ON THE FACEBOOK DEPENDENCE AND ITS NEGATIVE EFFECTS ON UNIVERSITY STUDENTS' WORK: A MULTI-GROUP ANALYSIS

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Abstract

The explosion of social networking websites in general, and Facebook in particular, impacts the educational context both positively and negatively. Too much time spent on Facebook leads to negative effects on the university work of students. The objectives of this research are to measure and analyse the relationship between the Facebook dependence and the negative consequences of the excessive use of Facebook on the university work of students. In this respect, a conceptual model has been tested that has two inter-correlated latent variables: the withdrawal syndrome, measuring the Facebook dependence and the negative consequences onto the university work. The analysis of results has been done onto three groups featuring the user's profile according to the network size (number of Facebook friends) of students. The findings show that the larger the Facebook network, the higher the frequency and duration of Facebook use. The analysis of measurement invariance shows that the model exhibits factorial, metric, and scalar invariance on the three user profiles. The comparison between groups shows that students having larger networks and spending more time on Facebook have a higher level of dependence and their university work is more affected.
Key words: *formative measurement models, e-learning process, educational value, motivation to learn.*

Introduction

The explosion of social networking websites in general, and Facebook in particular, produced a major impact on various educational settings, in several ways. On the positive side, new opportunities have been created for social learning by stimulating students to more actively present themselves, socialize, participate in various groups of interest, and debate hot topics (Zúñiga et al., 2002; Brown & Adler, 2008; Hill et al., 2009). On the negative side, many students stay continuously logged on and spend too much time on Facebook which in turn has negative effects on the concentration at school and on the academic performance (Junco, 2012; Bröns et al., 2013; Lamanauskas & Pribeanu, 2016; Gorghiu et al., 2016).

It is not a clear boundary between the use and abuse of social networking websites. Young people spend a lot of time on Social Networking Sites (SNS), and this can cause them

to become potential addicts. SNS addiction has been defined as a failure to control usage, which leads to negative personal outcomes (LaRose et al., 2010). Several measurement scales exist that aim to capture the key dimensions of the addictive behaviour related to the use of the Internet. The conceptualizations are featuring multidimensional models that include a diversity of constructs, such as: withdrawal syndrome, salience, tolerance, overuse, negative effects on the work, or mood modification (Hahn & Jerusalem, 2010; Andreassen et al., 2012; Masur et al., 2014; Orosz et al., 2015).

This research has three objectives. The first is to measure and analyse the relationship between the Facebook dependence and the negative consequences of the excessive use of Facebook on the university work of students. The model has been tested on a sample of 594 observations collected from three Romanian universities. The second is to analyse the measurement invariance on three groups according to the network size (number of Facebook friends). The third is to analyse the relationship with the user profile as regards the network size and the time spent daily on Facebook.

Theoretical Background and Conceptualization

Facebook Use and Abuse

The use of social networking websites in the educational context has been widely researched in the last years. Young people spend a lot of time on Social Networking Sites (SNS), and this is raising questions regarding the excessive use (Orosz et al., 2015). In turn, the overuse can cause them to become potential addicts. SNS addiction has been defined as a failure to control usage, which leads to negative personal outcomes (Larose et al., 2010).

It is difficult to define a boundary between the use and abuse of social networking websites. Ellison et al. (2007) developed a composite measure for the Facebook intensity that aims to combine characteristics of use with attitudinal items. Although it is not uni-dimensional, it has been widely used in the last decade. As Orosz et al. (2015) pointed out, a high Facebook intensity is a prerequisite for Facebook addiction.

It is obvious, that the popularity of the Internet and social media in essense have changed and further are changing the society. The so-called "Facebook generation" is forming. The young generation of adults and students are spending a great deal of time on the Internet and social networking, and seem to be attached to their smartphone all the time (Yong, Gates, Harrison, 2016). The other research show, that the users quite often create fake ID's and chat with them sometimes on Facebook of cyber fraud (John Henry, Niyi, Akorede Olufunbi, Egbeyemi Taiwo, Ukangwa, 2015). Generalising one can assert, that students mainly used Facebook for social purposes rather than educational purposes. In other words, students are socialising and talking to friends about work than actually doing work (Madge, Meek, Wellens, Hooley, 2009).

However, Facebook remains a very popular environment for the actual young generation to maintain a proper level of socialization, offering a powerful base for setting virtual communities. On the other hand, for stimulating the immersion in the virtual social life, the university activity variable has been rated as *insignificant* (Siti Hasanah, 2011).

Negative Effects of the Social Networking Websites

The Facebook popularity raised several research questions, as regards its excessive use (Balog et al., 2013; Masur et al., 2014; Orosz et al., 2015). Of particular interest in the educational context is the excessive use of Facebook that leads to the lack of attention, fatigue, difficulties in concentration while learning, and poor academic performance.

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A major negative effect - recorded at students' level - is the very limited time given to *socializing in person*, in report with the time spent on social networking sites. In this respect, the face-to-face communication suffers, leading to develop incapabilities for communicating in person, effectively. Even students themselves, noticed a clear quality degradation in face-to-face communication amongst the presence of technology (Drago, 2015). More than that, everybody can stay behind the words, creating a character who can have different face and attitude that the real one.

The research carried out in Lithuania showed, that students' most often mentioned lack of social networks, is *public information* (30.3%). SN information is announced publicly, there is lack of privacy, the presented data is not safe. Students claim that all portal users can know about you, quite often your information is spread. Though it has been noticed, that the users often publish too much information about themselves, make their personal life too public. Also, *information unreliability* (24.9%) is accentuated. Different lies, frauds are possible on SN, people can pretend to be not what they are in reality. There is a lot of inaccurate information, you don't know if somebody says the truth, or he or she published false information about himself. A possibility arises to get acquainted with bad people. This can negatively affect young personality development. It has been noticed, that participation in social networks *takes a lot of time* (19.5%), one involves in SN so that sometimes loses time understanding. Some students claim, that this is a thief of time. Sometimes you can try a lot, but you cannot break away, and this already hinders *concentrate on studies* (2.9%). Though only a small part of respondents begin to speak about this. They also claim, that SN encourage laziness, do not develop will and stubbornness. The respondents note, that some of the portal users, and especially children, *become dependent* (8.8%), because immoderate SN visiting not only increases dependence, but also *distracts from real communication* (2.7%). The meaning of "live" communication gets worse, communication skills in real life decrease, one gets estranged. And then, not only difficulties appear in communicating face to face, but also the desire decreases to communicate directly with people, one becomes reserved and dependent on internet. Some of the respondents pointed out, that there are too much advertising (4.4%) in social networks, which not always is interesting, informative and useful. It has been noticed, that there happens to be *not suitable information for children* (2.7%), for teenagers in SN, which makes the youth obtuse and does not stimulate them to improve. It has been noticed, that SN *are harmful for health* (1.6%), because long sitting at the computer is bad for human state and especially for eyes. Also, cyber spying is mentioned, i.e. the possibility to obtain secrets without the permission of the holder of the information and to share that information with others, sometimes wrongly interpreting one or another behaviour (Lamanauskas, Šlekienė, Ragulienė, 2013).

It is important to mention the effect of dependence on social networks. Dependence on social networks is psychological dependence, quite often it causes psychological discomfort, often manifesting itself by behaviour disorders. Davis pointed out (2001) that people depending on social networks typically show signs of moral remorse, searching for sympathy, support, virtual characters are being created, and by their stories the attempts are made to provoke people's reaction. The research carried out by Bulotaite (2009) show, that there are main symptoms of those having psychological dependence: less time is allotted for being with other people, working activity becomes worse, it is difficult to learn. The researchers reasonably assert, that risk level increases using social networks. Risky behaviour on the internet negatively affects young man's social life quality, his physical and psychic health (Livingstone, Ólafsson, 2011). Using the internet / SNW without any restrictions or control, usually has negative effects on young man's socialisation (Noll, Chad, Barnes, 2013; Christofides, Muise, Desmarais, 2012).

Conceptual Model and Research Questions

The focus of this work is to analyse the relationship between Facebook dependence and the negative effects of the excessive use onto the work of students. The distinction between various causes of the excessive use (for a discussion, see Griffiths, 2012) is not so relevant for this study. The idea is that the Facebook dependence, regardless the target of the addictive behaviour (e.g. games, social networking) negatively affects students that pay less attention to their university work.

In a previous work (Gorghiu et al., 2016), a conceptual model for the relationship between the Facebook dependence and the negative consequences of the excessive use of Facebook on the university work of students has been specified based on the existing concepts and measures from several studies. In this respect, two latent variables from the scale proposed by Masur et al. (2014) have been adapted: the withdrawal syndrome (AWS) and the negative effects on the work (ANC). The first is intended to measure the Facebook dependence and the second the negative effects on the university work of students.

The hypothesis is that there is a significant positive correlation between the two variables. The items for the two constructs are presented in Table 1.

Table 1. Variables.

Item	Description
AWS1	If I am off Facebook for a long period of time I feel nervous
AWS2	When I am not online I ask myself what happens on Facebook
AWS3	I feel out of touch when I haven't logged onto Facebook for a while
ANC1	I am regularly on Facebook while being at university
ANC2	My concentration at university suffers because I am on Facebook
ANC3	I often neglect my university work because of Facebook

The model has been tested and the first item of the second construct has been eliminated (ANC1) for two reasons: (a) poor convergent validity and (b) difficult to ascertain if the statement is a cause or an effect of underlying construct. Then the model has been tested again on the same sample and cross-validated on a second sample (Gorghiu et al, 2016). The final model is presented in Figure 1.
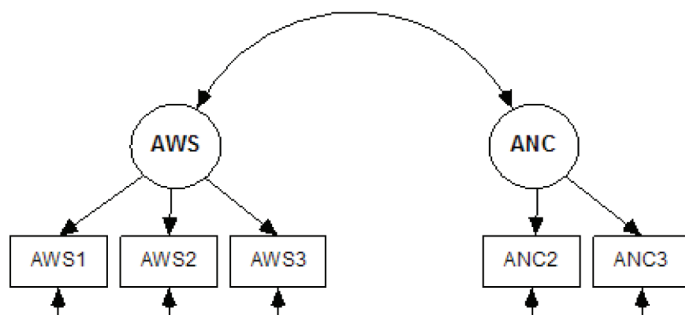

Figure 1: Conceptual model and operationalization.

In this work the model has been tested on a larger sample (N=594) collected from three Romanian universities. The measurement invariance has been analysed on three groups of students, according to the network size.

The following research questions are guiding this study:

- Are there important differences between university students as regards the network size (number of Facebook friends) and the Facebook usage (frequency and duration)
- Is the model invariant across groups?
- Which is the strength of the correlation between the two latent variables?
- Are there important differences as regards the correlation coefficients, latent means, and means of the observed variables?

Empirical Study

Method

The sample has been split into three groups as regards the number of Facebook friends, as follows: 1-250, 251-500, and over 500. The descriptive have been analysed using SPSS for Windows.

Prior to model testing, the data have been analysed in order to check the conditions for multivariate analysis (Fornell & Larcker, 1981). The normality of variables was checked by using SPSS for Windows. In order to assess the scale, a confirmatory factor analysis (CFA) using structural equation modelling (SEM) approach was taken. The model has been tested with AMOS 7.0 for Windows (Arbuckle, 2007), using the maximum likelihood estimation method.

Convergent validity has been assessed by examining the loadings and their statistical significance through t-values, the construct reliability (composite reliability), and the average variance extracted. The scale reliability has been analysed checking the magnitude of Cronbach's alpha. Factor loadings of all standardized items should be greater than 0.50, ideally exceed 0.7. Item reliability indicating the amount of variance should be greater than 0.50. Composite reliability (CR) measuring the internal consistency of a construct should be at least 0.60 (Fornell & Larcker, 1981). The average variance extracted (AVE) measuring the amount of variance captured by the construct should be greater than 0.50 (Hair et al., 2006).

Model estimation allows checking the significance of relationships between variables. The model testing results are analysed based on the GOF (goodness-of-fit) indices recommended by Hair et al. (2006). This study is using the following indices to assess the fit of the model with the data: Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

The measurement invariance has been analysed using MG-CFA (Multi-Group Confirmatory Factor Analysis) with AMOS 7.0 for Windows (Arbuckle, 2007). Measurement invariance enables further comparison between models, as regards the model structure, the observed means, and the latent means (Vandenberg & Lance, 2000).

Finally, the differences between mean values and the relationship between the two variables and the user profile as regards the network size and the time spend daily on Facebook have been analysed by using SPSS for Windows.

Participants and Samples

A sample collected in 2015 has been used that includes students from three Romanian universities: University Valahia of Targoviste, Technical University of Civil Engineering in Bucharest, and "Politehnica" University in Bucharest. The participants were asked to answer some general questions, then to rate the items on a 7-point Likert scale.

Apart from the items of the latent variables, the following measures have been used: the network size (number of Facebook Friends), the number of days per week using Facebook, the number of logs per day, and the minutes spend daily on Facebook. All measures were self-reported. The number of Facebook logs / day was self- reported on a four-point scale (1 = once, 2 = twice, 3 = three times, and 4 = continuous log).

The sample includes 594 students, from which 353 men and 241 women. The age is varying between 18 and 52 years with a mean of 22.61 (SD=5.30). Most of the students are undergraduates (87.90%). Three groups are considered in this study, following the number of Facebook friends.

The comparison between the three groups is presented in Table 2.

Table 2. Comparison between groups: network size and usage.

Network size	N	FB Friends		Days / Week		Logs / Day		Min. / Day	
		M	SD	M	SD	M	SD	M	SD
1-250	176	138.40	66.47	5.95	1.75	2.72	0.99	57.82	73.80
251-500	170	378.00	75.59	6.33	1.32	2.93	0.80	71.04	67.75
Over 500	248	1294.54	900.11	6.68	0.93	3.25	0.71	94.18	105.45
Total	594	689.67	781.95	6.36	1.36	3.00	0.86	76.78	88.26

A one-way ANOVA shows that the differences are statistically significant for all variables: FB Friends (F=9.584, p=0.000), Days / Week (F=15.255, p=0.000), Logs / Day (F=22.605, p=0.000), and Min. / Day (F=1261.981, p=0.000).

The comparison between groups shows that the higher the number of Facebook friends the higher the frequency and duration of Facebook use. The differences are important, especially for the third group which also has the most important weight (41.80%) in the sample. Overall, university students have pretty large networks (M=689.67, SD=781.95) and spend more than one hour per day on Facebook (M=76.78, SD=88.24).

Model Testing Results

The descriptive, item loadings, scale reliability (Cronbach's Alpha), and convergent validity criteria are presented in Table 3. As it could be observed, both constructs are unidimensional and exhibit good scale reliability and convergent validity. The mean values of items suggest a small to moderate Facebook dependence and small to moderate negative effects.

Table 3. Descriptive, loadings and convergent validity (N=165).

Item	M	SD	Loadings	Alpha	CR	AVE
AWS1	2.37	1.80	0.84	0.891	0.887	0.725
AWS2	2.61	1.83	0.87			
AWS3	2.60	1.86	0.86			
ANC2	2.80	1.94	0.81	0.846	0.862	0.759
ANC3	2.45	1.74	0.90			

The model testing results are presented in Figure 2. There is a significant (p<0.001) positive correlation between the Facebook dependence and its negative consequences on the work of students.
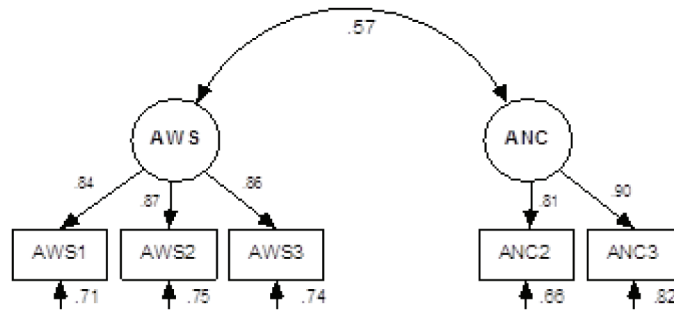
Figure 2. Model testing results (N=594).

The results revealed an excellent fit of the model with the data: c^2=8.41, DF=4, p=0.078, c^2/DF=2.103, TLI=0.993, CFI=0.997, SRMR = 0.0166, RMSEA=0.043.
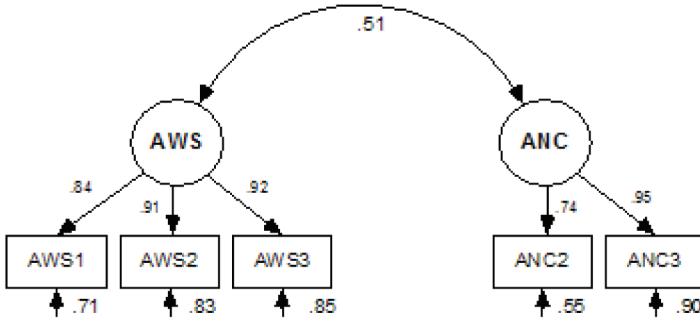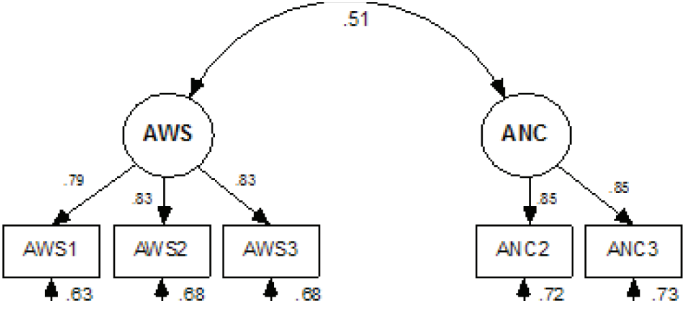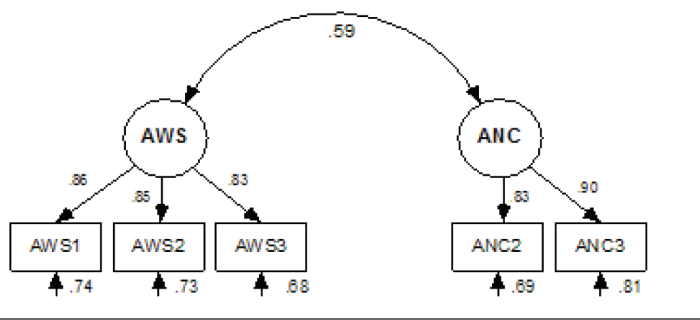
Measurement Invariance

Prior to analysing group differences for the models having latent variables, a measurement invariance analysis is required to check if the constructs are equivalent across groups (Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000). Otherwise, the conclusions are ambiguous (if not erroneous) since it is not clear if the differences are due to different perceptions or to a different interpretation of the sale (Vandenberg & Lance, 2000).

A multi-group CFA (MG CFA) has been carried on in order to analyse the measurement invariance of the model across the three groups. The multi-group CFA is testing a hierarchical series of nested models, starting with a baseline (unconstraint) model that fits all the samples taken together (N=594). Parameters are freely estimated and a baseline chi-square value is derived. Then, a sequence of nested models is obtained by adding constraints or invariance.

The first step in the invariance analysis is to test and validate the model on each group. The results showed that in all cases the evaluation instrument exhibits factorial invariance (invariant factor pattern). The factorial invariance (same factor structure and the same number of items measuring each factor) shows that the groups have a similar perception of the two latent variables. The factorial invariance enables further (more in-depth) comparisons.

The model testing results are presented in Table 4.

Table 4. Model testing results for the three groups.

Testing results	Group / GOF indices
	Group 1(N=176) 1-250 FB friends χ^2=4.933, DF=4, p=0.294, χ^2/DF=1.33, TLI=0.996, CFI=0.998, SRMR = 0.0117, RMSEA=0.037
	Group 1(N=170) 251-500 FB friends χ^2=13.556, DF=4, p=0.009, χ^2/DF=3.39, TLI=0.939, CFI=0.976, SRMR = 0.0229, RMSEA=0.119
	Group 1(N=248) Over 500 FB friends χ^2=4.933, DF=4, p=0.294, χ^2/DF=1.33, TLI=0.996, CFI=0.998, SRMR = 0.0117, RMSEA=0.037

The second step is to test the baseline model. The fit between the model and the data is good: c^2=160.91, DF=44, p=0.000, c^2/DF=3.641, TLI=0.951, CFI=0.929, SRMR = 0.0464, RMSEA=0.067.

The next step is to test the metric invariance between samples by constraining the factor loadings of like items to be invariant (Vandenberg & Lance, 2000). The results show that the evaluation instrument exhibits metric invariance (DF=3, CMIN=0.705, p=0.872, NFI=0.000, IFI=0.001, RFI=-0.009, TLI=-0.009). The implication is that the observed mean differences could be further compared across groups.

The test for scalar invariance between groups requires constraining the item intercepts of like items (Vandenberg & Lance, 2000). The results show that the evaluation instrument exhibits metric invariance (DF=5, CMIN=5.721, p=0.334, NFI=0.003, IFI=0.004, RFI=-0.009, TLI=-0.009). The implication is that the latent means could be compared across groups.

The test for the structural covariance invariance between groups requires constraining the structural covariance of latent variables (Vandenberg & Lance, 2000). The results show that the evaluation instrument exhibits structural invariance (DF=3, CMIN=6.001, p=0.112, NFI=0.004, IFI=0.004, RFI=-0.003, TLI=-0.003). The implication is that the covariance between the two latent variables could be compared across groups.

The measurement invariance analysis answers the second and the third research questions. The model exhibits factorial, metric, scalar, and structural invariance across the three user profiles. The strength of the correlation is the same between the two groups and higher for the third group.

Comparison between Groups

The metric invariance shows the equality of scaling units (Vandenberg & Lance, 2000) and enables the comparison between the observed means. The comparison of the three groups is presented in Table 5.

Table 5. Comparison of the observed scores.

| Group | N | AWS1 | | AWS2 | | AWS3 | | ANC2 | | ANC3 | |
		M	SD	M	SD	M	SD	M	SD	M	SD
1-250	176	1.97	1.58	2.26	1.78	2.17	1.70	2.41	1.77	1.89	1.35
251-500	170	2.22	1.71	2.41	1.67	2.39	1.66	2.76	1.94	2.48	1.79
Over 500	248	2.77	1.92	3.00	1.89	3.06	2.00	3.10	2.01	2.83	1.85
Total	594	2.37	1.80	2.61	1.83	2.60	1.86	2.80	1.94	2.45	1.74

As it could be observed, the larger the network size, the higher the measures of Facebook dependence and negative effects on the university work of students. The one-way ANOVA test shows that the differences are statistically significant for all measures AWS1 (F=1.367, p=0.000), AWS2 (F=10.159, p=0.000), AWS3 (F=13.831, p=0.000), ANC2 (F=6.687, p=0.001), and ANC3 (F=15.756, p=0.000).

The scalar invariance enables the comparison between the two latent means. The results are presented in Table 6 and show that the larger the Facebook network, the higher the Facebook dependence and the negative effects on the work of students.

Table 6. Comparison of the latent means.

| Group | N | AWS | | ANC | |
		M	SD	M	SD
1-250	176	2.13	1.57	2.15	1.44
251-500	170	2.34	1.48	2.62	1.74
Over 500	248	2.93	1.75	2.96	1.81
Total	594	2.52	1.66	2.62	1.72

The one-way ANOVA test shows that the differences are statistically significant for both constructs: AWS (F=14.398, p=0.000), ANC (F=1.029, p=0.000). Overall, given that the scores are on a 1 to 7 points, the Facebook dependence and the negative effects are low for the first two groups and low to moderate for the third group.

Discussion

This study sheds light on the relationship between the Facebook dependence, measured with the withdrawal syndrome scale and the negative consequences for university students. The results show a small to moderate dependence on Facebook and a significant positive correlation with the negative effects on the university work of students. Basically, this correlates with the other researcher obtained outcomes, that social networking websites have quite negative impact on academic performance (Abdulahi, Samadi, Gharleghi, 2014). Research carried out in Turkey shows that 5.1% of students are addicts and 22.6% of students are in the risky group (Balci, Gölcü, 2013).

The comparison between the three user profiles with respect to the network size show large and statistically significant differences regarding the mean number of Facebook friends, the frequency and the duration of use. While students in the first group have on average about 138 Facebook friends and spend on average less than one hour per day, the students in the third group have almost ten times more Facebook friends and spend on average more than an hour and a half on Facebook (almost double).

The excessive use of Facebook are impacting both the Facebook dependence and the negative consequences on the work of students. Although the scores are relatively low, the results clearly show that the higher the network size, the higher the addiction symptoms. On another hand, the third user profile corresponds to the largest group accounting for 41.75 of the total number of observations.

The model testing results for each user profile show that the strength of the correlation between the two latent variables is the same for the first two groups and higher for the third group. In other words, the higher the number of Facebook friends, the higher the negative consequences of the Facebook dependence on the university work of students.

An aspect that can be mentioned takes into account the profile of the Facebook user - the dependence on the social network makes the user practically isolated (in an *ivory tower*), even he or she interferes with real friends, in the virtual space. By sure, we can speak about a *generic* profile which tries to add more friends that seems to be understood as equipped with a massive interest for socialization. But on the other hand, considering the important positive correlation with the negative effects on the students' university work, this can be treated as an evidence that distances the students from each other, making them lonely people, posing barriers in the process of collaborative work and taking proper decisions. Having evaluated the carried out research results it is also obvious, that extensive use of Facebook by students with extraverted personalities leads to poor academic performance. In contrary, students who are more self-regulated, control their presence on these platforms more effectively (Rouis, Limayem, Salehi-Sangari, 2011). This shows, that negative consequences depend not only on intensiveness of usage, Facebook friend number, but also on particular personality traits, that requires further investigating.

On the other hand, Facebook is proper and effective education instrument. It is obvious that Facebook site as a social media is a useful tool to be used to deliver course materials and support learning and/or for other different educational activities. The researchers assert, that students felt comfortable with the use of the Facebook site (Al-Mashaqbeh, 2015). It is without doubt, that Facebook (the other social networks as well) is new and specific education space (Lamanauskas, 2012), and in a wider context this is Edusocial space (Pollara, Zhu, 2011). There

is no doubt, that Facebook and also other social networks will remain popular in the population of university students in future as well. It is obvious, that universities should be interested in engaging and retaining students. The position is ground, that university academic personnel should be very well acquainted with Facebook (and other such technologies) and to design and support interventions that meet students' educational needs (Junco, 2011). Thus, generally speaking, students see a lot of "Facebook" and other social network usage possibilities while learning. Social network usage possibilities in university studies are both big and diverse. In any case, social networks are becoming daily routine of university studies. The question remains basically open – how to maximally use their provided advantages, at the same time seeking to reduce negative effect.

Conclusions

This study contributes with an empirically cross-validated model measuring the Facebook dependence and the negative consequences onto the university work of students. The mean values of items suggest a small to moderate Facebook dependence and small to moderate negative effects. The analysis of measurement invariance onto three samples collected from three Romanian universities shows that the model exhibits factorial and metric invariance. The students perceive the model in the same way: same factor configuration, same pattern of items for each factor, as well as invariant factor loadings.

The results of this work have several implications for researchers and practitioners. First, it contributes to a better understanding of the factors that influence the students' performances, taking into account their solutions for various university works / tasks. It is obvious that the time spent on Facebook leads to impact the students' performances in a negative measure, and as this time increased, the students' performances are clearly affected.

Second, it contributes to a reliable evaluation instrument that performs well across three samples. The factorial structure is stable and the model exhibits metric invariance thus enabling the comparison of all manifest variables. Of course, considering Facebook or any other social network, it is difficult to take in calculus all the factors that influence the students' performances. But there are voices (Kirschner & Karpinski, 2010) tempted to consider that without Facebook, the students might spend their time engaged in other activities which are more oriented on studying.

There are inherent limitations of this work. First of all, the problematic use of social networking websites, in general, and Facebook, in particular, has many facets. In this paper, we focused on two of them. The relationship between other facets of the addictive behaviour may add other useful insights. Second, the samples are relatively small and most of the students have a technical profile. Next studies will collect samples for several universities and focus on the analysis of group differences, both by faculty profile and gender.

Acknowledgement

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