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Online Networks and Subjective Well-Being: The Effect of "Big Five Personality Traits"

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Abstract

This article provides an empirical examination of how online social networks affect subjective well-being, namely enquiring if networks mediate the effect of personality on subjective well-being of the individuals who use those networks. We use the theories of complementarity of face-to-face and online networks, preferential attachment, and the "Big Five Personality Traits" to test the following hypothesis: Given that online and offline networks complement each other as integrative factors that generate happiness, greater use of online networks would imply greater happiness. We also hypothesize that networks mediate the effect of personality on subjective well-being. Data was compiled from interviews of 4,922 people aged 18 years and older, carried out by the Centre for Sociological Research of Spain in 2014 and 2016. The results confirm the hypothesis and show how online networks, when controlled for personality traits, have a significant and even greater effect on subjective well-being than face-to-face networks.

Keywords

face-to-face networks; happiness; ICTs; online networks; personality; subjective well-being

Issue

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1. Introduction

With the development of ICTs, attention must be given to digital relationships as sources of happiness for people. Digital social constructs and new scenarios involving digital/face-to-face interaction should be considered alongside face-to-face relationships, which are no longer the sole source of integrative processes in communities (Requena & Ayuso, 2019). This article reports on how the use of online social network sites (SNS) affects well-being, specifically happiness, mediating the effect of personality traits on subjective well-being.

The extant literature on this topic contains some interesting analyses that demonstrate a positive relationship between online networks and happiness (Kim & Lee, 2011; Lee et al., 2011; Manago et al., 2012; Wang, 2013; Webster et al., 2021). For example, adolescents with large online networks tend to have higher levels of well-being; maintaining relationships with close friends through online networks has also been found to generate greater psychological well-being (Manago et al., 2012; Orben, 2020). Other studies, however, demonstrate a contradictory or clearly negative relationship between the use of online networks and happiness (Appel et al., 2019; Arampatzi et al., 2018; Helliwell & Huang, 2013; Lin & Utz, 2015; Locatelli et al., 2012; Lönnqvist & Itkonen, 2014; Saigioglou & Greitmeyer, 2014).

Clearly there is an ongoing debate regarding the connection between the use of SNS and subjective well-being, as online networks have both positive and negative impacts on relationships. Thus, the influence of context is very important. Context is a fundamental aspect to understand the new processes of social inclusion. The balance between online networks and

happiness probably varies according to the characteristics of a group, the setting the interactions takes place, the context in which these networks are used and who is using them. Online networks generated by SNS have a different effect on happiness than face-to-face networks (Arampatzi et al., 2018). This highlights both the significance of analyzing the relationship between online networks and happiness and the need to compare the mediating traits of people who use online networks.

How online networks are linked to personality traits is an area of great interest in current literature (Bollen et al., 2011; Kennon et al., 2011; Masur et al., 2014; Reinecke et al., 2014), so our objective is to provide evidence of the effects of various personality traits to determine how those traits affect online and offline networks and whether they are capable of generating happiness and subjective well-being.

2. Theoretical Framework

2.1. Online Relations and Happiness

Durkheim was the first of many to demonstrate that social relations, closeness, and personal contact generate happiness (Durkheim, 1897/1951). Since the mid-twentieth century, literature on well-being has shaped a solid profile of a happy person as a "young, healthy, well-educated, well-paid, extroverted, optimistic, worry-free, religious, married person with high self-esteem, job morale and modest aspirations, of either sex and of a wide range of intelligence" (Helliwell & Putnam, 2004, p. 1436; see also Diener et al., 1999). Social connections are strongly correlated with happiness, which signals their importance in *generating* happiness (Helliwell & Putnam, 2004) and supports the use of happiness as a very robust proxy indicator for subjective well-being. However, there is a current need to include the variable of "online networks" in the profile of a happy person, in a way that makes it possible to demonstrate how online networks can, in certain circumstances, add depth to that profile. For example, among college students, the number of friends on Facebook—in other words, the size of their online networks—has a positive effect on happiness (Kim & Lee, 2011). Nonetheless, the relationship between these two variables is not always positive, so there is an important debate regarding the relationships maintained on the internet and well-being (Orben et al., 2019; Orben & Przybylski, 2019).

2.2. Complementarity Theory of Face-To-Face and Online Networks

Diverse online environments such as Youtube, Instagram, Facebook, among others, can become sites for virtual communities. These SNS are not communities as such, but they function as social places in which communities can be formed (Requena & Ayuso, 2019). Because SNS involve sociability expectations such as connection

with others, empathy, support (Parks, 2011), virtual communities are not as virtual as they seem. Although computer-mediated communication supposedly frees individuals from the limitations of physical proximity, social connections in online communities generally rely on face-to-face contacts (Foucault et al., 2009). Internet-based communication in many cases serves and reinforces pre-existing groups that formed in other contexts. This is the idea of "connected presence" suggested by Licoppe (2004). Internet-based communication complements our everyday interactions with others (Requena & Ayuso, 2019), and the complementarity of online/offline networks gives rise to interesting questions.

2.3. Dimensions of Personality and Well-Being

Personality traits have been shown to affect well-being directly and indirectly. The relationship between psychological well-being and the "Big Five Personality Traits," or personality dimensions (Rammstedt & John, 2007), provides a working basis for the study of personality and its effects (McCrae & Costa, 1991; van Aken & Asendorpf, 2018).

Nonetheless, the current literature on social networks largely overlooks the role of psychological mechanisms (van Aken & Asendorpf, 2018; Zhu et al., 2013) and pays little attention to motivation, cognition, and personality. Thus, research on social networks runs the risk of showing results that undervalue human experience. Examining the link between personality and social networks promises to enrich our understanding of how social networks function and how they affect well-being (Burt et al., 1998; Kalish & Robins, 2006; Totterdell et al., 2008). Personality captures the relatively stable patterns of thought, emotion, motivation, and behavior (see Table 1); it influences perceptions, attitudes, and values in an individual's responses to people and situations (McAdams, 2009). In virtual social networks, personality traits play a very important role in the development and maintenance of social relations (Ilmarinen et al., 2019; McCrae, 1996; Reitz et al., 2014; Yang et al., 2015).

Indeed, several personality traits have been linked to important results concerning network functioning, including proactivity in building network ties (Forret & Dougherty, 2001; Lambert et al., 2006; Totterdell et al., 2008). While these studies provide useful information on personality traits in the configuration of social relations, results for effects on well-being have been incomplete. The relationship between personality and happiness through social networks has not been thoroughly explained (Zhu et al., 2013). Thus, it is important to give attention to the role of personality traits in social networks and in generating happiness.

2.4. Preferential Attachment Theory

Users of online networks tend to connect preferentially with other users who have similar levels of happiness

Table 1. The "Big Five Personality Traits" in relation to social networks.

Personality trait	Definition	References	Relation to social networks
Extraversion	The degree to which an individual is optimistic, sociable, energetic, enthusiastic, and has a cheerful outlook.	John and Srivastava (1999) McCrae and John (1992) Ilmarinen et al. (2019) Forret and Dougherty (2001)	A positive association has been demonstrated between extraversion and diverse aspects of social networks. People with high extraversion are more likely to develop networks in new environments. Sociometric status predicts extraversion in the case of adolescents in schools.
Agreeableness	A tendency to demonstrate a positive attitude towards others, altruism, modesty, trust, empathy, and concern for others.	Digman (1990) Graziano et al. (1996) Ahadi and Rothbart (1994) Jensen-Campbell et al. (2002) Klein et al. (2004)	Tendency toward larger friendship networks and better chances of being chosen as friends.
Conscientiousness	Socially prescribed impulse control that facilitates task- and goal-directed behavior. Conscientious people tend to be dutiful, organized, disciplined, hard-working, reliable, and achievement-oriented. They tend to have higher qualifications and better job performance.	John and Srivastava (1999) Costa and McCrae (1992) Judge et al. (1999) Anderson et al. (2001) Doeven-Eggens et al. (2008)	Social networks tend to overlap more with family networks; greater motivation towards relationships with others.
Openness	Describes individuals who are curious, flexible, receptive to new ideas, and motivated to seek novelty and explore new environments.	Costa and McCrae (1992) Woo et al. (2014) van Aken and Asendorpf (2018) McCrae (1996)	Openness may facilitate the development of new relationships because people who are curious and open-minded have an interest in getting to know others and seek out interactions with new people.
Neuroticism	The individual tendency to experience substantial and frequent mood swings, to exhibit poor emotional control, and to display negative emotions such as anger, hostility, impulsiveness, and irritability.	Costa and McCrae (1992) Turban and Dougherty (1994)	Expressed in greater sensitivity to the negative aspects of social relations, fear of rejection, and less likelihood of initiating relationships.

Source: Adaptation from Zhu et al. (2013).

(Bollen et al., 2011). As an online social network grows, new connections may be inclined toward similar people. Thus, it makes sense to speak in terms of preferential attachment theory, a process that assumes that personality traits are contagious. In other words, the happiness values of connected users tend to converge over time (Bollen et al., 2011). Similarly, being connected with unhappy users can make one feel less happy, and vice-versa. This suggests that people can control their level of happiness by choosing a specific group of online friends. People can also influence the happiness of their friends by creating strong social ties and expecting happiness

to "spread." Bollen et al. (2011) also point out that users of online networks can evaluate or express their own happiness based on that of their friends. As an online user's environment becomes happier, it can influence the expression of feelings related to his or her own happiness.

Given the increasing prevalence of online networks, their propensity to connect users with similar levels of happiness can provide an important tool for better understanding how positive and negative feelings are propagated through online social ties (Bollen et al., 2011). This underscores the importance of paying attention to basic personality traits in the process of forming online networks and to the happiness they generate.

3. Hypotheses

Prior theses have indicated three important processes in the relationship between online networks and happiness: the complementarity of online and offline networks; the effect of personality traits on those networks; and how all of these affect the generation of happiness (Vriens & van Ingen, 2017). Together, these three theoretical ideas lead us to propose a theoretical model that links personality, online networks and happiness.

Based on the above, we tested the following hypothesis:

- H1: If virtual networks complement face-to-face networks and the latter are an indicator of integration and sociability, then greater use of on-line networks is associated with greater subjective well-being of individuals.

From this, two sub-hypotheses can be formulated:

- H1a: This relationship mediates the relation between personality traits and happiness whereby greater extraversion and openness are associated with greater use of virtual networks and therefore greater subjective well-being.
- H1b: Personality traits predict and configure both online and offline networks.

These hypotheses should be interpreted only as statements, since no causal conclusions can be drawn between the variables analyzed, as longitudinal data are not used.

4. Data and Variables

4.1. Data

The data was extracted and combined from Barometers 3038 and 3128 of the Center for Sociological Research of Spain (CIS), two nationally representative surveys carried out in September 2014 and February 2016, respectively (all technical details and data are avail-

able online at the CIS website). The total sample analyzed was of 4,922 people of both sexes (49% men and 51% women), aged 18 years and older. Sample sizes are N = 2,444 for the September 2014 survey and N = 2,478 for the February 2016 one. The estimated combined error of the least favorable case was about ±1.4%. The interviews were conducted face-to-face in the homes of those interviewed. The data collection procedure was through questionnaires in paper-pencil format. The barometer questionnaires contained several questions related to the online and face-to-face personal networks of those interviewed.

4.2. Dependent Variable

Happiness was measured by the survey question on this topic, using a scale ranging from 0 ("completely unhappy") to 10 ("completely happy"). Prior analyses have demonstrated the strength of this scale for measuring happiness (Requena, 2016; Sarracino, 2012).

4.3. Mediator Variables

4.3.1. Online Networks

These dummy variables refer to the answers on the question regarding the frequency of use of online social media. The following variables were considered: Constantly connected (= 1), otherwise (= 0); connected several times a day (= 1), otherwise (= 0); connected several times a week (= 1), otherwise (= 0); connected less than weekly or almost never (= 1), otherwise (= 0); no virtual networks (= 1), otherwise (= 0). We used "no virtual networks" as the reference for comparison with all other variables related to connection (see Table 2).

4.3.2. Face-to-Face Networks

The size of personal face-to-face networks was measured by the following survey question:

> Now think about how many people you usually have contact with on a normal day, including the people you live with. We are referring to people with whom you have personal or face-to-face contact, those with whom you talk or interact in person. Only include people you talk with in person.

The interviewees responded by indicating the number of persons with whom they interacted face-to-face.

4.4. Independent Variables

Scales were included to measure basic personality traits, as personality can influence the predisposition to use online and/or offline networks. The aim was to see how each of the basic personality traits affected use of digital and face-to-face networks. Thus, we measured

the relatively stable personality traits that might influence perceptions, attitudes, and individual behavior using the "Big Five Personality Traits" model. This widely used model groups individual personality differences into five basic areas: openness, agreeableness, conscientiousness, extraversion, and neuroticism. Our analysis is based on the version of the model proposed by Rammstedt and John (2007) and used by the CIS.

4.5. Control Variables

The control variables were organized into three groups—demographics, social position, family situation—consisting of nine items.

The demographic variables considered as dummy variables in the analysis were: female, age intervals, rural, semi-urban, and urban.

Table 2. Descriptive statistics of the variables in the regression models.

	N	Min.	Max.	Mean	Standard deviation
Dependent Variable					
Happiness	4897	0	10	7.53	1.682
Independent Variables					
Personality					
Neuroticism	3931	0.00	8.00	3.1994	2.19678
Extraversion	3958	0.00	8.00	4.9192	1.95360
Agreeableness	3642	0.00	8.00	5.7271	1.58671
Conscientiousness	4833	0.00	8.00	6.2744	1.73826
Openness	3003	0.00	8.00	4.6973	2.02218
Mediator Variables					
Frequency of use of social media (dummy)					
Having no virtual networks	2555	0.00	1.00	0.6008	0.48983
Connected less than weekly or almost never	2555	0.00	1.00	0.0031	0.05588
Connected several times a week	2555	0.00	1.00	0.0051	0.07116
Connected several times a day	2555	0.00	1.00	0.2552	0.43605
Constantly connected	2555	0.00	1.00	0.1358	0.34266
Size of personal face-to-face networks	4836	0	300	16.16	22.517
Control variables					
Demographics					
Female (dummy)	4922	0.00	1.00	0.5148	0.49983
Age intervals in years (dummy)					
18–24	4922	0.00	1.00	0.0847	0.27850
25–34	4922	0.00	1.00	0.1587	0.36541
35–44	4922	0.00	1.00	0.1977	0.39829
45–54	4922	0.00	1.00	0.1841	0.38758
55 or older	4922	0.00	1.00	0.3748	0.48413
Rural/urban (dummy)					
Rural: less than 10,000 inhabitants	4922	0.00	1.00	0.3881	0.48736
Semi-urban: 10,001 to 100,000 inhabitants	4922	0.00	1.00	0.3941	0.48872
Urban: more than 100,000 inhabitants	4922	0.00	1.00	0.5148	0.49983
Social position					
Educational level (dummy)					
No studies	4914	0.00	1.00	0.0600	0.23757
Primary education	4914	0.00	1.00	0.1750	0.38001
Secondary education	4914	0.00	1.00	0.3826	0.48607
Vocational studies	4914	0.00	1.00	0.1764	0.38123
University undergraduate studies	4914	0.00	1.00	0.0867	0.28141
University graduate studies	4914	0.00	1.00	0.1193	0.32412

Table 2. (Cont.) Descriptive statistics of the variables in the regression models.

	N	Min.	Max.	Mean	Standard deviation
Monthly income of interviewee	3797	0	7000	779.6387	748.08703
Sector (dummy)					
Agriculture	4835	0.00	1.00	0.0759	0.26487
Industry	4835	0.00	1.00	0.1663	0.37238
Construction	4835	0.00	1.00	0.1011	0.30154
Services	4835	0.00	1.00	0.6567	0.47487
Work situation (dummy)					
Working	4913	0.00	1.00	0.4024	0.49043
Retired or pensioned	4913	0.00	1.00	0.2502	0.43314
Unemployed	4913	0.00	1.00	0.2243	0.41716
Student	4913	0.00	1.00	0.0462	0.20995
Non-remunerated domestic work	4913	0.00	1.00	0.0757	0.26457
Other work situation	4913	0.00	1.00	0.0012	0.03493
Family situation					
Number of persons living in the home	4915	1	14	2.90	1.277
Cohabitation situation (dummy)					
Married (reference)	4845	0.00	1.00	0.5414	0.49834
Single	4845	0.00	1.00	0.2528	0.43468
In a relationship but not cohabiting	4845	0.00	1.00	0.0912	0.28796
Unmarried but in a relationship and cohabiting	4845	0.00	1.00	0.1146	0.31851

Source: Authors' own, calculated from Barometer 3038 (Sept. 2014) and 3128 (Feb. 2016) from CIS (2014, 2016).

Social position was measured using the following variables: educational level (as a set of dummy variables including no studies, primary education, secondary education, vocational studies, university undergraduate studies and university graduate studies); net monthly income of the individual after taxes (continuous variable measured in euro); work activity sectors (dummy variable) of agriculture, industry, construction and services; and work situation (dummy variable), which included working, retired or pensioned, unemployed, student, non-remunerated domestic work, or other work situations.

Family situation was composed of dummy variables referring to cohabitation arrangements: married, single, in a relationship but not cohabiting, unmarried but in a relationship, and cohabiting (see Table 2).

5. Analysis Strategy

To explain how personality traits affect offline/online networks and subjective well-being, two multivariate analysis techniques were developed to study and test the stated hypotheses. One was a multiple ordinary least squares (OLS) regression model that allowed us to observe how personality, online and offline networks, and the control variables affected the dependent variable (happiness). This analysis strategy helped us to explore how personality traits affect the use of online networks and how those factors together contribute to happiness. The second technique was a causal analysis based on a causal diagram, namely structural equation modelling showing the effects of the personality traits on

online and offline networks and on happiness. We used this model to observe how the "Big Five Personality Traits" affect online and offline networks and the relations of those networks on happiness. SPSS 25 software was used for these analyses.

6. Results

6.1. Online Networks and Happiness

A first look at the correlation between the use of online networks and happiness shows a positive relation in which happiness tends to increase with greater use of online media. People who were constantly connected had a more significant correlation with happiness (Figure 1).

To add more detail to the figure above, the ANOVA test (Table 3) shows how the level of happiness varied substantially according to the level of online network use. The extreme categories ("constantly connected" and "no virtual networks") presented the highest significance (compared to the other groups). Happiness was 9% lower for people with no virtual networks and 10% higher for those who were constantly connected. Thus, we see how digital networks substantially increase the happiness of the people who use those networks.

The implications of the effect of personality trails and online and offline networks on subjective well-being can be observed in even greater detail in Table 4. Equation 1 shows the personality trails effects on happiness. The next two equations show separately the combined effects of personality variables, online (Equation 2) and
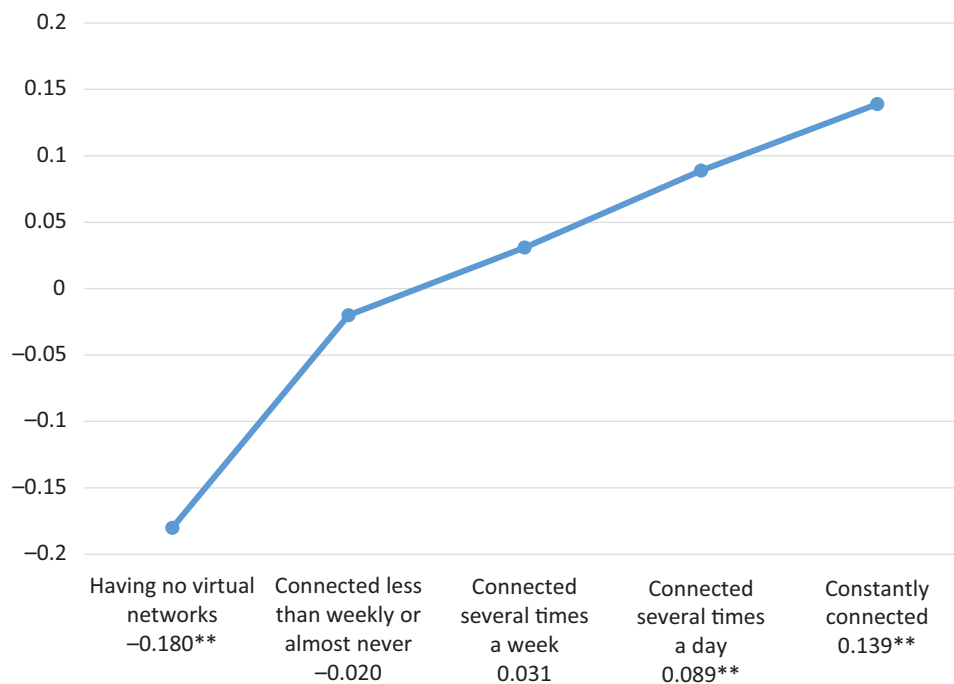
Figure 1. Correlation coefficients for the frequency of connection to digital networks and happiness. Level of significance: **0.01 (two-tailed), *0.05 (two-tailed). Source: Authors' own, calculated from Barometer 3038 (Sept. 2014) and 3128 (Feb. 2016) from CIS (2014, 2016).

offline networks (Equation 3) on happiness. The effect of online networks on happiness was greater than that of offline networks, whatever the personality trait, though the effects were significant in both cases. People who are constantly connected to online networks (Equation 2) had higher levels of happiness, as did those who were connected several times a day (compared to the other groups). In contrast, those who had no virtual networks had lower levels of happiness (compared to the other groups). This confirms that, in general, the use of digital networks positively affects levels of happiness. Face-to-face networks also had a positive and significant effect on happiness, though much smaller than that of online networks.

However, these effects become more subtle when the model include personality variables, demographics, social position, and family situation; as the literature has shown, these factors are very important (Appel et al.,

2019; Orben, 2020; Webster et al., 2021). Table 4 shows how the explained variance increases with each group of variables that is added to the regression model. As we look at the process in detail, we see that personality, demographics, social position, and family situation help explain the variance in happiness. Equation 4 shows the effects of online and offline networks together with personality traits. Here, the explanatory power of the model increases 1.09 and 1.75 times respectively compared to the model that only includes personality trails with online (Equation 2), and offline networks (Equation 3). There is a significant negative association between neuroticism and subjective well-being and a positive association in relation to conscientiousness. The model clearly shows that neuroticism is not beneficial to social relations; rather, it provokes a lack of self-control and mood swings that can be detrimental to social relations. In contrast, conscientiousness benefits social relations

Table 3. ANOVA results for frequency of connection to social media and happiness.

How often virtual networks are used	Subjective well-being			
	Mean	Mean	F	Significance
	Yes	No		*p* =
Does not have virtual networks	7.12	**7.77**	84.423	0.000
Connected less than weekly or almost never	6.75	7.38	1.026	0.311
Connected several times a week	8.15	7.38	2.489	0.115
Connected several times a day	**7.65**	7.29	20.403	0.000
Constantly connected	**8.00**	7.28	50.303	0.000

Source: Authors' own, calculated from Barometer 3038 (Sept. 2014) and 3128 (Feb. 2016) from CIS (2014, 2016).

Table 4. Impact of personality trails and social media on subjective well-being, OLS regression coefficients.

Independent variables	Equation 1		Equation 2		Equation 3		Equation 4		Equation 5	
Personality										
Neuroticism	−0.080	(−4.496)***	−0.098	(−3.585)***	−0.078	(−4.395)***	−0.097	(−3.501)***	−0.128	(−4.005)***
Extraversion	0.073	(3.791)***	0.077	(2.585)*	0.071	(3.626)***	0.067	(2.233)*	0.055	(1.599)*
Agreeableness	0.003	(0.137)	−0.043	(−1.120)	0.011	(0.425)	−0.039	(−1.017)	−0.031	(−0.692)
Conscientiousness	0.096	(4.420)***	0.093	(2.854)**	0.087	(3.989)***	0.087	(2.656)**	0.074	(1.931)**
Openness	0.039	(2.085)*	0.029	(1.021)	0.037	(1.960)*	0.026	(0.907)	0.030	(0.932)
Mediator variables										
How often virtual networks are used (dummy)										
Does not have virtual networks (reference)										
Connected less than weekly or almost never			−0.864	(−1.187)			−1.221	(−1.662)**	−7.235	(−4.554)***
Connected several times a week			0.709	(0.974)			0.844	(1.041)	1.039	(1.127)
Connected several times a day			0.490	(4.033)***			0.427	(3.462)***	0.134	(0.670)*
Constantly connected			0.740	(4.496)***			0.692	(4.138)***	0.382	(1.460)*
Size of face-to-face networks					0.005	(3.635)***	0.007	(2.983)**	0.005	(1.594)*
Control variables										
Demographics										
Female (dummy)									0.291	(2.064)*
Age intervals in years (dummy)										
18–24									1.239	(2.950)**
25–34									0.818	(2.621)**
35–44									0.473	(1.745)*
45–54									0.209	(0.807)
55 and older (reference)										
Rural/urban (dummy)										
Rural less than 10,000 (reference)										
Semi-urban 10,001 to 100,000									−0.223	(−1.430)*
Urban more than 100,000									−0.267	(−1.566)*

Table 4. (Cont.) Impact of personality trails and social media on subjective well-being, OLS regression coefficients.

Independent variables	Equation 1		Equation 2		Equation 3		Equation 4		Equation 5	
Social position										
Education by educational levels (dummy)										
Without studies (reference)										
Primary education										0.341	(1.478)*
Secondary education										0.306	(1.182)
Vocational studies										0.621	(2.119)**
University undergraduate studies										0.175	(0.476)
University graduate studies										0.221	(0.626)
Monthly income of interviewees										0.000	(0.841)
Activity sector (dummy)											
Agriculture (reference)											
Industry										0.131	(0.542)
Construction										−0.165	(−0.652)
Services										−0.056	(−0.259)
Work situation (dummy)											
Employed (reference)											
Retired or pensioned										0.450	(1.763)*
Unemployed										−0.124	(−0.572)
Student										0.014	(0.034)
Non-remunerated domestic work										0.114	(0.369)
Other work situation										−2.307	(−1.438)
Family situation											
Number of people living in the household										0.040	(0.692)
Cohabitation situation (dummy)											
Married (reference)										−0.732	(−4.373)***
Single										−0.140	(−0.520)
In a relationship but not cohabitating										−0.153	(−0.559)
Unmarried but in a relationship and cohabitating											
Constant	6.672	(31.139)***	6.704	(20.893)***	6.621	(30.789)***	6.695	(20.808)***	6.323	(11.525)***
R^2	0.040		0.075		0.047		0.082		0.199	
F of the model	16.050***		8.531***		15.575***		8.314***		4.654***	
N	1935		959		1899		941		693	
Comparison with prior model										
Times increased								1.75		2.43	

Notes: Students' *t* appears in parenthesis beside the respective estimated parameter; level of significance: ***$p < 0.001$; **$p < 0.01$; *$p < 0.05$. Source: Authors' own, calculated from Barometer 3038 (Sept. 2014) and 3128 (Feb. 2016) from CIS (2014, 2016).

by inducing greater happiness. Conscientious people are responsible, have more self-control and therefore tend to be more successful, which in turn generates higher levels of happiness.

In the most complete model, based on Equation 5, the explained variance increased to 19.9% and was 2.43 times greater than in the previous model. It shows the combined effects of online and offline networks with personality traits and the other control variables of demographics, social position, and family situation. With this model, personality traits are found to predict strong effects of happiness when controlling for the other control variables.

6.2. Causal Model

Thus far we have introduced the effects of online and offline networks on subjective well-being controlled for structural and personality predictors. We will now build a causal model in which we will study the particular effect of each of the "Big Five Personality Traits" on online and offline networks and their effect on subjective well-being. This will allow us to see both the direct and indirect effects of these variables on subjective well-being. The causal model constructed for this study (Figure 2) is a path analysis. This is a method for studying direct and indirect effects. Of course, we should consider the theory or knowledge associated with the object of study. In this case we considered as one of SEMs which is composed of all observed variables, without using latent variables (Jeon, 2015). Here, the path analysis shows the three-way relationship of personality, online networks and happiness that was identified in the theoretical framework. This causal process indicates the basic personality traits that directly affect online/offline networks. In our findings, online networks were affected by extraversion (beta = 0.085), openness (beta = 0.103), and neuroticism to a lesser degree (beta = 0.091). The personality traits that most affected offline networks were extraversion (beta = 0.043), followed by a negative influence of agreeableness (beta = −0.045) and then conscientiousness (beta = 0.084).

These differentiated effects reveal several interesting features. Firstly, the personality traits that affected online networks were not the same traits that affected face-to-face networks, except for extraversion, which affected both networks. The effect of extraversion on online networks was almost double that of offline networks, although the significance was higher in face-to-face networks. Secondly, it is also interesting
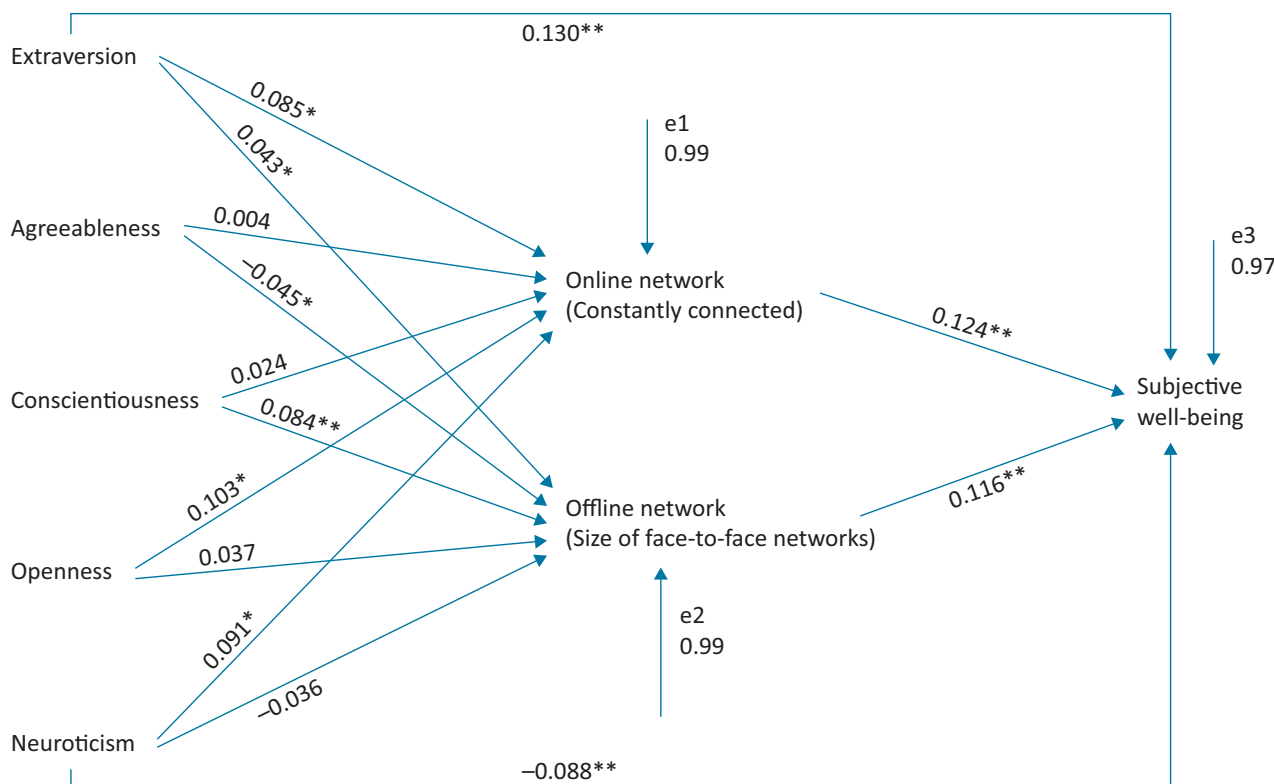

Figure 2. Causal model of subjective happiness. The structural equations have been constructed as follows:
1: Online net = x1 Extraversion + x2 Agreeableness + x3 Conscientiousness + x4 Openness + x5 Neuroticism + error 1;
2: Offline net = x1 Extraversion + x2 Agreeableness + x3 Conscientiousness + x4 Openness + x5 Neuroticism + error 2;
3: Happiness = x1 Extraversion + x2 Neuroticism + x3 Online net + x4 Offline net + error 3.
Notes: [+] p < 0.01, * p < 0.05, ** p < 0.001. Source: Authors' own, calculated from Barometer 3038 (Sept. 2014) and 3128 (Feb. 2016) from CIS (2014, 2016).

to note that agreeableness had a negative effect on face-to-face networks. In any case, it is very informative to know which personality traits have the greatest effect on online/offline personal networks. It is very important to observe that both online and offline networks had a positive and very significant effect on happiness. Notably, the effect of online networks was slightly higher than that of face-to-face networks.

The model shows the generally positive effect of extraversion (beta = 0.130) and the negative effect of neuroticism (beta = −0.088) on happiness. Personality traits affected each type of network differently, with a somewhat greater effect on online networks, and subsequently also affecting happiness. Among the indirect effects, it is interesting to point out that neuroticism had a negative effect, both directly (−0.088) and indirectly through offline networks (−0.036 × 0.116 = −0.004), but a positive indirect effect on well-being through online networks (0.091 × 0.124 = 0.011). This might be explained by the theory of connected presence, which implies the need for people to know they are connected at all times. This need might be more intense in people who present higher levels of neuroticism because they have less capacity for self-control, which would surely imply a need for greater online connection. Additionally, the positive effect of extraversion on happiness through online networks was seen both directly (0.130) and indirectly (0.085 × 0.124 = 0.011). The analyses therefore confirm the hypotheses presented above.

7. Discussion and Conclusions

This article has analyzed social well-being and its relationship with personality and online social networks. In doing so, it has shown the multiple research flows between sociology and psychology, considering the underlying processes between social networks, social well-being, and personality traits. As aptly pointed out by Zhu et al. (2013), social well-being is a broad psychological phenomenon that includes people's emotional responses, situational satisfaction, and life satisfaction. Happiness has been used as a proxy for subjective well-being. We have seen how personality traits affects online and offline social networks, which in turn affect happiness. Personality traits have been shown to directly affect positive and negative tendencies in personal networks, which indirectly affect well-being. The various personality dimensions clearly have patterns of association that differ qualitatively according to the type of personal network. Once socio-demographic and structural factors are accounted for, we can conclude that neuroticism leads to diminished well-being, both directly and through offline networks. In contrast, extraversion generates greater well-being directly and indirectly, through online networks. Our results contradict those of McCrae and Costa (1991) in the case of agreeableness, which in our study had a negative effect on online networks and therefore a negative indirect effect on well-being. Our findings show

that conscientiousness always had a positive effect on both online and offline networks, and therefore a positive indirect effect on happiness. The role of extroversion and neuroticism in well-being was clearly revealed. Our results should be interpreted within the current debate concerning the influence of digital social networks on the adolescent population (Boer et al., 2020; Spottswood & Wohn, 2020).

Findings from our analysis, based on data from the adult population in Spain, confirmed the original hypotheses. Our results for the effects of agreeableness and conscientiousness diverge from those of authors who used different mechanisms to study young American students. However, the same effects were observed for extraversion and neuroticism. We have also demonstrated that online networks do not substitute offline networks as generators of happiness. Rather, both have a similar effect, which is somewhat greater for online networks. According to Spanish data, the answer to the question put forward by Arampatzi et al. (2018), based on Dutch data, regarding whether online networks substituted face-to-face networks in providing happiness is that both types of networks are necessary to achieve higher levels of happiness. Complementarity between the two types of networks was clearly observed, which leads us to confirm our H1: Virtual networks do complement face-to-face networks, and happiness increases with increased use of online networks. In addition, as proposed in (H1a), the relationship strongly mediates that of personality traits on happiness, which determine (H1b) the effect on each type of personal network.

Finally, the debate will continue, because the positive or negative dynamics between online networks and happiness vary according to the contextual data used. Our data from Spain indicates a positive association between online networks and happiness, which contradicts the work of Sabatini and Sarracino (2017) based on data from Italy. The same is true for the case of the complementarity of online and offline networks: The study using data from Italy proposes that the use of SNS implies a conflict with face-to-face networks regarding the generation of subjective well-being. Although it is true that Sabatini and Sarracino (2017) use life satisfaction as a dependent variable and we use happiness as a proxy, in our data the Pearson correlation between life satisfaction and happiness is r = 0.626, significant at two-tailed p < 0.001, so we can assume some equivalence in the functioning between the two variables. This may be explained by the societal capacity to adapt to new technologies which, although initially perceived as negative, eventually become indispensable, even for our sociability.

This study does have some limitations that can be studied when longitudinal data for Spain becomes available. The data used is cross-sectional, and thus the study of causality would be more robust if the data were longitudinal. In this way, there would be no doubt that, for example, happiness could have affected online/offline networks, that is, reverse causality. This issue is avoided

by studying longitudinal data, which currently does not exist for Spain.

We will conclude by pointing out the significant finding that demonstrates the importance of context in the relationship between online networks and happiness. The national context from which the data were extracted and the specific characteristics and features of the interviewees produce variations in the effects online networks have on happiness. Our findings demonstrate that personality has many important effects. Future research will add greater detail to the association between online networks and happiness in diverse contexts.

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Conflict of Interests

The authors declare no conflict of interests.

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