



Online interaction by university students in Chile, Spain and Mexico

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Abstract

Social media sites have become an important tool for socialisation and political engagement, particularly in the case of young people. This article aims to explore the relationship between, on the one hand, the consumption and political use of social media and (a) the sense of political efficacy and (b) the building of social capital. The study presented focuses on university students from Chile, Spain and Mexico, who were surveyed during 2017–2018. A quantitative methodology combining univariate, bivariate and multivariate data analysis was used, with the results revealing that the sense of political efficacy is influenced by the political use of social media, while social capital is influenced by both the consumption of social media and the political use made thereof.

Keywords Social media · Political efficacy · Social capital · University students

Introduction

The effects of social media on political engagement have merited increased study in recent years. Social media sites have become one of the main sources of information for young people on issues of public interest. The influence of social media on the political behaviour of citizens, especially young people, has

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attracted considerable research attention. In particular, their role in encouraging political participation has become a growing field of study. However, insufficient scholarly attention has been paid to how social media can change political attitudes, particularly among young people still immersed in the process of political socialisation. Such attention is warranted given that political attitudes are more stable over time than political behaviour, which occurs at a particular and unique moment in time. Moreover, political attitudes can condition future political behaviour. There is a specific need, therefore, to investigate how the consumption and use of social media can shape the political attitudes of young people.

Consumption and use of social media can influence two key sociopolitical attitudes: the building of social capital and the strengthening of the sense of internal and external political efficacy. The present study sets out therefore to answer the following research question: do the consumption and use of social media influence political efficacy and social capital?

An idea frequently present in discussions in various academic works is that general conclusions are valid for the context and specific point in time analysed. For this reason, a survey was conducted in three major Spanish-speaking countries—Chile, Spain and Mexico—between the end of 2017 and the second half of 2018 for the purpose of identifying similarities and differences between the three contexts. All three countries witnessed influential social movements which first emerged in cyberspace and subsequently spread to the streets. The so-called Chilean winter of 2011 was a mobilisation for policy reforms which was organised by young people on virtual social networks (Eltit 2012). For its part, the 15-M Movement in Spain consisted of a series of protests against the ruling political class (Espinar 2015). Lastly, in Mexico's #YoSoy132 Movement a sector of young people challenged the country's media duopoly during the presidential elections of 2018 (Torres 2015). Since these events, the consumption of social media has spiralled and they have become not only one of the preferred news sources for young people but also an indispensable tool for political and institutional communications by the authorities in the three countries. This digital activism makes the three national contexts an ideal case study to analyse the influence of social media on two key political attitudes: political efficacy and social capital.

Accordingly, the main objective of the research is to investigate the relationship between the consumption and use of social media by young people in Chile, Spain and Mexico and (a) the building of social capital and (b) an increased sense of political efficacy, which is acknowledged as being a key element in civic engagement. Consumption of social media is taken here to mean the time devoted to using such tools, whereas use of social media refers to their use for political ends.

In the absence of empirical evidence, the following are posited as hypotheses and possible responses to the research question:

H1 The political efficacy of university students increases with increased consumption of social media.

H2 The political efficacy of university students increases with increased use of social media for political ends.

H3 The social capital of university students increases with increased consumption of social media.

H4 The social capital of university students increases with increased use of social media for political ends.

Political efficacy

Various studies have established a positive link between the sense of political efficacy and different modes of conventional political engagement, especially voting in elections (Michelson 2000; Anderson 2010; Diemer and Rapa 2016; Boulianne, and Ohme 2022). It is important to recall that, according to Craig (1979), the construct of political efficacy is broken down into two categories: internal efficacy and external efficacy. The former refers to an individual's perception of their capacity to influence collective issues, while the latter refers to their belief that their individual actions can contribute to changing the environment.

Dyck and Lascher (2009) argue that the sense of political efficacy is stronger in democratic systems. This is because, in a regime with extensive freedoms, citizens are more likely to believe that they can influence political affairs. With regard to university students, the study by Pasek et al. (2008) shows that young people who possess a strong sense of political efficacy tend to participate more actively in collective affairs.

Regarding online political engagement, various research (Park 2015; Yamamoto et al. 2017; Oser et al. 2022) has shown that social media help reinforce the sense of political efficacy. This is because the information disseminated and political actions undertaken on virtual platforms can lead users to seek to influence. However, as the conclusions of Lane et al. (2018) show, for this to happen, it is vital that Internet users have a prior interest in politics.

Social capital

Participation on social media contributes to leveraging social capital in individuals (Lee 2017; Shpigelman 2018). Moreover, according to Yen (2016), it can prove crucial in terms of motivating some social actors to transmit knowledge via such media. In some cases, user gender can be an important differentiator in strengthening the construct (Huang et al. 2018). However, results obtained by Son et al. (2016) suggest that strengthening social capital among Internet users requires specific behaviour, including shared values and trust among the virtual community.

Virtual social networks such as Facebook can act as a bridge between young people who suffer low self-esteem, although this connection may vary depending on the context (Johnston et al. 2013). Differences may also arise due to the personality of the users and the effect of social media is not uniform therefore. Results from

the study conducted by Stronge et al. (2015) reveal that introverts with Facebook accounts experienced greater difficulty connecting with other people, whereas extroverts found it much easier to socialise, with or without social media.

The above findings are in line with those of Guo et al. (2017) and Glaser et al. (2018) that offline social interaction and activities are crucial if virtual platforms are to contribute to the consolidation of social capital. The studies by Warren et al. (2015) and Simons et al. (2021) acknowledged that a common language, close ties to the community, and a shared vision are key to motivating online civic engagement. A further important factor is that, while social media contact can help reinforce ties with different people, there comes a point when an excessive number of “friends” may lead to a loss of privacy and this can cause some users to be cautious in terms of sharing content (Brandtzæg et al. 2010; Huang et al. 2021).

Social media and sociopolitical engagement

Chile

The mobilisation of young people on social media in Chile was a precursor of similar mobilisations throughout Latin America at the beginning of 2010's. Essentially, it commenced with student protests demanding greater access to education in a context of largely private provision (Donoso 2013; Slachevsky 2015).

Chilean students began to abandon traditional information sources in a transition which saw social media such as Facebook become a platform for interaction and news consumption. A trend emerged also whereby online civic engagement was complemented by offline participation, with the former eventually triggering the latter in some cases (Scherman and Arriagada 2012; Valenzuela et al. 2012; Condeza et al. 2014).

This historic moment was a turning point in the contemporary history of the country as regards political communication. In subsequent elections, political communication aimed at young people was channelled largely through digital platforms, a clear sign that emerging media also influenced conventional participation (Bacallao-Pino 2016).

With the passing of time, the use of social media in Chile as a source of information to counteract that offered by traditional media outlets and as a channel for collective organisation spread to other sectors of the population. At the end of 2019, broad sectors of society in Chile mobilised both in protest at certain policies of Sebastián Piñera's second government and to call for greater spaces of democratisation (Jiménez-Yañez 2020; Pizarro 2020).

Spain

The 15-M movement emerged in Spain shortly after the Arab Spring uprisings in which the people of Tunisia and Egypt succeeded in ousting the leaders of authoritarian governments through mass street protests organised on social media (Rennick 2013; Lynch 2015).

In Spain large crowds gathered in public squares on 15 March 2011 in response to a series of calls made on social media. The protestors called on the authorities to increase efforts to address the effects of the economic crisis suffered by the country and also denounced the lack of representative democracy in the Spanish political system (Castells 2012; Bonet 2015).

The movement spawned a new form of social organisation by a range of different social groups around various causes (Casas et al. 2016). It also paved the way for the gradual emergence of a number of political actors who would come to occupy an important place in Spanish politics (Bonet 2015; Rendueles 2015; García and Sáiz 2022).

In the elections which followed, new parties on both the left and right sought to capitalise on voter discontent with the mainstream parties. The emerging options, such as Podemos and Ciudadanos, also made extensive use of social media to put across their election manifestos (Rivero 2015; Cea 2019). Things have effectively changed in the last decade, to the point in where a far-right party called Vox has risen in popularity, also using a strategy in where they use social network sites to promote their programme (Vico and Rey 2020).

Mexico

In Mexico, the country with the largest Spanish-speaking population in the world, glimpses of change became apparent during the 2012 presidential elections. A particularly controversial subject was the alleged covert support given by the main media companies (especially Televisa, Mexico's most important broadcaster) to the candidate of the *Partido Revolucionario Institucional* (PRI), the party that had governed Mexico for most of the twentieth century and was preparing to return to power after an absence of 12 years (Meyer 2013; Navarro 2016).

To counter what they considered biased media coverage in favour of the PRI's Enrique Peña Nieto, a broad and heterogeneous group of university students mobilised to form the #YoSoy132 movement (Red 2013; Castillo 2014; Portillo 2015). Although they did not prevent Peña Nieto from winning, they did manage to place on the agenda the need to democratise the mass media, whose ratings and credibility in the eyes of the public declined substantially.

In the years that followed, virtual media became a tool that changed how young people socialised and sourced information on issues of public interest (Crovi 2013) and social media became firmly established as a key information source in subsequent elections in Mexico (Hernández 2019; Islas and Arribas 2019; Tlachino and Macías 2020).

In the presidential elections of 2018, social media were acknowledged as having a fundamental role in the candidates' communications strategy and were used extensively by Mexican voters to follow developments (Mendieta 2019). In addition, a fact-checking platform known as *VerificadoMx* was set up by journalists to counter fake news on social media during the elections. The interesting aspect is that this initiative was organised virtually and became a precedent in the fight against disinformation in the digital age (Magallón, 2019).

Methodology

A quantitative methodology was used to answer the research question, enabling results to be drawn which are representative of the study population (here: university students). During the period 2017–2018 three surveys of university students were conducted in Chile, Spain and Mexico with a sample of 1058, 627 and 1239 individuals, respectively. Non-probability convenience sampling was used for the surveys, which were carried out with students from a range of degrees in both public and private universities. The questionnaire was delivered online using Google Forms.

The dependent variables—political efficacy and social capital—were measured using various indicators on an ordinal response scale reflecting the degree of agreement or disagreement of respondents with a series of statements. The political efficacy variable consisted of eight items and the social capital variable consisted of eleven. Table 1 sets out all the items for both dependent variables. The responses for all the indicators were measured using an ordinal scale as follows: (1) strongly disagree; (2) disagree; (3) neither agree nor disagree; (4) agree; and (5) strongly agree.

Table 1 Indicators of political efficacy and social capital

Political efficacy

1. My vote makes a difference
2. The information I share on social media is quality information
3. The information I share on social media can help raise other people's awareness of issues I consider to be important
4. I can make a difference if I participate in politics
5. I have ways to influence the actions of government
6. I have ways to influence the actions of political parties
7. I have ways to influence the actions of candidates in elections
8. The comments I post on social media can help change the opinions of others

Social capital

1. I usually talk with my parents
2. I like to take part in activities designed for young people
3. My parents generally get involved in my day to day activities
4. I see my siblings every week
5. I see my friends every week
6. I feel I have strong community ties
7. I feel that social media help generate trust among members of society
8. I think social media help reduce mistrust among people offline
9. I believe social media in some way increase trust among people who do not know each other outside of Internet
10. I feel I have strong ties to my social media contacts
11. I trust my social media contacts as much as my real-life contacts

Source: Authors (2020)

Firstly, a univariate descriptive analysis will be undertaken to ascertain university students' degree of agreement or disagreement with each of the statements of the indicators of the variable dependents.

Following a detailed examination of the indicators, as a second stage an index based on these will be created for each of the two variables. This methodological procedure offers two important analytical advantages: it allows the individuals' political efficacy and social capital to be measured and summarised in a single data item, thus facilitating a comparison of the variables across the three countries studied. It also allows bivariate and multivariate analysis to be performed to identify possible causal relationships, that is, the factors that influence political efficacy and the building of social capital.

Each index comprises the indicators that make up its respective dependent variable. Each of the indicators is first converted to a scale of 0–1 by assigning the following values to the ordinal response scale categories: strongly disagree (0.00); disagree (0.25); neither agree nor disagree (0.50); agree (0.75); and strongly agree (1.00). The indicators of each dependent variable are then added together. This creates an index of political efficacy of between 0 and 8 (as there are eight indicators on a 0–1 scale) and an index of social capital of between 0 and 11 (eleven indicators on a 0–1 scale).

Thirdly, a bivariate analysis will be performed using the ANOVA method to compare the political efficacy index and social capital index across the three countries. The mean of each index will be compared across Chile, Spain and Mexico to test for significant differences between them. In other words, whether or not university students in these countries exhibit different levels of political efficacy and social capital.

Fourthly and lastly, a multivariate analysis will be performed to assess whether the consumption and use of social media influence the sense of political efficacy and the building of social capital. To that end, two multiple linear regression models will be developed for each country (6 multiple linear regressions in all). The dependent variables of the models are, therefore, the index of political efficacy and the index of social capital. Bearing in mind the research question and hypotheses posited, the independent variables are defined as follows: consumption of social media and political use of social media. The application of the two multiple linear regression models will thus enable us to verify two key questions. Firstly, whether the sense of political efficacy and the building of social capital increase with increased consumption of social media. Secondly, whether political efficacy and social capital increase with increased political use of social media. Finally, age, gender, and type of university will be incorporated as control variables, in this last case because studying in a public or private university may have consequences for political efficacy and social capital due to the potentially different social relationships arising in each type. The independent variables and control variables included in the analysis and their respective codings are shown in Table 2.

Table 2 Independent and control variables

Variable	Coding
Consumption of social media	Scale of 0–6 (Value 0= None; Value 1= A few minutes; Value 2= Half an hour; Value 3= One hour; Value 4= Two hours; Value 5= Three hours; Value 6= More than three hours daily)
Political use of social media	Scale of 0–14 (Comprises 14 indicators on a scale of 0–1: Value 0.00= None; Value 0.25= A little; Value 0.50= Some; Value 0.75= Quite a lot; Value 1.00= Extensively) [Indicators: 1. I look for information on politics; 2. I read humorous content related to politics; 3. I share humorous content related to politics; 4. I read discussions on politics; 5. I take part in discussions on politics; 6. I watch videos with political content; 7. I share videos with political content; 8. I post personal opinions on politics; 9. I “like” a comment on politics by another user when I agree with it; 10. I post information on politics on my profile; 11. I follow the accounts of politicians whom I like; 12. I follow the accounts of journalists, opinion leaders or columnists who publish information on politics; 13. I respond to comments posted by politicians; 14. I sign petitions on collective issues I agree with]
Type of university	Dichotomous (Value 0= Public; Value 1= Private)
Gender	Dichotomous (Value 0= Male; Value 1= Female)
Age	Scale of 1 to 4 (Value 1= 16 to 20; Value 2= 21 to 25; Value 3= 26 to 30; Value 4= 31 or more)

Source: Authors (2020)

Results

Political efficacy and social capital of university students in Chile, Spain and Mexico

The results obtained from the univariate analysis for the political efficacy of university students in Chile, Spain and Mexico are given in Table 3. For a clearer presentation of the results, the table shows the response given by the greatest number of respondents for each of the indicators used to measure political efficacy.

To the statement “my vote makes a difference”, student in Chile (49.6%) and Mexico (45.6%) responded strongly agree, whereas those in Spain responded neither agree nor disagree (30.3%). This last answer was the one mostly chosen by students in all three countries in response to the statement “The information I share on social media is quality information”: 44.4% in Chile, 38.8% in Spain and 44.1% in Mexico. The statement “The information I share on social media can help raise other people’s awareness of issues I consider important” also produces a consensus given that students in the three countries mostly responded

Table 3 Political efficacy of young people in Chile, Spain and Mexico

	Chile		Spain		Mexico	
	Most popular response	% Total	Most popular response	% Total	Most popular response	% Total
My vote makes a difference	Strongly agree	49.6	Neither agree nor disagree	30.3	Strongly agree	45.6
The information I share on social media is quality information	Neither agree nor disagree	44.4	Neither agree nor disagree	38.8	Neither agree nor disagree	44.1
The information I share on social media can help raise other people's awareness	Agree	34.4	Agree	39.4	Agree	32.0
I can make a difference if I participate in politics	Strongly agree	29.2	Agree	27.3	Strongly agree	31.8
I can influence the actions of government	Neither agree nor disagree	27.5	Disagree	31.7	Neither agree nor disagree	36.7
I can influence the actions of political parties	Strongly disagree	34.0	Strongly disagree	32.1	Neither agree nor disagree	36.0
I can influence the actions of candidates in elections	Strongly disagree	29.8	Disagree	30.8	Neither agree nor disagree	38.0
The comments I post on social media can help change the opinions of others	Neither agree nor disagree	32.3	Agree	31.3	Neither agree nor disagree	37.0

N = 1058 (Chile), 627 (Spain) and 1239 (Mexico). There are 5 Values: (1) Strongly disagree, (2) Disagree, (3) Neither agree nor disagree, (4) Agree, (5) Strongly agree
 Source: Authors (2020)

agree (34.4%, 39.4% and 32.0%). In general, respondents support the view “I can make a difference if I participate in politics”: Chileans (29.2%) and Mexicans (31.8%) strongly agree while Spaniards (27.3%) agree. The remaining statements elicited more varied responses. For example, university students in Chile (27.5%) and Mexico (36.7%) neither agree nor disagree with the statement “I can influence the actions of government”, whereas their counterparts in Spain disagree (31.7%). Chileans (34.0%) and Spaniards (32.1%) strongly disagree that they have the ability to influence the actions of political parties, with Mexicans preferring the neither agree nor disagree option (36.0%). With regard to the statement that they can influence the actions of candidates in elections, the top response in Chile was strongly disagree (29.8%), in Spain disagree (30.8%) and in Mexico neither agree nor disagree (38.0%). Lastly, Spanish university students (31.3%) agree with the statement “I can help change the opinions of others”, whereas Chileans (32.3%) and Mexicans (37.0%) neither agree nor disagree.

The results obtained from the univariate analysis for the social capital of university students in Chile, Spain and Mexico are given in Table 4. As above, the most popular response is shown for the eleven indicators used to measure social capital.

According to the above, the majority of university students surveyed talk with their parents: strongly agree was selected by 55.2% of Chileans, 53.9% of Spaniards and 53.1% of Mexicans. Meanwhile, students in all three countries take part in activities for young people, with agree selected by 31.5%, 33.0% and 30.6%, respectively. In response to the statement “my parents get involved in my activities”, 23.6% selected Agree, while 28.2% of Chileans and 29.2% of Mexicans chose neither agree nor disagree. The statements “I see my siblings every week” and “I see my friends every week” produced consensus in Chile, Spain and Mexico, with 47.2%, 47.4% and 50.6% selecting strongly agree for the former and 46.1%, 54.9% and 51.7% for the latter, respectively. With respect to ties to the community, the intermediate neither agree nor disagree was the preferred option for Chileans (31.2%), Spaniards (29.0%) and Mexicans (36.0%).

Turning to the social capital indicators related specifically to social media, no clearly defined position emerges in any of the countries concerning whether social media help generate trust among members of society or if they help reduce trust among people outside Internet. For the two statements, the response neither agree nor disagree was chosen, respectively, by 34.2% and 31.9% of Chileans, 36.0% and 37.0% of Spaniards, and 35.0% and 38.5% of Mexicans. Chileans (32.3%) and Mexicans (38.5%) also opted for this response to the statement “social media increase trust between people who do not know each other”, whereas a majority of Spanish university students expressed their agreement.

Similarly, there is no clear position with respect to the statement “I have strong ties to my contacts”, with neither agree nor disagree being the most popular response in Chile (29.2%), Spain (30.1%) and Mexico (36.0%). Lastly, strongly disagree was the most popular response among university students in the three countries to the statement “I trust my offline and online contacts equally” and was chosen by 49.7% of Chileans, 54.9% of Spaniards, and 26.5% of Mexicans.

The above two frequency tables (Tables 3 and 4) illustrating the extent to which university students in Chile, Spain and Mexico agree or disagree with a series of

Table 4 Social capital of university students in Chile, Spain and Mexico

	Chile		Spain		Mexico	
	Most popular response	% Total	Most popular response	% Total	Most popular response	% Total
I talk with my parents	Strongly agree	55.2	Strongly agree	53.9	Strongly agree	53.1
I take part in activities for young people	Agree	31.5	Agree	33.0	Agree	30.6
My parents get involved in my activities	Neither agree nor disagree	28.2	Agree	23.6	Neither agree nor disagree	29.2
I see my siblings every week	Strongly agree	47.2	Strongly agree	47.4	Strongly agree	50.6
I see my friends every week	Strongly agree	46.1	Strongly agree	54.9	Strongly agree	51.7
I have ties to the community	Neither agree nor disagree	31.2	Neither agree nor disagree	29.0	Neither agree nor disagree	36.0
Social media help generate trust	Neither agree nor disagree	34.2	Neither agree nor disagree	36.0	Neither agree nor disagree	35.0
Social media help reduce mistrust	Neither agree nor disagree	31.9	Neither agree nor disagree	37.2	Neither agree nor disagree	38.5
Social media increase trust between people who do not know each other	Neither agree nor disagree	32.3	Agree	32.9	Neither agree nor disagree	38.5
I have strong ties to my contacts	Neither agree nor disagree	29.2	Neither agree nor disagree	30.1	Neither agree nor disagree	36.0
I trust my offline and online contacts equally	Strongly disagree	49.7	Strongly disagree	54.9	Strongly disagree	26.5

N = 1058 (Chile), 627 (Spain) and 1,239 (Mexico). There 5 Values: (1) Strongly disagree, (2) Disagree, (3) Neither agree nor disagree, (4) Agree, (5) Strongly agree
 Source: Authors (2020)

statements on their political efficacy and social capital reflect the most popular category of response indicated. It is worth pointing out that, while the three countries largely coincide as regards the most popular response, the actual percentages can vary considerably. As just noted, for example, although the top response in all three to the statement “I trust my offline and online contacts equally” was strongly disagree, the percentage of respondents who chose this option ranged from 54.9% in Spain to 26.5% in Mexico. For this reason, an index for each of the two dependent variables was created in order to provide a more accurate reflection of reality. Each index includes all the response categories for the indicators and not just the category receiving the highest score, which in some cases was close in percentage terms to the next most popular response.

The political efficacy index ranges from 0 to 8 (given that it consists of eight indicators converted to a scale of 0–1) and the social capital index from 0 to 11 (eleven indicators converted to a scale of 0–1). A single-factor analysis of variance (ANOVA) will allow us to test for significant differences in the political efficacy and social capital of university students in Chile, Spain and Mexico. For this purpose, a comparison of the means of the political efficacy index and social capital index in the three countries will be undertaken (Table 5).

The mean index of political efficacy is 4.17 in Chile, 3.77 in Spain and 4.81 in Mexico, indicating that young Mexicans have the strongest sense of political efficacy, followed by Chileans. For their part, Spaniards have the lowest perception of their political efficacy. As the political efficacy index range is from 0 to 8, Mexico and Chile are situated above, and Spain below, the mid-point of the scale (4). To test whether these differences are statistically significant, that is, whether there are differences in the sense of political efficacy between Chilean, Spanish and Mexican university students, the results offered by the ANOVA need to be analysed. As the F statistic shows, there are significant differences in the mean index of political efficacy of the students in the three countries. This analysis indicates the presence of significant overall differences, but it does not tell us whether these differences are significant between all three countries are just between some. A Bonferroni post hoc test was therefore performed to compare the differences in means between pairs of countries. As can be seen, all the pairs of comparisons of means between countries

Table 5 Political efficacy index and social capital index in Chile, Spain and Mexico (ANOVA)

	Political efficacy index				Social capital index			
	M	SD	F	Bonferroni	M	SD	F	Bonferroni
Chile	4.17	1.54	107.801***	Spain 0.39*** Mexico -0.65***	5.78	1.69	117.597***	Spain -0.34*** Mexico -1.10***
Spain	3.77	1.55		Chile -0.39*** Mexico -1.04***	6.12	1.66		Chile 0.34*** Mexico -0.76***
Mexico	4.81	1.53		Chile 0.65*** Spain 1.04***	6.87	1.82		Chile 1.10*** Spain 0.76***

Source: Authors (2020)

are statistically significant and we can conclude, therefore, that the sense of political efficacy is different in Chile, Spain and Mexico.

Turning to the social capital index, the mean is 5.78 in Chile, 6.12 in Spain and 6.87 in Mexico. Thus, Mexican students have the greatest social capital, followed by those from Spain, with Chileans showing the lowest level. Bearing in mind that the index range is 0–11, all three countries lie above the mid-point of the scale (5.5), an indication that social capital is in good health in all three despite the aforementioned differences. In order to observe whether these differences in social capital are statistically significant, that is, if they actually exist and are not merely fortuitous, we will once again analyse the ANOVA results. In this case, the F statistic confirms significant differences in the mean index of the social capital of Chilean, Spanish and Mexican university students. The Bonferroni post hoc test also indicates that these social capital differences are significant in all paired comparisons between Chile, Spain and Mexico, thus confirming that Chileans, Spaniards and Mexicans differ in terms of their social capital.

By way of summary, Mexican university students have the greatest sense of political efficacy and the greatest social capital. Chilean students exhibit a greater sense of political efficacy than their Spanish counterparts, whereas the latter have greater social capital.

Influence of the consumption and use of social media on the political efficacy and social capital of university students in Chile, Spain and Mexico

Having established the different distribution of political efficacy and social capital in university students in Chile, Spain and Mexico, we will now turn our attention to the factors that may condition both of these in the three countries.

To take political efficacy first, Table 6 sets out the results of the multiple linear regression model used to seek to explain the influence of the use and consumption of social media. In this case, the mere consumption of social media was not found to affect university students' sense of political efficacy. This pattern is seen in all three countries. The use of social media for political ends does, however, indicate a statistically significant relationship with the dependent variable in all three. The relationship is positive, that is, greater political use of social media leads to a greater sense of political efficacy. Based on the unstandardised B coefficients, the political efficacy index increases by 0.21, 0.230 and 0.257 points, respectively, for Spanish, Mexican and Chilean students when an increase of one position occurs on the scale of the political use of social media. In the case of Chilean students, two of the control variables—gender and age—influence the sense of political efficacy, whereas the type of university is not statistically significant. None of the control variables was found to exert a significant influence in the case of Spanish and Mexican students.

In order to identify the relative importance of each explanatory variable within the regression model, without them being conditioned by the scales on which they are coded, we proceeded to examine the β coefficients, which confirm that the political use of social media is what most heavily determines the sense of political

Table 6 Multiple linear regression model to explain the influence of social media on the political efficacy index

	Chile		Spain		Mexico	
	B	β	B	β	B	β
Consumption of social media	0.017	0.016	0.013	0.013	- 0.047	- 0.044
Political use of social media	0.257***	0.503***	0.215***	0.485***	0.230***	0.406***
Type of university	- 0.110	- 0.035	- 0.048	- 0.008	0.022	0.005
Gender	0.301***	0.096***	0.106	0.034	0.011	0.003
Age	- 0.157**	- 0.066**	- 0.114	- 0.046	- 0.092	- 0.036
Constant	2.993***		2.602***		3.815***	
R	0.505		0.486		0.407	
R ²	0.255		0.236		0.166	
Adjusted R ²	0.251		0.230		0.162	
Standard error of the estimate	1.33699		1.35900		1.38144	
N	1057		626		1145	

B = Unstandardised coefficient. β = Standardised coefficient

Source: Authors (2020)

* $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$

efficacy in the three countries studied. In this regard, the β coefficient is highest for Chile (0.503), followed by Spain (0.485) and, lastly, Mexico (0.406).

Finally, with respect to the goodness of fit of the model, the independent variables successfully explain 25.1%, 23.0% and 16.2% of the variance of the political efficacy index in Chile, Spain and Mexico, respectively.

Table 7 gives the results of the multiple linear regression model used to determine the impact of the use and consumption of social media on social capital. In this case, consumption of social media was found to be statistically significant in the three countries and it therefore influences the building of social capital among young people in Chile, Spain and Mexico. As consumption of social media increases so too does the social capital index and a positive correlation exists between the two variables. In other words, the more young people use social media, the stronger their sense of social capital will be. For its part, the political use of social media is also statistically significant and positively influences the building of social capital in Chile, Spain and Mexico. Thus, social capital increases with the increased use of social media for political ends.

In terms of detail, according to the unstandardised B coefficients, the index of social capital increases by 0.193 points in Chile, 0.188 in Spain and 0.090 in Mexico when there is an increase of one position on the scale of consumption of social media. This increase is 0.142, 0.099 and 0.061 points for Mexican, Chilean and Spanish university students in the case of the index of the political use of social media.

However, these data are conditioned by the different scale on which the two explanatory variables are coded. The standardised beta coefficient enables us to identify the relative importance of each variable in the determination of the

Table 7 Multiple linear regression model to explain the influence of social media on the social capital index

	Chile		Spain		Mexico	
	B	β	B	β	B	β
Consumption of social media	0.193***	0.172***	0.188***	0.178***	0.090**	0.072**
Political use of social media	0.099***	0.178***	0.061***	0.127***	0.142***	0.213***
Type of university	- 0.166	- 0.049	0.051	0.008	0.589***	0.123***
Gender	0.221**	0.064**	0.378***	0.112***	- 0.023	- 0.006
Age	- 0.348***	- 0.133***	- 0.208*	- 0.078*	- 0.040	- 0.013
Constant	4.953***		5.168***		5.620***	
R	0.313		0.277		0.258	
R ²	0.098		0.077		0.067	
Adjusted R ²	0.094		0.070		0.062	
Standard error of the estimate	1.60954		1.6442		1.71034	
N	1057		626		1137	

B Unstandardised coefficient. *β* Standardised coefficient

Source: Authors (2020)

* $p \leq 0.1$; ** $p \leq 0.05$; *** $p \leq 0.01$

dependent variable (the social capital index). Thus, in Chile, the use of social media for political ends has a slightly greater impact than the consumption of social media, as reflected by their respective β coefficients of 0.178 and 0.172. The same pattern is observed in Mexico, although it is more pronounced given that the β coefficient is 0.213 for the political use of social media variable and 0.072 for the consumption of social media variable. The opposite situation is seen in Spain, where the consumption of social media ($\beta = 0.178$) is of greater relative importance than the political use of social media ($\beta = 0.127$).

Regarding the control variables, gender and age exert significant influence on the building of social capital in both Chile and Spain. In the case of gender, women exhibit greater social capital in both countries. In terms of age, the results show that social capital decreases with increased age and is strongest in younger Chilean and Spanish university students. The type of university studied in has significant influence on Mexicans, with private universities associated with greater social capital.

However, the data for the goodness of fit of the model show that the control variables used explain only a very small proportion of the variance in the social capital index: 9.4% for Chile, 7.0% for Spain and 6.2% for Mexico.

By way of summary, the sense of political efficacy is influenced by the use of social media for political ends but not by the mere consumption of social media for other purposes. Conversely, the building of social capital is affected by both the consumption and political use of social media. This may be due to the more

global nature of the concept of social capital compared to political efficacy and also to the social interaction that comes with the consumption of social media.

Conclusions

New technologies have brought major changes to all areas of society. Social media are among the most widely used tools, particularly by young people. Their consumption and use lead to new habits which may condition public attitudes such as political behaviour. Many digital activism experiences have subsequently continued offline, as evidenced by the “Chilean winter”, 15-M and #YoSoy132 movements in Chile, Spain and Mexico, respectively. These mobilisations have demonstrated how the digital sphere, and social media in particular, have become a new scenario for political engagement. This development has given rise to considerable academic interest in the relationship between social media and the political behaviour of individuals, especially young people.

However, the potential influence of social media on political attitudes has not been explored to the same extent. For this reason, the present study set out to examine the relationship between social media and two important political attitudes: political efficacy and social capital. The specific research question formulated was whether the consumption and political use of social media influence political efficacy and social capital. To answer this question, the main goal of the study was to ascertain if the consumption and political use of social media condition the sense of political efficacy and the building of social capital in young university students from Chile, Spain and Mexico during the period 2017–2018.

University students from Chile, Spain and Mexico were surveyed for the research question. The univariate (frequency tables), bivariate (single-factor ANOVA) and multivariate (multiple linear regression) analyses conducted reveal that the consumption of social networks influences the construction of social capital. Likewise, the political use of social networks conditions both the feeling of political efficacy and the construction of social capital. Therefore, it is not enough to use social networks so that the feeling of political efficacy is affected, but it is necessary to make a political use of them. Specifically, the regressions carried out show, regarding political efficacy, that this feeling has a positive relationship with the political use of social networks. This implies that the more social networks are used for political purposes, the feeling of political efficacy of university students increases. This occurs in the three countries analysed. This relationship is the strongest in the case of Chile, followed by Mexico and, finally, in Spain. Regarding social capital, the results of the regressions show that the social capital of university students increases both with the consumption of social networks and with the political use of these networks sites. Therefore, there is, a positive relationship between the consumption of social networks and the construction of social capital. There is also a positive relationship between the political use of social networks and the construction of social capital. Both relationships are present in the three countries examined. The consumption of social networks has a greater impact on the social capital of young Chilean university students, followed by the Spanish and, ultimately by Mexicans.

The political use of social networks, influences the social capital of Mexican students more, followed by Chileans and, finally, Spanish students. On the basis of the results, Hypotheses H.2, H.3 and H.4 are found to be true, whereas H.1 is rejected.

Approximately one quarter of political efficacy is explained by the independent variables and control variables used, particularly the political use of social media in Chile, Spain and, to a lesser extent, Mexico. A tenth of social capital in Chile and a lower proportion in Spain and Mexico are explained by the variables, particularly the consumption and political use of social media. As is natural, the data point to the existence of other factors that condition political efficacy and social capital, both of which are phenomena with multiple causes. Nonetheless, the figures obtained for the independent variables are far from negligible and confirm that social media influence the political attitudes of young people. This corroborates the impact of new technologies both on the socialisation and on the political engagement of citizens, even if their widespread use in society can be said to be relatively recent.

The analysis offered also yields important conclusions with regard to the differences and similarities between the countries examined. Thus, Mexican university students exhibit the greatest degree of political efficacy and social capital, with neither attitude influenced by gender or age. However, the type of university, in particular studying at a private university, positively conditions social capital in Mexico. Spanish students exhibit the lowest level of political efficacy and an intermediate level of social capital. Meanwhile, Chilean students exhibit an intermediate level of political efficacy and the lowest degree of political efficacy. Females and younger students have a higher level of social capital in Spain and Chile and both these factors are an important influence also on political efficacy. In the case of students from Spain and Chile, the type of university studied in does not lead to differences in the political attitudes analysed. It is worth noting that, with respect to the political efficacy construct, our research also indicates that the use of social media needs to be for political ends, a finding in line with the study by Lane et al. (2018), which shows that an interest in politics is a prerequisite if information generated on social media is to influence civic engagement. Similarly, the research has broadly shown that social media also influence the formation of social capital, in line with the findings of the studies by Liang et al. (2017) and Glaser et al. (2018), and in particular with the core elements identified by Warren et al. (2015).

These country-specific particularities demonstrate the robustness of the conclusions obtained as regards the influence of the consumption and political uses of social media on the political efficacy and social capital of young people. The results for these two explanatory variables show the same pattern of behaviour in all three countries: Chile, Spain and Mexico.

Lastly, however, it is worth noting that the political use of social media is not exclusive to young people at present. In all three countries, the digital divide and use of virtual platforms have grown constantly in recent years. For this reason, therefore, future studies need to address not just so-called digital natives but also social groupings who are not part of this generation.

References

- Anderson MR (2010) Community psychology, political efficacy, and trust. *Polit Psychol* 31(1):59–84. <https://doi.org/10.1111/j.1467-9221.2009.00734.x>
- Bacallao-Pino LM (2016) Redes sociales, acción colectiva y elecciones: los usos de Facebook por el movimiento estudiantil chileno durante la campaña electoral de 2013. *Palabra Clave* 19(3):810–837. <https://doi.org/10.5294/pacla.2016.19.3.6>
- Bonet J (2015) Movimiento del 15-M: la fuerza politizadora del anonimato. *ACME: an Intl E-J Crit Geogr* 14(1):104–123
- Boulianne S, Ohme J (2022) Pathways to environmental activism in four countries: social media, environmental concern, and political efficacy. *J Youth Stud* 25(6):771–792. <https://doi.org/10.1080/13676261.2021.2011845>
- Brandtzæg PB, Lüders M, Skjetne J (2010) Too many facebook ‘friends’? Content sharing and sociability versus the need for privacy in social network sites. *Int J Hum-Comput Interact* 26(11/12):1006–1030. <https://doi.org/10.1080/10447318.2010.516719>
- Casas A, Davesa F, Congosto M (2016) La cobertura mediática de una acción “conectiva”: la interacción entre el movimiento 15-M y los medios de comunicación. *Rev Esp De Investig Sociol* 155:73–96. <https://doi.org/10.5477/cis/reis.155.73>
- Castells M (2012) *Redes de Indignación y Esperanza*. Alianza Editorial, Madrid
- Castillo L (2014) Medios y elecciones 2012: viejos y nuevos desafíos para la comunicación política en México. *Nóesis: Rev De Ciencias Soc y Humanid*. <https://doi.org/10.20983/noesis.2014.1.1>
- Cea MN (2019) Nivel de interacción de la comunicación de los partidos españoles en redes sociales. *Marco* 5:41–57
- Condeza A, Bachmann I, Mujica C (2014) News consumption among Chilean adolescents: interests, motivations and perceptions on the news agenda. *Comun: Rev Cient De Comun y Edu* 22(43):55–64. <https://doi.org/10.3916/C43-2014-05>
- Craig SC (1979) Efficacy, trust, and political behavior: an attempt to resolve a lingering conceptual dilemma. *Am Polit Quart* 7(2):225–239
- Crovi D (2013) Jóvenes al fin, contraste de opiniones entre estudiantes y trabajadores. In: Crovi, D. (ed) *Jóvenes y apropiación tecnológica. La vida como hipertexto*. Sitesa/UNAM, pp. 183–196.
- Diemer M, Rapa L (2016) Unraveling the complexity of critical consciousness, political efficacy, and political action among marginalized adolescents. *Child Dev* 87(1):221–238. <https://doi.org/10.1111/cdev.12446>
- Donoso S (2013) Dynamics of change in Chile: explaining the emergence of the 2006 pingüino movement. *J Lat Am Stud* 45(1):1–29. <https://doi.org/10.1017/S0022216X12001228>
- Dyck J, Lascher E (2009) Direct democracy and political efficacy reconsidered. *Polit Behav* 31(3):401–442. <https://doi.org/10.1007/s11109-008-9081-x>
- Eltit D (2012) Camila Vallejo: Misión Cumplida. *Debate Fem* 46(23):189–198
- Espinar R (2015) El espacio público y la pugna por el significado de la democracia El debate alternativo sobre el estado de la nación en el movimiento 15-M. *ACME: an Int E-J Crit Geograp* 14(1):61–74
- García ABF, Sáiz ÁV (2022) De la calle a las instituciones: la evolución del mensaje populista de podemos (2014–2019). *Rev De Estudios Políticos* 195:97–123
- Glaser P, Liu J, Hakim M, Vilar R, Zhang R (2018) Is social media use for networking positive or negative? Offline social capital and internet addiction as mediators for the relationship between social media use and mental health. *N Z J Psychol* 47(3):12–18
- Guo W, Liang R, Wang L, Peng W (2017) Exploring sustained participation in firm-hosted communities in China: the effects of social capital and active degree. *Behav Inf Technol* 36(3):223–242. <https://doi.org/10.1080/0144929X.2016.1212402>
- Hernández C (2019) Campañas electorales presidenciales pragmáticas en México 2018. *Política y comunicación*. *Rev Mex De Cienc Políticas y Soc* 64:327–352
- Huang J, Kumar S, Hu C (2018) Gender differences in motivations for identity reconstruction on social network sites. *Int J Hum-Comput Interact* 34(7):591–602. <https://doi.org/10.1080/10447318.2017.1383061>
- Huang L, Zheng D, Fan W (2021) Do social networking sites promote life satisfaction? The explanation from an online and offline social capital transformation. *Inf Technol People* 35(2):703–722
- Islas, O, Arribas A (2019) La historia de los años recientes. In: Islas O, Arribas A (Eds) *Las benditas redes sociales digitales*. Cuadernos Artesanales de Latina, pp. 51–83.

- Jiménez-Yañez C (2020) # ChileDespertó: causas del estallido social en Chile. *Rev Mex Sociol* 82(4):949–957
- Johnston K, Tanner M, Lalla N, Kawalski D (2013) Social capital: the benefit of Facebook ‘friends.’ *Behav Inf Technol* 32(1):24–36. <https://doi.org/10.1080/0144929X.2010.550063>
- Lane D, Lee S, Liang F, Kim D, Shen L, Weeks B, Kwak N (2018) Social media expression and the political self. *J Commun* 69(1):49–72. <https://doi.org/10.1093/joc/jqy064>
- Lee J (2017) Social capital expectation and usage of social media: the moderating role of social capital susceptibility. *Behav Inf Technol* 36(10):1067–1080. <https://doi.org/10.1080/0144929X.2017.1344730>
- Liang Y, Jiang C, Ma L, Liu, Liang Y, Jiang C, Ma L, Liu L, Chen W, Liu L (2017) Government support, social capital and adaptation to urban flooding by residents in the Pearl River Delta area, China. *Habitat Internat* 59:21–31
- Lynch M (2015) How the media trashed the transitions. *J Democr* 26(4):90–99. <https://doi.org/10.1353/jod.2015.0070>
- Magallón R (2019) Verificado México 2018. desinformación y factchecking en campaña electoral. *Rev De Comun* 18:234–258
- Mendieta A (2019) Cerebro político en los procesos electorales: las emociones del voto en la campaña por la Presidencia de la República en México, 2018. *Anagramas Rumbos y Sentidos De La Comun* 17:45–69
- Meyer L (2013) Nuestra tragedia persistente. La democracia autoritaria en México. Debate, Distrito Federal.
- Michelson M (2000) Political efficacy and electoral participation of Chicago Latinos. *Soc Sci Q* 81(1):136–150
- Navarro E (2016) ¿Cómo contribuyen las redes sociales en el desarrollo de la subjetividad en sociedades autoritarias? El caso de #YoSoy132 en México. *Observatorio (OBS*)* 10:176–201
- Oser J, Grinson A, Boulianne S, Halperin E (2022) How political efficacy relates to online and offline political participation: a multilevel meta-analysis. *Polit Commun* 39(5):607–633
- Park C (2015) Pathways to expressive and collective participation: usage patterns, political efficacy, and political participation in social networking Sites. *J Broadcast Electron Media* 59(4):698–716. <https://doi.org/10.1080/088838151.2015.1093480>
- Pasek J, Feldman L, Romer D, Jamieson K (2008) Schools as incubators of democratic participation: building long-term political efficacy with civic education. *Appl Dev Sci* 12(1):26–37. <https://doi.org/10.1080/10888690801910526>
- Pizarro R (2020) Chile: rebelión contra el Estado subsidiario. *Trimest Econ*. <https://doi.org/10.20430/ete.v87i346.1055>
- Portillo M (2015) Construcción de ciudadanía a partir del relato de jóvenes participantes del # YoSoy132. *Glob Media J Méx* 12:1–18
- Red M (2013) Rocking the vote in Mexico’s 2012 presidential election: Mexico’s popular music scene’s use of social media in a post-arab spring context. *Int J Commun* 7:1205–1219
- Rendueles C (2015) Podemos y el «populismo de izquierdas»: ¿Hacia una contrahegemonía desde el sur de Europa? *Nueva Sociedad* (258re): 1–11.
- Rennick S (2013) Personal grievance sharing, frame alignment, and hybrid organizational structures: the role of social media in North Africa’s 2011 uprisings. *J Contemp Afr Stud* 31(2):156–174. <https://doi.org/10.1080/02589001.2013.781322>
- Rivero J (2015) Podemos. Objetivo: asaltar los cielos. Planeta, Barcelona.
- Scherman A, Arriagada A (2012) Jóvenes, disposición a votar y consumo de medios en Chile. *Comun y Soc* 25(1):85–112
- Shpigelman C (2018) Leveraging social capital of individuals with intellectual disabilities through participation on facebook. *J Appl Res Intell Disabil* 31(1):79–e91. <https://doi.org/10.1111/jar.12321>
- Simons M, Reijnders J, Peeters S, Janssens M, Lataster J, Jacobs N (2021) Social network sites as a means to support personal social capital and well-being in older age: an association study. *Comput Hum Behav Rep* 3:100067
- Slachevsky N (2015) Una revolución neoliberal: la política educacional en Chile desde la dictadura militar. *Educ Pesqui* 41:1473–1486
- Son J, Lee S, Cho E, Kim H (2016) Examining online citizenship behaviours in social network sites: a social capital perspective. *Behav Inf Technol* 35(9):730–747. <https://doi.org/10.1080/0144929X.2016.1143032>

- Stronge S, Osborne D, West-Newman T, Milojev P, Greaves L, Sibley C, Wilson M (2015) The facebook feedback hypothesis of personality and social belonging. *N Z J Psychol* 44(2):4–13
- Tlachino AT, Macías RAG (2020) Facebook, una extensión de marketing y no un espacio deliberativo: Caso de Andrés Manuel López Obrador en elecciones presidenciales de México en 2018. *Glob Media J Méx* 17(33):72–95
- Torres L (2015) ¿Quién programa las redes sociales en Internet? El caso de Twitter en el movimiento# Yosoy132 México. *Rev Int Soc* 73(2):63–75. <https://doi.org/10.3989/ris.2013.05.29>
- Valenzuela S, Arriagada A, Scherman A (2012) The social media basis of youth protest behavior: the case of Chile. *J Commun* 62(2):299–314. <https://doi.org/10.1111/j.1460-2466.2012.01635.x>
- Vico EA, Rey PR (2020) Discurso, estrategias e interacciones de Vox en su cuenta oficial de Instagram en las elecciones del 28-A. Derecha radical y redes sociales. *Rev Lat Comun Soc* 77:203–229. <https://doi.org/10.4185/RLCS-2020-1455>
- Warren A, Sulaiman A, Jaafar N (2015) Understanding civic engagement behaviour on Facebook from a social capital theory perspective. *Behav Inf Technol* 34(2):163–175. <https://doi.org/10.1080/0144929X.2014.934290>
- Yamamoto M, Kushin MJ, Dalisay F (2017) Social media and political disengagement among young adults: a moderated mediation model of cynicism, efficacy, and social media use on apathy. *Mass Commun Soc* 20(2):149–168. <https://doi.org/10.1080/15205436.2016.1224352>
- Yen C (2016) How to unite the power of the masses? Exploring collective stickiness intention in social network sites from the perspective of knowledge sharing. *Behav Inf Technol* 35(2):118–133. <https://doi.org/10.1080/0144929X.2015.1105297>

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