ORIGINAL RESEARCH

# Clinical and Psychological Factors Associated with Addiction and Compensatory Use of Facebook Among Patients with Inflammatory Bowel Disease: A Cross-Sectional Study

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**Background:** Inflammatory bowel diseases are chronic conditions characterized by incapacitating symptoms, which can compromise patient's quality of life and social interaction. As social media use is continuously increasing and Facebook is one of the most accessed social media worldwide, this study aimed to evaluate the use of Facebook and identify clinical and psychological factors associated with addiction and compensatory use among patients.

**Methods:** This case-control study enrolled 100 outpatients and 100 healthy individuals, who were classified into the patient and control groups, respectively. Facebook use was evaluated using the questionnaire Psycho-Social Aspects of Facebook Use (PSAFU). The IBD Questionnaire and the 36-Item Short-Form Health Survey (SF-36) were used to measure Health-related quality of life. Anxiety and depression were evaluated using the Hospital Anxiety and Depression Scale; self-esteem, using the Rosenberg Self-Esteem scale.

**Results:** The patient group included 54 patients with Crohn's disease and 46 with ulcerative colitis. Facebook use was similar between the patient and control groups in all evaluated aspects (p=0.21). In the patient and the control groups, the compensatory use of Facebook was directly related to the symptoms of depression (patients: R = 0.22; p = 0.03; controls: R = 0.34; p = 0.0006) and inversely related to self-esteem scale (patients: R = −0.27; p = 0.006; controls: R = −0.37; p = 0.0001). Facebook addiction showed an inverse correlation with self-esteem (patients: R = −0.32; p = 0.001; controls: R = −0.24; p = 0.02) and quality of life (patients: IBDQ score, R = −0.30; p = 0.003; controls: SF-36 score, R = −0.29; p = 0.004).

**Conclusion:** The use of Facebook was not different between study groups. Psychological aspects such as depression and low self-esteem were associated with the compensatory use of Facebook in both groups, which may be related to unsatisfactory personal aspects of social interaction.

**Keywords:** Facebook, addiction, compensatory use, inflammatory bowel disease

## Introduction

Inflammatory Bowel Diseases (IBD) are chronic conditions including Crohn's Disease (CD) and Ulcerative Colitis (UC). Symptoms can be disabling and compromise patient's quality of life and personal relationships, affecting social interaction.[1]

Considering that the disease, especially when clinically active, affects presential interactions, patients are expected to use the internet not only as a source of information about the disease but also for supporting one another and communicating with IBD organizations.[1] A study conducted in 2016 by Reich et al[2] showed that around 68% of enrolled IBD patients spent at least 1 hour daily on social media, with the most accessed social media being Facebook (FB) and

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the most frequently used IBD-specific website being the Crohn's and Colitis Foundation of America (86%). Another study conducted by the same group included a larger number of patients (n=1960) and confirmed that the most frequently used social media website was FB (79.8%), followed by Instagram (29.1%) and LinkedIn (26.8%).[3] In addition, the factors associated with the use of social media were female gender, young age, active disease and a diagnosis of CD compared to UC.[3]

Regarding the number of internet users, Brazil has the largest internet market in Latin America and the fourth-largest internet market globally.[4] The use of social media is increasing in the general population and FB is the leading social networking website in the country.[4] Brazil is the fourth country with the highest number of FB users globally, with 120 million users, behind India, the United States and Indonesia.[5]

Based on the increased incidence of IBD and the growing access to social networks, it is likely that the use of social media has also increased among IBD patients.[6] The present study hypothesizes that limitation in presential social interaction as a consequence of IBD symptoms might be balanced by virtual communication through FB, which would indicate that patients use social media as a form of compensation for the lack of personal socialization.[7] So, it is important to characterize the use of FB among IBD patients and identify clinical and psychological aspects related to this media use in order to better understand the main aspects of this interaction and supply unmet needs. Thus, this explorative and descriptive study aimed to evaluate FB use among IBD patients compared to healthy individuals and to identify the clinical and psychological factors associated with the compensatory use of FB and whether or not it is associated with an increased risk of FB addiction among this population.

# Methods

## Participants

This comparative cross-sectional study enrolled 100 consecutive IBD outpatients (patient group), comprising 54 and 46 individuals with Crohn's disease and ulcerative colitis respectively, treated at Botucatu Clinic Hospital, a tertiary service in Brazil, and 100 age and sex-matched healthy individuals as controls. The study was conducted between August 2018 and July 2019. Patients were interviewed to obtain clinical data and most of the questionnaires were self-administered. The diagnosis of IBD was based on clinical, endoscopic, radiologic, and histological criteria.[8] The inclusion criteria were as follows: age ≥18 years, consent to participate in the study and a confirmed IBD diagnosis (for patients). To ensure no interference with the responses, the exclusion criteria for the control group were as follows: the presence of chronic diseases or gastrointestinal symptoms, such as abdominal pain, diarrhea or constipation, the presence of blood in the stool and a previous history of diagnosed IBD or other intestinal diseases. In addition, a non-use of Facebook and an incomplete Facebook use questionnaire were exclusion criteria for both groups. The control group consisted of non-family healthy individuals recruited on the streets of Botucatu, Sao Paulo, Brazil. Individuals in the control group were interviewed to obtain sociodemographic and lifestyle data, including quality of life, psychological variables and Facebook use. The participants were interviewed and most of the questionnaires were self-administered.

The calculation of sample size was based on the estimate of the Brazilian population in 2019 (approximately 210 million people),[9] the number of Facebook users (approximately 120 million Brazilians [57% of the population]), a margin of error of 10% and 95% reliability, totaling a minimum sample size of 94 individuals per group. Participants were consecutively recruited until reaching 100 individuals per group.[5]

## Clinical Variables

The analyzed variables were current age, sex, family income, time since diagnosis, smoking status and the presence of comorbidities such as arterial hypertension, diabetes mellitus, dyslipidemia, cardiac or pulmonary diseases or other chronic diseases. Disease activity was assessed using the Crohn's Disease Activity Index (CDAI)[8,10] for CD patients and based on 9-point partial Mayo (pMayo) score (moderate-to-severe activity: pMayo ≥ 5)[11] for UC patients. The extent of the disease was based on the Montreal classification.[12,13] Other variables included previous surgeries or hospitalizations, history of ostomy and current medications, including mesalazine, azathioprine, corticosteroids, tofacitinib and biological therapy (infliximab, adalimumab, certolizumab pegol, vedolizumab, ustekinumab) or no medication.

## Health-Related Quality of Life (HRQoL) and Psychological Assessment

HRQoL was assessed using two self-administered scales validated for the Brazilian population: The Inflammatory bowel disease Questionnaire (IBDQ)[14] and the 36-Item Short-Form Health Survey (SF-36).[15] The IBDQ comprises four domains, including bowel function, emotional status, systemic symptoms and social function; the total score ranges from 32 to 224, with higher scores reflecting better HRQoL. According to the score, HRQoL is classified as excellent (≥200), good (151–199), regular (101–150) or poor (≤100).[16] The SF-36 evaluates eight health dimensions, including physical function, physical aspects, bodily pain, general health, vitality, mental health, emotional aspects and social function. The punctuation ranges from 0 to 100, with higher scores reflecting a more favorable health status.[15]

Symptoms of anxiety and depression were evaluated through the Hospital Anxiety and Depression Scale (HADS), a 14-item self-reporting tool that uses a four-point scale validated in Brazil.[17] A HADS score above 8 suggests probable anxiety and/or depression. Self-esteem was evaluated based on the Rosenberg self-esteem scale and participants were classified as having low (<26), medium (26–36) or high (>36) self-esteem.[18,19] Body image was assessed using the Body Image Scale (BIS),[20] a questionnaire originally created for body image evaluation in breast cancer patients, which was validated in Brazil;[21] the total score ranges from 0 to 30, with higher scores indicating greater concern for changes in body image resulting from the disease and/or its treatments.[22]

## Characterization of Facebook Use

The Facebook use covered different evaluated aspects, such as daily use of Facebook (hours), use of Facebook for communication purposes, use of Facebook for search information about IBD and characterization of use through the tool Psycho-Social Aspects of Facebook Use questionnaire (PSAFU).[22]

## Translation and Cultural Adaptation of the Psycho-Social Aspects of Facebook Use Questionnaire (PSAFU)

The PSAFU[22] questionnaire assesses people's behavior while using Facebook and captures nuances of the reasons, thoughts, feelings and attitude trends related to their use of this social media.[22] The scale encompasses compensatory use, self-presentation, addiction, construction of virtual identity related to the use of Facebook, socialization and search for sexual partners. The total score ranges from 51 to 207 and, in each domain, higher scores reflect a more intense use of the social network for that purpose (compensatory use: min. 13/max. 65; Self-presentation: min. 8/max. 40; Socialization: min. 13/max. 41; Virtual identity: min. 5/max. 25; addiction: min. 12/max. 36).

The translation and cultural adaptation of the PSAFU questionnaire followed the methodology proposed by Guillemin and cols.[23] The cultural equivalence pretest was performed by applying the final Portuguese version in outpatients in order to clarify their understanding of the scale items. Furthermore, the final questionnaire was reviewed and approved by the committee, considering the answers obtained in the pretest and the adaptations to the Brazilian reality.

## Statistical Analysis

Data were expressed as mean ± standard deviation or median (range) for continuous variables and as frequency (proportion) for qualitative variables. The chi-square test and the Fisher's exact test, as appropriate, were used to compare categorical data, whereas continuous data were compared using the ANOVA test. Pearson's correlation test was used to study the correlations between PSAFU domains and the scores obtained from IBDQ, SF-36, HADS-anxiety, HADS-depression, Rosenberg self-esteem scale and the BIS. Values of $p < 0.05$ were considered statistically significant. The statistical analyses were performed using SAS version 9.4 for Windows (SAS Institute Inc., Cary, NC, USA). All authors had access to the study data and the statistical review of the study was performed by a biomedical statistician.

## Ethical Considerations

The study was approved by the Local Research Ethics Committee, Botucatu Medical School (CAAE: 88204318.2.0000.5411). All participants received explanations about the study objectives and expected results and were enrolled in the study only after signing the informed consent form.

**Table I** Sociodemographic and Clinical Characteristics of the Patient Group and the Control Group

|  | Patient Group (n= 100) | Control Group (n= 100) | P |
|---|---|---|---|
| **Age** | 33.71 ± 10.08 | 34.98 ± 11.21 | 0.40 |
| **Female gender** | 63 (63) | 75 (75) | 0.07 |
| **Family income (BRL)** | 2374.21 ± 992.35 | 3110.52 ± 2098.92 | 0.0001 |
| **Per capita income (BRL)** | 984.06 ± 560.98 | 1355.90 ± 917.64 | 0.0003 |
| **Marital status** |  |  |  |
| Married | 51 (51) | 46 (46) |  |
| Single | 42 (42) | 35 (35) |  |
| Widowed | 1 (1) | 1 (1) | 0.11 |
| Separated/Divorced | 6 (6) | 16 (16) |  |
| Not declared | 0 | 2 (2) |  |
| **Comorbidities** | 31 (31) | 25 (25) | 0.34 |
| **Smoking** | 4 (4) | 15 (15) | 0.008 |
| **Alcohol abuse** | 5 (5) | 4 (4) | 0.74 |

**Note**: Data are expressed as mean ± standard deviation or frequency (proportion).
**Abbreviation**: BRL, Brazilian currency.

# Results

## Clinical Characteristics

In total, 139 patients were invited to participate in this study. Of this number, 8 were excluded due to refusal to participate, 28 (20.14%) due to non-use of Facebook and 3 due to incomplete PSAFU questionnaire, totaling 100 participants in the patient group. For the control group, 121 healthy individuals were invited, of whom 3 (2.48%) were excluded for not using Facebook and 18 for incomplete completion of the questionnaire, totaling 100 individuals in this group. The frequency of non-users of Facebook was higher in the patient group than in the control group (p<0.0001).

The patient group consisted of 54 (54%) and 46 (46%) patients with CD and UC, respectively. The mean age was 33.71 ± 10.08 years, 63% were female (Table 1) and the mean time since diagnosis was 7.73 ± 6.81 years. The family income (p=0.0001) and the frequency of smoking (p=0.008) were higher in the control group than the patient group (Table 1).

According to the Mayo score (67.39%) and CDAI (77.78%), the majority of IBD patients were in clinical remission despite the extensive involvement and the presence of complications (Table 2). The most commonly used medications were azathioprine and biological therapy in CD patients and mesalazine and azathioprine in UC patients (Table 2).

## Health-Related Quality of Life and Psychological Aspects

The patient group demonstrated a worse quality of life (assessed by SF-36) than the control group (p = 0.004), especially in the dimensions of physical aspects (p=0.001) and general health (p<0.0001) (Table 3). Nevertheless, the quality of life was rated good or excellent in most patients, according to the IBDQ (Table 3). The presence of anxiety was more prevalent in the patient group (p = 0.01) as well as a poorer body image (p=0.045), while no difference was observed in self-esteem (p=0.85) and depression (p=0.053) between the groups (Table 3).

Regarding previous psychological disorders, in the patient group, 2 participants presented with anxiety in use of specific medications for it and none referred depression. In the control group, 2 participants referred medicated depression, one had nonmedicated anxiety and another declared use of anxiety drug. As it was not the study scope, there was not an effort directed to certifying those referred diagnosis and continuous use medications.

## Clinical and Psychological Aspects Related with Facebook Use

A greater percentage of the patients have sought information about the disease on the internet (68.69%) and 54% use social media for communication purposes. The average duration of the daily use of Facebook was 1.81 ± 2.69 hours in

**Table 2** Clinical Characteristics of Patients with Crohn's Disease and Ulcerative Colitis

| | Crohn's Disease (n= 54) | Ulcerative Colitis (n=46) |
|---|---|---|
| **Age (y)** | 33.72 ± 10.22 | 33.70 ± 10.04 |
| **Time since diagnosis (y)** | 8.27 ± 7.83 | 7.09 ± 5.36 |
| **Disease extent (ulcerative colitis)** | | |
| Proctitis | | 12 (26.09) |
| Left-sided colitis | | 9 (19.57) |
| Extensive/Pancolitis | | 25 (54.35) |
| **Montreal Classification (Crohn's disease)** | | |
| **Age at diagnosis** | | |
| A1 (<17y) | 14 (25.93) | |
| A2 (17–40y) | 37 (68.52) | |
| A3 (>40y) | 3 (5.56) | |
| **Disease Location** | | |
| L1 (ileal) | 12 (22.22) | |
| L2 (colonic) | 6 (11.11) | |
| L3 (ileocolonic) | 36 (66.67) | |
| L4 (isolated upper disease) | 0 | |
| **Disease Behavior** | | |
| B1 (non-stenosing, non-penetrating) | 16 (29.63) | |
| B2 (stenosing) | 18 (33.33) | |
| B3 (penetrating) | 20 (37.04) | |
| Perianal disease | 27 (50) | |
| **Disease activity** | | |
| Remission | 42 (77.78) | 31 (67.39) |
| Mild | 6 (11.11) | 8 (17.39) |
| Moderate | 5 (9.26) | 6 (13.04) |
| Severe | 1 (1.85) | 1 (2.17) |
| **Partial Mayo score** | | 2.20 ± 2.55 |
| **CDAI** | 121.51 ± 95.01 | |
| **Medications** | | |
| Mesalazine | 0 | 22 (47.83) |
| Azathioprine | 27 (50) | 16 (34.78) |
| Corticosteroids | 1 (1.85) | 4 (8.70) |
| Infliximab | 26 (48.15) | 11 (23.91) |
| Adalimumab | 8 (14.81) | 4 (8.70) |
| Certolizumabe pegol | 1 (1.85) | 0 |
| No medication | 4 (7.40) | 2 (4.35) |
| **Previous hospitalization** | 37 (68.51) | 20 (43.48) |
| **Previous surgery** | 29 (53.70) | 7 (15.22) |
| **Presence of ostomy** | 8 (14.81) | 3 (6.52) |
| **Routine limitation by IBD** | 26 (48.15) | 20 (43.48) |

**Note**: Data are expressed as mean ± standard deviation or frequency (proportion).
**Abbreviations**: CDAI, Crohn's Disease Activity Index; IBD, inflammatory bowel disease.

the patient group and 2.18 ± 3.34 hours in the control group (p = 0.20). Facebook use was observed to be similar between the patient group and the control group according to the PSAFU questionnaire (p=0.21) in all evaluated aspects (Table 3).

The compensatory use of Facebook was inversely associated with the quality of life in the patient group (IBDQ score, R = - 0.25; p = 0.01) and the control group (SF-36 score, R = −0.27; p = 0.006). Similarly, it was related to the HADS score for depression (patient group: R = 0.22; p = 0.03; control group: R = 0.34; p = 0.0006) and self-esteem (inversely) (patient group: R = −0.27; p = 0.006; control group: R = −0.37; p = 0.0001) (Table 4). In both groups, Facebook addiction had inverse association with quality of life (patient group: IBDQ score, R = −0.30; p = 0.003; control group:

**Table 3** Quality of Life, Self-Esteem, Self-Image and Facebook Use Evaluation in the Patient Group and the Control Group

| Variable | Patient Group (n=100) | Control Group (n=100) | P-value |
|---|---|---|---|
| Quality of life (IBDQ)* | | | |
| Excellent | 19 (19.19) | | |
| Good | 43 (42.42) | | |
| Regular | 26 (26.26) | | |
| Poor | 12 (12.12) | | |
| **SF-36** | | | |
| Physical function | 75.10 ± 28.05 | 84.15 ± 21.68 | 0.10 |
| Physical aspects | 62.25 ± 42.27 | 80.25 ± 32.82 | 0.001 |
| Bodily pain | 49.30 ± 8.20 | 51.10 ± 7.90 | 0.12 |
| General health | 52.90 ± 19.99 | 64.50 ± 14.80 | <0.0001 |
| Vitality | 52.90 ± 22.26 | 57.90 ± 23.5 | 0.12 |
| Mental health | 59.96 ± 20.42 | 64.28 ± 24.17 | 0.17 |
| Emotional aspects | 60.67 ± 44.03 | 73.00 ± 40.12 | 0.04 |
| Social function | 47.38 ± 15.72 | 46.75 ± 12.39 | 0.76 |
| **SF-36 total score** | 57.56 ± 18.17 | 65.24 ± 15.29 | 0.004 |
| Presence of anxiety, n (%) | 40 (40.82) | 24 (24.24) | 0.01 |
| HADS score for anxiety | 7.49 ± 4.32 | 6.53 ± 4.39 | 0.12 |
| Presence of depression, n (%) | 27 (27.55) | 16 (16.16) | 0.053 |
| HADS score for depression | 5.63 ± 4.45 | 4.86 ± 3.97 | 0.45 |
| High self-esteem, n (%) | 80 (80) | 83 (83) | 0.85 |
| Self-esteem score | 45.41 ± 10.60 | 46.92 ± 10.20 | 0.31 |
| Body Image Scale | 7.94 ± 7.57 | 3.89 ± 5.61 | 0.045 |
| **PSAFU** | | | |
| Compensatory use | 21.90 ± 9.31 | 20.01 ± 8.03 | 0.09 |
| Self-presentation | 19.63 ± 8.08 | 18.70 ± 8.28 | 0.42 |
| Social | 11.51 ± 7.55 | 10.27 ± 6.98 | 0.17 |
| Addiction | 9.26 ± 5.39 | 9.46 ± 5.91 | 0.79 |
| Virtual Identity | 14.08 ± 4.72 | 13.50 ± 4.63 | 0.38 |
| Total punctuation | 76.38 ± 26.69 | 71.94 ± 25.72 | 0.21 |

**Note**: *n=99 patients. Data are expressed as mean ± standard deviation or frequency (proportion).
**Abbreviations**: IBDQ, Inflammatory Bowel Disease Questionnaire; SF-36, 36-Item Short-Form Health Survey; HADS, Hospital Anxiety and Depression Scale; PSAFU, Psycho-Social Aspects of Facebook Use questionnaire.

SF-36 score, R = −0.29; p = 0.004) and self-esteem (patient group: R = −0.32; p = 0.001; control group: R = −0.24; p = 0.02), being inversely related to the presence of anxiety (R = 0.36; p = 0.0002) and depression (R = 0.23; p = 0.03) only in the control group. Furthermore, the PSAFU total score was inversely associated with age (patient group: R = −0.23; p = 0.02; control group: R = −0.31; p = 0.001), quality of life (patient group: IBDQ score, R = −0.22; p = 0.03; control group: SF-36 score, R = −0.29; p = 0.004) and self-esteem (patient group: R = −0.21; p = 0.04; control group: R = −0.41; p <0.0001) in both groups (Table 4). The PSAFU total score was related to the presence of anxiety (R = 0.35; p = 0.0005) and depression (R = 0.33; p = 0.001) only in control group (Table 4).

Notably, no correlation was observed between the time since diagnosis and disease activity indices (CDAI for CD patients and Mayo score for UC patients) and the PSAFU domains (Table 4).

## Discussion

There was an inverse relationship between Facebook use and age, HRQoL and self-esteem (in both patient and control groups). Regarding the compensatory use of Facebook specifically, a positive correlation with depression symptoms and

**Table 4** Correlation of PSAFU Domains with Clinical and Psychological Variables in Patients' Group and Control Group

| | PSAFU (R Coefficient) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Compensatory Use | | Self-Presentation | | Socialization | | Addiction | | Virtual Identity | | Total PSAFU Punctuation | |
| | Patient | Control | Patient | Control | Patient | Control | Patient | Control | Patient | Control | Patient | Control |
| Age (years) | −0.12 | −0.17 | −0.29* | −0.30* | −0.21* | −0.24* | −0.20 | −0.38* | −0.02 | −0.07 | −0.23* | −0.31* |
| Income (BRL) | −0.20 | −0.21* | −0.11 | −0.17 | −0.20 | −0.21* | 0.03 | −0.21* | 0.00 | −0.24* | −0.15 | −0.27* |
| IBDQ score | −0.25* | - | −0.21* | - | 0.07 | - | −0.30* | - | −0.16 | - | −0.22* | - |
| SF-36 total score | −0.19 | −0.27* | −0.11 | −0.23* | 0.08 | −0.20 | −0.24 | −0.29* | −0.12 | −0.06 | −0.15 | −0.29* |
| Physical aspects | −0.16 | −0.27* | −0.11 | −0.15 | 0.10 | −0.13 | −0.19 | −0.14 | −0.16 | 0.04 | −0.13 | −0.20 |
| Bodily pain | −0.02 | 0.22* | 0.08 | 0.09 | 0.01 | 0.23* | −0.03 | 0.12 | 0.00 | 0.07 | 0.01 | 0.20 |
| General health | −0.18 | −0.33* | −0.19 | −0.25* | −0.03 | −0.26* | −0.29* | −0.19 | −0.17 | −0.14 | −0.22* | −0.32* |
| Vitality | −0.10 | −0.20* | −0.21* | −0.21* | 0.13 | −0.22* | −0.15 | −0.33* | −0.09 | −0.15 | −0.11 | −0.29* |
| Mental health | −0.23* | −0.26* | −0.12 | −0.28* | −0.01 | −0.19 | −0.33* | −0.38* | −0.10 | −0.19 | −0.20* | −0.34* |
| Emotional aspects | −0.16 | −0.09 | −0.03 | −0.18 | −0.02 | −0.11 | −0.21* | −0.29* | −0.08 | 0.01 | −0.13 | −0.18 |
| Social function | 0.10 | −0.26* | 0.06 | −0.11 | 0.17 | −0.14 | 0.10 | 0.02 | −0.05 | 0.00 | 0.11 | −0.15 |
| HADS score for anxiety | 0.11 | 0.26* | 0.10 | 0.34`* | −0.04 | 0.18 | 0.16 | 0.36* | 0.08 | 0.13 | 0.11 | 0.35* |
| HADS score for depression | 0.22* | 0.34* | 0.02 | 0.29* | −0.07 | 0.02* | 0.20 | 0.23* | 0.08 | 0.11 | 0.12 | 0.33* |
| Self-esteem score | −0.27* | −0.37* | −0.10 | −0.43* | −0.04 | −0.23* | −0.32* | −0.24* | −0.05 | −0.20 | −0.21* | −0.41* |

**Notes**: Pearson's correlation test (R coefficient). *Means p<0.05. The following variables had no significant correlation to the PSAFU domains: CDAI, Mayo score, SF-36 Physical Function and Body Image Index.
**Abbreviations**: PSAFU, Psycho-Social Aspects of Facebook Use questionnaire; BRL, Brazilian currency; CDAI, Crohn´s Disease Activity Index; IBDQ, Inflammatory Bowel Disease Questionnaire; SF-36, 36-Item Short-Form Health Survey; HADS, Hospital Anxiety and Depression Scale.

an inverse relation to HRQoL and self-esteem were observed in both groups; however, it was negatively and positively related to the family income and symptoms of anxiety, respectively, in the control group. Addiction was inversely correlated with HRQoL and self-esteem in both groups; however, it was related to age and family income (negatively) and symptoms of depression and anxiety (positively) in the control group. An aspect of HRQoL which demonstrated a significant negative correlation with Facebook addiction in the patient group was general health status.

Based on these data, it can be generally asserted that people with worse HRQoL, poorer self-esteem and lower income may use Facebook in a compensatory way, which might lead to addiction.[7] We can assume that the compensatory use of Facebook among IBD patients is related to personal and individual factors rather than to a poor presential social interaction. This may occur mainly considering the constant increase in social media use worldwide as well as the diversity of personal issues that can increase it even more, such as: physical disabilities, geographical limitations, lack of available time for presential socialization, introversion, preference for virtual socialization, among others.[4,5] Despite that, no significant statistical difference was observed between the IBD patients' and the healthy individuals' use of Facebook. This could have been due to a restricted sampling (Botucatu Clinic Hospital's outpatients and healthy individuals of Botucatu and nearby cities), the fact that most patients were in clinical remission or the assumption that individuals in the control group have other physical and mental health issues that influence their communication on Facebook. Furthermore, since the questionnaire was exhaustive and involved several aspects, the circumstances under which questionnaires were filled and the time available for filling might have had a direct impact on the attention paid to each question and the reliability of responses.

Similarly, as there was no significant relation between disease activity (based on CDAI for CD and Mayo score for UC) and Facebook addiction or the compensatory use of Facebook, disease remission may not exclusively attest for the similarity in the use of Facebook between the two groups. It is equally possible that people use Facebook in a similar way for different personal reasons. While IBD patients seek information about the disease and aim to construct a virtual network for sharing personal experiences to better cope with the disease, healthy people in the control group probably use social network for chatting and relaxation, which can explain the association between anxiety and the compensatory use of Facebook and addiction in the control group. In addition, many messages of help, support and encouragement are exchanged via IBD patients' Facebook groups.

Despite this, a lower frequency of Facebook use was observed in the patient group than in the control group; on the contrary, the initial hypothesis of this study assumed a higher frequency of use among IBD patients to compensate for the lack of face-to-face social interaction. It can be assumed that the limitations imposed by IBD affect not only personal social interaction, but also virtual interaction, demonstrated by a greater lack of interest in this type of interaction among IBD patients.

Facebook addiction can be defined as an excessive obsession with Facebook, which leads to disturbances in daily life activities and problems with interpersonal relationships.[24] Facebook addiction was associated with anxiety, depression and stress symptoms in German students[25] and with lower self-esteem, lower general self-efficacy and introversion in Serbian Facebook users.[26] Since mood disorders are common in IBD patients,[27] concerns about Facebook addiction should not be underestimated. In this study, the domain addiction of PSAFU questionnaire was inversely correlated to HRQoL and self-esteem in the patient group, which was consistent with the aforementioned studies. Addiction, as well as the other analyzed parameters of Facebook use, was characterized in a comparative form, through the PSAFU questionnaire items designed for assessing addiction specifically. It is important to clarify that as the PSAFU questionnaire, applied for Facebook use characterization, does not have cutoff points (general or for each domain), the obtained data were analyzed on basis of comparison.

Regarding the questionnaire used in the evaluation of the psycho-social aspects of Facebook use (PSAFU),[22] although it was translated and adapted to Brazilian's cultural and socioeconomic reality,[23] this tool was initially developed to capture the psychological processes that occur on Facebook. Thus, it was not specifically established to evaluate the relations between health issues and interactions on Facebook. However, it was the only available tool involving the psycho-social aspects of virtual communication (on Facebook) when this study was idealized.

Concerning Facebook use, Brazil occupied the second position among BRICS (Brazil, Russia, India, China and South Africa) in number of Facebook users in 2018, behind only India, and experienced an increase of 25.87% in the number of

users compared to the 2016 data.[5] These data reflect the importance of Facebook among the Brazilian population. Specifically, 68.69% of IBD patients in this study had already sought information about the disease on the internet and 25% had participated in IBD´s group on Facebook; therefore, it is clear that this virtual media generally plays an important role in social interaction and disease management as well (information and experience exchanges). This may be supported by data demonstrating that patients in debilitating physical states (the case of IBD patients in clinical activity of the disease) were the main users of virtual groups focused on specific health-related conditions.[28] A study published in 2017 found over 26,000 tweets on Twitter and almost 56,000 posts on Crohn's Facebook public pages related with the keyword "crohn", published from October 2011 to August 2015;[29] this shows the importance of social media on the routine of IBD patients.

Although the internet provides people with autonomy, flexibility and multiplicity regarding platforms where they can obtain information, exchange experience and communicate with one another,[30] there are still some uncertainties and risks associated with social media use. For example, interaction through Facebook can be useful for the exchange of information and experience while simultaneously causing feelings of anxiety and depression as people tend to compare their lives with others' constantly; concerning this, a research conducted in Michigan, USA suggested that Facebook use might affect one's self-esteem and satisfaction with life.[31]

Although social media has been increasingly accessed as a means of obtaining health information and exchanging experiences, unreliable information could be occasionally available;[32] it is, therefore, mandatory to increase research on the current impact of this social interaction path on medical care. Moreover, it is necessary to focus on the influence of sickness on social interaction on Facebook, as it is currently responsible for a significant and continually growing part of individuals' means of communication. Although it was not the objective of the study, it is similarly important to evaluate the motivations for using Facebook, such as investigating others, leisure, interaction with friends or using Facebook as a means of self-expression.

Regarding the aforementioned main points, this study can facilitate elucidation of the inter-relation between routine limiting health conditions (such as IBD) and virtual social interaction. Furthermore, despite the significant influence of social media on people's lives, only a few studies have assessed the impact of IBD on the use of these tools[32] and the use of social media as a substitute for face-to-face interaction. Studies have shown that patients who frequently use social media are highly interested in obtaining IBD education through social media; however, they are unsure of the quality of IBD information posted online.[2] Based on this, it can be assumed that it is important to evaluate how IBD patients deal with social media and the influence of this interaction on their lives. Facebook initially seemed to positively interfere with the lives of people living with IBD, since it enables the exchange of information about IBD and the formation of a supportive incentive network for patients.

The limitations of the study included unfavorable study condition and restricted sample, especially considering patients in active disease; an extension of the research has currently commenced on a National level with the application of the same questionnaires through patients' groups on social networks. It is expected that this new phase of the study will provide a more reliable reflection of Brazil's actual status concerning the HRQoL of IBD patients and how it impacts their social interaction. In addition, the web-based anonymity can be considered a positive factor since the sincerity of the responses will not be influenced by medical care. The study findings might provide more subsidy for health caregivers to understand patients' needs regarding HRQoL and supply, through social networks, educative information to facilitate disease management. Another notable limitation of the study relies on the impossibility of affirming inferred correlations or confirming hypothesis, as its format (cross-sectional) and its focus make it difficult to be done. Nevertheless, we believe it can shed a light on some important points of IBD patients HRQoL/psychological aspects and its relation to communication, general and specific uses of social media, serving as a starting point for studies aimed at proving hypothesis and setting improvements in the health care of these patients.

In conclusion, IBD patients demonstrated a lower frequency of Facebook use than healthy individuals. According to the PSAFU questionnaire, the characterization of the use of Facebook was not different between the patient and control groups. Psychological aspects such as the presence of depression and low self-esteem were associated with the compensatory use of Facebook among IBD patients, but the present study did not explore the cause-effect dynamic involved in these correlations, which would be best exploited by future longitudinal studies.

## Abbreviations

BRL, Brazil currency; CD, Crohn's Disease; CDAI, Crohn's Disease Activity Index; HADS, Hospital Anxiety and Depression Scale; HRQoL, Health-related Quality of Life; IBD, Inflammatory Bowel Disease; IBDQ, Inflammatory Bowel Disease Questionnaire; PSAFU, Psycho-Social Aspects of Facebook Use; SF-36, 36-Item Short-Form Health Survey; UC, Ulcerative Colitis.

## Ethics Approval

The study was approved by the local Research Ethics Committee, Botucatu Medical School (CAAE: 88204318.2.0000.5411) and was conducted in accordance with the Declaration of Helsinki.

## Consent to Participate

All participants received explanations about the study aims and expected results, having been enrolled in the study only after signing the informed consent term.

## Consent for Publication

All the authors agreed with this article publication.

The anonymity of all participants is guaranteed.

## Disclosure

The authors declare that they have no conflict of interest.

## References

1. Pittet V, Vaucher C, Froehlich F, et al. Patient self-reported concerns in inflammatory bowel diseases: a gender-specific subjective quality-of-life indicator. *PLoS One*. 2017;12(2):e0171864. doi:10.1371/journal.pone.0171864
2. Reich J, Guo L, Hall J, et al. A survey of social media use and preferences in patients with inflammatory bowel disease. *Inflamm Bowel Dis*. 2016;22 (11):2678–2687. doi:10.1097/MIB.0000000000000951
3. Reich J, Guo L, Groshek J, et al. Social media use and preferences in patients with inflammatory bowel disease. *Inflamm Bowel Dis*. 2019;25 (3):587–591. doi:10.1093/ibd/izy280
4. Internet usage in Brazil, Statista; 2017. Available from: https://www.statista.com/topics/2045/internet-usage-in-brazil/. Accessed December 26, 2019.
5. Leading countries based on Facebook audience size, Statista, 2019. Available from: https://www.statista.com/statistics/268136/top-15-countries-based-on-number-of-facebook-users/. Accessed December 26, 2019.
6. GBD 2017 Inflammatory Bowel Disease Collaborators. The global, regional, and national burden of inflammatory bowel disease in 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet Gastroenterol Hepatol*. 2020;5(1):26–27. PMID: 31648971; PMCID: PMC7026709. doi:10.1016/S2468-1253(19)30333-4
7. Muse K, Johnson E, David A. A feeling of otherness: a qualitative research synthesis exploring the lived experiences of stigma in individuals with inflammatory bowel disease. *Int J Environ Res Public Health*. 2021;18(15):17–24. doi:10.3390/ijerph18158038
8. O' Morain C, Tobin A, Leen E, Suzuki Y, O' Riordan T. Criteria of case definition in Crohn's disease and ulcerative colitis. *Scand J Gastroenterol Suppl*. 1989;24(sup170):7–11. doi:10.3109/00365528909091340
9. Censo Demográfico do Brasil 2018, IBGE. Available from: https://www.ibge.gov.br/. Accessed December 26, 2019.

10. Best WR, Becktel JM, Singleton JW, Kern F Jr. Development of a Crohn´s disease activity index. National Cooperative Crohn's Disease Study. *Gastroenterology.* 1976;70(3):439–444. doi:10.1016/S0016-5085(76)80163-1

11. Lewis JD, Chuai S, Nessel L, Lichtenstein GR, Aberra FN, Ellenberg JH. Use of the noninvasive components of the Mayo score to assess clinical response in ulcerative colitis. *Inflamm Bowel Dis.* 2008;14(12):1660–1666. doi:10.1002/ibd.20520

12. Silverberg MS, Satsangi J, Ahmad T, et al. Toward an integrated clinical, molecular and serological classification of inflammatory bowel disease: report of a Working Party of the 2005 Montreal World Congress of Gastroenterology. *Can J Gastroenterol.* 2005;19:5A–36A. doi:10.1155/2005/269076

13. Satsangi J, Silverberg MS, Vermeire S, Colombel JF. The Montreal classification of inflammatory bowel disease: controversies, consensus, and implications. *Gut.* 2006;55(6):749–753. doi:10.1136/gut.2005.082909

14. Pontes RMA, Miszputen SJ, Ferreira-Filho OF, Miranda C, Ferraz MB. Qualidade de vida em pacientes portadores de doença inflamatória intestinal: tradução para o português e validação do questionário "Inflammatory Bowel Disease Questionnaire" (IBDQ). *Arq Gastroenterol.* 2004;41(2):137–143. doi:10.1590/S0004-28032004000200014

15. Ciconelli RM, Ferraz MB, Santos W, Meinão I, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF-36). *Rev Bras Reumatol.* 1999;39(3):143–150.

16. Irvine EJ. Quality of life–measurement in inflammatory bowel disease. *Scand J Gastroenterol Suppl.* 1993;28(sup199):36–39. doi:10.3109/00365529309098355

17. Botega NJ, Bio MR, Zomignani MA, Garcia C Jr, Pereira WA. Transtornos do humor em enfermaria de clínica médica e validação de escala de medida (HAD) de ansiedade e depressão. *Rev Saúde Pública.* 1995;29(5):355–363. doi:10.1590/S0034-89101995000500004

18. Rosenberg M. *Society and the Adolescent Self-Image.* Princeton, NJ: Princeton University Press; 1965:326.

19. Azevedo AS, Faria LA Autoestima no ensino secundário: validação da rosenberg self-esteem scale. Proceedings of the X Conferência Internacional "Avaliação Psicológica: Formas e Contextos". Braga: Psiquilíbrios Edições; 2004:415–421.

20. Hopwood P, Fletcher I, Lee A, Al Ghazal S. A body image scale for use with cancer patients. *Eur J Cancer.* 2001;37(2):189–197. doi:10.1016/S0959-8049(00)00353-1

21. Moreira H, Silva S, Marques A, Canavarro MC. The Portuguese version of the Body Image Scale (BIS) – psychometric properties in a sample of breast cancer patients. *Eur J Oncol Nurs.* 2010;14(2):111–118. doi:10.1016/j.ejon.2009.09.007

22. Bodroza B, Jovanovic T. Validation of the new scale for measuring behaviors of Facebook users: Psycho-Social Aspects of Facebook Use (PSAFU). *Comput Hum Behav.* 2016;54:425–435. doi:10.1016/j.chb.2015.07.032

23. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *J Clin Epidemiol.* 1993;46(12):1417–1432. doi:10.1016/0895-4356(93)90142-N

24. Elphinston RA, Noller P. Time to face it! Facebook intrusion and the implications for romantic jealousy and relationship satisfaction. *Cyberpsychol Behav Soc Netw.* 2011;14(11):631e635. doi:10.1089/cyber.2010.0318

25. Brailovskaia J, Margraf J. Facebook addiction disorder (FAD) among German students – a longitudinal approach. *PLoS One.* 2017;12(12):e0189719. doi:10.1371/journal.pone.0189719

26. Milosevic-ÐorCevic JS, Zezelj IL. Psychological predictors of addictive social networking sites use: the case of Serbia. *Comput Hum Behav.* 2014;32:229e234.

27. Neuendorf R, Harding A, Stello N, Hanes D, Wahbeh H. Depression and anxiety in patients with Inflammatory Bowel Disease: a systematic review. *J Psychosom Res.* 2016;87:70–80. doi:10.1016/j.jpsychores.2016.06.001

28. Davison KP, Pennebaker JW, Dickerson SS. Who talks? The social psychology of illness support groups. *Am Psychol.* 2000;55(2):205–217. doi:10.1037/0003-066X.55.2.205

29. Roccetti M, Marfia G, Salomoni P, et al. Attitudes of Crohn's disease patients: infodemiology case study and sentiment analysis of Facebook and Twitter Posts. *JMIR Public Health Surveill.* 2017;3(3):e51. doi:10.2196/publichealth.7004

30. Merolli M, Gray K, Martin-Sanchez F. Health outcomes and related effects of using social media in chronic disease management: a literature review and analysis of affordances. *J Biomed Inform.* 2013;46(6):957–969. doi:10.1016/j.jbi.2013.04.010

31. Kross E, Verduyn P, Demiralp E, et al. Facebook use predicts declines in subjective well-being in young adults. *PLoS One.* 2013;8(8):1–6. doi:10.1371/journal.pone.0069841

32. Guo L, Reich J, Groshek J, Farraye FA. Social media use in patients with inflammatory bowel disease. *Inflamm Bowel Dis.* 2016;14:1–8.