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A MULTIDIMENSIONAL MODEL FOR THE BRIDGING SOCIAL CAPITAL AS PERCEIVED BY UNIVERSITY STUDENTS ON FACEBOOK

Abstract: *The increasing popularity of Facebook among university students stimulates the study of social networking websites and associated social phenomena. As social networking websites are able to provide valuable resources for students there is an increasing interest in measuring the social capital that is formed and developed in university contexts. This paper presents an empirical validation of a multidimensional model for the bridging social capital that has been conceptualized as a global factor with three dimensions: outward looking, broader group, and meeting new people. The model has been tested and cross-validated using two samples collected from two Romanian universities. The results show that the multidimensional model is a better conceptualization having a higher explanatory power than the unidimensional model. An analysis of invariance shows that the proposed scale is equivalent across university profiles thus enabling group comparisons.*

Keywords: *social capital, bridging social capital, multidimensional model, Facebook, Structural Equation Modeling, Multi-group CFA.*

JEL Classification: C31, D80, D83

1. Introduction

Social media, especially social network sites (SNSs) have been one of the most important social phenomena of the last ten years and represent a growing research area for scholars from a wide variety of disciplines. The use of SNS by university students became a challenge for the researchers, scholars, and educational practitioners concerned with the educational advancement (Dawson, 2008; Bosch, 2009; Davis III et al., 2012; Wang et al., 2013). By far, Facebook is considered the most popular SNS among college students (Hew, 2011).

Social media technologies have several positive consequences for university students, such as: support for integration into the university community

(McInnerney & Roberts 2004; Selwyn, 2009), social trust, civic engagement and political participation (Valenzuela et al., 2009; Junco, 2012), or psychological outcomes such as motivation, self-esteem, or self-efficacy (Ellison et al., 2007; Valenzuela et al., 2009, Aydin, 2012).

A research direction that received considerable attention over the last decade is the study of the relationship between Facebook use and various forms of social capital (Ellison et al., 2007; Valenzuela et al., 2009; Ahn, 2012; Ellison et al., 2014). Of particular interest for the study of Facebook use is the bridging social capital (BRSC) featuring weak ties, but providing new opportunities for social development (Jensen & Jetten, 2015), information and resource acquisition (Putnam, 2000; Williams, 2006; Selwyn, 2009; Ellison et al., 2014, Pribeanu et al., 2015), as well as for innovation and cultural diffusion (Granovetter, 1983).

Although several authors are relying on the social capital outcomes to explain various phenomena in higher education, few quantitative studies exist that utilize the measures of the bridging social capital. A possible explanation is the diversity of approaches as regards the measurement (Williams, 2006; Jung et al. 2013; Appel et al., 2014). Another explanation is the exploratory nature of the existing scales that have been validated on a single sample. As Bagozzi & Yi (1988) pointed out, a model which provides the best fit for a given data set may capitalize on the particular characteristics of that sample. As such, the empirical study is rather exploratory than confirmatory and validity remains questionable since it does not guarantee that the model is able to predict a new sample (Bagozzi & Yi, 1988). Moreover, if comparisons between groups are envisaged, the measurement scale should exhibit equivalence across groups (Steenkamp & Baumgartner, 1998; Byrne, 2010).

The aim of this paper is to advance both the theoretical conceptualization and the empirical validation of BRSC as perceived by university students on Facebook thus closing these gaps. Conceptually, it extends this line of research by re-framing BRSC as a second-order multidimensional construct that manifests on three dimensions: outward looking, broader group, and meeting new people. Empirically, it carries on a validation and cross-validation of the model as well as an analysis of invariance across groups by using survey data collected in 2015.

In the following section, we present the theoretical background and conceptualization. Section 3 deals with the empirical validation of the model: the methodological approach, data collection, model validation, and cross-validation. The paper ends with the discussion of findings and conclusion.

2. Theoretical background and model conceptualization

2.1 Social media technologies in the higher education

The social media technologies allow users to present themselves, maintain existing social ties, and establish new social connections. By far, the most popular social network site is Facebook with 1.86 billion monthly active users

(https://www.statista.com). In particular, the number of Facebook users accounts in Romania was 9.6 million in January 2017, with an increase of about 15.66% as compared with the last year (http://facebrands.ro/). From the total of users, 21.47% are young people of 18-24 years old.

Davis III et al. (2012) investigated the ways colleges described the uses of social media and found out that social media is offering several kinds of support: learning / academic (class assignments, course announcements, stronger learning communities, lecture posting, study groups, in-class collaboration, boosting students' academic accomplishment), student support (orientation, mentoring, feedback to the college), community building (strengthening the campus community and sense of belonging, encouraging student involving and participation in activities), and expanding connections.

Facebook provides with various facilities enabling people to communicate, find and share useful information and resources, present themselves, and collaborate. Seeing and accessing contacts in someone's social network create the possibility to extend the own social network in a purposive way. People could create a personal profile in a structured way by presenting their educational background, preferred places, photos, and personal concerns. The Facebook friends facility is a well-known example of how someone could progressively develop the social network by looking for and contacting people. Chat facilities enable the discussions with one or several Facebook friends at a time. Posting on the Facebook wall is another facility that enables people to share and exchange personal thoughts, information, photos, and resources. Facebook provides support for collaboration by the creation of groups. Last but not least, there are several filtering and security options, that enables handling the visibility of information and personal contacts or groups in an appropriate way.

2.2 Social capital

Social capital refers to the resources and benefits available to people, communities and/or broader society through people's social interactions (Bourdieu, 1986; Lin, 1999). Social capital is a controversial, elastic and slippery term that has been defined in many ways and conceptualized from different perspectives (Bourdieu, 1986; Lin, 1999; Putnam, 2000). For Bourdieu (1986) social capital is a sum of actual or potential resources that are linked to the possession of a durable social network. For Putnam (2000), the social capital means features of social life (networks, norms, and trust) enabling people to act together more effectively. For Lin (1999), the social capital means resources that are embedded in a social network and mobilized for purposive actions. The underlying idea behind the social capital is that people invest in social relations expecting some earnings.

There is a large consensus on the multi-dimensional nature of the social capital (Putnam, 2000; Scheufele & Shah, 2000; Williams, 2006) but there are

many divergences regarding the conceptualization and operationalization of its dimensions. Putnam (2000) distinguished two dimensions of social capital: bridging social capital (BRSC) and bonding social capital (BOSC). BRSC occurs when individuals are making connections between social networks. While BOSC is based on strong ties between individuals (family, close friends) that provide support for one another, BRSC is based on weak ties that broaden the social horizons and perspectives on the world and opens new opportunities for information and resources (Granovetter, 1983; Putnam, 2000).

As Putnam (2000) suggested, BRSC is itself a multifaceted concept and its dimensions could be conceptualized starting from four criteria: (1) outward looking and horizons broadening (trying new things, being curious about differences in others and different parts of the world), (2) contact with a broad range of people having different backgrounds (gender, religion, classes, profession), (3) a view of oneself as part of a broader group, and (4) diffuse reciprocity within a broader community (givingness).

Many researchers studying the relationship between social networks and social capital found that an intense Facebook use contributes to the bridging social capital (Ellison et al., 2007; Kwon et al., 2013; Neves & Fonseca, 2015). The development of BRSC is favored by self-disclosure that reveals key information about unknown people, thus making a friend request more likely to be accepted by others in a large and heterogeneous network (Liu & Brown, 2014). In turn, the perception of BRSC is associated with psychological measures of well-being, social skills, and resource requests. Several studies found a positive association between BRSC and the satisfaction with life (e.g., Ellison et al., 2007). The study of Pribeanu et al. (2015) showed that the satisfaction with university life is positively associated with the bridging social capital. Liu & Brown (2014) found that a higher level of bridging social capital among college students is associated with higher social skills. More recently, Ellison et al. (2014) found a positive correlation between BRSC and the mobilization request behavior on Facebook.

2.3 Measuring the bridging social capital

Bridging social capital has been widely researched in the literature, yet no study empirically examined its dimensionality on large samples in an educational context and for a given social networking website. A few studies examined the dimensionality of BRSC on small samples and through lab experiment (Jung et al., 2013) or in a pilot study (Pribeanu et al., 2015). Up to now, both unidimensional and multidimensional measures have been utilized, but there is no validation study providing a comparative assessment.

Williams (2006) took a specific approach to measuring the social capital as an outcome of the social network rather than the network itself. He proposed the Internet Social Capital Scales (ISCS) as an evaluation instrument for the study of social capital formation in the context of information and communication technologies. Same author argued for a rigorous approach by distinguishing

between the online and offline social capital. This operationalization avoids conflating the source of effects and enables further analyses on the relationship between social capital gains or losses when using specific information and communication technologies. The proposed ISCS consists of four scales: two for online and offline BRSC and two for online and offline BOSC. Although ISCS is based on the dimensions suggested by Putnam, Williams has been developed and validated BRSC as a unidimensional construct.

According to Appel et al. (2014), few papers published since 2007 used the original scales proposed by Williams (2006). Many papers utilized various versions of ISCS by dropping the distinction between online/offline, reducing the scale, and changing the wording of items. This way, the interpretation of results is problematic since it is difficult to distinguish between the measures of social capital and other measures. An example is the modified version of ISCS proposed by Ellison et al. (2007) that includes five items adapted from ISCS and four additional items, thus breaking the conceptual grounding of ISCS.

Recently, Jung et al (2013) unpacked the dimensions of BRSC in a three-factor model and found out that some dimensions play an important role in getting favors from Facebook friends while the two forms of social capital (bridging and bonding) do not significantly predict getting favors. They have adapted the structured 10-item scale defined by Williams (2006) for a Facebook network context and tested BRSC along three dimensions: outward looking, broader group, and meeting new people. More recently, in a pilot study of Pribeanu et al. (2015), a multidimensional model of BRSC as perceived by Lithuanian university students on Facebook networks has been proposed. The model has been operationalized following the structured BRSC scale developed by Williams (2006) by contextualizing the items for Facebook network and university context.

2.4 Conceptual model and measurement scale

Based on the findings from the existing research on the social capital, a multidimensional model for the bridging social capital (BRSC) has been specified and validated in this study. The model is measuring the BRSC as an outcome of a Facebook network as perceived by university students. BRSC has three dimensions that manifest in a Facebook network: Outward Looking (OL), Broader Group (BG), and Meeting New People (MNP). The operationalization of the three dimensions is presented in Table 1.

Outward looking (OL) is measuring the extent to which interacting on Facebook is stimulating the curiosity about university life, other places in the world, what other people are thinking, and trying new things. The outcomes of OL are more information, more experience, and awareness. Broader group (BG) is measuring the extent to which interacting on Facebook stimulates a sense of connectedness, membership, and participation. The outcomes are a better

integration in the university community and a holistic view of university activities. Meeting new people (MNP) is measuring the extent to which interacting on Facebook is enlarging the number of contacts and interlocutors. The main outcome is the development of the social network.

Table 1. Dimensions and items

Dimensions		Items
Outward Looking (OL)	OL1	Interacting on FB makes me interested in what goes on at my university
	OL2	Interacting on FB with people from my university makes me want to try new things
	OL3	Interacting on FB with people from my university makes me interested in what people unlike me are thinking
	OL4	Talking on FB with people from my university makes me curious about other places in the world
Broader Group (BG)	BG1	Interacting on FB with people from my university makes me feel like part of a larger community
	BG2	Interacting on FB with people from my university makes me feel connected to the bigger picture
	BG3	Interacting on FB with people from my university reminds me that everyone is connected
	BG4	Interacting on FB with people from my university stimulates me to participate in group activities
Meeting New People (MNP)	MNP1	Interacting on FB with people from my university gives me new people to talk to
	MNP2	Interacting on FB with people from my university, I come in contact with new people all the time

The scale was developed by adapting the items from the BRSC scale of Williams (2006) and the dimensions tested by Jung et al. (2013). The adaptation consists in measuring the outcomes of interaction on Facebook with people from the university. The first item (OL1) was reformulated since outward looking with respect to someone's town is not relevant and thus might be confusing for university students (hometown vs. university town). The interest in what happens in university refers to looking outside the year of study, specialization, and faculty. In this case "people from my university" is implied so it was omitted.

3. Empirical validation

3.1 Methodological approach

In order to empirically validate the model, a Confirmatory Factor Analysis (CFA) using Structural Equation Modeling (SEM) approach was carried on. The

measurement instrument was tested following the procedure proposed by Koufteros et al. (2009) for assessing second-order measurement models. The procedure includes the specification, testing, and the comparative assessment of alternative measurement models.

Three alternative models have been specified in order to validate the conceptualization. The first model M1 (Figure 1a) has one global factor with 10 reflective indicators, similar to the ISCS scale (Williams, 2006). Model M2 (Figure 1b) has three first-order correlated factors, similar to the three-factor model (Jung et al., 2013). M3 (Figure 1c) has one second-order factor and three first-order factors. The models have been tested and validated on two different samples, using AMOS 16.0 (Arbuckle, 2007) with the maximum likelihood estimation method.

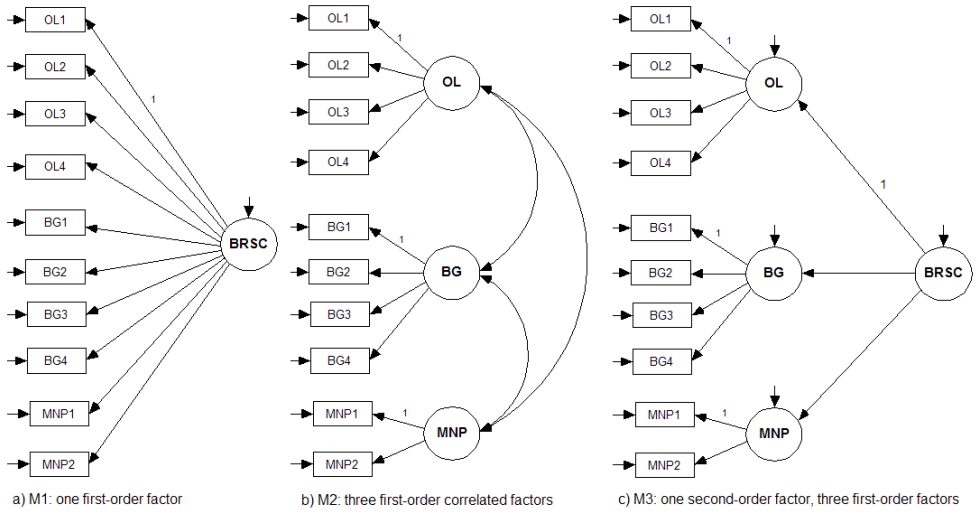

Figure 1. Measurement models

The model fit was assessed through commonly used goodness-of-fit indices: the χ^2 statistic, χ^2/df ratio, Tucker-Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). A satisfactory model fit should exhibit a significant χ^2 statistic, a χ^2/df value below 5, TLI and CFI estimates of 0.90 or higher, RMSEA estimate below 0.08, and SRMR estimate below 0.07 (Hair et al., 2010).

Convergent validity has been assessed by examining the loadings magnitude and statistical significance (*t*-values), item reliability, construct reliability (composite reliability), and average variance extracted. Factor loadings should be greater than 0.50 (ideally exceed 0.7) and *t*-values greater than |2| at 0.05

level. Item reliability indicating the amount of variance in an item due to the underlying construct should be greater than 0.50. Composite reliability (CR) measuring the internal consistency of a given construct should be at least 0.70. The average variance extracted (AVE) measuring the amount of variance captured by the construct should be greater than 0.50 ((Hair et al., 2010).

3.2 Samples and data screening

In order to collect data, a questionnaire was administrated in April – June 2015 to students from two Romanian public universities. Students were asked to answer general questions (faculty, the program of study, year of study, age, and gender), questions regarding the use of Facebook (network size, frequency, and duration of use), and then to evaluate the BRSC items on a 7-points Likert scale (1 - strongly disagree, 7 - strongly agree. Data was examined for the presence of univariate and multivariate outliers. The former was analyzed through standardized scores ($|z| \geq 3.30$) and the latter through Mahalanobis distance ($p<.001$). Also, the normality was investigated in terms of skewness and kurtosis (Hair et al, 2010).

The first sample includes 414 university students (156 men and 258 women) from the University of Economic Studies in Bucharest. From the total of 451 received questionnaires, 37 were eliminated because of missing data or same value for all items. The age of participants is varying between 18 and 37 years with a mean of 21.28 years (SD=2.78). Most of them (313) are undergraduates. The network size has a mean value of 840.6 (SD=825.69). From the total number of Facebook friends, 419.64 (49.92%) are students and 162.92 (19.38%) are studying in this university. The mean number of logs/day (1=once, 2=twice, 3=three times and more, 4-continuous log) is 2.72 (SD=0.98) and the time spent in minutes/day is on average 108.04 (SD=109.37).

The second sample includes 225 university students (129 men and 98 women) from the Building Engineering University of Bucharest. From the total of 235 received questionnaires, a number of 8 were eliminated because of incomplete data. After checking the multivariate outliers other two observations were eliminated. The age of participants is varying between 18 and 39 years with a mean of 20.95 (SD=2.36). As regards the study program, all students except for two are undergraduates. The network size has a mean value of 856.93 (SD=866.18). From the total number of Facebook friends, 416.36 (48.60%) are students and 98.81 (11.53%) are studying in this university. The mean number of logs/day is 3.05 (SD=0.82) and the time spent in minutes/day is on average 79.73 (SD=106.09).

3.3 Model validation

As previously mentioned three alternative models were specified. The first model M1 (unidimensional) assumes that all 10 items are reflective of one a single concept (BRSC). The estimation results for M1 showed a poor fit (χ^2=373.976, df=35, p<0.001, χ^2/df=10.685, TLI=0.824, CFI=0.863, RMSEA=0.153, SRMR=0.061 that illustrates one of the adverse consequences of combining

indicators tapping on different dimensions (Koufteros et al., 2009).

The second model M2 (three correlated first-order factors) is a multidimensional model and the fit indices indicate an acceptable level of fit of the model with the data: χ^2=126.869, df=32, p<0.001, χ^2/df=3.965, TLI=0.946, CFI=0.962, RMSEA=0.085, SRMR=0.036. Comparing the goodness-of-fit indices of M1 and M2 shows that M2 is a better model (lower chi-squared and improved fit indices). Furthermore, as M1 is nested in M2, the difference test in their respective chi-squares and degrees of freedom ($\Delta\chi^2$=147.107, Δdf=3, p<0.001) shows that M2 fits the data better than M1. This leads to consider a multidimensional structure of the bridging social capital.

The third model M3 (three first-order factors and one second-order factor) has identical goodness-of-fit with M2. As noted by Rindskopf and Rose (1998), because there are only three first-order factors, M3 is just identified, and, therefore, the overall test of goodness-of-fit of the model could not test the second-order structure. The two models have the same number of parameters and, therefore, are equivalent. From the point of view of the goodness-of-fit, either M2 or M3 can be chosen. However, if a second-order model fits the data nearly as well as a corresponding first-order model, then the second-order model is a better alternative (Koufteros et al., 2009; Rindskopf and Rose, 1998).

Empirical support for convergent validity of the multidimensional model could be found in the magnitude and significance of estimated parameters as well as in the amount of variance explained (see Table 2). All standardized factor loadings were statistically significant (*t*-values > 1.96), and ranged from 0.66 to 0.89, which were above the recommended threshold of 0.60. The item reliability (R^2) values are above the suggested standard of 0.5.

Table 2. Descriptives, convergent validity for the first-order factors (N=414)

First-order factors	Item	M	SD	Loading (λ)	*t*-value	R^2
Outward Looking (OL)	OL1	4.13	1.78	0.66	-[a]	0.43
	OL2	3.58	1.62	0.80	13.61	0.65
	OL3	3.57	1.62	0.81	13.70	0.66
	OL4	3.78	1.69	0.72	12.51	0.52
Broader Group (BG)	BG1	3.65	1.67	0.85	-[a]	0.72
	BG2	3.69	1.59	0.80	18.83	0.64
	BG3	3.49	1.70	0.78	18.13	0.60
	BG4	3.69	1.67	0.76	17.73	0.58
Meeting New People (MNP)	MNP1	4.05	1.68	0.89	-[a]	0.79
	MNP2	3.75	1.67	0.87	19.98	0.75

[a] Indicates a parameter fixed at 1.00 in the original solution

Furthermore, as shown in Table 3, the Cronbach alpha (α) and the composite reliability (CR) of each first-order factor are above the minimum level required. The average variance extracted (AVE) is above the minimum recommended level of 0.50 (Fornell and Larker, 1981). Among the AVEs of factors, MNP had the highest value of 0.772, indicating that 77.2% of the variance in the specified indicators was accounted for by this factor.

Table 3. Descriptives, convergent validity for the second-order factor (N=414)

First-order factors	M	SD	α	CR	AVE	Second-order factor		
						Loading(γ)	*t*-value	R^2
Outward Looking (OL)	3.77	1.36	0.83	0.84	0.564	0.903	12.93	0.81
Broader Group (BG)	3.63	1.41	0.87	0.87	0.635	0.907	17.37	0.82
Meeting New People (MNP)	3.90	1.57	0.87	0.87	0.772	0.830	16.39	0.69

The correlations between the first-order factors are high, with values ranging from 0.75 (between OL and MNP, BG and MNP) to 0.82 between OL and BG. The high correlations between dimensions suggested the presence of a second-order factor explaining the common variance (Koufteros et al., 2009).

For multidimensional constructs, it is also important to examine the convergent validity of lower-order factors as reflective indicators of the higher-order construct. As shown in Table 3, all standardized second-order factor loadings are large and exhibit high *t*-values at the 0.001 significance level. Specifically, the results indicated that Broader group (γ= 0.907, *t*-value=17.37) and Outward looking (γ= 0.903, *t*-value=12.93) were the strongest dimensions of the second-order factor (BRSC), followed by Meeting new people (γ= 0.830, *t*-value=16.39). The high values of the coefficient of determination (R^2) for each of dimension indicate that BRSC construct explains a high degree of variance in every case.

The construct reliability (CR) for the second-order factor (BRSC) is 0.912, above the minimum recommended level of 0.70. This suggests that the dimensions are sufficiently representative on the second-order factor. The value of the average variance extracted (AVE) for second-order factor is 0.776, above the minimum level of 0.50. These results suggest that, on average, more than two-thirds of the variance in the dimensions are shared with a second-order factor and thus provide evidence of convergent validity.

To assess the overall relationship between the second-order factor (BRSC) and its dimensions, we computed the total (multivariate) coefficient of determination (R^2_m), as suggested by Edwards (2001). This represents the amount of variance in the set of dependent variables (BRSC dimensions) explained by the independent variable (BRSC construct). BRSC exhibited strong multivariate relationships with dimensions OL and BG, as evidenced by R^2_m value of 0.766 and

0.699, respectively. Also, relationships between BRSC and MNP dimension have been moderate, with R^2_m value of 0.499. Therefore, M3 allows capturing the variance explained in each dimension by the second-order construct with more precision (Edwards, 2001). Also, each dimension captures a unique aspect of the BRSC concept and demonstrates a unique relationship to the general concept.

In order to explore if the network size is predicting BRSC, a simple linear regression was performed on Facebook friends that are students in the university. The regression analysis results show that Facebook friends explain 2.6% variance in BRSC (R=0.168, R^2=0.028, Adj. R^2=0.026, F (1,409) =18.62, Sig.<0.001). The standardized coefficient beta was 0.168 (*t*-value=3.451, Sig.<0.001).

3.4 Cross-validation on a different sample

Thus far, the BRSC scale validation was achieved by testing the model on a single sample. Even though the second-order factorial structure has an acceptable fit with the data, we recognize that the results could be specific to this particular sample. Therefore, we used the second sample (N=225) to validate the model.

The results for M1 (unidimensional) showed a poor fit: χ^2=267.399, df=35, p<0.001, χ^2/df=7.640, TLI=0.805, CFI=0.848, RMSEA=0.172, SRMR=0.069. The fit indices for M2 and M3 indicate a satisfactory level of fit of the proposed model with the sample data: χ^2=93.927, df=32, p<0.001, χ^2/df=2.935, TLI=0.943, CFI=0.960, RMSEA=0.093, SRMR=0.044. The difference in chi-squares and degrees of freedom ($\Delta\chi^2$=173.472, Δdf=3, p<0.001) shows that M2 and M3 provide a better fit, thus cross-validating the conceptualization of BRSC as a second-order factor with three dimensions.

All standardized factor loadings were statistically significant and above the recommended threshold of 0.60. The item reliability (R^2) values are above the suggested standard of 0.5 (see Table 4).

Table 4. Descriptives, convergent validity for the first-order factors (N=225)

First-order factors	Item	M	SD	Loading(λ)	*t*-value	R^2
Outward Looking (OL)	OL1	3.80	1.71	0.75	-[a]	0.56
	OL2	3.62	1.77	0.90	13.76	0.81
	OL3	3.54	1.74	0.87	13.33	0.76
	OL4	3.92	1.80	0.74	11.23	0.55
Broader Group (BG)	BG1	3.69	1.74	0.84	-[a]	0.71
	BG2	3.53	1.70	0.87	16.07	0.75
	BG3	3.36	1.77	0.74	12.69	0.55
	BG4	3.82	1.78	0.81	14.42	0.65
Meeting New People (MNP)	MNP1	4.10	1.65	0.86	-[a]	0.74

	MNP2	3.67	1.71	0.81	12.47	0.66

[a] Indicates a parameter fixed at 1.00 in the original solution

The composite reliability (CR) of each first-order factor is above the minimum level of 0.70 and the average variance extracted (AVE) is above the minimum recommended level of 0.50 (see Table 5). The correlations between the first-order factors are high: 0.67 between OL and MNP, 0.80 between OL and BG, and 0.81 between BG and MNP. Overall, the testing results show that the second-order factor structure is well supported in the cross-validation sample.

Table 5. Descriptives, convergent validity for the second-order factor (N=225)

First-order factors	M	SD	α	CR	AVE	Second-order factor		
						Loading(γ)	*t*-value	R^2
Outward Looking (OL)	3.72	1.51	0.88	0.88	0.669	0.809	10.22	0.65
Broader Group (BG)	3.60	1.51	0.89	0.89	0.667	0.982	13.73	0.96
Meeting New People (MNP)	3.88	1.55	0.82	0.82	0.700	0.822	11.37	0.68

The relationships between the second-order factor (BRSC) and the dimensions OL and MNP were moderate, as evidenced by R^2_m value of 0.537 and 0.511, respectively. Also, the relationship between BRSC and BG dimension has been high, with R^2_m value of 0.928. Thus, these results provide cross-validation that each dimension captures a unique aspect of the BRSC concept and demonstrates a unique relationship to the general concept.

In order to explore if the network size is predicting BRSC on this sample, a simple linear regression was performed on Facebook friends that are students in the university. The results show that Facebook friends explain 13.6% variance in BRSC ($R=0.374$, $R^2=0.140$, Adj. $R^2=0.136$, $F(1,223)=36.17$, Sig. <0.001). The standardized coefficient beta was 0.374 (*t*-value=6.014, Sig. <0.001).

3.5 Invariance analysis across university profiles

Comparisons between groups require evaluation instruments that exhibit adequate equivalence across groups. In other words, the constructs should be invariant across groups. Otherwise, the conclusion based on the measurement scale is ambiguous if not erroneous since it is not possible to assess if the differences are due to different perceptions or a different interpretation of the evaluation instrument (Steenkamp and Baumgartner, 1998; Byrne, 2010).

In this study, the two samples having different university profiles were used: economic profile ($N_1=414$) and building engineering profile ($N_2=225$).

A multi-group CFA (MGCFA) has been conducted to assess whether the scale is invariant across profiles. Following the methodology recommended by Chen, Sousa, and West (2005) a hierarchical series of nested models were tested. The starting model is a baseline model that fits the two samples taken together

(N=639). All parameters are freely estimated (configural invariance) and a baseline chi-square value is derived. Then, a sequence of nested models is obtained by adding constraints for invariance. At each step, a lack of invariance is signalled by a statistically significant chi-square difference ($\Delta\chi^2$) for the respective pair of nested models. As the $\Delta\chi^2$ test becomes bias when sample sizes increases, Cheung and Rensvold (2002) recommended using ΔCFI < –.01, which indicates a decrease in CFI larger than .01 and should be interpreted as a signal for lack of invariance. The results are summarized in Table 6. The results of configural invariance testing (m0) revealed a good fit, pointing that the factor loading patterns are equivalents across groups. It means that students from the two samples are employing the same conceptual frame of reference.

Table 6. The GOF indices for profile invariance tests (N=639)

	χ^2	df	CFI	$\Delta\chi^2$	Δdf	p	ΔCFI
m0: configural invariance	220.796	64	.961	-	-	-	-
m1: first-order factor loadings invariant	226.567	71	.961	5.771	7	.567	.000
m2: first-order loadings and item intercepts invariant	249.577	78	.957	23.010	7	.010	–.004
m3: first- and second-order factor loadings and item intercepts invariant	254.101	80	.956	4.524	2	.104	–.001
m4: first- and second-order factor loadings, item intercepts, and first-order factor intercepts invariant	254.186	83	.957	.085	3	.994	.001

The examination of the $\Delta\chi^2$ and ΔCFI in Table 6 provides evidence for invariant first-order factor loadings (m1-m0), second-order factor loadings (m3-m2), and second-order intercepts (m4-m3). If we rely on the criteria suggested by Cheung and Rensvold (2002), then comparison shows that invariance is achieved at all levels. As noted by Chen, Sousa, and West (2005), ΔCFI might be considered a liberal test, whereas the $\Delta\chi^2$ might be considered a too-conservative test.

4. Discussion

This work contributes with a theoretically grounded and empirically validated model measuring the bridging social capital as perceived by university students on Facebook. BRSC has a robust and meaningful second-order multidimensional structure. In addition, a second-order factor model is a better conceptualization having a higher explanatory power than a unidimensional model.

It is worth noting that when taking a unidimensional approach is possible that either the latent variable does not load in a satisfactory way on all 10 items (e.g. Ellison et al., 2014) or the convergent validity is not achieved. This leads to dropping out some items. In this case, the results are susceptible of capitalization by chance, since the validated scale is different from the conceptualized scale. In general, when changing the items of an existing scale a validation on another sample is needed, otherwise, the approach is only exploratory.

In both samples, BRSC manifested more on the second dimension (broader group), which confirms the results of previous studies (Jung et al., 2013; Pribeanu et al., 2015). The usage data in the two samples show large Facebook networks, which suggest that university students are extensively using the 'Facebook friends' facility. The fact that about half of the Facebook friends are university students suggests that they have a strong view of themselves as part of a larger community that expands beyond the year of study and faculty boundaries.

The analysis of invariance across profiles (economics vs. building engineering) provides evidence for configural, metric, and scalar invariance. In this regard, the three dimensions of the BRSC scale have the same meaning across groups (samples), and the students from the two universities answered the items in the same way. This finding has two implications: it brings further evidence for the reliability of the measurement scale and it enables comparisons. The comparison of the results shows two things. First, in both samples meeting new people dimension was rated higher, followed by outward looking and broader group. Second, there are some differences between the two university profiles. Students in economics have a slightly higher perception of each BRSC dimension as well on the global factor than students in building engineering. Also, the students in economics have a higher perception than students in building engineering as regards the degree to which the interaction on Facebook is raising interest in the university life.

The underlying idea of this study was to better understand the benefits of the Facebook use in a university context. In this respect, the model enables a more precise measurement of the social capital developed by interacting on Facebook with university people. The testing results show relatively low mean values of BRSC and associated dimensions as well as relatively low predictive power of the number of Facebook friends that are studying in the same university. This suggests that the development of BRSC is likely to be more related to the interaction with people from outside the university. Although the model has been tested on Facebook, the scale could be easily adapted for other social networking (e.g., by replacing Facebook with the target social networking website) as well as for other BRSC sources (e.g., by replacing "people from university" with "other students").

The validation and cross-validation of the second-order factor measuring BRSC have several benefits for the researchers interested in measuring the social capital. It goes without saying that only valid measures of BRSC and associated dimensions enable drawing inferences as regards the consequences of BRSC on another variable of interest. Since the unidimensional nature of each dimension has

been demonstrated, by averaging items of each dimension the resulted means could be used as indicators of a first-order construct (Bagozzi and Edwards, 1998). This way, the BRSC could be included in other models relating latent variables. For example, it would be worthwhile to relate BRSC with other variables that are measuring college enrolment, student engagement, academic performance, or professional identity formation.

The multidimensional model is also useful for education practitioners aiming to understand the perceived value of interacting on Facebook with people from the university. Since the use of social media is part of the students' lifestyle, educators should adapt and maximize the educational use of Facebook. In this respect, each BRSC dimension is of interest for the adjustment to college.

There are several limitations that should be considered for future research. First, typical limitations are associated with the cross-sectional nature of the study. Second, most students are undergraduates and come from one faculty of each university. Also, the data have been collected from only two Romanian universities. Future research needs to validate the models on other samples and check the measurement invariance. Third, the study was carried out within a specific domain of BRSC (Facebook use by university students) in a specific context. A future research direction is to test the BRSC scale in other cultural settings in order to assess its stability across different countries, samples, and contexts. Another research direction is to analyze the relationship between BRSC and other variables of interests, such as motivation to use Facebook and perceived educational usefulness.

5. Conclusion

This paper provides empirical justification for a multidimensional model featuring three key dimensions of the bridging social capital as perceived by students: outward looking, broader group, and meeting new people. The results show that a second-order factor model is a better conceptualization than a unidimensional model. A valid and reliable evaluation instrument for assessing BRSC has been developed. The instrument has been tested following a systematic methodological approach, including assessment of reliability, convergent validity, cross-validation on a second sample, and invariance analysis.

The study reported in this article represents an essential step in validating the bridging social capital scale. As such, it enables further work on investigating the relationship between the bridging social capital and other variables of interest as well as group comparisons and cross-cultural studies.

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