Gender differences in the addiction to social networks in the Southern Spanish university students

Aparicio-Martínez Pilar[1,4,6], Ruiz-Rubio Manuel[2], Perea-Moreno Alberto-Jesús [3], Martínez-Jiménez María del Pilar[3] , Pagliari Claudia[4], Redel-Macías María Dolores [5], Vaquero-Abellán Manuel [6]

[1] Departamento de Enfermería, Universidad de Córdoba, Campus de Menéndez Pidal, Córdoba, Spain. n32apmap@uco.es

[2] Departamento de Genética, Universidad de Córdoba, Instituto Maimónides de Investigación Biomédica de Córdoba (IMIBIC), Hospital Universitario Reina Sofía, Campus, 14071 Córdoba, Spain. ge1rurum@uco.es

[3] Departamento de Física Aplicada, Universidad de Córdoba, ceiA3, Campus de Rabanales, 14071 Córdoba, Spain. Aperea@uco.es, fa1majip@uco.es

[4] eHealth Research Group, Usher Institute of Population Health Sciences and Informatics, University of Edinburgh, Edinburgh, UK, claudia.pagliari@ed.ac.uk

[5] Departamento Ingeniería Rural, Ed Leonardo da Vinci, Campus de Rabanales, Universidad de Córdoba, Campus de Excelencia Internacional Agroalimentario, ceiA3, Cordoba, Spain, mdredel@uco.es

[6] Grupo Investigación epidemiológica en Atención primaria (GC-12) del Instituto Maimónides de Investigación Biomédica de Córdoba (IMIBIC), Hospital Universitario Reina Sofía, 14071 Córdoba, Spain mvaquero@uco.es

* Author to whom correspondence should be addressed: Pilar Aparicio-Martinez;n32apmap@uco.es; Phone: +34679727823

Gender differences in the addiction to social networks in the Southern Spanish university students

Abstract

Social networks sites have become the most popular instrument used to communicate and exchange information resulting in the addiction to this media. Previous studies suggested that personal characters play an essential role in addictive behavior and gender difference may be involved. Nevertheless, there are contradictions about the influence of gender. Some studies indicated higher addiction in men. Meanwhile, other researchers pointed out higher addiction among Spanish teenage female. Little studies in the Spanish context have analyzed the different socio-cultural and biological factors possibly related to this addiction and gender differences. With all being said, this study focused on determining the current incidence of social networks addiction in young college students, relating this social networking addiction with loneliness, prenatal testosterone (2D:4D ratio), self-esteem and personal satisfaction. A cross-sectional study focused on female and male college students aged 17 to 25 years (N=278) was carried out. It was used several surveys, including the Social Network Addiction Questionnaire (SNA) and the 2D:4D ratio. The results showed difference among male and female about addiction (chi-square= 12.77, p-value=0.002). Moreover, this addiction was linked with several factors, such as importance given to social networks by females (p-value<0.001) and males (p-value<0.001). Also, the findings showed that addiction to social networks might be influenced by gender, showing more importance sociopsychological factors in females and a combination of biological and social factors in the men. Moreover, Instagram has increased as the predominant social network for communication for college students (97.2% men and 93.7% women).

Keywords: addiction, social networks, gender differences, loneliness, Instagram

1. Introduction

The Internet has become the most widely used tool to communicate, and exchange information mostly accessed via mobile phones. The internet has modified how people exchange information, interact with other people, entertainment, and consumption of media (Firth et al., 2019). The interactions of people on the internet and social media have overgrown because of the ubiquitous characteristic (Sirola et al., 2019).

Nevertheless, the number of the population connected and handling information by mobile phone and social media is growing at a risky rhythm resulting in their addiction (Liu et al., 2018; Molavi et al., 2018). For instance, it has been estimated that only in America, over 40 million had a sign of compulsive behavior related to technology (Clements and Boyle, 2018). In particular, the number of people using social media, with an estimation of a billion, and being addicted to these tools has increased (Frost and Rickwood, 2017).

Additionally, social networking sites (SNS), described as internet-based sites that promote the exchange of information among the users, have increased as a preferable choice (Cohen et al., 2018). These sites are used by 90% of young adults (ages 18-29), who are also the most active users (Alzougool, 2018; Cohen et al., 2018). Three elements mainly characterize these social media: the user has a personal profile; the profile's connection time is public; a big data of recurrently updated content is reflected in the pages, which is created and promoted by one's connections and relationships in these sites (Alzougool, 2018).

Among these networks, Instagram and Facebook were rated as the most negative tools affecting the health of young people, especially their mental health. Moreover, seven out of 10 teenagers in the United Kingdom suffered compulsive use of social media, being described as more addictive than cigarettes or alcohol (Royal Society for Public Health, 2017).

Facebook, Twitter, or Instagram are used mainly by young people during large amounts of time (Penni, 2017). Young people have turned these networks into their distinctive sociocultural interactional instrument because of several factors such as continuity of friendship, emotional encounters (Watson et al., 2015), or buying products (Mäntymäki and Salo, 2011). Young people are the most addict users accessing them an unhealthy amount of time from daily to multiple times per day (Rodgers et al., 2009; van den Eijnden et al., 2016). The addiction to these networks has increased over the last decade, overcoming other types of addiction. According to the report of addiction and drug use from the Spanish Ministry (2017), eighteen percent of Spanish young people under 24 years old was addicted to social networks. Meanwhile, the rate of addiction to illegal drugs was 14.3% (Observatorio Español de las Drogas y las Adicciones Delegación del Gobierno para el Plan Nacional sobre drogas, 2017).

Addiction to SNS can be defined as excessive participation or attachment in SNS activities and usually provokes difficulties in everyday social functioning (Alzougool, 2018). Tolerance or withdrawal, among others, is characteristic of this addiction, which are the same features observed in other addiction diseases. According to Griffiths, addictions have in standard six core components: salience, mood modification, tolerance, withdrawal symptoms, conflict, and relapse (Griffiths, 2005). Additionally, many authors have suggested that any behavior (e.g., social networking) that satisfies these six could be considered an addiction (Griffiths and Dhuffar, 2014; Sussman et al., 2011).

Due to the addictive components that have the social networks services, a strong influence on young people's habits, lifestyle or perceptions have been linked between its use and the health of the youngest (Dhir et al., 2017). However, this population does not perceive the influence and does not contemplate as unfavorable, believing that the use of them does not have side effects in their health (Wang et al., 2015). Moreover, unlike with traditional media consumers, the users of SNS have dual profile being as much as active as passive receivers of the content posted in these media (Wang et al., 2017). Changes across many areas that compose personality (Brooks et al., 2016; Powell et al., 2018; Wyssen et al., 2016) have been connected with the influence of SNS on young people (Apaolaza et al., 2014, 2013).

Differently, many authors have established the enormous potential of these media for treatment, feedback for drug-dependent users, emotional support, or community building. In this sense, the addictive behavior was linked to the user's intention, experience, or gender (Cuomo et al., 2008; Royal Society for Public Health, 2017). Besides, Jenaro et al. (2007) described that the problematic and nonproblematic use of these networks depends on a series of factors such as age, gender, demographics, parenting control or application use (Acier and Kern, 2011; Jenaro et al., 2007). In this sense, the interaction, learning, and mapping the use of SNS could play an essential role in this addiction (Jeong et al., 2019; Manzano-Agugliaro et al., 2016).

One the most outstanding results of this addiction, especially Facebook, is the social isolation syndrome, which is characterized by the impossibility of social interaction with other people and constant connection to these technologies (Moral Jiménez and Fernández Domínguez, 2019). In this syndrome also interfere other health problems such as loneliness, depression or substances use (Frost and Rickwood, 2017; Molavi et al.,

2018; Moral Jiménez and Fernández Domínguez, 2019; Shoenberger and Tandoc, 2014). These caused illness, and risky behaviors might determine the quality of life in adulthood (World Health Organization, 2018). Even though young people are often thought of as a healthy group, many young adults suffer from disease or die prematurely due to risky. These hazardous behaviors during teenagehood, which are, in many cases, preventable or treatable and sometimes, results in chronic ill-health and disability (World Health Organization, 2018). The excessive use of SNS has been suggested to be a representation of addictive behavior, resulting in mental health disorders (Brailovskaia and Margraf, 2018).

Previous studies suggested that personal characters play an essential role in addictive behavior (Alzougool, 2018; Chan, 2014; Griffiths, 2005; Lian et al., 2016). Moreover, previous research focused on Facebook addiction (Błachnio et al., 2016) discovered that normal users diverge significantly in self-esteem and personal satisfaction from dependent and intensive users. Facebook addiction was associated with lower levels of self-esteem and negative life satisfaction (Alzougool, 2018).

Additionally, numerous studies have established a linked between compulsive behaviors, standing out the obsession with gaming and SNS (Canan et al., 2017). Such addictions have been linked more to men (Canan et al., 2017), and variations in the ratio of second-to-fourth digit length (2D:4D ratio) (Cicek et al., 2017; Cuomo et al., 2008). The second to fourth digit ratio (2D:4D) describes the relative length of the index finger (2D) to the ring finger (4D). This ratio is a biological marker based on prenatal testosterone levels and is determined mainly during the fetal period and becomes stable across the lifespan beginning at two years (Canan et al., 2017). Prenatal androgen exposure and responsiveness have been cited as predictors of 2D:4D ratios (Cohen-Bendahan et al., 2005; Muller et al., 2011). On average males have lower ratios compared to females. This digit ratio is commonly used as a marker of the balance between prenatal testosterone and estrogen. The ratio of the second and fourth fingers (2D:4D ratio) is defined as "a sexually dimorphic trait, with men tending to have lower values than women" (Uban et al., 2017). Other authors consider that the differences between the sexes are due only to the fact that the hands of men are larger than those of women (Leslie, 2019). Accordingly, typical masculine traits, such as hostility, reproductive success, sociosexuality, dominance, and competitiveness, have been inversely associated correlated with 2D:4D ratios (Barut et

al., 2008; Cicek et al., 2017; Jeevanandam, 2016). Notwithstanding the above, there is not a study focused on both a male and female sample capable of proving a substantial association between 2D:4D ratio and social networks addiction.

2. Background

The addictive and compulsive behavior concerning the use of the social networks and mobile among adolescents had higher rates in Northern and Southern European regions, varying from 7.9% in Iceland to 22.8% in Spain (Lopez-Fernandez et al., 2017; Tsitsika et al., 2014). The country with higher rates of addictive behavior regarding SNS has been the United Kingdom, followed by Spain (Lopez-Fernandez et al., 2017).

In the Spanish context, most studies have focused on adolescents pointing out that 21.3% were in risk of developing an addiction (Malo-Cerrato et al., 2018). Moreover, previous studies established differences of gender regarding the compulsive use of social addiction and addiction to these media (Espinar Ruiz and González Río, 2009; Malo-Cerrato et al., 2018; Peris et al., 2018). These studies proved that female adolescents are more active users than men are. However, the results of addiction to these networks showed difference depending on the sample and region (Peris et al., 2018; Sarabia and Estévez, 2016). Different studies have shown that frequent the problematic use of these networks was higher in females during adolescence (Martínez-Ferrer et al., 2018; Sarabia and Estévez, 2016). The reason for using SNS may play an important role, being more important the game plays or chats for male and feedback for females (Andrie et al., 2019; Carbonell et al., 2018; Machimbarrena et al., 2018).

Nevertheless, little studies have focused on young adults, whose age ranges from 18 to 25 (de-Sola et al., 2017; Hökby et al., 2016). In this sense, these studies analyzed the problematics use of internet or mobile phone, but the social network addiction was not included and factors that influence them (de-Sola et al., 2017; Hökby et al., 2016). Finally, the last report about addiction showed that problematic, and addiction to SNS was segmented for adolescents, is not available the rate for young adults (18-24 years) (Observatorio Español de las Drogas y las Adicciones Delegación del Gobierno para el Plan Nacional sobre drogas, 2018).

With all being said, this study focused on determining the current incidence of social networks addiction in young college students, relating this addiction to social networks to loneliness, prenatal testosterone (2D:4D ratio), self-esteem and personal satisfaction.

3. Materials and methods

3.1. Study structure

This cross-sectional study focused on female and male college students aged 17 to 25 years. The sample was recruited to participate in an in-person survey about "The imperceptible influence of social networks on eating disorders, social isolation, and addiction" during the second semester in 2018 at the University of Cordoba. The sample was recruited at different Faculties in the classroom.

The initial obtained sample was 342 people from biological, education, engineering, and nursing undergraduate. The inclusion criteria were to be a college student and have an account in a social network. The exclusion criteria used were the previous diagnosis of addiction to the internet, gaming or social networks, substances abuse, diagnosis of depression or isolation and diagnosis of low levels of self-esteem or life satisfaction.

3.2. Measure

3.2.1. Scales for addition to SNS, self-description, and loneliness.

Initially, participants indicated the number of accounts on each social network that they used and amount of times they enter their respective accounts daily on a 5-point scale: hardly ever (1), sometimes, usually, all most all the time and always (5). Based on previous studies regarding addiction and effects on health that SNS have (Frost and Rickwood, 2017; Huang and Su, 2018; Royal Society for Public Health, 2017), the leading social networks included in the survey were: Instagram, Twitter, Facebook, Snapchat, Tumblr and YouTube.

It was also evaluated by the participants the amount of time expend in those social networks, hours per day in each social networks, and importance of some affirmations such as "The socials Networks are a basic tool to keep in touch with people" rated on a 1 (strongly disagree) to 5 (strongly agree) scale. These questions were included because of

The social network addition was evaluated by a validated survey called the Social Network Addiction Questionnaire (SNA) (Mayaute and Blas, 2014), based on the DSM-IV-TR (Pichot et al., 2001). This survey is formed by 24 items applying the 5-point rating system (from 0 to 4) considering the frequency from "never" to "always." Moreover, scores over 25 points obtained in this test are considered a definite diagnosis of addiction to SNS.

The Rosenberg Self-esteem Scale (RSE) was used to determine the levels of self-esteem. This scale is 10-item that measures global self-worth by measuring both positive and negative feelings about the self, ranging from 1 (strongly disagree) to 4 (strongly agree) (Robins et al., 2001; Rosenberg, 1965). For personal satisfaction, the body image satisfaction questionnaire was used to address the satisfaction that volunteers had. The questionnaire consisted of 26 five-point rating scales; each question subject rated his/her body, with the response alternatives ranging from dissatisfied (1) to satisfied (5). Moreover, it was included the survey ESTE II, with 34 items adapted for adults (Jiménez et al., 2010), in order to establish the social loneliness that the young suffer and the SNS.

3.2.2. Biological measures

In this section, the biological measure focused on testosterone levels during the gestation was the 2D:4D ratio quantified by the difference of the dimension of the flanges, with lower ratio relating with higher levels of testosterone (Jeevanandam, 2016; Wang et al., 2018). The difference between the phalanges was based on taking photos of both hands and after measure the difference 2D:4D ratio ((Jeevanandam, 2016).

3.3. Instruments

A free image analysis program called GeoGebra (https://www.geogebra.org) was used to determine the difference in the ratio of the sample. The data obtained from this program and surveys were saved in an excel sheet and were afterward export to SPSS VR. 22 for the statistical analysis.

3.4. Procedure

Research Ethics Committee of Public Health System in Cordoba gave their approval to this project in March on 2018 and May on 2019. The recruitment of the data was carried out on the college campus during the second trimester (March and April) in 2018 and 2019. Following their consent, participants read a participant information declaration, consent form, and questionnaires. After providing informed consent, participants completed the initial survey, followed by the self-esteem and body image satisfaction survey, SNS surveys, and finally, the hand measures.

3.5. Data collection

After approval from the Ethics Committee, the data collection was carried in person, taking place in different classrooms across the University. This collection started after receiving permission from professors and students. Students were told about the study, voluntarily in the participation and the anonymity of their responses. One researcher and teacher were remaining in the classroom during the survey administration and filling out. The average time to respond to the survey and take the images was 25 minutes.

The surveys were stored in a classification room, only having access to these documents the researches. The data was manually storage in an excel sheet and later saved in the university cloud. Moreover, the data was exported to SPSS for the statistical analysis.

Personal and geographic data was stored separately from the surveys.

3.6. Sample description

From the initial sample, 86.3% of the participants completed the survey. Meanwhile, 13.7% were excluded from the study because of missing data (3%, 10 out of 342), unwillingness to participate (7.3%) or age higher than 25 years old (3.4%).
Furthermore, 5.8% of the participants (17 out of 295 participants) were eliminated from the final sample after applying the exclusion criteria. From the participants excluded, 64.7% were males, and 35.3% were females. In the exclusion, 17.6% indicated problem or addiction to internet, 17.6% addictive or compulsive behavior related to gaming or SNS, 35.2% substance abuse, and 29.4% diagnosis of depression or social isolation. Out of the participants eliminated because of internet addiction, 100% were males, gaming and SNS addiction 66.7% were males and 33.3% females, drug abuse 100% were males and, depression or isolation 66.7% were females.

After applying the exclusion criteria, the final sample was of 278 college students (172 women and 106 men). The initial analysis showed that 15.5% were biology

3.7. Data Analysis

For the sample of 278 cases, the descriptive analysis of the quantitative and qualitative data was carried out. It was also studied the chi-square for the qualitative variables such as gender, the number of accounts, duration of the connections, times connect per day, and importance of the social networks. The t-student test was used for the quantitative variables such as the score in the self-esteem, body image satisfaction, social networks addiction, and loneliness questionnaire. Also, the correlation tests were carried for all the variables studied.

4. Results

The descriptive analysis of the survey of the social network showed that 33.8 % of the sample had a score over twenty-five points, meaning a definite diagnosis of addiction. Although this frequency represented a third part of the sample, the study of the frequencies according to gender showed difference among females (16.9%) and males (61.3%). Based on these results, the chi-square was carried out to determine the significant difference among females and males in the definite diagnosis of the addiction. The data showed that gender could play an essential role in having a definite diagnosis of SNS addiction (chi-square= 12.77, p-value=0.002).

Further analysis of the difference regarding gender and the values was obtained from the surveys. Firstly, the first the gender regarding loneliness was studied, showing that 45.3% of males and 36.4% of the females suffered medium-high levels of loneliness (44.8% of the sample). However, the chi-square test proved no significant difference in loneliness between the female and male sample (p-value=0.2). Moreover, medium and high levels of self-esteem and personal satisfaction were higher in men (62.8% self-esteem and 68.5% body satisfaction) than in women (43.7% self-esteem and 45.3% body satisfaction). These data showed a fundamental difference among groups, which was also supported by the results from the chi-square (p-values>0.01).

The difference between the social networks and gender caused the separation of the sample in college female and male samples. In this sense, the analysis of the number of accounts that the college students had shown that 86.7% of the women had more than

three accounts, meanwhile a 75,5% of men had more than three accounts in the different social networks. The social networks most used were Instagram (97.2% men and 93.7% women), Facebook (51.8% men and 78.5% women) and Twitter (48.1% men and 36% women). Furthermore, the relationship between the type of social network using and definite diagnosis of social networks addiction in each group was studied (Figure 1). From the sample, the positive diagnosis, 94 participants out of 278, was 65 males and 29 females. The chi-square test showed no significant valued for having a social network, and this addition for the females. Meanwhile, the test proved the significance value for having an account on Instagram and a definite diagnosis for males (Chi-square= 4.98, p-value<0.05).

Moreover, it was also analyzed the duration and frequency of connection to social networks. Though the duration of the connections showed no significant relation to the diagnosis (p-value>0.05), the frequency of connections to these networks showed significant value for both males (p-value<0.05), and females (p-value<0.001).

The importance given by female and male users was studied as a possible factor related to SNS addiction. The data from the chi-square test proved the difference in both groups, female (p-value<0.001) and male (p-value<0.001), concerning the importance, is given and definite diagnosis.
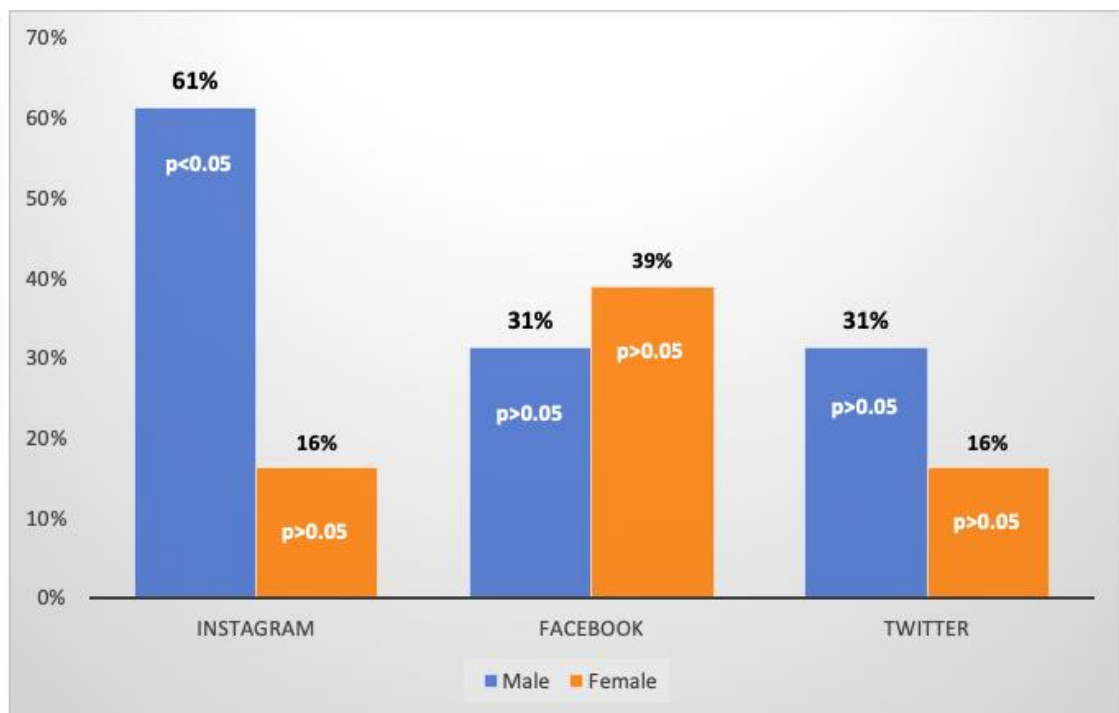

Figure 1. Frequency of positive diagnosis according to each social network

The loneliness that the young college students suffered was studied as a factor related to the positive diagnosis. For both samples, females (chi-square=11.79, p-value=0.001) and males (chi-square=10.24, p-value=0.002), the loneliness showed to be related with positive diagnosis of social networks addiction and age. In this sense, younger people suffered higher levels of loneliness and addictive behavior (Figure 2). Moreover, the frequency of positive addiction and levels of loneliness related to gender and age was studied (Figure 2).
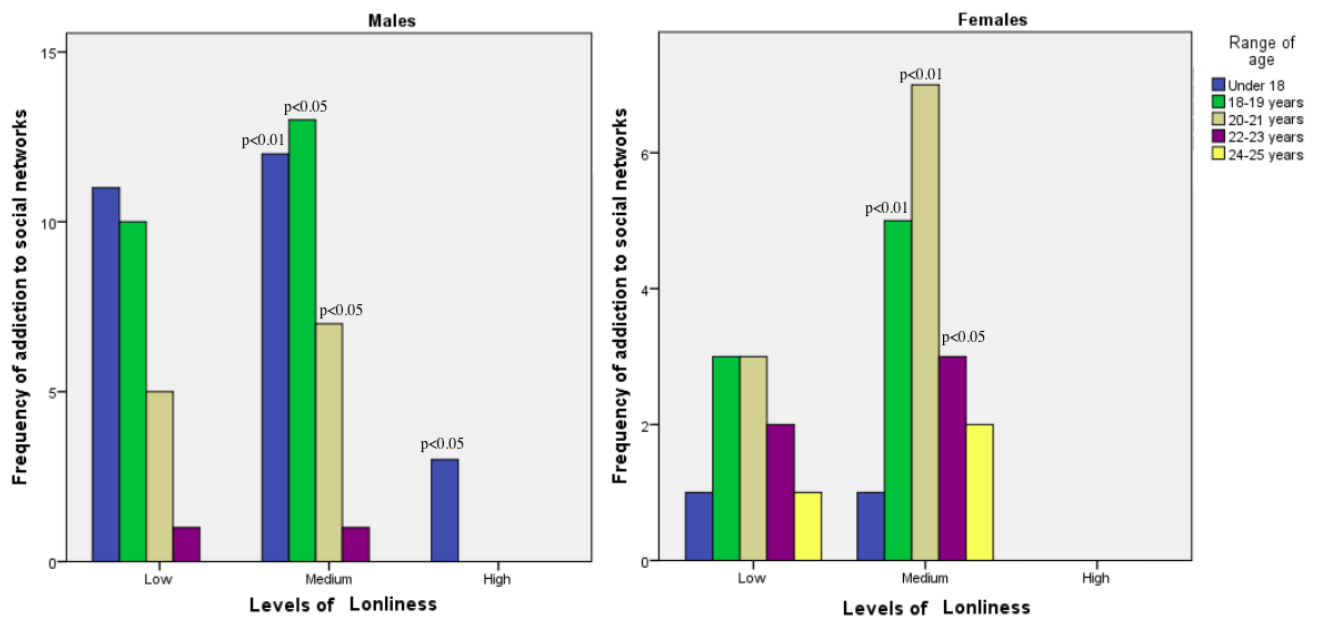
Figure 2. Frequency of addiction to social networks and levels of loneliness

The t-student was used for the score of the self-esteem, body image satisfaction test, and testosterone levels (2D:4 ratio difference) to study the relationship with the SNS addiction. The self-esteem and body image satisfaction showed no significant relationship with a definite diagnosis of SNS addiction (p-value>0.05). The ratio 2D:4D ratio, which showed no difference among female and male (p-value>0.05), proved to be related to SNS addiction for both (p-value<0.05).

Because of these results, associations between the SNS addiction with the other variables in both samples have been carried out in order to look for dependencies among the variables (Table 1). This table showed how for females and males, the addiction to social networks is associated with different variables such as loneliness, self-esteem, the duration of the connection, the frequency of connections and importance are given.

Table 1. Correlations between the score of SNS addiction and studied variables in women's and men's sample

	Female		Male	
	Correlation	P-value	Correlation	P-value
SNS frequency of use	0.27	<0.001	0.43	<0.001
SNS connection duration	0.31	<0.001	0.38	<0.001
SNS importance	0.65	<0.001	0.61	<0.001
2D:4D			-0.64	<0.001
Self-esteem	-0.23	<0.01		
Body image satisfaction	-0.18	<0.05	0.21	<0.05
Loneliness	0.301	<0.001	0.34	<0.001

The data showed that the addiction to social networks in females was dependent on social and personal variables and had no relevance with hormonal testosterone levels. Meanwhile, for males, testosterone levels were associated with a higher score for addiction, the importance given by them, and the duration of the connection. Thus, the correlation was studied in order to establish a link between the different variables and a definite diagnosis of SNS addiction for the women's and men's sample (Table 2).

Table 2: Correlation between the diagnosis of SNS and the variables

	Female		Male	
	Correlation	P-value	Correlation	P-value
SNS frequency of use	0.27	<0.001	0.42	<0.001
SNS connection duration			0.42	<0.001
SNS importance	0.41	<0.001	0.61	<0.001
2D:4D			-0.619	<0.001
Self-esteem	-0.22	<0.01		
Loneliness	0.244	<0.01	0.333	<0.001

For females, the frequency of use, the duration, and importance of SNS were positively related to a diagnosis of addiction. Meanwhile, the level of self-esteem was negatively related to the diagnosis.

For males, the possibility of SNS addiction was linked to frequency of use the social networks, the duration of the connections, the importance given to social networks and

loneliness. Meanwhile, the testosterone levels (2D:4D ratio) was negatively related with a definite diagnosis of SNS, meaning that more exposure to testosterone, which implies lower 2D:4D ratio, was linked to the diagnosis of SNS.

Furthermore, the age of the participants was also analyzed in order to determine its relationship with this addiction. The analysis for both groups using t-student showed a significant relationship between being younger and having more score in addiction test (p<0.001). In this sense, the correlation showed negative relation in both female (Correlation= -0.369, p-value p<0.001) and male groups (Correlation= -0.25, p-value p<0.001).

The Anova model test was used to determine whether the variables related to social networks addiction were dependent on the diagnosis (Table 3). The results from the ANOVA test proved differences according to gender. For females, the definite diagnosis of this addiction was dependent on the frequency of the social accounts used, and the importance is given to this media and the level of loneliness that they suffered. Meanwhile, for the males, the definite diagnosis was dependent of the frequency of the social accounts used, the duration of these connections, the importance given to this media, the exposure to testosterone (2D:4D ratio), the level of loneliness that they suffered and the age they had. Moreover, the ANOVA test was used for having Instagram for men showing significant value (F=5.03, p-value<0.05).

Table 3. Anova model

	Women		Men	
	F	p-value	F	p-value
SNS frequency of use	13.19	<0.001	22.27	<0.001
SNS connection duration			21.9	<0.001
SNS importance	32.94	<0.001	61.28	<0.001
2D:4D ratio			64.48	<0.001
Loneliness	10.76	<0.01	13.01	<0.001
Age			16.73	<0.001

Finally, the level of loneliness that young people suffered was analyzed in order to established possible links with the other variables (Figure 3). Firstly, the results from frequency showed that higher frequency of connection and higher levels of self-esteem in females. Meanwhile, for men, the frequencies showed higher rates of connections,

duration of these connections, the importance given to the social networks, and higher levels of body image satisfaction.
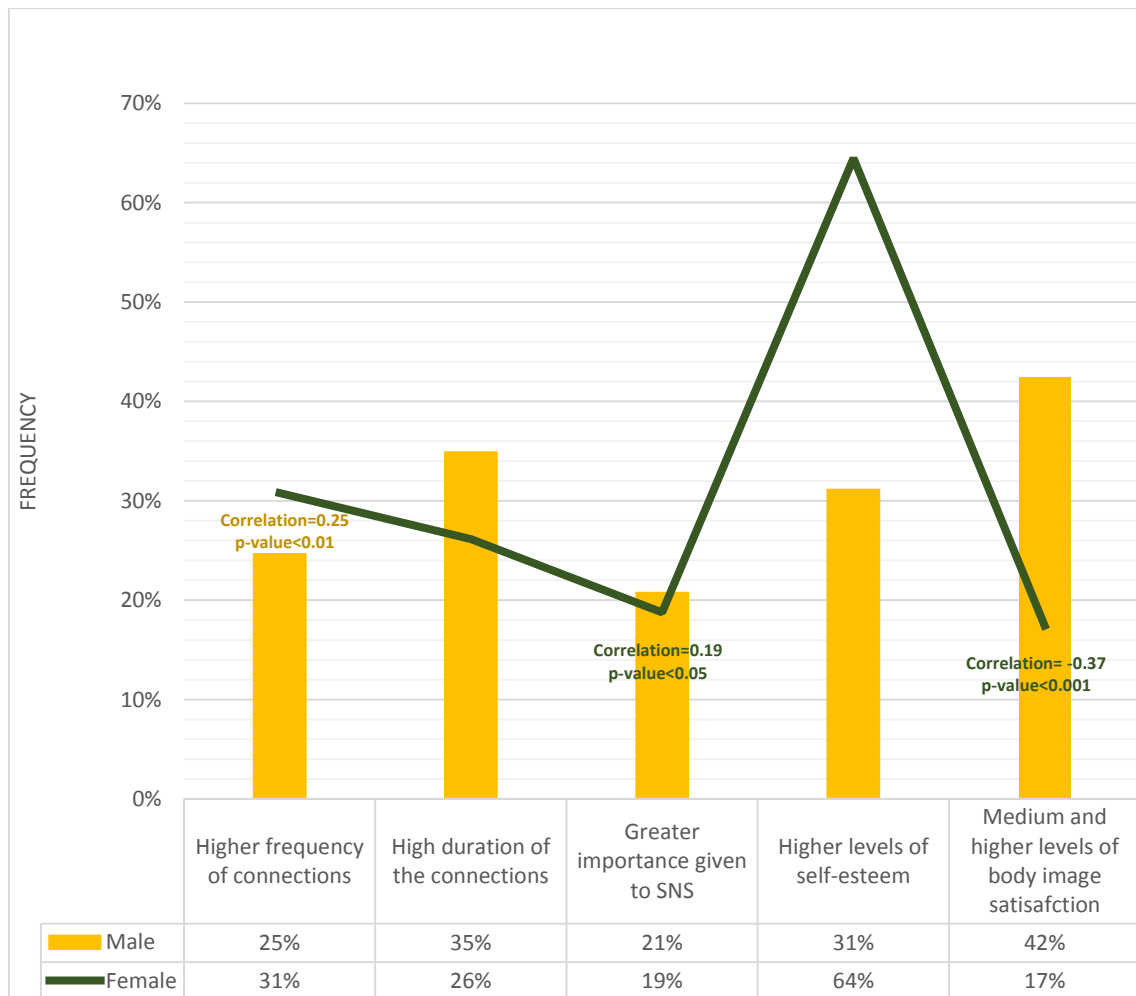

Figure 3. Relationship between the frequency of each variable and medium and high levels of loneliness

Furthermore, the correlation test was carried out to determine the link between higher levels of loneliness and the variables included in the study. The test was significant for only one variable for the men's sample and two for the women's sample (Figure 2). For males, the positive relationship with having higher levels of loneliness, apart from the addiction test, was with a higher frequency of connections to the social networks ($p<0.01$).

Meanwhile, for the females, the higher score to the importance given to the social networks and lower levels of body image satisfaction was linked with higher levels of loneliness ($p<0.01$).

5. Discussion

The results concerning the incidence of social networks addiction test showed higher frequency than initially expected, especially for men. This outcome is partially contrary to the Spanish Ministry (2017), that found an incidence of social networks addiction lower (18%) in the range of age from 18 to 24 years old. However, the findings regarding young college women corroborated the conclusions from previous works, showing a relation between addiction and mood modification (Buran Köse and Doğan, 2019). Nevertheless, these results contracted with previous studies focused on teenagers pointing out that Spanish females were more addicted than men (Gómez et al., 2017).

Prior studies have noted the importance of self-esteem, body perception, or testosterone levels as factors related to addiction to social networks (Alzougool, 2018; Griffiths and Dhuffar, 2014). In this sense, numerous studies found that emotional changes and mood was linked to addiction to internet and mobile (Bergman et al., 2018; Peng et al., 2019). Self-determination and behavioral routings also play an important in addition to social networks, being regulated by the emotional intelligence and individuals tendencies (Chou and Chou, 2019; Seo and Ray, 2019). Other factors highlighted as contributing to compulsive use of the social media were the self-expression and social connectedness (Abbasi and Drouin, 2019).

Besides, the current study found that gender also might play a significant role in this addiction. This study has suggested that masculine gender had a higher association with social networks addiction. In this sense, as previous research established, gender differences might play a role in social networks addition and other addiction, such as mobile addiction (Chung, 2011). These studies matched the results from this research in which the SNS addition in the men was a combination of the social factors (i.e., SNS importance) and biological measures (2D:4D). Meanwhile, this addiction in women was related with a combination of socio-psychological factors (i.e., self-esteem or loneliness) proving that different factors cause the addiction (Błachnio et al., 2016; Moretta and Buodo, 2018). Nevertheless, this study partially contradicts the previous studies because of the link between definite diagnosis of SNS addiction, not only related to 2D:4D and the SNS themselves, but the social loneliness in men (Błachnio et al., 2016; Moretta and Buodo, 2018). Thus, the results from this study seemed to match the findings of Su et al.

The results proved how in the case of women the testosterone levels (2D:4D ratio) did not play an essential role in the social networking addiction, but it could be related to other phycological problems such as low self-esteem (Quinton et al., 2011; Voracek et al., 2010). The research established that addictive behavior might be related to depression, suicidal ideation, and mobile use (Jasso-Medrano and López-Rosales, 2018). The findings from this research about loneliness linked with addiction to social networking matched for both males and females.

On the other hand, a recent study has highlighted how the difference between sexes regarding 2D:4D ratio could be considered minor, and the considerations that advocates and skeptics had about its scientifically validated (Leslie, 2019). Nonetheless, in the present study, all the participants were women, and no significant differences in the size of the hands were observed. On the other hand, in adults, the relationship between 2D:4D and levels of sex hormones are not significant (Manning et al., 2014). Nonetheless, it has been proved a higher significant link concerning the diagnosis of social networking addiction and loneliness for men.

The results testosterone levels in males matched with previous research focused on men, establishing a relationship with the addiction and testosterone (Canan et al., 2017). Nevertheless, the studies focused on hormonal relation with addiction did not include other cultural and physiological factors (Canan et al., 2017; Cuomo et al., 2008). Moreover, other studies have established how the ratio of males may be linked to the consumer of drugs and other addiction (Frost and Rickwood, 2017; Verduyn et al., 2017). Meanwhile, other studies have linked the dependency between SNS addiction and other behavior addiction, but without including the ratio. For all that, the men's addiction could be described as a combination of social factors and testosterone levels during the gestation. These results agree with previous with states related the 2D:4D to pathological health issues such as addiction to substances and SNS, though, the addiction to SNS has not been studied until recently (Alzougool, 2018; Cicek et al., 2017; Jeevanandam, 2016).

Consistent with the literature, this research found that participants who reported using more frequently and more time the social networks also had a definite diagnosis of

addiction (Saikia et al., 2019). In the case of men, the addiction was also linked to having an account on Instagram, similar with a previous study that highlighted the popularity an addiction to this network site (Huang and Su, 2018). Jasso-Medrano and López-Rosales (2018) proposed that social networks addiction might be linked with mobile addiction, which could be a result of negatives thoughts (Jasso-Medrano and López-Rosales, 2018). This result match with others that pointed out how the addiction to mobile phone is growing at a dangerous rate being estimated from 10-46% in college students and how the negatives emotions and the incapability of face them are related with the addiction to mobile phone and for that to SNS, being more addicted to them in stressful situations (Lian et al., 2016; Saikia et al., 2019).

The results from previous research matches with the general strain theory that states the fact that several types of tension or stress that one person suffered would provoke negative background leading to problematic behaviors (Anderson and Gerbing, 1988). Finally, it could be concluded that the SNS addiction is related with the mobile and a complex of emotions and stressful situations that the individual is currently facing such as low self-esteem or loneliness (Anderson et al., 2017; Chung, 2011; Lian et al., 2016). Nevertheless, there were contractions about whether the depression and negative emotions were the cause or an effect of this addiction (Błachnio et al., 2015; Jasso-Medrano and López-Rosales, 2018), but the one thing proposed was the creation of a circle of dependency. In this circle, the addictive individual would be exposed to SNS addiction and phycological issues such as loneliness or depression (Orsal et al., 2013). All these previous researches matched with the results shown, though, it has been established differences about negatives thoughts depending on the gender of the college student.

Nonetheless, the effectiveness of using SNS as a tool to teach and decrease the effects of risky behaviors has also been proven and many authors indicate the possible benefit of using SNS as a supportive community to overcome difficult situations (Dhir et al., 2017; Khatmi et al., 2018; Parra Sierra et al., 2016).

Nonetheless, the results of this research represented in Table 1 and Figures 2 and 4, were opposite with Moretta in which the compulsive use of SNS on the mobile phone is higher male comparing with females (8.13 males, 8.05 females) (Moretta and Buodo, 2018). Nonetheless, the mean of connections and use of SNS was higher in female similar in

other study focused on the mobile phone addiction resulting in higher levels of addiction in women than in men (Lian et al., 2016).

Furthermore, as previously described the main SNS currently used by the college students from the sample was Instagram stead of Facebook, that was described as the most popular and in use SNS but that in this result represent the second social network. These results correspond with other researches that have outlined that Instagram might become the most popular social network provoking the phycological side effects and being more addictive than Facebook (Cohen et al., 2017).

6. Conclusions

The present study was designed to determine the effect of loneliness, self-esteem, body satisfaction, and testosterone levels in the addiction to social networks. In this sense, this paper has argued that the prevalence of this addiction might be increasing. Moreover, how this addiction could be linked with gender differences, being more critical the sociopsychological factor in females and a combination of biological and social factors in the men.

Though the debate on whether the overuse of SNS should be defined as a disorder related to addiction and its psychopathological importance continues. This study has linked the social loneliness in men and the SNS addiction, that was previously described only in women. Moreover, the results have shown how Instagram has increased as the predominant social network for communication for college students.

These findings contribute in several ways to our understanding of this addiction. A contribution would be a basis for gender and sociobiological model related to this addiction. Also, the study contributes to our understanding of the implication of prenatal testosterone levels as a factor related to SNS addiction in men. Furthermore, the perpetuation of studies focused on investigating the use of social media, and its addiction might be highly relevant, having under consideration its growing popularity, in order to prevent unhealthy outcomes of its use.

In light of the present findings, it is needed to be considered the possible limitations of the study. Firstly, the participants of this study were university students, delimiting the results to the one group and being eliminated the possibility of the generalized the results to other groups of women and men. Secondly, the sample of men was lower the initial expected, being higher the sample related to females than males, which can be the reason

for the lower prevalence of SNS addiction comparing them with other authors. Despite these limitations, the current study contributes to relevant data to scientific knowledge regarding social networking addiction. The findings regarding the 2D:4D ratio should be studied in the case of women with phycological distress since the ratio is not directly linked with SNS addiction, but it was related with loneliness and body dissatisfaction.

Finally, future researches should continue studying differentiation in levels of social networking addiction and 2D:4D, including body concerns, self-esteem, loneliness, and eating disorders. Given the findings regarding differences SNS currently using related to the age of the sample, it could be interesting to study the social networking addiction and social factors within specific gender/age groups. Additionally, the samples of the males and females should be more similar, trying to obtain the same amount of population in both samples. Additionally, a longitudinal study would be recommended in order to determine the path of the association between SNS use and future repercussions in health during adulthood, such as substances used.

7. References

Abbasi, I., Drouin, M., 2019. Neuroticism and Facebook Addiction: How Social Media can Affect Mood? The American Journal of Family Therapy 47, 199–215. https://doi.org/10.1080/01926187.2019.1624223

Acier, D., Kern, L., 2011. Problematic Internet use: Perceptions of addiction counsellors. Comput. Educ. 56, 983–989. https://doi.org/10.1016/j.compedu.2010.11.016

Alzougool, B., 2018. The impact of motives for Facebook use on Facebook addiction among ordinary users in Jordan. International Journal of Social Psychiatry 64, 528–535. https://doi.org/10.1177/0020764018784616

Anderson, E.L., Steen, E., Stavropoulos, V., 2017. Internet use and Problematic Internet Use: a systematic review of longitudinal research trends in adolescence and emergent adulthood. International Journal of Adolescence and Youth 22, 430–454. https://doi.org/10.1080/02673843.2016.1227716

Anderson, J.C., Gerbing, D.W., 1988. Structural equation modeling in practice: A review and recommended two-step approach. Psychological Bulletin 103, 411–423. https://doi.org/10.1037/0033-2909.103.3.411

Andrie, E.K., Tzavara, C.K., Tzavela, E., Richardson, C., Greydanus, D., Tsolia, M., Tsitsika, A.K., 2019. Gambling involvement and problem gambling correlates among European adolescents: results from the European Network for Addictive Behavior study. Soc Psychiatry Psychiatr Epidemiol. https://doi.org/10.1007/s00127-019-01706-w

Apaolaza, V., Hartmann, P., Medina, E., Barrutia, J.M., Echebarria, C., 2013. The relationship between socializing on the Spanish online networking site Tuenti and teenagers' subjective wellbeing: The roles of self-esteem and loneliness. Computers in

Human Behavior 29, 1282–1289. https://doi.org/10.1016/j.chb.2013.01.002

Apaolaza, V., He, J., Hartmann, P., 2014. The effect of gratifications derived from use of the social networking site Qzone on Chinese adolescents' positive mood. Computers in Human Behavior 41, 203–211. https://doi.org/10.1016/j.chb.2014.09.029

Barut, C., Tan, U., Dogan, A., 2008. Association of height and weight with second to fourth digit ratio (2D:4D) and sex differences. Percept Mot Skills 106, 627–632. https://doi.org/10.2466/pms.106.2.627-632

Bergman, B.G., Claire Greene, M., Hoeppner, B.B., Kelly, J.F., 2018. Expanding the reach of alcohol and other drug services: Prevalence and correlates of US adult engagement with online technology to address substance problems. Addictive Behaviors 87, 74–81. https://doi.org/10.1016/j.addbeh.2018.06.018

Błachnio, A., Przepiorka, A., Pantic, I., 2016. Association between Facebook addiction, self-esteem and life satisfaction: A cross-sectional study. Comput Hum Behav 55, 701–705. https://doi.org/10.1016/j.chb.2015.10.026

Błachnio, A., Przepiórka, A., Pantic, I., 2015. Internet use, Facebook intrusion, and depression: Results of a cross-sectional study. European Psychiatry 30, 681–684. https://doi.org/10.1016/j.eurpsy.2015.04.002

Brailovskaia, J., Margraf, J., 2018. What does media use reveal about personality and mental health? An exploratory investigation among German students. PLoS One 13. https://doi.org/10.1371/journal.pone.0191810

Brooks, K.R., Mond, J.M., Stevenson, R.J., Stephen, I.D., 2016. Body Image Distortion and Exposure to Extreme Body Types: Contingent Adaptation and Cross Adaptation for Self and Other. Front Neurosci 10. https://doi.org/10.3389/fnins.2016.00334

Buran Köse, Ö., Doğan, A., 2019. The Relationship between Social Media Addiction and Self-Esteem among Turkish University Students. addicta 6, 175–190. https://doi.org/10.15805/addicta.2019.6.1.0036

Canan, F., Karaca, S., Düzgün, M., Erdem, A.M., Karaçaylı, E., Topan, N.B., Lee, S.-K., Zhai, Z.W., Kuloğlu, M., Potenza, M.N., 2017. The relationship between second-to-fourth digit (2D:4D) ratios and problematic and pathological Internet use among Turkish university students. J Behav Addict 6, 30–41. https://doi.org/10.1556/2006.6.2017.019

Carbonell, X., Chamarro, A., Oberst, U., Rodrigo, B., Prades, M., 2018. Problematic Use of the Internet and Smartphones in University Students: 2006–2017. IJERPH 15, 475. https://doi.org/10.3390/ijerph15030475

Chan, T.H., 2014. Facebook and its effects on users' empathic social skills and life satisfaction: a double-edged sword effect. Cyberpsychol Behav Soc Netw 17, 276–280. https://doi.org/10.1089/cyber.2013.0466

Chou, H.-L., Chou, C., 2019. A quantitative analysis of factors related to Taiwan teenagers' smartphone addiction tendency using a random sample of parent-child dyads. Computers in Human Behavior 99, 335–344. https://doi.org/10.1016/j.chb.2019.05.032

Chung, N., 2011. Korean Adolescent Girls' Addictive Use of Mobile Phones to Maintain Interpersonal Solidarity [WWW Document]. https://doi.org/info:doi/10.2224/sbp.2011.39.10.1349

Cicek, I.E., Cicek, E., Demirel, B., Ayhan, M.G., Varsak, N., Özbek, S.Y., Selçuk, M., Eren, I., 2017. Digit ratio (2D:4D), impulsiveness and aggression in male heroin addicts:

A prospective controlled study. Personality and Individual Differences 117, 1–5. https://doi.org/10.1016/j.paid.2017.05.031

Clements, J.A., Boyle, R., 2018. Compulsive technology use: Compulsive use of mobile applications. Computers in Human Behavior 87, 34–48. https://doi.org/10.1016/j.chb.2018.05.018

Cohen, R., Newton-John, T., Slater, A., 2018. 'Selfie'-objectification: The role of selfies in self-objectification and disordered eating in young women. Comput Hum Behav 79, 68–74. https://doi.org/10.1016/j.chb.2017.10.027

Cohen, R., Newton-John, T., Slater, A., 2017. The relationship between Facebook and Instagram appearance-focused activities and body image concerns in young women. Body Image 23, 183–187. https://doi.org/10.1016/j.bodyim.2017.10.002

Cohen-Bendahan, C.C.C., van de Beek, C., Berenbaum, S.A., 2005. Prenatal sex hormone effects on child and adult sex-typed behavior: methods and findings. Neuroscience & Biobehavioral Reviews, Prenatal Programming of Behavior, Physiology and Cognition 29, 353–384. https://doi.org/10.1016/j.neubiorev.2004.11.004

Cuomo, C., Sarchiapone, M., Giannantonio, M.D., Mancini, M., Roy, A., 2008. Aggression, Impulsivity, Personality Traits, and Childhood Trauma of Prisoners with Substance Abuse and Addiction. The American Journal of Drug and Alcohol Abuse 34, 339–345. https://doi.org/10.1080/00952990802010884

de-Sola, J., Talledo, H., Rodríguez de Fonseca, F., Rubio, G., 2017. Prevalence of problematic cell phone use in an adult population in Spain as assessed by the Mobile Phone Problem Use Scale (MPPUS). PLoS ONE 12, e0181184. https://doi.org/10.1371/journal.pone.0181184

Dhir, A., Khalil, A., Lonka, K., Tsai, C.-C., 2017. Do educational affordances and gratifications drive intensive Facebook use among adolescents? Computers in Human Behavior 68, 40–50. https://doi.org/10.1016/j.chb.2016.11.014

Espinar Ruiz, E., González Río, M.J., 2009. Jóvenes en las redes sociales virtuales: un análisis exploratorio de las diferencias de género. fem 87–105. https://doi.org/10.14198/fem.2009.14.06

Firth, J., Torous, J., Stubbs, B., Firth, J.A., Steiner, G.Z., Smith, L., Alvarez- Jimenez, M., Gleeson, J., Vancampfort, D., Armitage, C.J., Sarris, J., 2019. The "online brain": how the Internet may be changing our cognition. World Psychiatry 18, 119–129. https://doi.org/10.1002/wps.20617

Frost, R.L., Rickwood, D.J., 2017. A systematic review of the mental health outcomes associated with Facebook use. Computers in Human Behavior 76, 576–600. https://doi.org/10.1016/j.chb.2017.08.001

Gómez, P., Rial, A., Braña, T., Golpe, S., Varela, J., 2017. Screening of Problematic Internet Use Among Spanish Adolescents: Prevalence and Related Variables. Cyberpsychol Behav Soc Netw 20, 259–267. https://doi.org/10.1089/cyber.2016.0262

Griffiths, M., 2005. A 'components' model of addiction within a biopsychosocial framework. Journal of Substance Use 10, 191–197. https://doi.org/10.1080/14659890500114359

Griffiths, M., Dhuffar, M., 2014. Collecting Behavioural Addiction Treatment Data Using Freedom of Information Requests. SAGE Publications, Ltd., 1 Oliver's Yard, 55

City   Road, London EC1Y   1SP United   Kingdom.
https://doi.org/10.4135/978144627305014533925

Hökby, S., Hadlaczky, G., Westerlund, J., Wasserman, D., Balazs, J., Germanavicius, A., Machín, N., Meszaros, G., Sarchiapone, M., Värnik, A., Varnik, P., Westerlund, M., Carli, V., 2016. Are Mental Health Effects of Internet Use Attributable to the Web-Based Content or Perceived Consequences of Usage? A Longitudinal Study of European Adolescents. JMIR Ment Health 3, e31. https://doi.org/10.2196/mental.5925

Huang, Y.-T., Su, S.-F., 2018. Motives for Instagram Use and Topics of Interest among Young Adults. Future Internet 10, 77. https://doi.org/10.3390/fi10080077

Jasso-Medrano, J.L., López-Rosales, F., 2018. Measuring the relationship between social media use and addictive behavior and depression and suicide ideation among university students.   Computers   in   Human   Behavior   87,   183–191. https://doi.org/10.1016/j.chb.2018.05.003

Jeevanandam, S., 2016. 2D:4D Ratio and its Implications in Medicine. Journal of Clinical and   Diagnostic   Research   10,   CM01–CM03. https://doi.org/10.7860/JCDR/2016/21952.9000

Jenaro, C., Flores, N., Gómez-Vela, M., González-Gil, F., Caballo, C., 2007. Problematic internet and cell-phone use: Psychological, behavioral, and health correlates. Addiction Research & Theory 15, 309–320. https://doi.org/10.1080/16066350701350247

Jeong, M., Zo, H., Lee, C.H., Ceran, Y., 2019. Feeling displeasure from online social media postings: A study using cognitive dissonance theory. Comput. Hum. Behav. 97, 231–240. https://doi.org/10.1016/j.chb.2019.02.021

Jiménez, J.L.C., Gallego, M.M.V., Villa, E.H., Echeverri, Á.Q., 2010. Validación de la escala ESTE para medir la soledad de la población adulta. Investigación y Educación en Enfermería 28, 416–427.

Khatmi, N., Dany, L., Ndiaye, K., Carrieri, P., Rojas Castro, D., Roux, P., 2018. Impact of an educational intervention on risks associated with drug injection, and on psychosocial factors (PSF) involved in initiating and maintaining new health behaviors over   time.   Addictive   Behaviors   87,   222–230. https://doi.org/10.1016/j.addbeh.2018.07.007

Leslie, M., 2019. The mismeasure of hands? Science 364, 923–925. https://doi.org/10.1126/science.364.6444.923

Lian, L., You, X., Huang, J., Yang, R., 2016. Who overuses Smartphones? Roles of virtues and parenting style in Smartphone addiction among Chinese college students. Computers in Human Behavior 65, 92–99. https://doi.org/10.1016/j.chb.2016.08.027

Liu, Q.-Q., Zhang, D.-J., Yang, X.-J., Zhang, C.-Y., Fan, C.-Y., Zhou, Z.-K., 2018. Perceived stress and mobile phone addiction in Chinese adolescents: A moderated mediation   model.   Computers   in   Human   Behavior   87,   247–253. https://doi.org/10.1016/j.chb.2018.06.006

Lopez-Fernandez, O., Kuss, D.J., Romo, L., Morvan, Y., Kern, L., Graziani, P., Rousseau, A., Rumpf, H.-J., Bischof, A., Gässler, A.-K., Schimmenti, A., Passanisi, A., Männikkö, N., Kääriänen, M., Demetrovics, Z., Király, O., Chóliz, M., Zacarés, J.J., Serra, E., Griffiths, M.D., Pontes, H.M., Lelonek-Kuleta, B., Chwaszcz, J., Zullino, D., Rochat, L., Achab, S., Billieux, J., 2017. Self-reported dependence on mobile phones in

young adults: A European cross-cultural empirical survey. Journal of Behavioral Addictions 6, 168–177. https://doi.org/10.1556/2006.6.2017.020

Machimbarrena, J.M., Calvete, E., Fernández-González, L., Álvarez-Bardón, A., Álvarez-Fernández, L., González-Cabrera, J., 2018. Internet Risks: An Overview of Victimization in Cyberbullying, Cyber Dating Abuse, Sexting, Online Grooming and Problematic Internet Use. IJERPH 15, 2471. https://doi.org/10.3390/ijerph15112471

Malo-Cerrato, S., Martín-Perpiñá, M.-M., Viñas-Poch, F., 2018. Excessive use of social networks: Psychosocial profile of Spanish adolescents. Comunicar 26, 101–110. https://doi.org/10.3916/C56-2018-10

Manning, J., Kilduff, L., Cook, C., Crewther, B., Fink, B., 2014. Digit Ratio (2D:4D): A Biomarker for Prenatal Sex Steroids and Adult Sex Steroids in Challenge Situations. Front. Endocrinol. 5. https://doi.org/10.3389/fendo.2014.00009

Mäntymäki, M., Salo, J., 2011. Teenagers in social virtual worlds: Continuous use and purchasing behavior in Habbo Hotel. Computers in Human Behavior 27, 2088–2097. https://doi.org/10.1016/j.chb.2011.06.003

Manzano-Agugliaro, F., Castro-García, M., Pérez-Romero, A.M., García-Cruz, A., Novas, N., Salmerón-Manzano, E., 2016. Alternative methods for teaching cadastre and remote sensing. Survey Review 48, 450–459. https://doi.org/10.1179/1752270615Y.0000000046

Martínez-Ferrer, B., Moreno, D., Musitu, G., 2018. Are Adolescents Engaged in the Problematic Use of Social Networking Sites More Involved in Peer Aggression and Victimization? Front. Psychol. 9, 801. https://doi.org/10.3389/fpsyg.2018.00801

Mayaute, M.E., Blas, E.S., 2014. Construcción Y Validación Del Cuestionario De Adicción a Redes Sociales (ars). Liberabit. Revista Peruana de Psicología 20, 73–91.

Molavi, P., Mikaeili, N., Ghaseminejad, M.A., Kazemi, Z., Pourdonya, M., 2018. Social Anxiety and Benign and Toxic Online Self-Disclosures: An Investigation Into the Role of Rejection Sensitivity, Self-Regulation, and Internet Addiction in College Students. The Journal of Nervous and Mental Disease 1. https://doi.org/10.1097/NMD.0000000000000855

Moral Jiménez, M. de la V., Fernández Domínguez, S., 2019. Uso problemático de internet en adolescentes españoles y su relación con autoestima e impulsividad. Av. Psicol. Latinoam. 37, 103. https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.5029

Moretta, T., Buodo, G., 2018. Modeling Problematic Facebook Use: Highlighting the role of mood regulation and preference for online social interaction. Addictive Behaviors 87, 214–221. https://doi.org/10.1016/j.addbeh.2018.07.014

Muller, D.C., Giles, G.G., Bassett, J., Morris, H.A., Manning, J.T., Hopper, J.L., English, D.R., Severi, G., 2011. Second to fourth digit ratio (2D:4D) and concentrations of circulating sex hormones in adulthood. Reproductive Biology and Endocrinology 9, 57. https://doi.org/10.1186/1477-7827-9-57

Observatorio Español de las Drogas y las Adicciones Delegación del Gobierno para el Plan Nacional sobre drogas, 2018. Adicciones comportamentales.Juego y uso compulsivo de internet en las encuestas de drogas y adicciones en España EDADES y ESTUDES (No. 680-18-111–2). MINISTERIO DE SANIDAD, CONSUMO Y BIENESTAR SOCIAL, Madrid, España.

Observatorio Español de las Drogas y las Adicciones Delegación del Gobierno para el Plan Nacional sobre drogas, 2017. Adicciones comportamentales.Juego y uso compulsivo de internet en las encuestas de drogas y adicciones en España EDADES y ESTUDES (No. 731-19- 002–1). MINISTERIO DE SANIDAD, CONSUMO Y BIENESTAR SOCIAL, Madrid, España.

Orsal, Ozgul, Orsal, Ozlem, Unsal, A., Ozalp, S.S., 2013. Evaluation of Internet Addiction and Depression among University Students. Procedia - Social and Behavioral Sciences 82, 445–454. https://doi.org/10.1016/j.sbspro.2013.06.291

Parra Sierra, V., Vargas Martínez, J.I., Zamorano González, B., Peña Cárdenas, F., Velázquez Narváez, Y., Ruiz Ramos, L., Monreal Aranda, O., 2016. Adicción y factores determinantes en el uso problemático del Internet, en una muestra de jóvenes universitarios. Edutec. Revista Electrónica de Tecnología Educativa 0, 337. https://doi.org/10.21556/edutec.2016.56.741

Peng, C.-T., Wu, T.-Y., Chen, Y., Atkin, D.J., 2019. Comparing and modeling via social media: The social influences of fitspiration on male instagram users' work out intention. Computers in Human Behavior 99, 156–167. https://doi.org/10.1016/j.chb.2019.05.011

Penni, J., 2017. The future of online social networks (OSN): A measurement analysis using social media tools and application. Telematics and Informatics 34, 498–517. https://doi.org/10.1016/j.tele.2016.10.009

Peris, M., Maganto, C., Garaigordobil, M., 2018. Scale of risk of addiction to social networks and Internet for adolescents: reliability and validity (ERA-RSI). Rev. Psicol. Clin. Ninos Adolesc. 5, 30–36. https://doi.org/10.21134/rpcna.2018.05.2.4

Pichot, P., López-Ibor Aliño, J.J., Valdés Miyar, M., 2001. Manual diagnóstico y estadístico de los trastornos mentales: DSM-IV. Masson, Barcelona.

Powell, E., Wang-Hall, J., Bannister, J.A., Colera, E., Lopez, F.G., 2018. Attachment security and social comparisons as predictors of Pinterest users' body image concerns. Comput Hum Behav 83, 221–229. https://doi.org/10.1016/j.chb.2018.01.039

Quinton, S.J., Smith, A.R., Joiner, T., 2011. The 2nd to 4th digit ratio (2D:4D) and eating disorder diagnosis in women. Pers Indiv Differ 51, 402–405. https://doi.org/10.1016/j.paid.2010.07.024

Robins, R.W., Hendin, H.M., Trzesniewski, K.H., 2001. Measuring Global Self-Esteem: Construct Validation of a Single-Item Measure and the Rosenberg Self-Esteem Scale. Pers Soc Psychol Bull 27, 151–161. https://doi.org/10.1177/0146167201272002

Rodgers, R.F., Faure, K., Chabrol, H., 2009. Gender Differences in Parental Influences on Adolescent Body Dissatisfaction and Disordered Eating. Sex Roles 61, 837–849. https://doi.org/10.1007/s11199-009-9690-9

Rosenberg, M., 1965. Society and the Adolescent Self-Image. Princeton University Press, Princeton, 148, 804. https://doi.org/10.1126/science.148.3671.804

Royal Society for Public Health, 2017. Status of Mind: Social media and young people's mental health. Royal Society for Public Health.

Saikia, A.M., Das, J., Barman, P., Bharali, M.D., 2019. Internet Addiction and its Relationships with Depression, Anxiety, and Stress in Urban Adolescents of Kamrup District, Assam. J Family Community Med 26, 108–112. https://doi.org/10.4103/jfcm.JFCM_93_18

Sarabia, I., Estévez, A., 2016. Sexualized behaviors on Facebook. Computers in Human Behavior 61, 219–226. https://doi.org/10.1016/j.chb.2016.03.037

Seo, D., Ray, S., 2019. Habit and addiction in the use of social networking sites: Their nature, antecedents, and consequences. Computers in Human Behavior 99, 109–125. https://doi.org/10.1016/j.chb.2019.05.018

Shoenberger, H., Tandoc, E., 2014. Understanding Facebook Use through Explicit and Implicit Measures of Attitudes and Motivations. Online Journal of Communication and Media Technologies 4, 223–44.

Sirola, A., Kaakinen, M., Savolainen, I., Oksanen, A., 2019. Loneliness and online gambling-community participation of young social media users. Computers in Human Behavior 95, 136–145. https://doi.org/10.1016/j.chb.2019.01.023

Su, W., Han, X., Jin, C., Yan, Y., Potenza, M.N., 2019. Are males more likely to be addicted to the internet than females? A meta-analysis involving 34 global jurisdictions. Computers in Human Behavior 99, 86–100. https://doi.org/10.1016/j.chb.2019.04.021

Sussman, S., Lisha, N., Griffiths, M., 2011. Prevalence of the Addictions: A Problem of the Majority or the Minority? Eval Health Prof 34, 3–56. https://doi.org/10.1177/0163278710380124

Tsitsika, A., Janikian, M., Schoenmakers, T.M., Tzavela, E.C., Olafsson, K., Wójcik, S., Macarie, G.F., Tzavara, C., Richardson, C., 2014. Internet addictive behavior in adolescence: a cross-sectional study in seven European countries. Cyberpsychol Behav Soc Netw 17, 528–535. https://doi.org/10.1089/cyber.2013.0382

Uban, K.A., Herting, M.M., Wozniak, J.R., Sowell, E.R., 2017. Sex differences in associations between white matter microstructure and gonadal hormones in children and adolescents with prenatal alcohol exposure. Psychoneuroendocrino 83, 111–121. https://doi.org/10.1016/j.psyneuen.2017.05.019

van den Eijnden, R.J.J.M., Lemmens, J.S., Valkenburg, P.M., 2016. The Social Media Disorder Scale. Comput Hum Behav 61, 478–487. https://doi.org/10.1016/j.chb.2016.03.038

Verduyn, P., Ybarra, O., Résibois, M., Jonides, J., Kross, E., 2017. Do Social Network Sites Enhance or Undermine Subjective Well-Being? A Critical Review: Do Social Network Sites Enhance or Undermine Subjective Well-Being? Social Issues and Policy Review 11, 274–302. https://doi.org/10.1111/sipr.12033

Voracek, M., Reimer, B., Dressler, S.G., 2010. Digit ratio (2D:4D) predicts sporting success among female fencers independent from physical, experience, and personality factors: 2D:4D and fencing. Scandinavian Journal of Medicine & Science in Sports 20, 853–860. https://doi.org/10.1111/j.1600-0838.2009.01031.x

Wang, C.-W., Ho, R.T.H., Chan, C.L.W., Tse, S., 2015. Exploring personality characteristics of Chinese adolescents with internet-related addictive behaviors: Trait differences for gaming addiction and social networking addiction. Addictive Behaviors 42, 32–35. https://doi.org/10.1016/j.addbeh.2014.10.039

Wang, L., Huo, Z., Lu, H., Bai, C., Li, K., Ma, W., 2018. Digit ratio (2D:4D) and coronary artery disease in north Chinese women. Early Human Development 116, 64–67. https://doi.org/10.1016/j.earlhumdev.2017.11.007

Wang, R., Yang, F., Haigh, M.M., 2017. Let me take a selfie: Exploring the psychological

effects of posting and viewing selfies and groupies on social media. Telematics and Informatics 34, 274–283. https://doi.org/10.1016/j.tele.2016.07.004

Watson, A., Lecki, N.K., Lebcir, M., 2015. Does size matter? An exploration of the role of body size on brand image perceptions. Jnl of Product & Brand Mgt 24, 252–262. https://doi.org/10.1108/JPBM-05-2014-0616

World Health Organization, 2018. Adolescent health [WWW Document]. WHO. URL http://www.who.int/topics/adolescent_health/en/ (accessed 6.4.18).

Wyssen, A., Coelho, J.S., Wilhelm, P., Zimmermann, G., Munsch, S., 2016. Thought-shape fusion in young healthy females appears after vivid imagination of thin ideals. J Behav Ther Exp Psy 52, 75–82. https://doi.org/10.1016/j.jbtep.2016.03.010