its variation during lockdown, as indicated respectively by the non-significant OR of the *Sample* predictor (OR = 0.86, 95 % CI [0.65, 1.13], $p = .270$) and by the non-significant interaction "*Sample*Pandemic*" (OR = 0.90, 95 % CI [0.60, 1.36], $p = .623$).

4.2. Effects of socio-demographic variables, personality factors, and life satisfaction on social media use

In our OLR model, other socio-demographic variables were significant predictors of time spent on social media daily. Specifically, males appeared to have a lower likelihood of using social media for a longer time as compared to females (OR = 0.47, 95 % CI [0.38, 0.59], $p < .001$). Moreover, the time spent on social media appeared to diminish with age (OR = 0.95, 95 % CI [0.93, 0.96], $p < .001$). See Fig. 3 to appreciate the predicted probability of responses related to the time spent on social media as a function of age (step increase of likelihood of response "less than 30 minutes" as a function of age, mirrored by a decrease of likelihood of responses "more than 4 hours" as a function of age).

The OLR model also included the 5 traits of the TIPI personality test and the Quality of Life survey (SWLS). Results indicate that the likelihood of spending more time on social media significantly increased as a function of Extraversion (OR = 1.13, 95 % CI [1.05, 1.21], $p < .001$) and Agreeableness (OR = 1.10, 95 % CI [1.00, 1.21], $p = .044$). While it decreased as a function of Emotional Stability (OR = 0.88, 95 % CI [0.82, 0.95], $p = .002$) and Openness (OR = 0.90, 95 % CI [0.82, 0.99], $p = .024$). The last trait of the TIPI, i.e., Conscientiousness, was not a significant predictor of SMU. Interestingly, the satisfaction with life survey (SWLS) was also not significant.

4.3. Results on the active use of social media (ASMU)

The vast majority of studies assess SMU by quantifying its prevalence, such as time spent online each day. However, previous research

Table 3
Odd ratios (ORs), 95 % confidence interval (CI), z-statistic (z), and *p*-values (p), and the collinearity statistics for each predictor of the OLR on SMU. Bold denotes statistical significance. An asterisk (*) specifies statistical significance at p < 0.05, two asterisks (**) at p < 0.005 and three asterisks (***) at p < 0.001.

					Collinearity stats	
Predictor	OR	95 % CI	Z	p	Tol.	VIF
Pandemic (Covid Time)	**1.44**	**[1.02, 2.06]**	**2.070**	**0.038** *	**0.298**	**2.531**
Sample (Italy)	0.86	[0.65, 1.13]	-1.10	0.270	0.466	3.103
Occupation (Worker)	**0.68**	**[0.48, 0.98]**	**-2.08**	**0.038** *	**0.322**	**3.146**
Gender (male)	**0.47**	**[0.38, 0.59]**	**-6.56**	**< 0.001** ***	**0.771**	**1.298**
Age	**0.95**	**[0.93, 0.96]**	**-8.60**	**< 0.001** ***	**0.392**	**2.550**
Extraversion	**1.13**	**[1.05, 1.21]**	**3.52**	**< 0.001** ***	**0.876**	**1.141**
Agreeableness	**1.10**	**[1.00, 1.21]**	**2.01**	**0.044** *	**0.85**	**1.176**
Conscientiousness	0.92	[0.84, 1.00]	-1.95	0.051	0.842	1.188
Emot. Stab.	**0.88**	**[0.82 0.95]**	**-3.11**	**0.002** **	**0.708**	**1.413**
Openness	**0.90**	**[0.82 0.99]**	**-2.26**	**0.024** *	**0.877**	**1.141**
SWLS	1.02	[0.93, 1.11]	0.38	0.707	0.790	1.267
Pand. ✻ Occ.	**1.73**	**[1.14 2.63]**	**2.56**	**0.010** *	**0.389**	**2.574**
Pand. ✻ Sample	0.90	[0.60 1.36]	-0.49	0.623	0.264	3.787

Table 4
Percentage of respondents reporting SMU before and during pandemic.

	Less than 30 min.	1 h	2 h	3 h	4 h or more
Before Lockdown	14.68 %	21.52 %	30.25 %	16.58 %	16.96 %
Pandemic period	7.74 %	19.35 %	29.19 %	24.19 %	19.52 %

highlighted the necessity of also considering participative engagement within social media platforms (Korda & Itani, 2013; Scott et al., 2017). To test the influence of the lockdown, sample (i.e., nation), occupation, socio-demographic variables, personality factors, and life satisfaction, we ran an ordinal logistic regression with social media engagement, i.e., AMSU (responses to "how often do you post on social media") as a criterion variable. Results are reported in Table 6.

The tests for collinearity show an average VIF lower than 2.5 (VIF = 2.0) and a tolerance higher than 0.1 (Tol. = 0.6). The two values indicate the absence of concerns for collinearity between our predictor variables (Johnston et al., 2018).

Hypothesis 1. Effect of pandemic on active use of social network.

As Table 6 shows, the predictor *Pandemic* is not significant (OR = 0.83, 95 % CI [0.59, 1.19], $p = .318$) indicating that participants were not more actively involved on social media during the pandemic lockdown phase than before the pandemic.

Hypothesis 2. Effect of employment on active use of social network during the pandemic.

The occupation was not a significant predictor of ASMU (OR = 0.89, 95 % CI [0.63, 1.28], $p = .539$). However, a significant interaction "Occupation*Pandemic" was revealed (OR = 1.59, 95 % CI [1.04, 2.43], $p = .031$). Indeed, as displayed in Fig. 4, the model predicted that, holding constant all other variables, the full-time employees as compared to the students, would have a higher likelihood of posting on

Table 5
Percentages of students' and full-time employees' responses to the question related to the time spent on social networks.

	<30 min.	1 h	2 h	3 h	4 h or more
Students	7.13 %	15.53 %	30.43 %	23.94 %	22.98 %
full-time employees	20.64 %	30.64 %	28.51 %	11.91 %	8.30 %

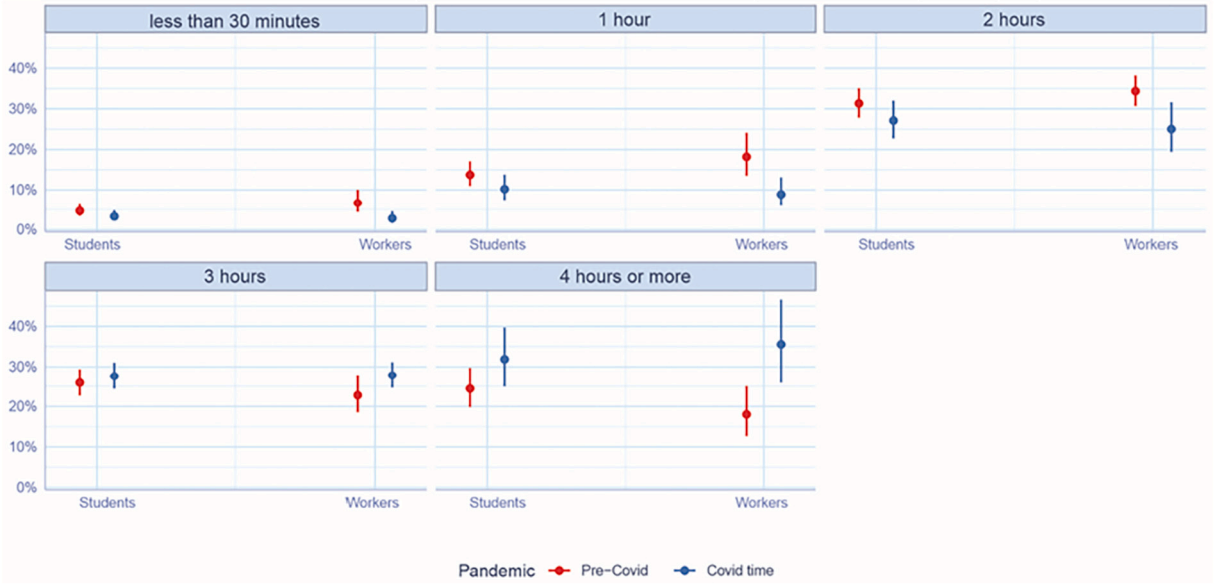

Fig. 2. The predicted probability of the responses about the amount of time spent on social media as a function of Occupation (Students vs. full-time employees) and Pandemic (Pre-Covid-19 vs. Covid-19 time).

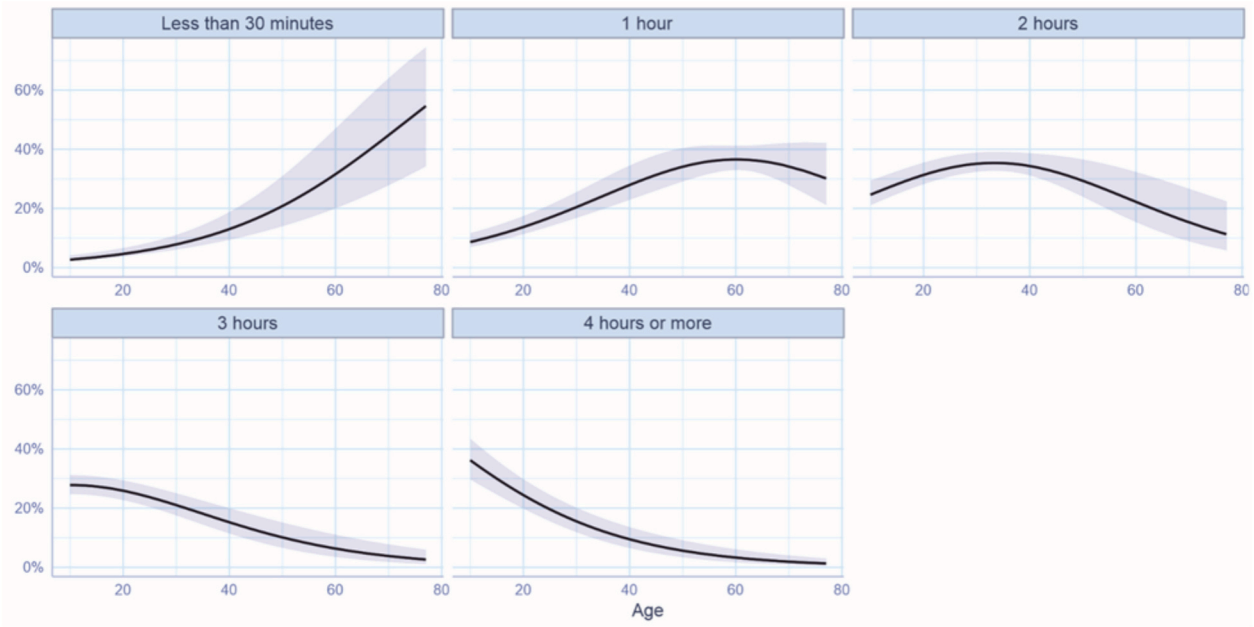

Fig. 3. The predicted probability of the responses about the amount of time spent on social media as a function of age.

Table 6
Odd ratios (ORs), 95 % confidence interval (CI), z-statistic (z), and *p*-values (p), and the collinearity statistics for each predictor of the ordinal logistic regression on ASMU. Bold denotes statistical significance. An asterisk (*) specifies statistical significance at p < 0.05, two asterisks (**) at p < 0.005 and three asterisks (***) at p < 0.001.

					Collinearity stats	
Predictor	OR	95 % CI	Z	p	Tol.	VIF
Pandemic (Covid Time)	0.83	[0.59, 1.19]	-0.999	0.318	0.3	3.35
Sample (Italy)	**0.49**	**[0.37, 0.65]**	**-5.021**	**<0.001** ***	**0.47**	**2.15**
Occupation (Worker)	0.89	[0.63, 1.28]	-0.614	0.539	0.32	3.10
Gender (male)	**0.52**	**[0.41, 0.65]**	**-5.716**	**<0.001** ***	**0.77**	**1.30**
Age	**0.98**	**[0.97, 0.99]**	**-3.629**	**<0.001** ***	**0.39**	**2.55**
Extraversion	**1.26**	**[1.18, 1.35]**	**6.769**	**<0.001** ***	**0.88**	**1.14**
Agreeableness	0.97	[0.89, 1.06]	-0.628	0.530	0.85	1.18
Conscientiousness	0.99	[0.92, 1.08]	-0.128	0.898	0.84	1.19
Emot. Stab.	**0.92**	**[0.86, 0.999]**	**-1.997**	**0.046** *	**0.71**	**1.41**
Openness	1.07	[0.98, 1.17]	1.494	0.135	0.88	1.14
SWLS	1.00	[0.92, 1.09]	0.021	0.982	0.79	1.27
Pand. ✻ Occ.	**1.59**	**[1.04, 2.43]**	**2.163**	**0.031** *	**0.39**	**2.57**
Pand. ✻ Sample	1.25	[0.83, 1.88]	1.060	0.289	0.26	3.79

social media, see e.g., response "3 posts per day" and response "4 or more posts per day", during the pandemic, as compared to the pre-pandemic period in the employees vs. student.

Hypothesis 3. Effect of country on daily use of social network during the pandemic.

The model indicates that people from the USA tended to have more direct engagement on social media than Italians, as indicated by the *Sample* predictor (OR = 0.49, 95 % CI [0.37, 0.65], $p < .001$). Indeed, as shown in Table 7, 38.63 % of the Italian sample reported posting only two times per day, as compared to the 28.04 % of the sample from the USA. While 19.34 % of subjects from the USA reported more than four posts per day, as compared to the 7.43 % of the Italian sample. Interestingly, these results were not modulated by the presence of the Pandemic crisis as indicated by the non-significant interaction *Sample*Pandemic* (OR = 1.25, 95 % CI [0.83, 1.88], $p = 289$).

4.4. Effects of socio-demographic variables, personality factors, and life satisfaction on social media use

In agreement with our previous results on general SMU, we found that the strongest predictors for active social media usage (ASMU) have been age and gender. Results indicate that males appeared to have a lower likelihood of extensively posting on social media (OR = 0.52, 95 % CI [0.41, 0.65], $p < .001$); and that active posting diminishes with age (OR = 0.98, 95 % CI [0.97, 0.99], $p < .001$). Fig. 5 displays the predicted probability of ASMU responses as a function of age.

Concerning the 5 traits of the TIPI personality test, the results of OLR indicate that the likelihood of higher ASMU responses increases as a function of *Extraversion* (OR = 1.26, 95 % CI [1.18, 1.35], p < .001), and decreases as a function of *Emotional Stability* (OR = 0.92, 95 % CI [0.86, 0.999], $p = .046$). The other three traits of the TIPI, Openness, Agreeableness, and Conscientiousness were not significant predictors of ASMU. Interestingly, the quality of life survey was also not significant.

Hypothesis 4. Effect of bubble size and isolation on SMU and ASMU.

As a last hypothesis, we expected that lockdown could have influenced the use of social media, especially the amount of active posting, with an increase of active users versus users who passively scroll others' contributions. Thus, to further detail the influence of social distancing (i.e., *Bubble Size* and *Isolation*) on SMU and ASMU, we ran two OLR on the participants that completed the survey during the pandemic lockdown, with criterion variables SMU and ASMU respectively, and *bubble Size, Isolation, and Sample* as predictor. The tests for collinearity show an average VIF lower than 2.5 (all VIF $\leq$ 1.04) and a tolerance higher than 0.1 (all Tol. $\geq$ 0.96). The two values indicate the absence of concerns for

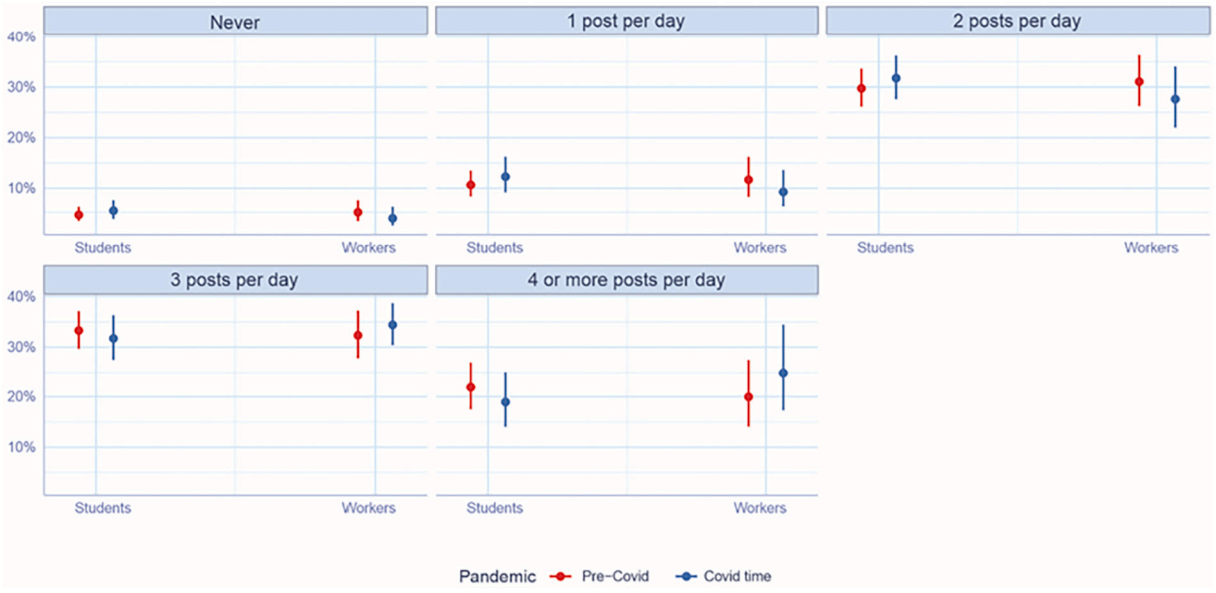

Fig. 4. Predicted probability of responses about the number of active posts in the favorite social media as a function of Occupation (Students vs. full-time employees) and Pandemic (Pre-Covid-19 vs. Covid-19 time).

Table 7
Percentages of responses to the question related to the number of active posts in the favorite social media in the two samples from USA and Italy.

	Never	1 post epr day	2 posts per day	3 posts per day	4 or more posts per day
USA	10.08 %	16.71 %	28.04 %	25.83 %	19.34 %
Italy	10.06 %	19.83 %	38.63 %	24.05 %	7.43 %

collinearity between our predictor variables (Johnston et al., 2018). Results of the analysis on SMU (see Table 8) indicate that the strictness of the isolation was a significant predictor of the time spent in social media (OR = 1.19, 95 % CI [1.03, 1.37], p = .019), suggesting a significant higher likelihood of spending longer time on social media an as a function of the reported isolation. Interestingly, neither *bubble size* nor *Sample* were significant contributing factors.

Results of the analysis on active engagement (ASMU, Table 9), indicate that neither the strictness of the isolation, nor the size of the social bubble were significant predictors of ASMU. *Sample*, mirroring the results obtained in the previous analysis for active posting for pre- and during the pandemic, was significant, indicating that Americans posted more than Italian during the lockdown phase of the pandemic (OR = 0.59, 95 % CI [0.43, 0.79], $p \leq 0.001$).

5. Discussion

Our study intended to contribute to the evolving discourse on the interplay between social media engagement during times of crisis and

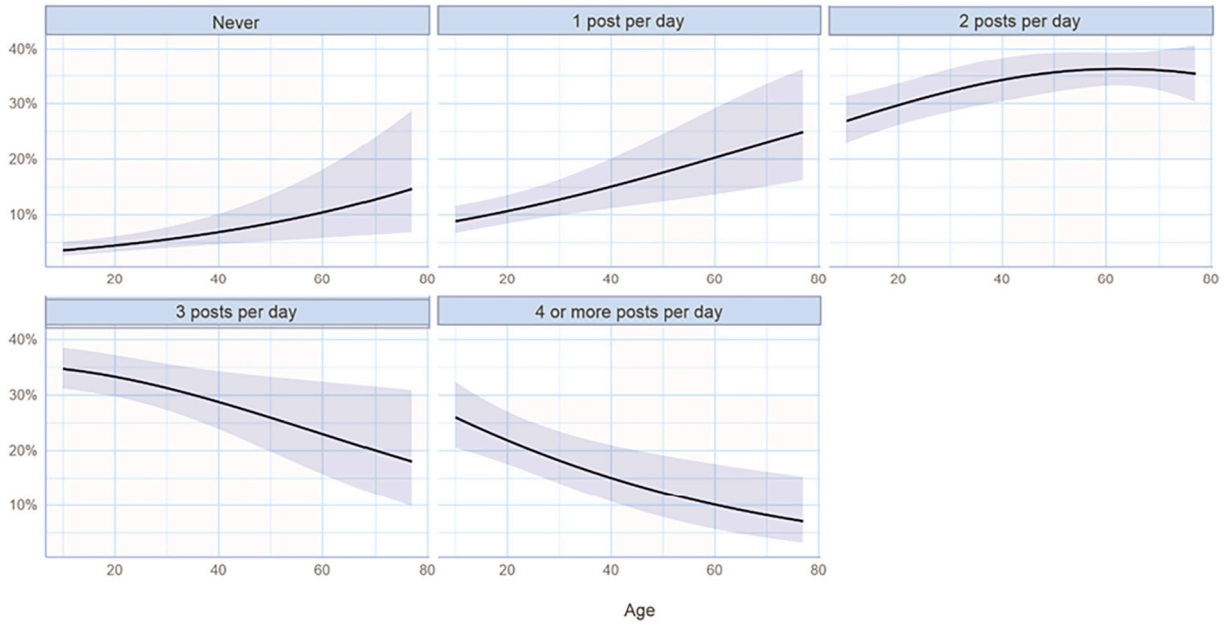

Fig. 5. The predicted probability of ASMU responses as a function of age.

Table 8
Odd ratios (ORs), 95 % confidence interval (CI), z-statistic (z), and *p*-values (p), and the collinearity statistics for each predictor of the ordinal logistic regression on the effect of bubble size and isolation on SMU. Bold denotes statistical significance. An asterisk (*) specifies statistical significance at $p < 0.05$.

					Collinearity stats	
Predictor	OR	95 % CI	Z	p	Tol.	VIF
Bubble size	1.05	[0.94, 1.17]	0.893	0.372	0.99	1.01
Isolation	**1.19**	**[1.03, 1.37]**	**2.351**	**0.019** *	**0.96**	**1.04**
Sample (Italy)	1.16	[0.86, 1.56]	0.955	0.339	0.97	1.03

Table 9
Odd ratios (ORs), 95 % confidence interval (CI), z-statistic (z), and *p*-values (p), and the collinearity statistics for each predictor of the ordinal logistic regression on the effect of bubble size and isolation on ASMU. Bold denotes statistical significance. Three asterisks (***) specify statistical significance at $p < 0.001$.

					Collinearity stats	
Predictor	OR	95 % CI	Z	p	Tol.	VIF
Bubble size	0.97	[0.88, 1.08]	-0.489	0.625	0.99	1.01
Isolation	1.04	[0.90, 1.20]	0.582	0.560	0.96	1.04
Sample (Italy)	**0.59**	**[0.43, 0.79]**	**-3.430**	**<0.001**	**0.97**	**1.03**

demographic and psychological factors. Before the COVID-19 pandemic, online social media platforms were already an integral part of the lives of billions of people worldwide. Our research assessed how their usage patterns have evolved during the unique challenges posed by the pandemic via the exploration of multiple hypotheses involving the interaction between psychological, demographic, cultural, and situational factors.

Before discussing the influence of the factors in the analysis, it is worth mentioning that, regardless of the pandemic and the lockdown, our results confirm the pervasiveness of the use of social media. A very small percentage of our respondents used social media for <30 min daily, while the majority used it for longer periods, ranging from one to four or more hours per day. These findings align with previous research by Scott et al. (2017) and Riehm et al. (2019). Instagram was the most preferred social media platform, followed by Facebook, Snapchat, Twitter, and other platforms. Preferences varied between the American and Italian samples and between the two periods in which the surveys were administered.

Our first hypothesis posited a significant surge in social media usage during the pandemic. The empirical evidence supports this assertion, indicating a significant increase of social media usage during the lockdown phase of the pandemic. While we do not have data able to specify why the increase happened, we speculate, in agreement with previous studies, that the increase can be driven by individuals seeking solace, information dissemination, and emotional support amid uncertainties and isolation (Saud et al., 2020; Wong et al., 2021). This finding also aligned with a general increase of use of the internet and online searches (Effenberger et al., 2020; Fischer, 2020).

Our second hypothesis claimed that during the initial three months of COVID-19 lockdown procedures, full-time employees exhibit a significant increase in social media usage, while students maintain a relatively constant rate of social media activity. This hypothesis was supported by the data. Specifically, we found that, while students spent more time on social media than full-time employees both before and during the pandemic, full-time employees increased their social media use more than students during the pandemic (see Ahmad et al., 2022 for similar findings). We argue that this result is related to a greater availability of free time during the pandemic and greater accessibility to social media platform and a diminished control over employee productivity in remote work settings during the pandemic (Ahmad et al., 2022).

Our third hypothesis proposed that Italy's stricter lockdown regulations led to a greater increase in social media use during the pandemic compared to the US. However, the data did not support this hypothesis. Both Italian and American samples showed increased social media use, but there was no significant difference between them. We do not have a data-driven explanation for the lack of a difference between Italy and the USA in spite of the significantly higher isolation of the Italian citizen. However, while full-time employees in Italy and USA showed an analogous amount of increase in their use of social media, students differed by country. Specifically, while American students showed a significant increase of time spent on social media, Italian did not. Possible reasons for this difference is that American students before the pandemic had less free time to dedicate to social media than Italian students, either because they are typically student-full-time employees or because they are taking more classes than Italian students.

We also analyzed the intervening impact of socio-demographic factors such as age, gender and personality factors on the social media usage, before and during the lockdown period. Our results indicate, as expected, that younger participants spend more time on social media. Confirming results of many other studies and statistical reports (see, for example, Perrin, 2015), age negatively correlates with SMU being our stronger predictor of the likelihood of spending time on social media. An interesting finding concerning demographic factors in the use of social media is related to gender. We found that female participants spent more time on social media compared to male participants. This result confirms previous findings (Perrin, 2015).

Previous studies offered converging evidence of the association between personality traits, especially extraversion and emotional stability, and the use of social media (Correa et al., 2010). In our study, we wanted to investigate whether such personality predictors remained significant predictors after controlling for the presence of the pandemic and the other socio-demographic factors included in our design. Our results confirmed the complex interplay between different dimensions of personality and the use of social media, with both extraversion and emotional stability as significant predictors of the use of social media after controlling for the other variables in our model. Specifically, we found that emotional stability is negatively correlated with social media usage. These results have an overwhelming consistency across studies conducted in different countries, with different methodologies and types of participants (Correa et al., 2010; Roos, 2023; Seidman, 2013) and points out the alarming relationship between the use of social media and the tendency toward anxiety, depression, self-doubt, and negative feelings. Analogously, our results confirm the strong link between extraversion and use of social media (Bowden-Green et al., 2020). Interestingly, recent studies argued that the link between extraversion and the use of social media can act as a moderating factor to mitigate the relationship between social media and negative aspects of personality and behavior. Weiß and colleagues found that extraversion moderates the association between social media use and depression (Weiß, Baumeister, et al., 2022) and Marengo and collaborators found that it can influence the relationship between social media and neuroticism (Marengo et al., 2020). We also found that high agreeableness increased the likelihood of spending more time on social media, while openness decreased it. Recent studies have found a positive correlation between high agreeableness and engagement on social media platforms. For instance, Smith (2023) demonstrated a significant association between agreeableness and increased frequency of social media interactions in their longitudinal study. This aligns with previous research by Lee et al. (2022), who similarly reported a positive relationship between agreeableness and social media use. Our results, together with previous findings, suggest that individuals high in agreeableness may exhibit more prosocial behaviors in online environments. Conscientiousness and life satisfaction (*SWLS*) were not significant predictors of social media use.

Most studies measure SMU by tracking how much time is spent online daily. However, previous research suggests it's also important to consider active engagement on social media. We ran an ordinal logistic

regression using active use of social media (ASMU) as the criterion variable and pandemic, personality, life satisfaction, socio-demographics, nationality, and occupation as predictors. We found that the presence of the pandemic was not a significant predictor of ASMU, indicating that participants were not more active engaged with posts and comments during the lockdown than before. Similarly, occupation alone was not a significant predictor of ASMU. However, there was a significant interaction between occupation and the pandemic, with the model predicting that full-time employees were more likely to post on social media during the pandemic compared to students. Consistently with our results, a recent study by Zhang et al. (2023) contradicts the notion that the pandemic significantly influenced active engagement on social media platforms. Their findings revealed that the pandemic was not a significant predictor of social media activity, suggesting that individuals did not exhibit increased engagement with posts and comments during the lockdown compared to pre-pandemic levels. It is interesting to note that isolation and social distancing during the lockdown, while causing an increased time spent on social media, did not influence active engagement. We can speculate that isolation contributed to a more passive use of social media, which is actually considered more dangerously linked to depression than active SMU (Escobar-Viera et al., 2018). Moreover, while occupation alone did not emerge as a significant predictor of ASMU, an interesting interaction effect was observed between occupation and the pandemic. We found that full-time employees were more likely to engage in posting on social media during the pandemic compared to students, indicating a nuanced relationship between occupation and social media behavior during times of crisis. Earlier research by Chen et al. (2021) confirmed the influence of external factors such as the pandemic on social media engagement. Their study reported a significant increase in social media activity during the pandemic, suggesting that situational factors can indeed impact individuals' propensity to engage with online content.

Consistent with our previous findings on general social media use, age and gender were the strongest predictors of active social media usage. In line with previous studies, our results show that active posting decreases with age (Auxier & Anderson, 2021) and that males are less likely to post extensively than female. In line with Frison and Eggermont (2015) and Simoncic et al. (2014) this may be because females seem to benefit more from active engagement, they are more socially skilled and experience fewer negative online interactions compared to males. Interestingly, the ordinal logistic regression showed that Americans tended to engage more actively on social media compared to Italians. While a high percentage of Italians reported posting only twice a day, more Americans posted over four times a day. These differences were not influenced by the pandemic.

Concerning the influence of personality traits on ASMU, our results indicate that higher active social media use is more likely with individuals with higher levels of Extraversion and less likely with individuals with higher levels of Emotional Stability. The other traits—Openness, Agreeableness, and Conscientiousness—were not significant predictors of active social media usage. Additionally, the quality of life survey was not a significant predictor. Specifically, our study found that emotional stability is negatively correlated with active social media posting, a result consistently supported by prior research across various contexts (see Bowden-Green, Hinds, Joinson, 2021b for a review). This correlation highlights a concerning link between increased social media use and heightened tendencies toward anxiety, depression, self-doubt, and other negative emotional states. Moreover, our findings indicate that extraversion is positively correlated with active engagement on social media platforms, such as posting and commenting. Previous studies have consistently shown that extraverts are more likely to engage in these activities due to their inherent sociability and desire for interaction. For instance, Correa et al. (2010) found that extraverts use social media to fulfill their social needs, engaging more frequently in posting and commenting. Similar conclusions were drawn by Seidman (2013), who noted that extraverts are driven by the need for social connection and validation, leading to higher levels of social media activity. Additionally, Ryan and Xenos (2011) highlighted that extraverts' active social media engagement stems from their tendency to seek out and enjoy social interactions.

To further understand how social distancing affects social media use, we investigated whether social isolation predicts both SMU and ASMU during the lockdown phase, focusing specifically on the influence of bubble size and the strictness of social distancing practices. The analysis showed that the strictness of social distancing was a significant predictor of increased social media use, while bubble size and sample did not significantly influence social media behavior. These findings align with other research, indicating a general increase in social media use during the pandemic due to higher levels of stress and anxiety from social isolation (Eden et al., 2020; Lee et al., 2022). In line with the social compensation theory (Valkenburg & Peter, 2009), our results suggest that individuals with psychosocial challenges are more likely to turn to social media as a means of fulfilling their social needs. Confirming the lack of an influence of pandemic on active engagement and posting in social media (ASMU), we did not find any significant influence of bubble size and strictness of social distancing on ASMU. These findings, overall, suggest that the increased use of social media was not characterized by a greater active engagement in the social media platforms (like posting and commenting), but rather by a passive experience of contents, which can lead to depression and anxiety (Escobar-Viera et al., 2018).

While our study sheds light on previously unexplored aspects of social media use during the COVID-19 pandemic and social distancing, it is important to acknowledge certain limitations. Primarily, our data collection was conducted exclusively through online questionnaires. Although we are aware of the potential risks associated with online administration, such as variability in participant engagement and limited control over participant behavior, previous studies have demonstrated that the results obtained using paper-and-pencil and Internet data collection methods are generally equivalent (Dodou & de Winter, 2014; Weigold et al., 2013). Another potential limitation is related to the snowball sampling recruitment method. Participants recruited through this method might be more similar to each other due to their shared social network (Kirchherr & Charles, 2018). However, it is important to note that our study employed an exponential non-discriminative snowball sampling method, where each participant referred multiple new participants, and this process continued exponentially. This approach allowed the sample to grow rapidly and include a wider variety of individuals, thereby reducing participant similarity and enhancing the representativeness and generalizability of the results. Another limitation is the exclusion from the model of potentially relevant psychological mediators and moderators. Previous research conducted in Greece, a country culturally and geographically close to Italy, shows that religiousness and spirituality influence subjective well-being both before the COVID-19 crisis (Giannoulis & Giannouli, 2020) and during the pandemic (Giannouli & Giannoulis, 2022).

6. Conclusion

In summary, our study provides valuable insights into how social media usage evolved during the COVID-19 pandemic, emphasizing the role of demographic, psychological, and situational factors. We observed a general increase in social media use, particularly among full-time employees, driven by increased free time and social isolation. However, active engagement, such as posting and commenting, did not significantly rise, suggesting an increased passive consumption of social media contents during the pandemic. Personality traits like extraversion were positively associated with active social media use, while emotional stability was negatively correlated. These findings align with previous research and underscore the complex relationship between social media use, personality, and the psychological impacts of prolonged isolation. The results suggest that while social media served as a coping mechanism, its passive usage may contribute to negative emotional states,

reinforcing concerns about its role in exacerbating mental health challenges during crises.

CRediT authorship contribution statement

Franco Delogu: Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Kineta Morgan-Paisley:** Writing – review & editing, Conceptualization. **Claudia Del Gatto:** Writing – review & editing, Validation, Resources. **Allegra Indraccolo:** Writing – review & editing, Validation, Investigation. **Tiziana Pedale:** Writing – review & editing, Methodology, Formal analysis. **Riccardo Brunetti:** Writing – review & editing, Supervision, Methodology, Investigation, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.actpsy.2025.104888.

Data availability

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

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