



Full length article

Facebook addiction among Polish undergraduate students: Validity of measurement and relationship with personality and well-being[☆]Paweł A. Atroszko^{a, *}, Julia M. Balcerowska^a, Piotr Bereznowski^a, Adriana Biernatowska^a, Ståle Pallesen^b, Cecilie Schou Andreassen^b^a University of Gdańsk, Bażyńskiego 4, 80-309, Gdańsk, Poland^b University of Bergen, Department of Clinical Psychology, Christiesgate 12, Postboks, 7807, 5020, Bergen, Norway

ARTICLE INFO

Article history:

Received 12 November 2017

Received in revised form

5 February 2018

Accepted 2 April 2018

Available online 3 April 2018

Keywords:

Facebook addiction

Health

Personality

Scale

Social anxiety

Stress

ABSTRACT

Facebook addiction has been suggested as a potential behavioral addiction emerging from the framework of the theory and research on social networking sites addiction and Internet addiction. Previous studies showed that Facebook addiction is related to specific personality traits and well-being. However, there is still a scarcity of studies showing the relative contribution of different personality characteristics to Facebook addiction within an integrated model. In addition, few studies have investigated the unique contribution of Facebook addiction in terms of explaining different facets of well-being above and beyond personality characteristics previously shown to be related to psychosocial functioning. The present study demonstrates validation of the Bergen Facebook Addiction Scale (BFAS) in the sample of Polish students and a tentative integrated model of potential Facebook addiction personality risk factors. BFAS was administered to 1157 students. In addition, participants were asked about demographic variables, and personality traits (Big Five, self-esteem, self-efficacy, narcissism), loneliness, social anxiety, and well-being indicators were measured. BFAS had acceptable fit with the data and demonstrated good reliability. The investigated model showed that Facebook addiction was related to higher extraversion, narcissism, loneliness, social anxiety, and lower general self-efficacy. Facebook addiction was further related to impoverished well-being (impaired general health, decreased sleep quality, and higher perceived stress), which is congruent with previous findings.

© 2018 Elsevier Ltd. All rights reserved.

1. Introduction

New technological solutions may be useful tools in managing health related behaviors, and as such merit study in the psychological framework (Shin & Biocca, 2017; Shin, 2018; Shin, Lee, & Hwang, 2017). However, increasing amount of data shows that they can also be abused. Numerous studies have been conducted on Internet addiction (Chou, Condron, & Belland, 2005; D'Hondt & Maurage, 2017; Kuss, Griffiths, Karila, & Billieux, 2014; Kuss & Lopez-Fernandez, 2016; Weinstein & Lejoyeux, 2010; Widianto &

Griffiths, 2006; Young, 1996). Nevertheless, it has been questioned whether this reflects an addiction to the platform, to the content, or to the activity performed (Griffiths, 1999, 2000; Young, 2009). Similar doubts were raised when the Facebook addiction concept emerged (Griffiths, 2012). However, there are important premises which warrant systematic study of Facebook addiction.

Among Social Networking Sites (SNSs), Facebook is by far the most popular one. It involved on average 1.23 billion daily active users and 1.86 billion monthly active users in December 2016 (Facebook, 2017). In Poland there are 15.53 million registered members. Studies show differences between users that prefer different online activities (Thompson, 2001). Furthermore, even within the social networking sites users there are variations in motivations of usage (Gülner, Balci, & Çakır, 2010; Mull & Lee, 2014). This could be related to different forms of gratification drawn from using a particular site and distinct needs underlying this use. In line with this, it is crucial to separate out results from specific sites in order to understand the development of SNSs

[☆] Validity of Measurement and Relationship with Personality and Well-Being.

* Corresponding author. Institute of Psychology, University of Gdańsk, Bażyńskiego 4, 80-952, Gdańsk, Poland.

E-mail addresses: p.atroszko@ug.edu.pl (P.A. Atroszko), balcerowskajulia@gmail.com (J.M. Balcerowska), piotr.bereznowski@gmail.com (P. Bereznowski), biernatowskaa@gmail.com (A. Biernatowska), staale.pallesen@psysp.uib.no (S. Pallesen), cecilie.andreassen@psych.uib.no (C. Schou Andreassen).

(Ryan, Chester, Reece, & Xenos, 2014). In addition, it seems that Facebook has the strongest addictive quality and the strongest potential negative consequences for younger populations (Denti et al., 2012). Therefore, studies on its risk factors among primary, secondary and tertiary education students are warranted.

Social Network Sites addiction is defined as “being overly concerned about SNSs, driven by a strong motivation to log on to or use SNSs, and to devote so much time and effort to SNSs that it impairs other social activities, studies/job, interpersonal relationships, and/or psychological health and well-being” (Andreassen & Pallesen, 2014, p. 4054). This definition also refers to the Facebook addiction, as an example of SNS addiction. Therefore, one of the main aims of this study was to investigate whether Facebook addiction can be validly and reliably measured among university students.

1.1. Bergen Facebook Addiction Scale

The Bergen Facebook Addiction Scale (Andreassen, Torsheim, Brunborg, & Pallesen, 2012) is based on the six core components of addiction distinguished by Griffiths (2005). It includes six statements concerning symptoms experienced during the past 12 months. The responses are provided on a 5-point Likert scale ranging from *very rarely* (1) to *very often* (5). Higher scores indicate higher levels of Facebook addiction. The Polish adaptation of BFAS has shown good validity and reliability in previous research (Charzyńska & Gózdź, 2014). In line with the aforementioned conceptualization of addiction, other measures of distinct behavioral addictions have been created and have shown good validity and reliability, such as the Bergen Work Addiction Scale (Andreassen et al., 2012; Atroszko, Pallesen, Griffiths, & Andreassen, 2017), the Bergen Study Addiction Scale (Atroszko, Andreassen, Griffiths, & Pallesen, 2015) Game Addiction Scale for Adolescents (Lemmens, Valkenburg, & Peter, 2009), the Exercise Addiction Inventory (Terry, Szabo, & Griffiths, 2004), Problematic Pornography Consumption Scale (Bóthe et al., 2017) and the Bergen Shopping Addiction Scale (Andreassen et al., 2015).

1.2. Aims of the study

Taking into account the current and rapidly growing research on behavioral addictions (Karim & Chaudhri, 2012) the aim of this study was to provide data on the validity and reliability of the measurement of Facebook addiction. For this purpose the BFAS was administered to undergraduate students. Moreover, the study aims to investigate the relative contribution of different personality characteristics to Facebook addiction within an integrated model, as well as the unique contribution of Facebook addiction in terms of explaining different facets of well-being above and beyond personality characteristics that consistently have been shown to be related to psychosocial functioning (Burger & Samuel, 2017; Pinquart & Sörensen, 2000; Ryan & Deci, 2001). A tentative integrated model of personality factors that may represent risk factors for Facebook addiction is of significant importance, not only to ease understanding of this addiction, but also from the perspective of prevention and therapy, as it identifies crucial areas related to personality which should be addressed in such interventions.

1.3. Facebook addiction and personality

Personality traits have been identified as risk factors for various behavioral addictions (Andreassen et al., 2013). With reference to the Big Five personality model, there have been shown positive relationships between addictive tendencies and neuroticism (Andreassen, Torsheim et al., 2012; Blachnio, Przepiórka, Benvenuti et al., 2016; Blachnio, Przepiórka, Senol-Durak, Durak, & Sherstyuk,

2017; Mahmood & Farooq, 2014) and negative relationships between Facebook addiction and conscientiousness (Andreassen, Torsheim et al., 2012; Andreassen et al., 2013; Blachnio, Przepiórka, Benvenuti et al., 2016; Blachnio, Przepiórka, Senol-Durak et al., 2017; Tang, Chen, Yang, Chung, & Lee, 2015). Moreover, some studies show positive relationships between Facebook addiction and extraversion (Andreassen, Torsheim, et al., 2012; Andreassen et al., 2013) and negative relationships between Facebook addiction and openness to experience (Andreassen et al., 2013; Blachnio; Przepiórka, Senol-Durak, Durak; Sherstyuk, 2017; Blachnio, Przepiórka, Benvenuti et al., 2016). General self-efficacy has been identified as an important factor in addiction, as it is related to the motivation to initiate or to resist the addictive behavior (Marlatt, Baer, & Quigley, 1995). Furthermore, low self-efficacy predicts Internet Communication Disorder (Wegmann & Brand, 2016). Although, self-efficacy is not related to Facebook intensity and Facebook intrusion (Blachnio, Przepiórka, & Czuczwar, 2017), the insufficient self-control and low level of failure-related action orientation can put Facebook users “at-risk” of Facebook addiction (Blachnio & Przepiórka, 2016). Moreover, studies show that narcissism is positively related to SNS addiction (Andreassen, Pallesen, & Griffiths, 2016), as well as, Facebook addiction (Malik & Khan, 2015). Furthermore, people with low self-esteem regard social media as a safer place to express themselves than people with high self-esteem (Forest & Wood, 2012). In line with these findings, excessive SNS use was found to be related to lower self-esteem (Andreassen et al., 2016; Blachnio, Przepiórka, & Rudnicka, 2016; Malik & Khan, 2015; Wilson, Fornasier, & White, 2010).

1.4. Facebook addiction and social functioning

Although in the field of SNS use and addiction, researchers have distinguished between a large number of motivations to use it (Chen & Kim, 2013; GlobalWebIndex, 2016; Huang, 2012; Mull & Lee, 2014; Ryan et al., 2014), numerous studies have emphasized relationship maintenance as a key reason for Facebook use (Joinson, 2008; Raacke & Bonds-Raacke, 2008; Sheldon, 2009; Valentine, 2012) as well as for all SNS use (Kuss & Griffiths, 2011). In line with this, studies show that Facebook addiction is related to poor social functioning, e.g. relationship dissatisfaction (Elphinstone & Noller, 2011), loneliness (Blachnio et al., 2016), social anxiety (Dobrea & Păsărelu, 2016), and lack of social support (Tang et al., 2015), as well as preference for online social interaction (POSI; Lee, Cheung, & Thadani, 2012). Individuals who suffer from psychosocial problems may prefer online social interaction over face-to-face conversation, thus the POSI may facilitate compulsive Internet use that results in negative outcomes (Caplan, 2003). On the other hand, it should also be taken into account that online social networking may have positive influence on social functioning (Burke, Marlow, & Lento, 2010; Ellison, Steinfield, & Lampe, 2007; Steinfield, Ellison, & Lampe, 2008).

1.5. Facebook addiction and well-being

The crucial requirement for considering behavior as addictive is the negative consequences that it brings for the psychosocial functioning of the individual and/or people close to him/her (Andreassen & Pallesen, 2014; Atroszko, 2012; Griffiths, 2005). Thus far, Facebook addiction has been linked to lower subjective well-being (Denti et al., 2012; Kross et al., 2013), lower life satisfaction (Blachnio et al., 2016; Satici & Uysal, 2015), as well as lower subjective happiness and subjective vitality (Uysal, Satici, & Akin, 2013). In the context of health, Facebook addiction has in addition been related to insomnia, poor sleep quality, and somatic

symptoms (Andreassen, Torsheim et al., 2012; Hanprathet, Manwong, Khumsri, Yingyeun, & Phanasathit, 2015; Koc & Gulyagci, 2013; Wolniczak et al., 2013). Also, using social networks can increase stress. The longitudinal study of Campisi et al. (2012) showed that Facebook users find use of the social network to be stressful and generating negative emotions. Another study showed that online chatting is associated with prolonged stress, at least for women (Thomé, Eklöf, Gustafsson, Nilsson, & Hagberg, 2007). What is more, meta-analysis showed that Internet addiction is associated with tendency to escape from self, insufficient self-control, difficulties in emotional regulation, and negative stress coping (Koo & Kwon, 2014). These findings can be applied to the social skill model of generalized problematic Internet use (Caplan, 2010). According to this model those who prefer online communication are at greater risk of addiction. Moreover, individuals who manifest deficient self-regulation of Internet use tend to engage in social media to release stress and improve mood. Communicating online relieves negative moods, which then reinforces online use.

1.6. Tentative model of Facebook addiction risk factors

On the basis of the existing literature and understanding of addiction in the context of stress coping/emotion regulation (Jacobs, 1986) we suggest a tentative model in which Facebook addiction would be a result of ineffective mood regulation by individuals who have problematic social life, specifically those who have high social anxiety and loneliness, as well as general emotional instability, low self-esteem, and low general self-efficacy combined with low openness to new experience. At the same time these individuals are typically extraverted and narcissistic, therefore they crave for social interaction, especially self-validation through these interactions. Consequently, because underlying causes of distress are not confronted and dealt with by these individuals due to their low general self-efficacy, the increasingly compulsive Facebook activity generates additional stress and, in consequence, negatively affects their psychosocial functioning.

1.7. Hypotheses

On the basis of previous research and theoretical frameworks, it was hypothesized that (i) the Bergen Facebook Addiction Scale has a single factor solution in the student sample (H1); (ii) low emotional stability, conscientiousness, and openness to experience, as well as high extraversion would be positively related to Facebook addiction (H2); (iii) high narcissism, low self-esteem and low self-efficacy would be positively related to Facebook addiction (H3); (iv) loneliness and social anxiety would be positively related to Facebook addiction (H4); (v) Facebook addiction would be related to impaired well-being (lower quality of life, sleep quality, general health and higher stress) (H5).

2. Methods

2.1. Sample

The sample comprised 1182 undergraduate students. Due to missing data on relevant variables, 25 participants were eliminated from the analyses. When data were missing at random and only a very small portion of data were missing (less than 2% overall), missing data were imputed using Missing Values Analysis within SPSS 24.0. This algorithm provides unbiased parameter estimates and improves statistical power of analyses (Enders, 2001; Scheffer, 2002). The final sample therefore comprised 1157 full-time students: 601 females (51.9%), 546 males (47.2%) and 10 persons (0.9%) who did not report gender, with mean age of $M = 20.33$ years

($SD = 1.68$). The individuals were studying at the universities from Gdańsk: University of Gdańsk, Gdańsk Technological University, Gdańsk University of Sport and Recreation. Students were affiliated with different faculties, courses of study and years of study.

2.2. Instruments

Facebook addiction. The Polish adaptation (Charzyńska & Gózdź, 2014) of the Bergen Facebook Addiction Scale (BFAS; Andreassen, Torsheim et al., 2012) includes 6 items that are based on core addiction components (Griffiths, 2005). The questions concern symptoms experienced during the past 12 months. The responses are provided on a 5-point Likert scale ranging from *very rarely* (1) to *very often* (5). Higher scores indicate greater Facebook addiction. The BFAS has shown good validity and reliability in previous research (Charzyńska & Gózdź, 2014). In the present sample the Cronbach's alpha reliability coefficient was 0.86.

Personality. The Polish version (Atroszko, 2015) of Ten Item Personality Inventory (TIPI; Gosling, Rentfrow, & Swann, 2003) was used to assess the five-factor model of personality: Extraversion, Agreeableness, Conscientiousness, Emotional stability, and Openness to experience. Respondents provided answers on a 7-point Likert scale, ranging from *strongly disagree* (1) to *agree strongly* (7). Each of Big Five factors is measured with two items, one for its positive extremity and one for its negative extremity. It has shown good validity and reliability in previous research (Atroszko, Andreassen, Griffiths, & Pallesen, 2016a, 2016b; Atroszko, 2015). In the present sample the Spearman-Brown reliability coefficient was of 0.68 for Extraversion, 0.29 for Agreeableness, 0.65 for Conscientiousness, 0.56 for Emotional stability and 0.28 for Openness to experience. These were very similar to the ones obtained in the original version of the scale, which were 0.68, 0.40, 0.50, 0.73, and 0.45 respectively. As the authors of the scale argue, TIPI demonstrates good validity and biased estimates of reliability using internal consistency measures should be expected due to very small number of items. Therefore, less biased measures of reliability should be used, such as the test–retest reliability, which for the original scale yielded acceptable correlations between two measurements with 6-week interval between them, varying from 0.62 for Openness to .77 for Extroversion.

Self-efficacy was measured by two items based on the General Self-Efficacy Scale (GSES; Schwarzer & Jerusalem, 1995). The measure was developed by the authors of this paper and included the following items: “I can usually handle whatever comes my way” and “I can solve most problems if I invest the necessary effort”. Respondents provided answers on a 9-point Likert scale, from *no* (1) to *yes* (9). The two items have the highest content validity and the current presented data supports its criterion validity, congruent with previous results with the full version of the scale (Schwarzer, Jerusalem, & Juczyński, 2012). In the present sample the Spearman-Brown reliability coefficient was of 0.81.

Single Item Narcissism Scale (SINS) described by Konrath, Meier, and Bushman (2014) was used to measure narcissism. A Polish adaptation developed by the authors of this paper was used. The participants were presented the following statement: “I am a narcissist (Note: The word ‘narcissist’ means egotistical, self-focused, and vain)” with response range from *no* (1) to *yes* (9). In this study response format has been extended to a 9-point scale. The item has shown good validity and reliability in previous research (Konrath et al., 2014), and currently presented data supports its criterion validity, congruent with previous results.

Self-esteem. Self-esteem was measured with a single-item scale developed by Atroszko et al. (2017) on the basis of item from WHOQOL Bref scale (Skevington, Lotfy, & O'Connell, 2004). The following question was asked: “How satisfied are you with

yourself?” with 9-point response scale, from *very dissatisfied* (1) to *very satisfied* (9). The scale has shown good validity and reliability in previous research (Atroszko, Sawicki et al., 2017), and it has been argued that its indirect character may provide a better estimate of self-esteem than direct questions about “having high self-esteem”. In previous study the intraclass correlation coefficient (ICC) for test-retest reliability was 0.79.

Loneliness. It was measured by a Polish adaptation (Atroszko, 2015) of the Short Loneliness Scale (SLS; Hughes, Waite, Hawkey, & Cacioppo, 2004), which includes 3 items with a 3-point response format scale, ranging from *almost never or never* (1) to *often* (3). The scale has shown good validity and reliability in previous research (Atroszko, 2015; Atroszko et al., 2015; Atroszko et al., 2015; Atroszko et al., 2015; Atroszko et al., 2017; Atroszko, Sawicki et al., 2017; Sendal, Sawicki, Bagińska, & Atroszko, 2016). In the present sample the Cronbach's alpha reliability coefficient was 0.79.

General health, sleep quality, and quality of life. Three questions were measured with ultra-brief scales developed by Atroszko (2015) based on the items from WHOQOL Bref scale (Skevington et al., 2004). General health was measured by the question: “How satisfied are you with your health?” with 9-point response scale, from *very dissatisfied* (1) to *very satisfied* (9). Sleep quality was measured by the question: “How satisfied are you with your sleep?” with 9-point response scale, from *very dissatisfied* (1) to *very satisfied* (9). Quality of life was measured by the question: “How would you rate your quality of life?” with a 9-point response scale, from *very poor* (1) to *very good* (9). The scales have shown good validity and reliability in previous research (Atroszko, Andreassen, et al., 2015; Atroszko, Bagińska, et al., 2015).

Social anxiety. Social anxiety was measured with a shortened Polish version (see Dąbkowska, 2008) of Liebowitz Social Anxiety Scale (LSAS; Liebowitz, 1987). It consists of nine items from the original scale concerning the component of fear experienced in social situations. The responses are provided on a 4-point scale ranging from *none* (0) to *severe* (3). The Cronbach's alpha reliability coefficient of social anxiety in this sample was .83. Currently presented data supports its criterion validity, congruent with previous results (Baker, Heinrichs, Kim, & Hofmann, 2002).

Stress. Perceived stress was measured by a Polish adaptation (Atroszko, 2015) of the Perceived Stress Scale (PSS-4; Cohen, Kamarck, & Mermelstein, 1983). It consists of four items with a 5-point Likert response format scale, ranging from *never* (1) to *very often* (5). The scale has shown good validity and reliability in previous research (Atroszko, 2015; Atroszko, Andreassen, et al., 2015; Atroszko, Bagińska, et al., 2015; Atroszko, Krzyżaniak, et al., 2015; Atroszko, Pianka, et al., 2015; Atroszko, Sawicki, Mąkinia, et al., 2017; Atroszko, Sawicki, Sendal, et al., 2017; Sendal et al., 2016). The Cronbach's alpha reliability coefficient in this sample was .69.

The TIPI, PSS-4, Short Loneliness Scale, and the measures of general health, sleep quality, and quality of life have been extensively validated in a sample of 3621 undergraduate Polish students from several universities across Poland, providing data supporting their construct validity and good reliability (Atroszko, 2015).

2.3. Procedure

Data collection was based on convenience sampling. Students were invited to participate anonymously in the study during lectures or classes. The estimated response rate was above 95%. Participation in the study was totally anonymous and no monetary or other material rewards were offered.

2.4. Statistical analyses

Mplus 6.11 (Muthén & Muthén, 1998–2010) was used to perform factor analyses. Robust Maximum Likelihood (RML) estimator was used due to nonnormality of distributions of items. The latent variable was scaled by fixing factor variance to one. Missing data were handled with the expectation-maximization (EM) algorithm. Following measures were used to evaluate fit of the model: χ^2 divided by degrees of freedom (χ^2/df), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Squared Error of Approximation (RMSEA). Cut-off scores for those indexes for acceptable fit are: $\chi^2/df \leq 3$, CFI ≥ 0.95 , TLI ≥ 0.95 , RMSEA ≤ 0.06 to 0.08 (Hu & Bentler, 1999; Schreiber, Nora, Stage, Barlow, & King, 2006).

Means, standard deviations, percentages, and correlation coefficients were calculated. Five hierarchical regression analyses were conducted where Facebook addiction, stress, general health, sleep quality, and quality of life were dependent variables. Independent variables introduced in subsequent steps can be found in Tables 2 and 3. For all linear regression analyses, preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity, and homoscedasticity. All tests were two-tailed and the significance level was set to $\alpha = 0.05$.

2.5. Ethics

The project was approved by the Research Ethics Committee at the Psychology Department of the University of Gdańsk. Attaining formal and written informed consent was not regarded as necessary as voluntary completion of the questionnaires was regarded as providing consent.

3. Results

3.1. Factor analysis

The model with one factor of Facebook addiction showed following fit indices: $\chi^2/df = 29.78$, CFI = 0.88, TLI = 0.79, RMSEA = 0.158 (90% CI = 0.142–0.174). Standardized factor loadings on items were: 0.75, 0.94, 0.70, 0.78, 0.72, 0.87, respectively. Due to the lack of acceptable model fit, residuals of the first and second item were correlated on the basis of modification indices similarly to previous studies (Charzyńska & Gózdź, 2014). The modified model had a good fit: $\chi^2(8) = 12.89$ ($p = .012$), $\chi^2/df = 1.61$, CFI = 0.998, TLI = 0.996, RMSEA = 0.023 (90% CI = 0.000–0.045). Standardized factor loadings on items were: 0.60, 0.86, 0.71, 0.81, 0.74, 0.89, respectively. The correlation between residuals of the first and second item was 0.51.

3.2. Descriptive statistics

Table 1 presents mean scores, standard deviations, percentages, and correlation coefficients of the study variables.

3.3. Predictors of Facebook addiction

Regression analysis for Facebook addiction (see Table 2) showed that the independent variables explained a total of 11.6% of the variance of Facebook addiction, $F_{12,1124} = 12.26$, $p < .001$. Significant independent variables in Step 4 were gender ($\beta = -0.10$), showing that females score higher on Facebook addiction, age ($\beta = 0.07$), extraversion ($\beta = 0.17$), narcissism ($\beta = 0.17$), self-efficacy ($\beta = -0.12$), social anxiety ($\beta = 0.16$), and loneliness ($\beta = 0.07$).

Table 1

Mean scores and standard deviations (SD), percentages, and correlation coefficients (Pearson product-moment/point-biserial) between study variables.

Variable	Mean (SD)/Percentages	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. Facebook addiction	12.15 (5.12)	–															
2. Gender ^a	51.9% females	-.13**	–														
3. Age	20.33 (1.68)	.06*	-.04	–													
4. Extraversion	8.88 (2.90)	.04	-.10**	.01	–												
5. Agreeableness	9.71 (2.26)	-.05	-.09**	-.02	.07*	–											
6. Conscientiousness	9.37 (2.66)	-.07*	-.09**	.08**	.11**	.07*	–										
7. Emotional stability	8.48 (2.76)	-.15**	.19**	.03	.09**	.35**	.16**	–									
8. Openness to experience	9.92 (2.23)	-.07*	-.10**	-.06*	.37**	.04	.10**	.02	–								
9. Self-esteem	5.85 (1.81)	-.10**	.06*	.09**	.32**	.15**	.29**	.31**	.22**	–							
10. Narcissism	3.81 (2.14)	.13**	.20**	.00	.02	-.36**	-.04	-.08**	.03	.04	–						
11. Self-efficacy	14.02 (2.67)	-.17**	.09**	.05	.27**	.09**	.26**	.29**	.32**	.44**	.09**	–					
12. Social anxiety	18.29 (5.43)	.19**	-.17**	-.04	-.39**	.08**	-.18**	-.20**	-.31**	-.32**	-.11**	-.39**	–				
13. Loneliness	4.75 (1.70)	.13**	-.01	-.11**	-.35**	-.05	-.17**	-.26**	-.15**	-.42**	.03	-.33**	.37**	–			
14. Stress	10.80 (2.97)	.22**	-.15**	-.06	-.21**	-.05	-.21**	-.32**	-.11**	-.48**	-.05	-.42**	.35**	.38**	–		
15. General health	6.09 (2.08)	-.15**	.04	-.08**	.11**	.12**	.12**	.17**	.06*	.35**	-.04	.20**	-.09**	-.14**	-.21**	–	
16. Sleep quality	5.23 (2.16)	-.11**	.04	.05	.07*	.06*	.06*	.19**	-.00	.33**	.00	.16**	-.12**	-.18**	-.25**	.41**	–
17. Quality of life	6.99 (1.39)	-.07*	-.07*	-.01	.30**	.15**	.18**	.21**	.17**	.50**	-.02	.43**	-.23**	-.37**	-.37**	.30**	.26**

* $p < .05$. ** $p < .01$.^a Point-biserial correlation coefficient (0 = female, 1 = male).**Table 2**Results of hierarchical multiple regression analyses in which age, gender, big five personality traits, self-esteem, narcissism, self-efficacy, social anxiety and loneliness were regressed upon the scores on BFAS ($n = 1137$).

Predictor	β	ΔR^2
Step 1		.020**
Gender ^a	-.13**	
Age	.06	
Step 2		.032**
Gender ^a	-.12**	
Age	.06	
Extraversion	.08**	
Agreeableness	-.02	
Conscientiousness	-.06*	
Emotional stability	-.12**	
Openness to experience	-.09**	
Step 3		.024**
Gender ^a	-.14**	
Age	.06*	
Extraversion	.09**	
Agreeableness	.04	
Conscientiousness	-.05	
Emotional stability	-.11**	
Openness to experience	-.09**	
Self-esteem	-.07*	
Narcissism	.16**	
Step 4		.040**
Gender ^a	-.10**	
Age	.07**	
Extraversion	.17**	
Agreeableness	.00	
Conscientiousness	-.01	
Emotional stability	-.05	
Openness to experience	-.04	
Self-esteem	.00	
Narcissism	.17**	
Self-efficacy	-.12**	
Social anxiety	.16**	
Loneliness	.07*	
Total R^2		.116**

* $p < .05$. ** $p < .01$.^a 0 = female, 1 = male.

3.4. Facebook addiction as predictor of well-being

Regression analysis for stress (see Table 3) showed that the independent variables explained a total of 35.8% of the variance of stress, $F_{13, 1123} = 48.14$, $p < .001$. Significant independent variables

in Step 5 were Facebook addiction ($\beta = 0.10$), gender ($\beta = -0.05$, $p = .055$), showing that females score higher on quality of life, emotional stability ($\beta = -0.12$), openness to experience ($\beta = 0.06$) self-esteem ($\beta = -0.28$), self-efficacy ($\beta = -0.17$), social anxiety ($\beta = 0.09$), and loneliness ($\beta = 0.13$).

Regression analysis for general health (see Table 3) showed that the independent variables explained a total of 15.6% of the variance of general health, $F_{13, 1123} = 15.99$, $p < .001$. Significant independent variable in Step 5 were Facebook addiction ($\beta = -0.11$), age ($\beta = -0.11$), and self-esteem ($\beta = 0.33$).

Regression analysis for sleep quality (see Table 3) showed that the independent variables explained a total of 13.8% of the variance of sleep quality, $F_{13, 1123} = 13.79$, $p < .001$. Significant independent variables in Step 5 were Facebook addiction ($\beta = -0.08$), emotional stability ($\beta = 0.08$), openness to experience ($\beta = -0.08$), and self-esteem ($\beta = 0.32$).

Regression analysis for quality of life (see Table 3) showed that the independent variables explained a total of 34.4% of the variance of quality of life, $F_{13, 1123} = 45.26$, $p < .001$. Significant independent variables in Step 5 were gender ($\beta = -0.11$), showing that females score higher on quality of life, age ($\beta = -0.07$), extraversion ($\beta = 0.09$) self-esteem ($\beta = 0.33$), self-efficacy ($\beta = 0.23$), and loneliness ($\beta = -0.14$).

4. Discussion

4.1. Psychometric properties of BFAS

Factor-analytical results showed that original 6-item one factor solution had mediocre fit to the data. Examination of the modification indices showed that error term of Item 1 had substantial covariance with error term of Item 2. The results were similar to the results obtained by Charzyńska and Gózdź (2014). The error correlations were introduced also in the case of other addiction scales based on the core components of addiction, and it was suggested that it may be related to the fact that addiction, apart from the core compulsion, also includes general component of high time and energy investment concerning particular behavior measured by these scales (Atroszko et al., 2017). The 6-item one-factor solution of the Bergen Facebook Addiction Scale with correlated error terms had acceptable fit (H1 substantiated). All factor loadings were significant, with standardized values above 0.40. It has been recently suggested in the context of development of a work addiction scale

Table 3

Results of hierarchical multiple regression analyses in which Facebook addiction, age, gender, big five personality traits, self-esteem, narcissism, loneliness, self-efficacy and social anxiety were regressed upon the scores on anxiety, stress, general health, sleep quality and quality of life ($n = 1137$).

Predictor	Stress		General health		Sleep quality		Quality of life	
	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1		.046**		.024**		.014**		.007**
Facebook addiction	.21**		-.16**		-.12**		-.08**	
Step 2		.020**		.005*		.005		.007*
Facebook addiction	.20**		-.15**		-.12**		-.09**	
Gender ^a	-.13**		.02		.03		-.09**	
Age	-.07*		-.07*		.06*		-.01	
Step 3		.137**		.044**		.034**		.138**
Facebook addiction	.16**		-.12**		-.10**		-.06*	
Gender ^a	-.11**		.02		.01		-.07*	
Age	-.05		-.08**		.05		-.02	
Extraversion	-.18**		.09**		.08*		.25**	
Agreeableness	.07*		.06		.00		.04	
Conscientiousness	-.15**		.09**		.03		.11**	
Emotional stability	-.26**		.11**		.16**		.16**	
Openness to experience	-.03		.00		-.04		.06	
Step 4		.107**		.080**		.084**		.136**
Facebook addiction	.15**		-.11**		-.09**		-.04	
Gender ^a	-.07**		.00		-.02		-.10**	
Age	-.02		-.11**		.03		-.06*	
Extraversion	-.09**		.01		.00		.14**	
Agreeableness	.07*		.03		-.01		.02	
Conscientiousness	-.07*		.02		-.05		.02	
Emotional stability	-.18**		.04		.09**		.08**	
Openness to experience	.01		-.03		-.08*		.01	
Self-esteem	-.37**		.33**		.33**		.42**	
Narcissism	-.02		-.03		.00		-.01	
Step 5		.048**		.003		.001		.056**
Facebook addiction	.10**		-.11**		-.08**		-.00	
Gender ^a	-.05†		.01		-.02		-.11**	
Age	.00		-.11**		.02		-.07**	
Extraversion	-.01		.03		-.01		.09**	
Agreeableness	.05		.02		-.01		.03	
Conscientiousness	-.03		.02		-.05		-.01	
Emotional stability	-.12**		.05		.08*		.02	
Openness to experience	.06*		-.03		-.08*		-.03	
Self-esteem	-.28**		.33**		.32**		.33**	
Narcissism	-.01		-.03		.00		-.02	
Self-efficacy	-.17**		.04		.01		.23**	
Social anxiety	.09**		.06		-.01		.01	
Loneliness	.13**		.02		-.03		-.14**	
Total R^2		.358**		.156**		.138**		.344**

* $p < .05$. ** $p < .01$, † $p = .055$.

^a 0 = female, 1 = male.

(Atroszko et al., 2017) that more attention should be devoted to measuring tools based on core components of addiction (Griffiths, 2005), as more clear delineation between high engagement and addiction is necessary (Griffiths, Demetrovics, & Atroszko, 2018).

4.2. Facebook addiction and personality

Before including all personality variables in the tested model there was a negative relationship between Facebook addiction and emotional stability as well as conscientiousness and openness to experience, which is congruent with previous studies (H2 substantiated) (Andreassen, Torsheim et al., 2012; Andreassen et al., 2013; Błachnio, Przepiorka, Benvenuti et al., 2016; Błachnio, Przepiorka, Sendol-Durak et al., 2017; Mahmood & Farooq, 2014; Tang et al., 2015). Furthermore, there was a positive relationship between Facebook addiction and extraversion even after controlling for all the investigated personality characteristics. This suggests that strong need for social interactions might be an independent risk factor for Facebook addiction (Tang et al., 2015).

Facebook addiction was positively related to narcissism but there was no relationship between Facebook addiction and self-

esteem (H3 partially substantiated). Expressing ambitions and showing successes to a potentially large audience while obtaining highly visible rewards through “likes” and comments, may be a strong gratification for narcissists attracted to engaging in ego-enhancing activities (Andreassen et al., 2016; Wang, Jackson, Zhang, & Su, 2012). On the other hand, positive and negative feedback from other users as well as different motivations to use Facebook, can both enhance or lower self-esteem (Valkenburg, Peter, & Schouten, 2006). Furthermore, Facebook addiction was negatively related to self-efficacy. People with low self-efficacy, who do not believe in their own abilities to cope with wide range of situations, have limited strategies to cope with stress or social anxiety (Wegmann & Brand, 2016). They could get involved in activities on Facebook to escape from problems. This is one of the most important findings, as self-efficacy has been more or less neglected in the context of Facebook addiction, despite the fact that there is a well-established link between this trait and addiction in general (Marlatt et al., 1995) and well-being (Burger & Samuel, 2017). At the same time, self-efficacy is modifiable (Gist & Mitchell, 1992) which opens for possibilities of successful interventions.

4.3. Facebook addiction and social functioning

Both social anxiety and loneliness were positively related to Facebook addiction (H4 substantiated) which is congruent with previous studies (Blachnio et al., 2016; Dobrea & Păsărelu, 2016). It shows that although loneliness is one of the effects of social anxiety it might be as well an effect of another affliction and have unique contribution to Facebook addiction even after controlling the level of social anxiety. Thus, results show relative contribution of social anxiety and loneliness to Facebook addiction within a more complementary model of personality risk factors. These results are fundamental from the perspective of a well-established link between social support and health and well-being (Cohen & Wills, 1985), and suggest that a detailed analysis of the difficulties in the social life of a person addicted to Facebook may reveal areas for proper interventions. These may focus on social anxiety, but as the results indicate, they should not be limited just to this source of feelings of loneliness. The lack of social skills, low self-efficacy and ineffective coping strategies may be other potential sources of deficits in regarding experienced social support, and may as such constitute other relevant areas of intervention.

4.4. Facebook addiction and well-being

Facebook addiction was positively associated with perceived stress and negatively with general health and sleep quality above and beyond personality factors and social functioning (H5 partially substantiated). These results are congruent with previous studies (Hanprathet et al., 2015) and show that Facebook dependence may have detrimental effect on health. However, Facebook addiction was not related to quality of life (part of H5 not substantiated). Single item measure of quality of life might be excessively general and/or not sensitive enough to identify small differences in global quality of life. As a general indicator of psychosocial functioning quality of life may deteriorate at a relatively slow rate, and since study included young people, it may take time to observe overall decrease in their well-being due to Facebook addiction.

4.5. Strengths and limitations

To the authors' knowledge the current study is the first to investigate the relative contribution of a wide range of relevant personality characteristics to Facebook addiction, and the unique variance which this addiction explains in different facets of well-being above and beyond these personality characteristics. The present study comprised a relatively large sample size providing high statistical power and valid and reliable psychometric tools were included. Consequently, the study significantly adds to the existing literature on behavioral addictions, and provides further insights into the nature of Facebook addiction, and its relationship to health and psychological well-being. On the other hand, the study has some limitations that should be noted. All data were self-reported, which is in turn open to the usual weaknesses of such data (e.g., common method, social desirability and recall biases). Furthermore, as the Polish sample was not representative, this puts restrictions on the generalizability to other populations.

5. Conclusions and future research directions

Based on the findings in the present study it is concluded that Facebook addiction can be validly and reliably measured among university students in Poland. What is more, results provide some initial support for the general hypothesis that Facebook addiction might be a result of ineffective mood regulation by individuals who have a problematic social life. When suggested tentative

personality risk factors model were investigated, addictive Facebook use was related to being female, being older, extraverted, narcissistic, having low sense of self-efficacy as well as feeling loneliness and social anxiety. In the light of these results, it seems that Facebook dependent individuals crave for social interactions, especially self-validation through these interactions. However, because underlying causes of distress are not confronted and dealt with, due to their low general self-efficacy, the increasingly compulsive Facebook activity may generate additional stress and in consequence may negatively affect their psychosocial functioning. In line with the addiction framework, Facebook addiction is related to higher stress, lower general health and lower sleep quality. Future research should attempt to collect and analyze further data on the psychometric properties of the Bergen Facebook Addiction Scale, including reasons for the correlated error terms between items. Due to the fact that the results of previous studies are not always coherent, future investigations on the impact of Big Five personality traits on the Facebook addiction should be conducted, as well as on the impact of self-efficacy and insufficient self-control on Facebook addiction. The role of motivation to use Facebook may provide useful information in terms of possible correlates of Facebook addiction. Furthermore, longitudinal studies using representative samples of young adults would aid the examination of potential developmental risk factors of Facebook addiction. The temporal stability of Facebook addiction should also be investigated.

Declaration of interest

None.

Funding

This work was supported by the research grant under the project for young researchers and PhD students of University of Gdańsk [grant number 538-7422-B286-16].

Funding sources

This research was financed by the research grant under the project for young researchers and PhD students of University of Gdańsk (538-7422-B286-16).

Authors' contribution

PAA assisted with obtaining funding, literature search, study design and concept, data collection, statistical analyses, data interpretation, manuscript preparation and editing, and final editing; JB assisted with literature search, study design and concept, data collection, data interpretation, generation of the initial draft of the manuscript, manuscript preparation and editing, and final editing; PB assisted with literature search, study design and concept, data collection, statistical analyses, data interpretation, generation of the initial draft of the manuscript, manuscript preparation and editing, and final editing; AB assisted with literature search, study design and concept, data collection, data interpretation, generation of the initial draft of the manuscript, manuscript preparation and editing, and final editing; SP assisted with literature search, data interpretation, manuscript preparation and editing, and final editing; CSA assisted with literature search, data interpretation, manuscript preparation and editing, and final editing.

Conflicts of interest

None.

Ethics

The project was approved by the Research Ethics Committee at the Psychology Department of the University of Gdańsk. Attaining formal and written informed consent was not regarded as necessary as voluntary completion of the questionnaires was regarded as providing consent.

Acknowledgements

We would like to thank all the students from the Student Research Group “Experior” at the Institute of Psychology at the University of Gdańsk for their help in gathering the data.

References

- Andreassen, C. S., Griffiths, M. D., Gjertsen, S. R., Krossbakken, E., Kvam, S., & Pallesen, S. (2013). The relationships between behavioral addictions and the five-factor model of personality. *Journal of Behavioral Addictions*, 2, 90–99. <https://doi.org/10.1556/JBA.2.2013.003>.
- Andreassen, C. S., Griffiths, M. D., Hetland, J., & Pallesen, S. (2012). Development of a work addiction scale. *Scandinavian Journal of Psychology*, 53, 265–272. <https://doi.org/10.1111/j.1467-9450.2012.00947.x>.
- Andreassen, C. S., Griffiths, M. D., Pallesen, S., Bilder, R. M., Torsheim, T., & Aboujaoude, E. (2015). The Bergen Shopping Addiction Scale: Reliability and validity of a brief screening test. *Frontiers in Psychology*, 6, 1–11. <https://doi.org/10.3389/fpsyg.2015.01374>.
- Andreassen, C. S., & Pallesen, S. (2014). Social network site addiction—an overview. *Current Pharmaceutical Design*, 20, 4053–4061. <https://doi.org/10.2174/13816128113199990616>.
- Andreassen, C. S., Pallesen, S., & Griffiths, M. D. (2016). The relationship between addictive use of social media, narcissism, and self-esteem: Findings from a large national survey. *Addictive Behaviors*, 64, 287–293. <https://doi.org/10.1016/j.addbeh.2016.03.006>.
- Andreassen, C. S., Torsheim, T., Brunborg, G. S., & Pallesen, S. (2012). Development of a Facebook addiction scale. *Psychological Reports*, 110, 501–517. <https://doi.org/10.2466/02.09.18.PR0.110.2.501-517>.
- Atroszko, P. A. (2012). Research on behavioral addictions: Work addiction. In M. Baranowska-Szczepańska, & M. Gołoszewski (Eds.), *Modern research trends of young scientists: Current status, problems and prospects* (pp. 11–24) (Poznań, Poland: Wydawnictwo Naukowe Wyższej Szkoły Handlu i Usług). Retrieved from https://www.researchgate.net/profile/Pawel_Atroszko/publication/264117897_Research_on_Behavioural_Addictions_Work_Addiction/links/53ce6e890cf279d93530a23c/Research-on-Behavioural-Addictions-Work-Addiction.pdf.
- Atroszko, P. A. (2015). *The structure of study addiction: Selected risk factors and the relationship with stress, stress coping and psychosocial functioning* (Unpublished doctoral thesis). Poland: University of Gdańsk.
- Atroszko, P. A., Andreassen, C. S., Griffiths, M. D., & Pallesen, S. (2015). Study addiction—a new area of psychological study: Conceptualization, assessment, and preliminary empirical findings. *Journal of Behavioral Addictions*, 4, 75–84. <https://doi.org/10.1556/2006.4.2015.007>.
- Atroszko, P. A., Andreassen, C. S., Griffiths, M. D., & Pallesen, S. (2016a). Study addiction: A cross-cultural longitudinal study examining temporal stability and predictors of its changes. *Journal of Behavioral Addictions*, 5, 357–362. <https://doi.org/10.1556/2006.5.2016.024>.
- Atroszko, P. A., Andreassen, C. S., Griffiths, M. D., & Pallesen, S. (2016b). The relationship between study addiction and work addiction: A cross-cultural longitudinal study. *Journal of Behavioral Addictions*, 5, 708–714. <https://doi.org/10.1556/2006.5.2016.076>.
- Atroszko, P. A., Bagińska, P., Mokosińska, M., Sawicki, A., & Atroszko, B. (2015). Validity and reliability of single item self-report measures of general quality of life, general health and sleep quality. In M. McGreevy, & R. Rita (Eds.), *Proceedings of the 4th biannual CER comparative European research conference* (pp. 207–211). London, UK: Sciemcee Publishing. Retrieved from https://www.researchgate.net/profile/Artur_Sawicki2/publication/283726345_VValidity_and_reliability_of_single-item_self-report_measures_of_general_quality_of_life_and_sleep_quality/links/5645b8f208ae9f9c13e6eac6.pdf.
- Atroszko, P. A., Krzyżaniak, P., Sendal, L., & Atroszko, B. (2015). Validity and reliability of single item self-report measures of meaning in life and satisfaction with life. In M. McGreevy, & R. Rita (Eds.), *Proceedings of the 4th biannual CER comparative European research conference* (pp. 212–215). London, UK: Sciemcee Publishing. Retrieved from https://www.researchgate.net/publication/283733060_VValidity_and_reliability_of_single-item_self-report_measures_of_meaning_in_life_and_satisfaction_with_life.
- Atroszko, P. A., Pallesen, S., Griffiths, M. D., & Andreassen, C. S. (2017). Work addiction in Poland: Adaptation of the Bergen Work Addiction Scale and relationship with psychopathology. *Health Psychology Report*, 5(4). <https://doi.org/10.5114/hpr.2017.68759>.
- Atroszko, P. A., Pianka, L., Raczynska, A., Sektas, M., & Atroszko, B. (2015). Validity and reliability of single item self-report measures of social support. In M. McGreevy, & R. Rita (Eds.), *Proceedings of the 4th biannual CER comparative European research conference* (pp. 216–219). London, UK: Sciemcee Publishing. Retrieved from https://www.researchgate.net/publication/283733172_VValidity_and_reliability_of_single-item_self-report_measures_of_social_support.
- Atroszko, P. A., Sawicki, A., Makinia, A., & Atroszko, B. (2017). Further validation of single-item self-report measure of satisfaction with life. In M. McGreevy, & R. Rita (Eds.), *Proceedings of the 7th biannual CER comparative European research conference* (pp. 107–110). London, UK: Sciemcee Publishing. Retrieved from https://www.researchgate.net/publication/318275000_Further_validation_of_single-item_self-report_measure_of_satisfaction_with_life.
- Atroszko, P. A., Sawicki, A., Sendal, L., & Atroszko, B. (2017). Validity and reliability of single-item self-report measure of global self-esteem. In M. McGreevy, & R. Rita (Eds.), *Proceedings of the 7th biannual CER comparative European research conference* (pp. 120–123). London, UK: Sciemcee Publishing. Retrieved from https://www.researchgate.net/publication/316034029_VValidity_and_reliability_of_single-item_self-report_measure_of_global_self-esteem.
- Baker, S. L., Heinrichs, N., Kim, H. J., & Hofmann, S. G. (2002). The Liebowitz Social Anxiety Scale as a self-report instrument: A preliminary psychometric analysis. *Behaviour Research and Therapy*, 40, 701–715. [https://doi.org/10.1016/S0005-7967\(01\)00060-2](https://doi.org/10.1016/S0005-7967(01)00060-2).
- Burger, K., & Samuel, R. (2017). The role of perceived stress and self-efficacy in young people's life satisfaction: A longitudinal study. *Journal of Youth and Adolescence*, 46, 78–90. <https://doi.org/10.1007/s10964-016-0608-x>.
- Burke, M., Marlow, C., & Lento, T. (2010). Social network activity and social well-being. In *Proceedings of the 2010 ACM conference on human factors in computing systems* (pp. 1909–1912). New York, NY: ACM.
- Blachnio, A., & Przepiórka, A. (2016). Dysfunction of self-regulation and self-control in Facebook addiction. *Psychiatric Quarterly*, 87, 493–500. <https://doi.org/10.1007/s11262-015-9403-1>.
- Blachnio, A., Przepiórka, A., Benvenuti, M., Cannata, D., Ciobanu, A. M., Senol-Durak, E., ... Ben-Ezra, M. (2016). Cultural and personality predictors of Facebook intrusion: A cross-cultural study. *Frontiers in Psychology*, 7, 1895. <https://doi.org/10.3389/fpsyg.2016.01895>.
- Blachnio, A., Przepiórka, A., Boruch, W., & Balaćkier, E. (2016). Self-presentation styles, privacy, and loneliness as predictors of Facebook use in young people. *Personality and Individual Differences*, 94, 26–31. <https://doi.org/10.1016/j.paid.2015.12.051>.
- Blachnio, A., Przepiórka, A., & Czuczwar, S. J. (2017). Type D personality, stress coping strategies and self-efficacy as predictors of Facebook intrusion. *Psychiatry Research*, 253, 33–37. <https://doi.org/10.1016/j.psychres.2017.03.022>.
- Blachnio, A., Przepiórka, A., & Pantic, I. (2016). Association between Facebook addiction, self-esteem and life satisfaction: A cross-sectional study. *Computers in Human Behavior*, 55, 701–705. <https://doi.org/10.1016/j.chb.2015.10.026>.
- Blachnio, A., Przepiórka, A., & Rudnicka, P. (2016). Narcissism and self-esteem as predictors of dimensions of Facebook use. *Personality and Individual Differences*, 90, 296–301. <https://doi.org/10.1016/j.paid.2015.11.018>.
- Blachnio, A., Przepiórka, A., Senol-Durak, E., Durak, M., & Sherstyuk, L. (2017). The role of personality traits in Facebook and internet addictions: A study on Polish, Turkish, and Ukrainian samples. *Computers in Human Behavior*, 68, 269–275. <https://doi.org/10.1016/j.chb.2016.11.037>.
- Bóthe, B., Tóth-Király, I., Zsila, Á., Griffiths, M. D., Demetrovics, Z., & Orosz, G. (2017). The development of the Problematic Pornography Consumption Scale (PPCS). *The Journal of Sex Research*. <https://doi.org/10.1080/00224499.2017.1291798>.
- Campisi, J., Bynog, P., McGehee, H., Oakland, J. C., Quirk, S., Taga, C., et al. (2012). Facebook, stress, and incidence of upper respiratory infection in undergraduate college students. *Cyberpsychology, Behavior, and Social Networking*, 15, 675–681. <https://doi.org/10.1089/cyber.2012.0156>.
- Caplan, S. E. (2003). Preference for online social interaction: A theory of problematic internet use and psychosocial well-being. *Communication Research*, 30, 625–648. <https://doi.org/10.1177/0093650203257842>.
- Caplan, S. E. (2010). Theory and measurement of generalized problematic internet use: A two-step approach. *Computers in Human Behavior*, 26, 1089–1097. <https://doi.org/10.1016/j.chb.2010.03.012>.
- Charzyńska, E., & Góźdz, J. (2014) [In the network of addiction. Polish adaptation of Facebook addiction scale (the Bergen Facebook Addiction Scale) by C. S. Andreassen, T. Torsheim, G. S. Brunborg and S. Pallesen]. In C. S. Andreassen, T. Torsheim, G. S. Brunborg i, & S. Pallesen (Eds.), *W sieci uzależnienia. Polska adaptacja skali uzależnienia od Facebooka (the Bergen Facebook Addiction Scale)* (Vol. 22, pp. 163–185). Chownanna. Retrieved from <http://bazhum.muzhp.pl/media/files/Chownanna/Chownanna-r2014-t1/Chownanna-r2014-t1-s163-185/Chownanna-r2014-t1-s163-185.pdf>.
- Chen, H., & Kim, Y. (2013). Problematic use of social network sites: The interactive relationship between gratifications sought and privacy concerns. *Cyberpsychology, Behaviour, and Social Networking*, 16, 806–812. <https://doi.org/10.1089/cyber.2011.0608>.
- Chou, C., Condon, L., & Belland, J. C. (2005). A review of the research on Internet addiction. *Educational Psychology Review*, 17, 363–388. <https://doi.org/10.1007/s10648-005-8138-1>.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived

- stress. *Journal of Health and Social Behavior*, 24, 385–396. <https://doi.org/10.2307/2136404>.
- Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin*, 98, 310–357. <https://doi.org/10.1037/0033-2909.98.2.310>.
- D'Hondt, F., & Maurage, P. (2017). Electrophysiological studies in internet addiction: A review within the dual-process framework. *Addictive Behaviors*, 64, 321–327. <https://doi.org/10.1016/j.addbeh.2015.10.012>.
- Denti, L., Barbopoulos, L., Nilsson, L., Holmberg, L., Thulin, M., Wendeblad, ... Davidsson, E. (2012). *GRI-rapport, Sweden's largest Facebook study (GRI-rapport 2012:3)*. Retrieved from Gothenburg Research Institute website: https://gupea.ub.gu.se/bitstream/2077/28893/1/gupea_2077_28893_1.pdf.
- Dobrea, A., & Păsărelu, C. R. (2016). Impact of social media on social anxiety: A systematic review. In F. Durbano, & B. Marchesi (Eds.), *New developments in anxiety disorders* (pp. 129–149). <https://doi.org/10.5772/65188>. InTech.
- Dąbkowska, M. (2008). Wybrane aspekty lęku u ofiar przemocy domowej. *Psychiatria*, 5(3), 91–98.
- Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of Facebook 'friends': Social capital and college students' use of online social network sites. *Journal of Computer-Mediated Communication*, 12, 1143–1168. <https://doi.org/10.1111/j.1083-6101.2007.00367.x>.
- Elphinstone, R. A., & Noller, P. (2011). Time to face it! Facebook intrusion and the implications for romantic jealousy and relationship satisfaction. *Cyberpsychology, Behavior, and Social Networking*, 14, 631–635. <https://doi.org/10.1089/cyber.2010.0318>.
- Enders, C. K. (2001). A primer on maximum likelihood algorithms available for use with missing data. *Structural Equation Modeling*, 8, 128–141. https://doi.org/10.1207/S15328007SEM0801_7.
- Facebook. (2017, March, 5). *Facebook reports fourth quarter and full year 2016 results*. Retrieved from Facebook website: <https://investor.fb.com/investor-news/press-release-details/2017/Facebook-Reports-Fourth-Quarter-and-Full-Year-2016Results/default.aspx>.
- Forest, A. L., & Wood, J. V. (2012). When social networking is not working in individuals with low self-esteem recognize but do not reap the benefits of self-disclosure on Facebook. *Psychological Science*, 23, 295–302. <https://doi.org/10.1177/0956797611429709>.
- Gist, M. E., & Mitchell, T. R. (1992). Self-efficacy: A theoretical analysis of its determinants and malleability. *Academy of Management Review*, 17, 183–211. <https://doi.org/10.5465/AMR.1992.4279530>.
- GlobalWebIndex. (2016). *Social summary. GlobalWebIndex's quarterly report on the latest trends in social networking*. Retrieved from Global Web Index website: <http://insight.globalwebindex.net/hubfs/Reports/GWI-Social-Q4-2016-Summary-Report.pdf?submissionGuid=ff36bd64-4bed-44aa-bde7-a3a8f41fdb22>.
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B. (2003). A very brief measure of the Big-Five personality domains. *Journal of Research in Personality*, 37, 504–528. [https://doi.org/10.1016/S0092-6566\(03\)00046-1](https://doi.org/10.1016/S0092-6566(03)00046-1).
- Griffiths, M. D. (1999). Internet addiction: Fact or fiction? *The Psychologist*, 12, 246–250.
- Griffiths, M. D. (2000). Internet addiction—time to be taken seriously? *Addiction Research*, 8, 413–418. <https://doi.org/10.3109/16066350009005587>.
- 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. D. (2012). Facebook addiction: Concerns, criticism, and recommendations—a response to Andreassen and colleagues. *Psychological Reports*, 110, 518–520. <https://doi.org/10.2466/01.07.18.PR0.110.2.518-520>.
- Griffiths, M. D., Demetrovics, Z., & Atroszko, P. A. (2018). Ten myths about work addiction. *Journal of Behavioral Addictions*, 1–13. <https://doi.org/10.1556/2006.7.2018.05> [Epub Ahead of Print].
- Gülınar, B., Balci, S., & Çakır, V. (2010). Motivations of Facebook, You Tube and similar web sites users. *Biling*, 54, 161–184.
- Hanprathet, N., Manwong, M., Khumsri, J., Yingyeun, R., & Phanassathit, M. (2015). Facebook addiction and its relationship with mental health among Thai high school students. *Journal of the Medical Association of Thailand*, 98, 81–90.
- Huang, H. (2012). *Social media addiction among adolescents in urban China: An examination of sociopsychological traits, uses and gratifications, academic performance, and social capital* (Doctoral thesis). Available from: ProQuest Dissertations and Theses database. (UMI No. 3514530).
- Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6, 1–55. <https://doi.org/10.1080/10705519909540118>.
- Hughes, M. E., Waite, L. J., Hawkey, L. C., & Cacioppo, J. T. (2004). A short scale for measuring loneliness in large surveys results from two population-based studies. *Research on Aging*, 26, 655–672. <https://doi.org/10.1177/0164027504268574>.
- Jacobs, D. F. (1986). A general theory of addictions: A new theoretical model. *Journal of Gambling Behavior*, 2, 15–31. <https://doi.org/10.1007/BF01019931>.
- Joinson, A. N. (2008). Looking at, looking up or keeping up with people? Motives and use of Facebook. In *Proceedings of the 26th annual SIGCHI conference on human factors in computing systems* (pp. 1027–1036). New York, NY: ACM.
- Karim, R., & Chaudhri, P. (2012). Behavioral addictions: An overview. *Journal of Psychoactive Drugs*, 44, 5–17. <https://doi.org/10.1080/02791072.2012.662859>.
- Koc, M., & Gulyagci, S. (2013). Facebook addiction among Turkish college students: The role of psychological health, demographic, and usage characteristics. *Cyberpsychology, Behavior, and Social Networking*, 16, 279–284. <https://doi.org/10.1089/cyber.2012.0249>.
- Konrath, S., Meier, B. P., & Bushman, B. J. (2014). Development and validation of the Single Item Narcissism Scale (SINS). *PLoS One*, 9. <https://doi.org/10.1371/journal.pone.0103469>. e103469.
- Koo, H. J., & Kwon, J. H. (2014). Risk and protective factors of internet addiction: A meta-analysis of empirical studies in Korea. *Yonsei Medical Journal*, 55, 1691–1711. <https://doi.org/10.3349/ymj.2014.55.6.1691>.
- Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D. S., Lin, N., et al. (2013). Facebook use predicts declines in subjective well-being in young adults. *PLoS One*, 8, e69841. <https://doi.org/10.1371/journal.pone.0069841>.
- Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction—a review of the psychological literature. *International Journal of Environmental and Public Health*, 8, 3528–3552. <https://doi.org/10.3390/ijerph8093528>.
- Kuss, D. J., Griffiths, M. D., Karila, L., & Billieux, J. (2014). Internet addiction: A systematic review of epidemiological research for the last decade. *Current Pharmaceutical Design*, 20, 4026–4052. <https://doi.org/10.2174/13816128113199990617>.
- Kuss, D. J., & Lopez-Fernandez, O. (2016). Internet addiction and problematic internet use: A systematic review of clinical research. *World Journal of Psychiatry*, 6, 143–176. <https://doi.org/10.5498/wjpv.6.1.143>.
- Lee, Z. W. Y., Cheung, C. M. K., & Thadani, D. R. (2012). An investigation into the problematic use of Facebook. In R. H. Sprague, Jr. (Ed.), *Proceedings of the 45th Hawaii international conference on system sciences* (pp. 1768–1776). Los Alamitos, CA: IEEE. <https://doi.org/10.1109/HICSS.2012.106>.
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a Game Addiction Scale for adolescents. *Media Psychology*, 12, 77–95. <https://doi.org/10.1080/15213260802669458>.
- Liebowitz, M. R. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, 22, 141–173. <https://doi.org/10.1159/000414022>.
- Mahmood, S., & Farooq, U. (2014). Facebook addiction: A study of big-five factors and academic performance amongst students of IUB. *Global Journal of Management and Business Research*, 14(5). Retrieved from <http://journalofbusiness.org/index.php/GJMBR/article/view/1553>.
- Malik, S., & Khan, M. (2015). Impact of Facebook addiction on narcissistic behavior and self-esteem among students. *Journal of Pakistan Medical Association*, 65, 260–263.
- Marlatt, G. A., Baer, J. S., & Quigley, L. A. (1995). Self-efficacy and addictive behavior. In A. Bandura (Ed.), *Self-efficacy in changing societies* (pp. 289–315). New York, NY: Cambridge University Press.
- Mull, I. R., & Lee, S. (2014). 'PIN' pointing the motivational dimensions behind Pinterest. *Computers in Human Behavior*, 33, 192–200. <https://doi.org/10.1016/j.chb.2014.01.011>.
- Muthén, L. K., & Muthén, B. O. (1998–2010). *Mplus User's guide* (6th ed.). Los Angeles, CA: Muthén & Muthén.
- Pinquart, M., & Sörensen, S. (2000). Influences of socioeconomic status, social network, and competence on subjective well-being in later life: A meta-analysis. *Psychology and Aging*, 15, 187–224. <https://doi.org/10.1037/0882-7974.15.2.187>.
- Raacke, J., & Bonds-Raacke, J. (2008). MySpace and Facebook: Applying the uses and gratifications theory to exploring friend-networking sites. *CyberPsychology and Behavior*, 11, 169–174. <https://doi.org/10.1089/cpb.2007.0056>.
- Ryan, T., Chester, A., Reece, J., & Xenos, S. (2014). The uses and abuses of Facebook: A review of Facebook addiction. *Journal of Behavioral Addictions*, 3, 133–148. <https://doi.org/10.1556/JBA.3.2014.016>.
- Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: A review of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, 52, 141–166. <https://doi.org/10.1146/annurev.psych.52.1.141>.
- Satici, S. A., & Uysal, R. (2015). Well-being and problematic Facebook use. *Computers in Human Behavior*, 49, 185–190. <https://doi.org/10.1016/j.chb.2015.03.005>.
- Scheffer, J. (2002). Dealing with missing data. *Research Letters in the Information and Mathematical Sciences*, 3, 153–160. Retrieved from http://equinetrust.org.nz/massey/fms/Colleges/College%20of%20Sciences/IIMS/RLIMS/Volume03/Dealing_with_Missing_Data.pdf.
- Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). Reporting structural equation modeling and confirmatory factor analysis results: A review. *The Journal of Educational Research*, 99, 323–338. <https://doi.org/10.3200/JOER99.6.323-338>.
- Schwarzer, R., & Jerusalem, M. (1995). Generalized self-efficacy scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). Windsor, UK: NFER-NELSON.
- Schwarzer, R., Jerusalem, M., & Juczyński, Z. (2012). *NPPPPZ – narzędzia pomiaru w promocji i psychologii zdrowia. GSES – skala uogólnionej własnej skuteczności*. Warsaw, Poland: Pracownia Testów Psychologicznych Polskiego Towarzystwa Psychologicznego.
- Sendal, L., Krzyżaniak, P., Raczynska, A., & Atroszko, P. A. (2016). The mediating effect of stress coping between cynical hostility and perceived stress – preliminary findings. In J. Leśny, & J. Nyckowiak (Eds.), *Badania i Rozwój Młodych Naukowców w Polsce. Nauki humanistyczne i społeczne* (pp. 83–90). Poznań, Poland: Młodzi Naukowcy. Retrieved from https://www.researchgate.net/publication/324259465_The_mediating_effect_of_stress_coping_between_cynical_hostility_and_perceived_stress-preliminary_findings.
- Sendal, L., Sawicki, A., Bagińska, P., & Atroszko, P. A. (2016). Relationship of cynical hostility with anxiety and depressiveness among university students in Poland.

- In J. Leśny, & J. Nyckowiak (Eds.), *Badania i Rozwój Młodych Naukowców w Polsce. Nauki humanistyczne i społeczne* (pp. 91–98). Poznań, Poland: Młodzi Naukowcy. Retrieved from https://www.researchgate.net/publication/301519855_Relationship_of_cynical_hostility_with_anxiety_and_depressiveness_among_university_students_in_Poland.
- Sheldon, P. (2009). Maintain or develop new relationship? Gender differences in Facebook use. *Rocky Mountain Communication Review*, 6, 51–56.
- Shin, D. (2018). Empathy and embodied experience in virtual environment: To what extent can virtual reality stimulate empathy and embodied experience? *Computers in Human Behavior*, 78, 64–73. <https://doi.org/10.1016/j.chb.2017.09.012>.
- Shin, D., & Biocca, F. (2017). Health experience model of personal informatics: The case of a quantified self. *Computers in Human Behavior*, 69, 62–74. <https://doi.org/10.1016/j.chb.2016.12.019>.
- Shin, D., Lee, S., & Hwang, Y. (2017). How do credibility and utility affect the user experience of health informatics services? *Computers in Human Behavior*, 67, 292–302. <https://doi.org/10.1016/j.chb.2016.11.007>.
- Skevington, S. M., Lotfy, M., & O'Connell, K. A. (2004). The world health Organization's WHOQOL-BREF quality of life Assessment: Psychometric properties and results of the international field trial. A report from the WHOQOL group. *Quality of Life Research*, 13, 299–310. <https://doi.org/10.1007/s10597-009-9282-8>.
- Steinfeld, C., Ellison, N. B., & Lampe, C. (2008). Social capital, self-esteem, and use of online social network sites: A longitudinal analysis. *Journal of Applied Developmental Psychology*, 29, 434–445. <https://doi.org/10.1016/j.appdev.2008.07.002>.
- Tang, J. H., Chen, M. C., Yang, C. Y., Chung, T. Y., & Lee, Y. A. (2015). Personality traits, interpersonal relationships, online social support, and Facebook addiction. *Telematics and Informatics*, 33, 102–108. <https://doi.org/10.1016/j.tele.2015.06.003>.
- Terry, A., Szabo, A., & Griffiths, M. (2004). The Exercise Addiction Inventory: A new brief screening tool. *Addiction Research and Theory*, 12, 489–499. <https://doi.org/10.1080/16066350310001637363>.
- Thomé, S., Eklöf, M., Gustafsson, E., Nilsson, R., & Hagberg, M. (2007). Prevalence of perceived stress, symptoms of depression and sleep disturbances in relation to information and communication technology (ICT) use among young adults – an explorative prospective study. *Computers in Human Behavior*, 23, 1300–1321. <https://doi.org/10.1016/j.chb.2004.12.007>.
- Thompson, T. S. H. (2001). Demographic and motivation variables associated with Internet usage activities. *Internet Research*, 11, 125–137. <https://doi.org/10.1108/10662240110695089>.
- Uysal, R., Satici, S. A., & Akin, A. (2013). Mediating effect of Facebook® addiction on the relationship between subjective vitality and subjective happiness. *Psychological Reports*, 113, 948–953. <https://doi.org/10.2466/02.09.18.PR0.113x32z3>.
- Valentine, A. (2012). *Uses and gratifications of Facebook members 35 years older* (Master's Thesis). Available from: ProQuest Dissertations and Theses database (UMI No. 1511466).
- Valkenburg, P. M., Peter, J., & Schouten, A. P. (2006). Friend networking sites and their relationship to adolescents' well-being and social self-esteem. *CyberPsychology and Behavior*, 9, 548–590. <https://doi.org/10.1089/cpb.2006.9.584>.
- Wang, J. L., Jackson, L. A., Zhang, D. J., & Su, Z. Q. (2012). The relationships among the Big Five personality factors, self-esteem, narcissism, and sensation-seeking to Chinese university students' uses of social networking sites (SNSs). *Computers in Human Behavior*, 28, 2313–2319. <https://doi.org/10.1016/j.chb.2012.07.001>.
- Wegmann, E., & Brand, M. (2016). Internet-communication disorder: It's a matter of social aspects, coping, and Internet-use expectancies. *Frontiers in Psychology*, 7, 1747. <https://doi.org/10.3389/fpsyg.2016.01747>.
- Weinstein, A., & Lejoyeux, M. (2010). Internet addiction or excessive internet use. *The American Journal of Drug and Alcohol Abuse*, 36, 277–283. <https://doi.org/10.3109/00952990.2010.491880>.
- Widyanto, L., & Griffiths, M. (2006). 'Internet addiction': A critical review. *International Journal of Mental Health and Addiction*, 4, 31–51. <https://doi.org/10.1007/s11469-006-9009-9>.
- Wilson, K., Fornasier, S., & White, K. M. (2010). Psychological predictors of young adults use of social networking sites. *Cyberpsychology, Behavior, and Social Networking*, 13, 173–177. <https://doi.org/10.1089/cyber.2009.0094>.
- Wolniczak, I., Caceres-DelAguila, J. A., Palma-Ardiles, G., Arroyo, K. J., Solís-Visscher, R., Paredes-Yauri, S., et al. (2013). Association between Facebook dependence and poor sleep quality: A study in a sample of undergraduate students in Peru. *PLoS One*, 8, e59087. <https://doi.org/10.1371/journal.pone.0059087>.
- Young, K. S. (1996). Psychology of computer use: XL. Addictive use of the internet, a case that breaks the stereotype. *Psychological Reports*, 79, 899–902. <https://doi.org/10.2466/pr0.1996.79.3.899>.
- Young, K. S. (2009). Internet addiction: Diagnosis and treatment consideration. *Journal of Contemporary Psychotherapy*, 39, 241–246. <https://doi.org/10.1007/s10879-009-9120-x>.