Relationship Between Facebook Problematic use and Pathological Personality Traits: a Systematic Review

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Abstract
We aimed to investigate relationships between Facebook problematic use (Facebook PU) and pathological traits of personality, by a systematic review. The literature search was proceeded based on a search strategy including the keywords "Facebook", "problematic use" and "personality". We found a total of 236 publications and selected 21 papers for full verification. All of them were excluded, characterizing an empty review. As an attempt to increase the probability of finding eligible publications, first, we have broadened the search of the systematic review from "Facebook" to "social network sites" (and variations); and then from "social network sites" to "internet". Regarding this last change, the final set of publications after full reading based on the eligibility criteria was composed by 15 papers. We emphasize that there was no empirical evidence on the relationship between Facebook PU and pathological traits of personality. Given the proximity between Facebook PU and internet addiction, it is possible to hypothesize that there is a relationship between pathological traits (i.e., Neuroticism, Impulsivity, and Psychoticism) and Facebook PU.
Keywords: personality disorder; internet (addiction); nonchemical dependency; literature review.

Relação Entre uso Problemático do Facebook e Traços Patológicos da Personalidade: uma Revisão Sistemática

Resumo
O objetivo desse estudo foi investigar as relações entre o uso problemático do *Facebook* (*Facebook* PU) e traços patológicos, por meio de uma revisão sistemática. Os descritores foram "Facebook", "uso problemático" e "personalidade", e variações foram incluídas. Foi encontrado um total de 236 publicações. Entre elas, 21 foram selecionadas para leitura completa e todas foram excluídas, o que caracterizou o trabalho como uma *empty review*. Como uma tentativa de aumentar a probabilidade de encontrar publicações elegíveis, foi ampliado a busca para "internet". O conjunto final de publicações após a leitura completa com base nos critérios de elegibilidade foi composto por 15 artigos. Ressalta-se que não há evidência empírica sobre a relação entre o *Facebook* PU e traços patológicos. Dada a proximidade entre o *Facebook* PU e a dependência da *internet*, é possível supor que existe uma relação entre traços patológicos (isto é, neuroticismo, impulsividade e psicoticismo) e o *Facebook* PU.
Palavras-chave: distúrbios da personalidade, dependência não química, *internet* (dependência), revisão de literatura.

Relación Entre uso Problemático de Facebook y Características Patológicos de la Personalidad: una Revisión Sistemática

Resumen
El objetivo de este estudio fue investigar las relaciones entre el uso problemático de Facebook (Facebook PU) y los rasgos patológicos de la personalidad, a través de una revisión sistemática. La búsqueda bibliográfica incluyó los descriptores "Facebook", "uso problemático", "personalidad" y variaciones. Se encontró un total de 236 publicaciones, de las cuales, 21 fueron seleccionadas para la verificación completa, a pesar de que todos fueron excluidos, lo que caracterizó el trabajo como una revisión vacía. En un intento de aumentar la probabilidad de encontrar publicaciones elegibles, se amplió las palabras claves a "sitios de redes sociales" (y variaciones); y luego a "internet". El conjunto final de publicaciones después de la lectura completa basada en los criterios de elegibilidad consistió en 15 artículos. Cabe enfatizar que no hubo evidencias empíricas sobre la relación entre el Facebook PU y los rasgos patológicos. Dada la proximidad entre Facebook PU y la adicción a Internet, es posible suponer que existe una relación entre los rasgos patológicos (i.e., neuroticismo, impulsividad y psicoticismo) y Facebook PU.
Palabras clave: trastorno de personalidad; internet (adicción); dependencia no química; revisión de literatura.

Introduction

Facebook is a social networking site (SNS) characterized by providing several features for social interaction and is often used daily by its users (Mahajan, 2009). Some people may find it difficult to monitor the time spent on this SNS. Intense access to the platform can lead to interpersonal, social, and professional problems, as the individual stops doing other activities or interacting personally with others to be connected to the Facebook (Blachnio et al., 2017; Elphinston & Noller, 2011; Lee et al., 2012). Studies are reporting that users wake up in the middle of the night to check on social media (Abhijit, 2012) and that there are individuals who

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are more interested in being connected to SNSs than sleeping and resting (Hofmann et al., 2012). Furthermore, there is a growing complaint in mental health services regarding the increase of social isolation due to the excessive use of the platform (Guedes et al., 2016). Such behaviors may be called Facebook problematic use (Facebook PU) (Blachnio et al., 2017; Elphinston & Noller 2011).

Previous studies suggest personality traits as relevant predictors of the Facebook PU. For instance, Marino et al. (2016) found a direct relationship between Facebook PU and extraversion, and indirectly (through motives and metacognitions) relationship between Facebook PU and emotional stability. Moreover, there are studies suggesting the relationship between pathological traits of personality and Facebook non-PU. Kapidzi (2013) found that people with typical symptoms of Narcissistic Personality Disorder (NPD) are highly motivated to show their positive features on Facebook, in addition to having more markups, photos, status updates and more time spent on Facebook. Significant correlations were observed between histrionic PD (HPD) symptoms and Facebook non-PU, as well as a tendency to present a higher number of friends compared to non-HPD people (Rosen et al., 2013). This evidences suggest possible relationships between pathological personality traits (and PDs) and Facebook PU.

Rationale and aims of the current systematic review

Considering previous evidence linking personality traits and Facebook PU (e.g., Marino et al., 2016), and also taking into account that there is evidence relating pathological personality traits and Facebook non-PU variables (e.g., Kapidzi, 2013, Mehdizadeh, 2010; Rosen et al., 2013), our hypothesis is that there is a positive relationship between Facebook PU and pathological personality traits (and PDs). The present study aimed to investigate the relationship between Facebook PU and pathological personality traits/PDs. A systematic review was carried out.

Materials and Methods

The procedures used in this study were performed based on PRISMA guideline suggested for conducting a systematic review (Moher et al., 2009).

2.1 Search Strategy

As a first step, we conducted a screening in March 2017. We searched the PsyInfo, PubMed, and Science Direct databases, focusing on peer-reviewed journals. The selected terms were grouped (i.e., Boolean operator AND) into three sets: (1) Facebook, Internet and social network site, online social network; (2) dependence/dependency, problematic use, abusive use, addiction; (3) personality disorder, pathological personality trait, pathological personality. Variations of these terms (e.g., Facebook dependence, abusive use, inadequate personality) were used, based on the MeSH mechanism of PubMed. We entered these terms in the title, abstracts, keywords and full texts. Complementarily, we also hand searched at Google Scholar, the first 10 pages.

2.2 Eligibility Criteria

As a second step, we conducted a screening of the title and abstract of each paper selected from the search strategy. We include studies that (1) provided empirical evidences of the relation between Facebook problematic use/addiction and pathological personality traits, (2) involved adults aged 18 or older, and (3) included a measurement of Facebook problematic use or addiction, and a measurement of personality disorders or pathological personality traits. We used no restrictions of date and language. We excluded studies that (1) evaluated aspects of the Facebook not directly related to problematic use or addiction (e.g., general use, motivations) and/or (2) included only Facebook assessment or pathological personality traits assessment.

2.3 Data Extraction

Data were extracted using a standardized data extraction method by the authors. Paper managing was conducted using Mendeley Desktop version 1.16.1 for Windows. We distributed the papers in folders depending on database, then, duplicate papers verification was proceeded. Two authors independently assessed titles and abstracts to select papers within the established inclusion criteria. Discrepancies were solved by consensus, considering a third author. Then, the authors read the selected articles, focusing mainly on the Method and Results, considering the established inclusion criteria. From this more detailed reading, the selected papers met the criteria for inclusion in the systematic review.

2.4 Quality report and bias risk assessment

As we did not find specific tools for quality report assessment and bias risk, we integrated parts of tools and strategies used in previously research. For quality report assessment: Strengthening the Reporting of Observational studies in Epidemiology (STROBE; von Elm et al., 2007); for bias risk: Critical Appraisal

and Data Extraction for Systematic Reviews of Prediction Modeling Studies (CHARM; Moons et al., 2014) guidelines and some keys were created according to other researches. However, as can be observed in the results, as we did not find publications matching inclusion criteria, we could not apply the key items selected in these tools and the key items we planned to insert in the adapted tools. We are presenting the findings of this (empty) systematic review, following the procedures suggested in the previous literature (Lang et al., 2007; Moat et al., 2013; Schlosser & Sigafoos, 2009; Slyer, 2016; Yaffe et al., 2012).

Results

Study Selection

Using the previously described criteria and databases, we identified 142 publications. The search using Google Scholar provided 94 additional publications. The correct amount identified, after removing for duplicates, was 236. In the screening stage, based on the reading of the titles and abstracts, most of the papers were excluded (91,1%). The 21 remaining papers were fully verified, and all of them were excluded. In all cases, the exclusion in the final selection was by not using a measure assessing Facebook PU, some of the papers assessed Facebook but not problematic use (n =2), and others were not focused on Facebook (n = 19). The result was, in the terminology of the systematic review methodology, an "empty review" (i.e., a systematic review in which no eligible study was identified (Lang et al., 2007). The detailed process can be visualized in Figure 1.

As noted in Figure 1, no eligible studies were found for this systematic review. Specifically, one of the criteria was not met by any of the papers, i.e., to present empirical data of Facebook PU. Although there is no specific guide to reporting empty reviews (Yaffe et al., 2012), following the suggestion of Lang et al. (2007), we are using a specific expression for the present situation: in the present review, there were no eligible studies found.

Faced with the absence of studies showing effects on the relationship between problematic use of

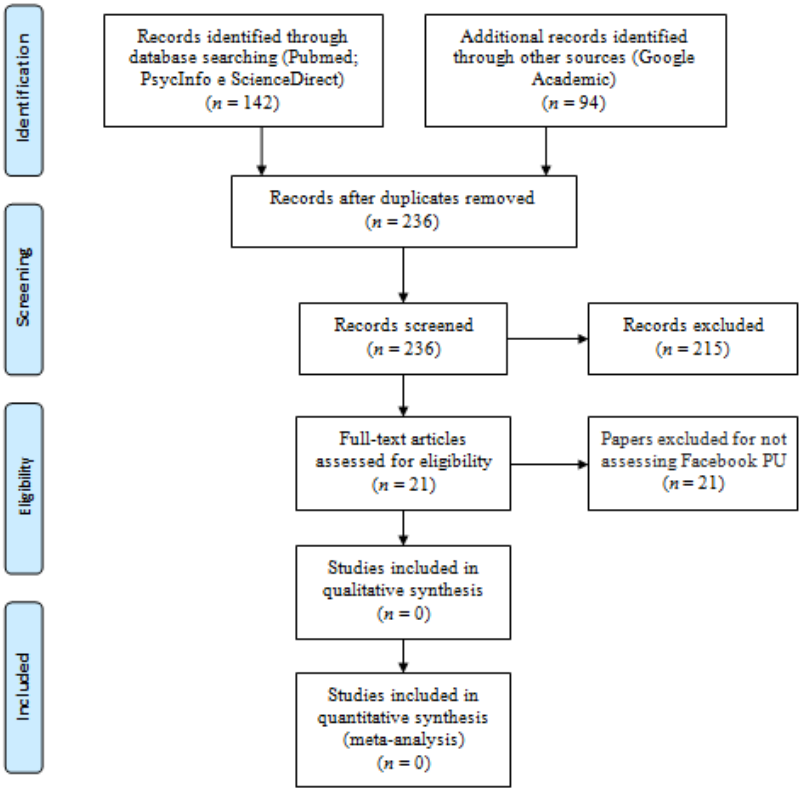

Figure 1. Flow diagram based on PRISMA.

Facebook and pathological personality traits, our decision was to investigate peripheral studies as close as possible to our original goal. We tried not to conclude anything based on the absence of known effects (Yaffe et al., 2012), but to explore the broader field of study in which our goal is embedded. Furthermore, as suggested (Lang et al., 2007), we are presenting observations generated through the papers retrieved, even though none of them has met the initial eligibility criteria. Therefore, seeking to know the peripheral studies composing the broader field of study in which Facebook PU and pathological personality traits are inserted, we searched for papers presenting information regarding the relationship between internet problematic use/addiction and pathological personality traits. The terms used in the systematic review search procedure (e.g., Internet) made it possible to search for publications on Internet problematic use/addiction. We must highlight that previously we also looked at studies dealing with problematic use/addiction in other online social networks since the terms used allowed this verification (e.g., social network site, online social network), but no study was found.

Since the initial search terms enabled the verification of studies relating Internet problematic use/addiction with pathological personality traits, we started with the 236 publications reported in Figure 1, whose titles and abstracts were read by two researchers independently. The same inclusion and exclusion criteria were used, but now replacing "Facebook" over "internet". We hand-searched Google Scholar again, the first 10 pages each time. After the titles and abstracts were screened, 39 publications were selected, which were read in full. One of the studies, despite meeting all inclusion criteria, presented no relevant results regarding the relationship between pathological personality traits/PDs and internet addiction, as the focus of the study was the bipolar disorder (Wölfling et al., 2015). So, we decided to exclude this paper, together with 20 studies that not reached all inclusion criteria. The final set of publications after full reading based on the eligibility criteria was composed of 15 papers.

Study Characteristics

For the results, we extracted the following data presents in Table 1 from the 15 studies.

More than three authors composed most studies (n = 13), and the number of authors ranged from two to nine. These authors (n = 65) were from several science fields, mainly from psychiatry (57%), general medicine (21.5%), and psychology (10.8%). Almost all the authors were from health or health-related areas except four authors from the educational field. Maybe as reflection of it, publications were most in psychiatry journals (n = 8), followed by addiction-focused journals (n = 3), and human-computer interaction focused journals (n = 2). According, the more recurrent journal was Psychiatry Research (n = 3), followed by Journal of Behavior Addictions (n = 2), and Comprehensive Psychiatry (n =2). Papers were published from 2009 to 2016, showing stability on the number of publications (n = 3) in the last years (i.e., 2014-2016). The sample´s country also showed a tendency, being Taiwan the most frequent (n = 5) followed by Turkey and Germany (n = 3, each).

About 70% of the papers presented as focus one or more personality disorders or at least some pathological personality traits. In some of it (n = 4), the nosological diagnostic system (i.e., DSM-IV categorical) is clearly declared. PDs, in general, are encompassed in about one-third of the papers, and the borderline personality disorder is the focus on two publications. Neuroticism (n = 6), Impulsivity (n = 5), and Psychoticism (n = 4) are the most frequent pathological personality traits investigated. In general, they were assessed by different measures, but the most recurrent was the Barratt Impulsiveness Scale (BIS-11; n = 2), the Symptom Checklist-90-R (SCL-90-R; n = 2), both self-report tools, and the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; n =2), a structured interview. Only in one study a measure (i.e., NEO-FFI) based on the Five-Factor Model (FFM) was applied. Regarding the internet addiction measurement, all tools were self-report, mainly the Chinese Internet Addiction Scale (CIAS) and its revised version (CIAS-R), totaling five papers, the Scale for the Assessment of Internet and Computer Game Addiction (AICA-S; n = 3), and the Internet Addiction Scale (IAS; n = 3). These measurement tools were applied, in almost 70% (n =11) of studies, to graduated or undergraduate students, in three papers to clinical patients, and in two papers, the specific group population was not presented in the paper. The sample size ranged from 50 to 4266, seven studies composed by more than 500 subjects, and four studies composed of less than 200 subjects.

Altogether, the results reported in the studies indicated the relationship between IA and Neuroticism, Impulsivity, Psychoticism, and PDs. IA was positively correlated to Neuroticism (Chang et al., 2015; Dalbudak et al., 2014; Dong et al., 2012; Floros et al., 2014; Müller

Table 1.
Descriptive characteristics of the eligible studies

Nº	Authors (Year)	Country	Journal	Personality traits	Sample/Age	Measures of Internet	Measures of Personality	Objective	Results
3	Müller et al. (2013)	German	BioMed Research International	Neuroticism	N = 118 male patients[a]; n=70 patients[b]/ M=29,3 years; n=48 patients[c]/ M=31,7 years	AICA-S	NEO-FFI	Compare personality profiles of patients in different rehabilitation centers.	IA group > alcohol group: neuroticism.
7	Floros, Siomos, Stogiannidou, Giouzepas, & Garyfallos (2014)	Greece	Addictive Behaviors	PD[j] ZKPQ[k]	N=50 university students[d]; 39 males/ M=21,03 years; 11 female/ M=22,64 years	OCS	ZKPQ	Investigate relationship between IA, personality and psychopathology.	Patients with IA: 22% narcissistic, 10% borderline, 4% obsessive compulsive, 2% schizotypal and antisocial, each; $\beta_{3\ ZKPQ\ factors} \rightarrow$ IAD: impulsivity, neuroticism-anxiety, and sensation seeking.
14	Bernardi & Pallanti (2009)	Italy	Comprehensive Psychiatry	PD[j]	N=50 outpatients/ M= 23,33 years; n=15 patients[b]	Young's IAS	SCID-II	Investigate the relationship between dissociative symptoms and IA; evaluate the comorbidities between PDs and IA[e].	Patients with IA: 14% borderline, 7% obsessive compulsive and 7% avoidant.

(Continued)

Table 1.
Descriptive characteristics of the eligible studies (Continuation)

N°	Authors (Year)	Country	Journal	Personality traits	Sample/Age	Measures of Internet	Measures of Personality	Objective	Results
20	Wu, Ko, & Lane (2016)	Taiwan	The Journal of Nervous and Mental Disease	PD[i]	N=556 university students (61.3% female); n=73b (56,1% male)	CIAS	Personality Disorder Factor Scale	Investigate the comorbidities of PD in students with and without IA.	IA group > non-IA group: scores on borderline, narcissistic, avoidant and dependent PD; ♂ with IA: higher frequency of narcissistic PD; ♀ with IA: higher frequency of borderline, narcissist, avoidant and dependence PD.
21	Senormanci et al. (2014)	Turkey	Comprehensive Psychiatry	Neuroticism and psychoticism	N=720 university students (50,2% female)/ M=19 years; n=52[b] (71,1% male)	IAS	EPQR-A	Investigate the relationship of dysfunctional attitude, self-esteem, personality and depression with students diagnosed with IA[f].	IA group > non-IA group: neuroticism and psychoticism.
22	Dalbudaket al. (2013)	Turkey	Psychiatry Research	Impulsivity and psychoticism	N=319 university students (73,3% female)	IAS	BIS-11 and SCL-90R	Investigate the relationship between IA with impulsivity and severity of psychopathology.	Mild IA group: higher scores than the non-IA group in impulsivity; IA group > mild IA group: psychoticism; $r_{IA * impulsivity * psychoticism}$ was positive; $\beta_{3\ factors\ of\ BIS\text{-}11} \rightarrow$ IA.

(Continued)

Table 1.
Descriptive characteristics of the eligible studies (Continuation)

N°	Authors (Year)	Country	Journal	Personality traits	Sample/Age	Measures of Internet	Measures of Personality	Objective	Results
23	Dong, Wang, Yang, & Zhou (2012)	China	Journal of the Pacific Rim College of Psychiatrists	Neuroticism and psychoticism	N=868 freshman students (51,5% male)/M=20,8 years	Young's IAT	EPQA	Investigate if $\beta_{personality} \rightarrow$ individuals diagnosed with IA.	Students with IA > non-IA: neuroticism and psychoticism; $\beta_{neuroticism\ and\ psychoticism} \rightarrow$ IA.
25	Yen, Ko, Yen, Chen, & Chen (2009)	Taiwan	Psychiatry and Clinical Neurosciences	Impulsivity	N=1992 university students (70,8% female)/M=20,4 years.	CIAS	BIS	Evaluate the personality characteristics related to IA and to alcohol use.	$r_{IA}{}^{*}{}_{impulsivity}$ was positive.
27	Zadra et al. (2016)	Germany	Journal of Behavioral Addictions	PD[i]; impulsivity	N=168 individuals[g]; n=71[b]	CIUS	SCID II e BIS-11	Investigate the relationship between PD and IA.	Individuals with IA > non-IA: more often PD; ♂ with IA > ♂ non-IA: Cluster C PD; BIS-11 ≠ significantly between participants with and without IA. Borderline was the only PD that presented significantly ≠s between individuals with IA and without IA. Individuals with IA and no Cluster B PD tend to show decrease in the IA symptoms in comparison to who does have some Cluster B PD.

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Table 1.
Descriptive characteristics of the eligible studies (Continuation)

N°	Authors (Year)	Country	Journal	Personality traits	Sample/Age	Measures of Internet	Measures of Personality	Objective	Results
28	Chang et al. (2015)	Taiwan	Journal of Medical Sciences	Neuroticism	N=4266 university students (66,2% male) 30,7%[h]/ M=22,2 years	CIAS-R	Neuroticism scale of the Maudsley Personality Inventory	Explore the differences in the relationship between neuroticism and psychosocial indicators, considering the sexes.	Group higher scores in neuroticism also obtained higher mean in IA, which was found in both sexes.
29	Tsai et al. (2009)	Taiwan	Psychiatric Research	Neuroticism	N=1360 freshman students (n = 680 possible cases of IA)	CIAS-R	MPI	Investigate risk factors related to IA in college students.	Group with IA: higher means in neuroticism; $\beta_{neuroticism} \rightarrow$ risk of IA.
30	Dalbudak, Evren, Aldemir, & Evren (2014)	Turkey	Psychiatry Research	Borderline	N=271 university students (59,4% female)	IAS	BPI	Investigate the relationship between IA risk and borderline traits.	$r_{IA}{}^{*}{}_{borderline}$ factors were found; $\beta_{borderline\ personality\ traits} \rightarrow$ IA scores.
31	Laconi, Andréoletti, Chauchard, Rodgers, & Chabrol (2016)	France	L' Encéphale	PD[i]	N=276 participants[g] (41% male)/ M=28 years	OCS	PDQ-4	Explore the relationship between internet and personality traits.	♂: $r_{IA*personality\ traits}$ showed similar significant effects (~.27) for Cluster A and B, and for borderline, schizotypal, antisocial, and schizoid PD. ♀: none of the PD presented relationship with IA.

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Table 1.
Descriptive characteristics of the eligible studies (Continuation)

N°	Authors (Year)	Country	Journal	Personality traits	Sample/Age	Measures of Internet	Measures of Personality	Objective	Results
32	Mottram & Fleming (2009)	Australia	CyberPsychology & Behavior	Impulsivity	N=272 undergraduate students (68% females), 17-56 years	IAT	UPPS Impulsive Behavior Scale	Investigate predictor variables of the problematic use of Internet.	$r_{\text{one subscale of the UPPS (lack of perseverance)}} *_{IA}$: positive and significant
33	Wu, Ko, Tung & Li (2016)	Taiwan	Computers in Human Behavior	Borderline PD[i]	N=1826 students (1st data collection) and N=623 students (2nd data collection)	CIAS	BPDFS	Investigate if the characteristics of Borderline PD would increase the risk of the severity of IA.	Borderline PD symptoms: relationship with IA in both data; $\beta_{\text{first data collection was able}}$ →severity of IA in the second data collection.

Note. In the table only the applicable results to the present systematic review are presented. AICA-S: Scale for the Assessment of Internet and Computer game Addiction; NEO-FFI: NEO Five Factors Inventory; IA: internet addiction; PD: personality disorder; ZKPQ: Zuckermann–Kuhlman Personality Questionnaire; OCS: Online Cognitions Scale; IAD: internet addiction disorder; Young´s IAS: Young's Internet Addiction Scale; SCID-II: Structured Clinical Interviews for DSM-IV; CIAS: Chinese Internet Addiction Scale; IAS: Internet Addiction Scale; EPQR-A: Eysenck Personality Questionnaire Revised/Abbreviated Form; BIS-11: Barratt Impulsiveness Scale-11; SCL-90-R: Symptom Checklist- Revised; Young's IAT: Young's Internet Addiction Test; EPQ: Eysenck Personality Questionnaire for Adult; BIS: Behavior inhibition system; CIUS: Compulsive Internet Use Scale; CIAS-R: Chinese Internet Addiction

Scale-Revision; MPI: Maudsley Personality Inventory; BPI: Borderline Personality Inventory; PDQ-4: Personality Diagnostic Questionnaire-4; IAT: Internet Addiction Test; BPDFS: Borderline Personality Disorder Features Scale; a: rehabilitation centers; b: diagnostic of IA; c: diagnostic of alcohol dependence; d: registered in the volunteer service for counseling students with problematic internet use and with diagnostic of IA; e: in this study the Dissociative Experiences Scales was used to screening symptoms of Dissociative Identity Disorder (DID); we did not used these results as DID is not considered as a PD in the diagnostic manual (APA, 2013); f: in this study the Dysfunctional Attitudes Scale was used to screening dysfunctional attitudes and beliefs, the back depression inventory was used to measuring symptoms of depression and Rosenberg Self-Esteem Scale was used to measure global feelings of self-worth or self-acceptance; these results were not presented in our study as it´s not relevant to our goal; g: sample specificities (e.g., patient, students, etc.) were not given; h: cut-off from Neuroticism scale of the Maudsley Personality Inventory was used to establishment of groups; i: PD diagnostic based on DSM-IV; j: narcissistic, borderline, obsessive compulsive, schizotypal and antisocial; k: subscales: impulsiveness, neuroticism-anxiety, sensation seeking, aggression-hostility, activity, and sociability.

et al., 2013; Senormanci et al., 2014; Tsai et al., 2009), and this relationship does not change when controlling by sex (Chang et al., 2015). IA was also positively correlated to Impulsivity (Dalbudak et al., 2014; Floros et al., 2014; Mottram & Fleming 2009; Zadra et al., 2016; Yen et al., 2009 – lack of perseverance), and Psychoticism (Dong et al., 2012; Senormanci et al., 2014). Moreover, PD presented a relationship with IA (Laconi et al., 2016; Zadra et al., 2016; Wu et al., 2016), but it seems to be mediated by the sex (e.g., Laconi et al., 2016). Borderline PD show up as one of the most related to IA (e.g., Dalbudak et al., 2014; Wu et al., 2015), the more prevalent (Bernardi & Pallanti 2009; Wu et al., 2016; Zadra et al., 2016), and no sex differences were observed (Dalbudak et al., 2014). Contradicting these findings, in one study, no significant differences between the PD group and non-PD group was found (Floros et al., 2014).

Discussion

Based on previous findings (e.g., Kapidzi, 2013; Mehdizadeh, 2010; Rosen et al., 2013), our initial hypothesis was that the Facebook PU should be positively correlated to personality pathological traits/PDs in general. We performed the typical procedures of a systematic review. Considering the lack of studies according to our aim, this systematic review is characterized as an empty review (Lang et al., 2007). Empty reviews are rare, but maybe less than we usually think (Yaffe et al., 2012). Knowing that there is no evidence in support of or against a scientific problem based on the inclusion criteria used in the review is important, in terms of provide a clear direction for future original research (Schlosser & Sigafoos, 2009).

Based on these premises, what the absence of evidence leads us to know concerning the initial objective of this systematic review? First, since there is no evidence in favor or against our hypothesis, it is not possible to state whether there is relationship between Facebook PU and pathological personality traits/PDs. However, the lack of evidence from an empty review is not an indication of lack of effect. Therefore, the main contribution of this study is to point out the necessity of empirical research showing the effects between the Facebook PU and pathological traits. It is surprising that almost 15 years after the Facebook was launched, and about 10 years after the first studies on Facebook relationship with personality traits was published, no study was published yet investigating the correlations between the addiction and other problematic uses of the most popular SNS and pathological variations of the personality traits.

As stated before, our decision was to investigate peripheral studies as close as possible to our original goal. We first looked at studies dealing with problematic use/addiction in any online social networks. But, again, no studies were found even relaxing the criteria to cover any SNS. Facing these results, we settle our search to the next natural broad field, i.e., internet problematic use/addiction relationship with pathological personality traits/PDs.

Regarding the characteristics of the selected publications, it was observed that most authors were from mental health departments, since these are publications dealing with two conditions: IA and pathological personality traits/PDs. Similarly, most of the journals were in the field of psychiatry. In addition, the country with more publications was Taiwan, which may be explained by the country's specific attention given to IA as a public health problem (Block, 2008). We also identified a larger number of publications in the last 5 years, suggesting that studies contemplating IA and pathological personality traits have been increasingly frequent, which is consistent with the widespread access to the Internet among the population (Ginige, 2017).

The studies' samples were predominantly composed by young, female, and university students. On the one hand, the majority of young people in the sample may be related to the public who use the Internet the most (e.g., Ginige, 2017), although the Internet has made it possible to include groups that are difficult to access in surveys (Onnela & Rauch 2016). However, the observed trend may also denote the most represented group in behavioral sciences studies (i.e., Western, Educated, Industrialized, Rich, and Democratic; WEIRD). In this case, few studies sought to consider samples with psychiatric diagnoses, which may decrease variability regarding the variables investigated, since they represent atypical behaviors in the general population.

The most studied traits in the selected studies was Neuroticism, followed by Impulsivity and Psychoticism. The choice to investigate these traits with IA seems to have different reasons. Studies have shown that people with high scores in Neuroticism tend to use the Internet to soothe the loneliness generated by anxiety, shyness and insecurity, besides considering it a safe and comfortable environment (Butt & Phillips, 2008; McCrae et al., 2002; Müller et al., 2013). Regarding Impulsivity, from the very nature of the trait it is possible to sustain its investigation with IA, since those who are

prone to IA behaviors tend to make decisions without worrying about the consequences (Belin et al., 2008). Moreover, these people tend to see the Internet as an area in which they receive short-term rewards, and this immediate gratification tends to reinforce the use (Lee et al., 2012; Mazhari, 2012). Similarly, the association of IA with Psychoticism is related to the search for sensations, low impulse control, aggressiveness, insensitivity and socially unacceptable behaviors (e.g., Dalbudak & Evren, 2014; Dong et al., 2012; Mok et al., 2014).

In general, Neuroticism (Dong et al., 2012; Floros et al., 2014; Tsai et al., 2009), Impulsivity (Dalbudak et al., 2013; Floros et al., 2014) and Psychoticism (Dong et al., 2012) were significant predictors of IA. Moreover, in group comparisons with college students, groups composed by people with high scores in IA obtained higher means in these pathological personality traits when compared with groups with low scores in IA (Chang et al., 2015; Senormanci et al., 2014; Tsai et al., 2009).

Positive and statically significant associations between PDs and IA were also observed, specifically, for Narcissistic, Borderline, Obsessive-compulsive, Schizotypal, Antisocial, Avoidant, Dependent, and Schizoid PDs. When compared by sex, differences were observed in the associations with some PDs, with men presenting more comorbidity with Schizoid, Schizotypal and Antisocial PDs. The most investigated PD in the studies was Borderline, showing no differences in relation to sex, and showing the highest prevalence, possibly being the PD most related to IA. According to Floros et al. (2014), patients diagnosed with Borderline PD are those who should present greater exacerbation in IA behaviors.

We can conclude that there is relationship between IA and pathological personality traits, i.e., people who present high scores in specific personality traits tend to show typical behaviors of IA (Bernardi & Pallanti, 2009; Dalbudak et al., 2014, Floros et al., 2014). These findings can bring some possibilities to the clinical context. For instance, if the patient shows behaviors related to IA, the clinician can use this information as an indicator of the presence of pathological traits. The inverse can also be true, although personality traits are probably before the development of specific addictions. Considering these implications, future studies should focus on the occurrence of IA in patients diagnosed with PD.

One should observe that associations between IA and pathological personality traits may be more expressive than what we found, since most studies did not use clinical samples or samples with patients diagnosed with PDs. There is a tendency for low responses (disagreement of items) and decreased variability of responses in instruments using samples from the general population, therefore, results may be different for clinical samples.

The main limitations of this research should be observed. The first limitation refers to the non-use of gray literature (e.g., unpublished studies, thesis, dissertations); we did not perform a meta-analysis of the results regarding IA; and for the data related to IA, we did not perform a new search in the literature, as we were already using IA as a descriptor. Besides, our review was focused on only one online social network, the Facebook. Although it´s currently the most popular social network, not including other platforms could bring some limitations to our findings.

Based on the objective of this systematic review, we can hypothesize that the present results can be generalized for Facebook use, since a significant part of the internet use can be explained by the use of this SNS (Poli, 2017). However, some reservations should be outlined, for instance, the definitions for the constructs involved. More research is required to investigate similarities and differences between Internet addiction and Facebook PU.

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