Regional Differences in Facebook Privacy Settings and Behaviour

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***Abstract*—The way youth communicates has been highly revolutionized by the Internet, particularly by the emergence of social network services such as Facebook, Instagram and Pinterest. In the search of a sharing behavioral pattern between three different regions, a quantitative research was performed. The three selected regions are: German speaking countries, Latin American countries and the United States. With such, personal information sharing settings were analyzed. For data collection, Facebook profiles of business school students ranging of age 18-21 were analyzed. With a sample size of 900 profiles, four hypotheses were tested. Findings show that German speaking countries are the most private when it comes to sharing personal data on social media; but there is not an overall most open region since Latin american and US students lead in different categories. It is important to take into account diverse limitation faced during the study such as sample size per region and access to the profiles.**

I. Introduction

Over the last couple decades, human interaction has been revolutionized by the appearance of new vehicles through which people can communicate. Particularly for younger generations who were born immerse in the digitalization era, such digital natives have adopted new technologies like social networking services as the main medium for keeping in touch with friends in a quick, fun and inexpensive way [1]. Social networks are social structures composed of groups of people which are interconnected by one or various types of relationships like friendship, kinship, common interests or shared knowledge [2].

Starting in 1995 with classmates.com, created by Randy Conrads who wanted to open up an online space in which people could connect and reconnect with former classmates, friends from universities, coworkers and more; until nowadays were services like Facebook, Instagram and Pinterest are the main contenders as online social interaction providers. The targeting, style and settings of social networks has evolved, became sharper and are now connecting billions of users from across the globe [2].

The web has become the host for diverse digital media and social networks that transformed communication and socialization habits of human society. These services are now embedded in daily lives. Nonetheless, with new technologies, new concerns arise.

For most teenagers the world is unimaginable without the power of Internet, more specifically without social media since it eases communication between peers, reinforces social acceptance and group identity, and allows the creation of personal spaces without constraints [3]. The fast and easy access that youngsters have to online social networks have allowed the development of an incoming field of study regarding the employment of privacy settings and actions taken towards information safety [4]. With such, our study will focus on the comparison of privacy settings used by college students on Facebook of three different regions: German speaking countries, Latin America and The United States of America.

Objectives

Although the Internet is a common platform for user from various places of the world, the way they use it differs. In the following study emphasis will be made on the way college students configure their privacy sharing setting regarding their personal information on Facebook. For such, the main objective of the study will be: identify patterns on personal information sharing by region analyzed. Likewise, it is relevant to (a) delimit the type and format of information that is shared and (b) identify differences within regions.

II. Literature Research

As social media platforms have continued to grow in size and prevalence researchers have taken interest in how much data Facebook users are sharing. With that said, few studies up to this point have examined the relationship between a region's culture and its Facebook user's privacy settings. Regardless, the findings and insights developed from past research regarding privacy settings remain relevant and are worth examining for our purposes. Facebook is divided by two types of privacy settings. One type of the data shared is through the Privacy Settings, which is what we have analysed in this research. However, other type of data can be shared, which is through third-party apps, internet browsing behaviour, data from our clicks, and interactions. "Several studies have suggested that people make their disclosure decisions based on a variety of factors, including whether others have disclosed, the order of questions, website design and aesthetics, and social motivations." Facebook, as a social network, has designed a platform that is user friendly and trustworthy to their users. For that, back in 2013, Facebook asked their users "How trustworthy is Facebook overall?". Looking deeply into this question, what Facebook wants is to "inspire user trust and, in turn, sharing. Its committee of Trust Engineers, for example, plays with wording, multiple choice options, the order of

questions, designs, and other tools to encourage users to honestly report what they do not like about posts they want taken down. That may be an important goal, but it shows that Facebook is well aware that trust and sharing are linked."

Past studies have been made on college students and the privacy settings that are very relevant. For example, according to Waters and Ackerman [5], students have four main motivations to show private information in Facebook and other social platforms: share information, store information or entertainment, keep up with trends and, finally, show popularity. Contrary to widespread opinion, Boyd and Hargittai [6] found the majority of teenage Facebook users are concerned about their privacy settings and have altered them to some extent. The paper examined possible explanations for increased user engagement with privacy settings from 2009 to 2010. These possible factors included: increased attention to privacy matters, changes to Facebook's default settings, and online rhetoric about online safety. The research also noted users who regularly post content are more likely to change their privacy settings, which can be attributed to familiarity with technology and their desire to control the information they share. In addition, they suggest that a recent "culture of fear" cultivated by news media and the internet may motivate the youth to adjust their privacy settings. They also found that men reveal more basic information, such as date of birth, place of birth and sentimental situation, and contact information (includes email addresses and phone numbers) than women, and on the other hand, women were more motivated than men to reveal private information on Facebook for the storage of information or its use as a form of entertainment. In addition, users with more self-revelations in their profile showed greater satisfaction. Lewis, Kaufman, and Christakis [7] analyzed the level of privacy set for college students' Facebook profiles. Their research also presented a number of predicting factors that influence whether a user will adjust his or her privacy settings. The studies' results suggest that the more friends with private profiles that a certain user has, the more likely they are to have a private profile themselves. Secondly, the more a user manipulates their profile, the more likely they are to make their profile private in the future. In addition, their results support Special and Li-Barber's [8] findings that females are more likely to keep their profile private than males, which Boyd and Hargittai research also affirms. Perhaps the most notable and relevant finding of their study was the lack of correlation between privacy settings and a users ethnicity. Considering this research was done prior to 2018, a time when concerns over privacy are at an all time high, we felt the topic required re-examination ensure its results are still accurate.

No study has previously attempted to compare the cultures of Germany, US, and Latin America and their privacy settings on Facebook. Instead our hypothesis will rely on information we know about each of these region's culture. Hofstede Insights has developed a country comparison tool that that differentiates country's culture by 6 categories: Power Distance, Individualism, Masculinity, Uncertainty Avoidance, Long term orientation, and Indulgence. Individualism Is of particular importance, as it indicates the intentions that a particular culture may have when using Facebook. Hofstede defines individualism as "The degree of interdependence a society maintains among its members. It has to do with whether people's self-image is defined in terms of "I" or "We" Hofstede Insights [9]. According to their scale that is rated from 0 to 100, USA ranks the highest at 91, Germany at number two with 67, and Peru scoring the lowest at 16.

Reasoning behind the region selection was quite straightforward. Selected regions are enough culturally distanced (as opposed to EU countries only), but stem from the same "western" culture. Therefore are relatively comparable. Authors considered to include also Russian speaking universities, but prevalence of Vkontakte.com in Russian environment made it incomparable. Same applies for China, where Facebook is even banned. Asian and African countries were excluded due to language barriers.

A. *Hypothesis*

In regards of the academic research [10], [11], [12], [13], the following hypothesis will be tested: If the countries have higher levels of individualism, the more likely they are to share their information on their public Facebook profile. In average, German college students share more information than Latin american students but less than Americans. To test the validity of this hypothesis, the methodology of our study is displayed below:

Specific hypotheses:

- US profiles will share more categories of personal information than Germany, and German profiles will share more information than Latin American users
- Latin american profiles are less likely to display the amount of friends they have than German and American profiles
- German profiles will have less profiles with public posts than the US, but more than Latin America
- US users will share more individual profile pictures than German but less than Latin America

III. Methodology

Although there is extensive research and studies on privacy concerns in regards of social media which provides a theoretical foundation, a more in depth investigation needs to be carried out. Therefore, as a complementary source, a specific research on latin american, german and american online sharing behavior will be performed. The social media selected for the study is Facebook, the biggest social network site on the internet in both total number of user and name recognition.

A. *Sample selection & description*

The study focuses on the behavior of college students ranging from age 18 to 21. The participants were selected from public or closed Facebook groups. The main filter was the university, the program and the class the student belongs to. Once examiners had access to the Facebook groups, the list of members would be revised in order to select profiles by random.

Table I presents the general demographic for the total of the sample. There is a total of 900 Facebook profiles revised; 60 profiles per university of a total of 15 universities.

TABLE I. SAMPLE DESCRIPTION

Age	18 - 21
Gender	Female & Male
College	Business related schools
Regions	***USA***
	North Carolina (1), Texas (1), California (1)
	German speaking countries (GSC)
	Germany (2), Switzerland (2), Austria (2)
	Latin America (LATAM)
	Peru (2), Colombia (1), Brasil (1), Mexico (2)

For USA, three colleges were sampled which were geographically selected: NC state university (east coast), University of Texas at Austin (central) and UCLA (west coast).

TABLE II. USA SAMPLE DEMOGRAPHY

University	Female	Male	Total
NC State University	29	31	*60*
UT Austin	33	27	*60*
UCLA	22	38	*60*
Total	*84*	*96*	*180*

For the German speaking countries (GSC) there is a total of three countries sampled. The number of universities selected are proportionate to the population of each country, being Germany the most populated and Switzerland the least. There is a total of 360 profiles reviewed. The details of universities and demography is presented in Table III.

TABLE III. GSC SAMPLE DEMOGRAPHY

University	Country	Female	Male	Total
Uni Hohenheim	Germany	36	24	60
University of Bayreuth		25	35	60
University of Cologne		30	30	60
University of Graz	Austria	30	30	60
WU Wien		31	29	60
HSG St. Gallen	Switzerland	29	32	61
Total		*181*	*180*	*361*

For the latin American (LATAM) sample four countries were samples: Peru, Mexico, Colombia and Brasil. Such were selected due to their shared cultural similarities. Despite Brasil being a non spanish speaking countries, many cultural traits are shared with the three other countries. Table IV presents details on the universities selected and the demography of the sample.

TABLE IV. LATAM. SAMPLE DEMOGRAPHY

University	Country	Female	Male	Total
Universidad del Pacífico	Peru	29	31	60
Universidad de Lima		34	26	60
Instituto Technológico y de Estudios Superiores de Occidente	Mexico	40	20	60
Universidad Nacional Autónoma de México		37	23	60
Universidad de Antioquia	Colombia	36	24	60
Pontífica Universidade Católica	Brasil	36	24	60
Total		*212*	*148*	*360*

As evidenced on the descriptives, the sample is overall more female than male. Although the study will analyze the results with averages, if needed differentiation per gender will be performed.

B. Data collection

There is a total of 27 variables which analyzed both text and multimedia data. Information was grouped by categories: general information, basic information, profile picture, title picture, additional pictures and public posts. For each but general information data was collected in binary values unless an amount was needed (e.g. number of friends).

TABLE V. OBSERVED PARAMETERS

Parameters		Values
General Information	University	selected university
	Name	civil name
	Profile link	hyperlink
	Country	
	Gender	male / female
Basic Information	Number of friends	# or 0 when not public
	Birth date	Public / Private
	City of origin	Public / Private
	Current city	Public / Private
	Phone number	Public / Private
	Family members	Public / Private
	Relationship status	Public / Private
	Religion	Public / Private
	School	Public / Private
	University	Public / Private
	Job position	Public / Private
	Workplace	Public / Private
	Public friend request	Public / Private
	Social links	Public / Private
Profile picture	#	Num. of publ. pictures
	Individual	yes/no
	Group	yes/no
	Non-human	yes/no
Title Picture	#	Num. of publ. pictures
	Individual	yes/no
	Group	yes/no
	Non-human	yes/no
Other pictures		Public / Private
Public posts		Public / Private

Regarding the process of data collection, Facebook groups of the university or particular classes (e.g. Universidad Lima administración 2017) were searched. For more accuracy private groups were looked up through administrators filter who has access, therefore the quality of the members is more exact. Nonetheless limitations were faced for examiners who were not from the university since access wasn't granted easily. If the request was declined or not granted for over a week, public Facebook groups were the source of information. In the case of public groups, a prior screening has been performed in order to assure that the profile searched meet the parameters.

Once with access to the profiles of students, the complete profile would be revised including all the information published on the "about" section, the posts, the profile pictures, the title pictures and additional pictures shared. An exhaustive revision of the profiles was needed in order to have a full grasp of how much personal information is shared by the student and in which format. We have not used the Facebook API, profile pages were analyzed by personal observation. Since we have observed (without storing) only publicly available information, there was no need for consent from study participants. The selection of participants was random within the observed

Facebook group, with only number of male/female participants being balanced.

The following flowchart depicts the process of data collection.

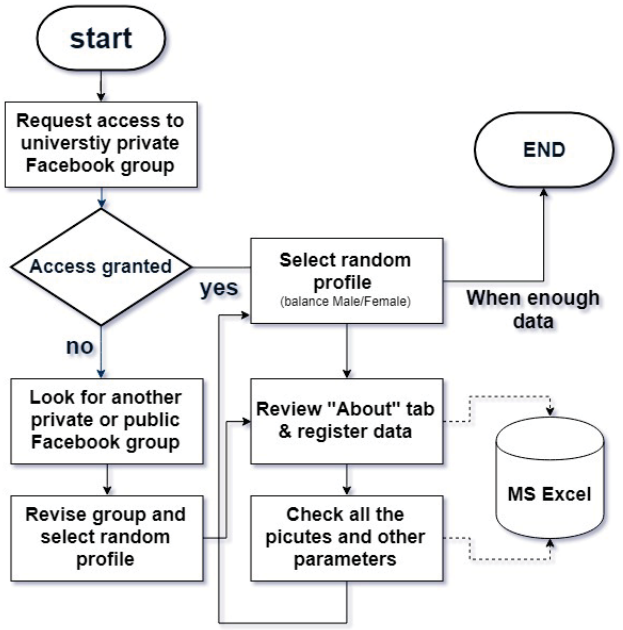

Fig. 1. Process of data collection

IV. Data and Results

As described above our study focuses on comparing the privacy attitude of students in 3 different regions, namely the United States, Latin America and German speaking countries. For this purpose, we formed a number of hypotheses that we are now going to test.

Hypothesis 1: US profiles will share more categories of personal information than Germany, and German profiles will share more information than Latin American users

We analyzed the means of 14 parameters set in the category basic information per country and across countries, as well as the overall mean of each region (see table below). The mean helps to get a central tendency of a statistical distribution for a certain data set.

Our research shows that American students tend to provide much more content on Facebook than their fellow students: The American mean of information sharing is 0.413, while Latin Americans achieve a value of 0.307 and German speaking only just 0.245.

The Table VI below gives an overview of the means calculated. It is noticeable that American students, as predicted before, provide the highest amount of information in their Facebook profiles: In ten of 14 cases they score the highest mean, only once (phone number) those students USA is the bottom of the list. Surprisingly, Latin Americans share more details than German speaking students. The latter do not tend to share ten basic information to the extent the other two regions do. Only when it comes to the phone number, German speaking countries are at the top of the list, with still a quite low percentage of sharing (0.05%). Latin America builds the compromise of the two other extremes since it mostly appears in the middle of the other two regions. Yet, three times the lowest rate is reached and three times the highest.

TABLE VI. Means Comparison

Parameters | *Regions*	*GSC*	*LATAM*	*USA*
Number of friends	0.427	0.269	0.753
Birth date	0.08011	0.1791	0.0989
City of origin	0.3453	0.4879	0.7637
City of living	0.4199	0.5615	0.7418
Phone number	0.005525	0.00535	0.000
Family members	0.2017	0.2647	0.3022
Relationship status	0.1188	0.2433	0.1813
Religion	0.02493	0.03476	0.02762
School	0.3158	0.2941	0.6978
University	0.4127	0.6177	0.9835
Job position	0.07202	0.1096	0.2253
Workplace	0.1468	0.1818	0.2308
Public friend request	0.9252	0.8823	0.967
Social links	0.1207	0.1283	0.1429

Means of parameters (percentage of "Yes" = 1)
highest percentage middle percentage lowest percentage

In order to analyze whether the Facebook users degree of privacy differs with statistical significance across countries we run an Anova, as running several t-tests would result in a high Type 1 error. However, the null hypothesis that there is no difference between the countries with regard to their sharing behavior can not be rejected. Thus the degree of privacy does not vary significantly between the countries with a significance level of 0.05, the p-value being 0.249. The sharing behaviour is defined by the 14 variables: *number of friends public, birth date, city of origin, city they live in, phone number, family members, relationship status, religion, school, university, job, workplace, public friend request and social links.*

We can conclude that while we can observe differences and tendencies when looking at the means, the deviation is not high enough in order to be statistically significant.

Hypothesis 2: Latin American profiles are less likely to display the amount of friends they have than German and American profiles

To compare the number of friends we used R to visualize our results statistically (Histogram and Boxplot). It can be seen that Latin Americans have an average of more than 1000 friends, which is nearly twice as high as the average amount of friends German speaking people tend to have (456 friends). Yet, it has to be considered that only 12.62 % of the Latin American students provide the number of friends public and 41.67 % of the Germans, so there might be a deviation (non-public friends list correspond to number of NA). In this category, American students build the middle way with an average of 747 friends. It is noticeable that Americans are the group of students that does not tend to hide their friend list (74.73% share their friend list).

TABLE VII. ANOVA RESULTS

Anova: Single Factor						
SUMMARY						
Groups	*Count*	*Sum*	*Average*	*Variance*		
Column 1	153	82909	541,888889	180490,876		
Column 2	113	121789	1077,77876	609920,442		
Column 3	137	101631	741,832117	294786,229		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	18734917,3	2	9367458,66	27,5844849	0,0000000	3,01828074
Within Groups	135836630	400	339591,574			
Total	154571547	402				

The number of friends also differs with statistical significance. The Anova has a p-value of 0,00 and thus the null hypothesis of no difference between the regions can be rejected with a significance level of 0.05.

Comparing the histograms of the three regions it can be seen that all distributions are right skewed, since the modal value is to the left of the mean (GSC:456 > 541.9 / LATAM: 936 > 1078 / USA: 635.3 > 747). This can be interpreted as follows: most students are in the area of having a certain amount of friends, while the amount of few students are almost unlimited. Another typical example of right skewness is the income distribution of a population. As a typical arrangement of your positional parameters you get in a right skewed distribution: mean> median> mode.

Next step is to look at the Boxplots of the three regions. 50 % of the students in German speaking countries tend to have approximately 247 to 738 friends. Almost 100% are in the range to 1500 friends. Half of the Latin American students do have in between 541 to 1491 friends. Nearly 100% of the students are in between the range up to 3000 friends. Surprisingly, Americans do not have as many friends compared to their southern fellow students: 50% have a number of friends in between 350.5 to 1011.

Additionally the outliers can be seen in the Boxplot. In Latin America there are fewer outliers compared to the US and German speaking countries, and those three outliers vary much more. In this outlier analysis, the student with the highest number of friends can be found: 4950. The Maximum of German speaking friends is almost half of the Latin American number. The American extreme lies in the middle with a number of 3248 friends.

Yet it is noticeable, that the ratio of x-axis label differs in all three regions, which indicates a high deviation of number of friends in the three regions.

Hypothesis 3: US users will share more individual profile pictures than German but less than Latin America

Now, we will continue with analyzing the profile pictures shared by students. Pictures can be differentiated between individual, non-human and group profile pictures.

Obviously, individual profile pictures are most common. In Latin America, only 5.47 % do not have a single individual profile picture shared, while that is the case for 10.80 % of the Germans and for 12.64 % of the Americans.

Non-human profile pictures are relatively rare. Yet, in this case Latin Americans share the most non-human profile pictures (14.76 %). Americans and German speaking students do prefer human profile pictures more and achieve a similar score. Approximately 11 % of the students of these two regions share at least one non-human profile picture.

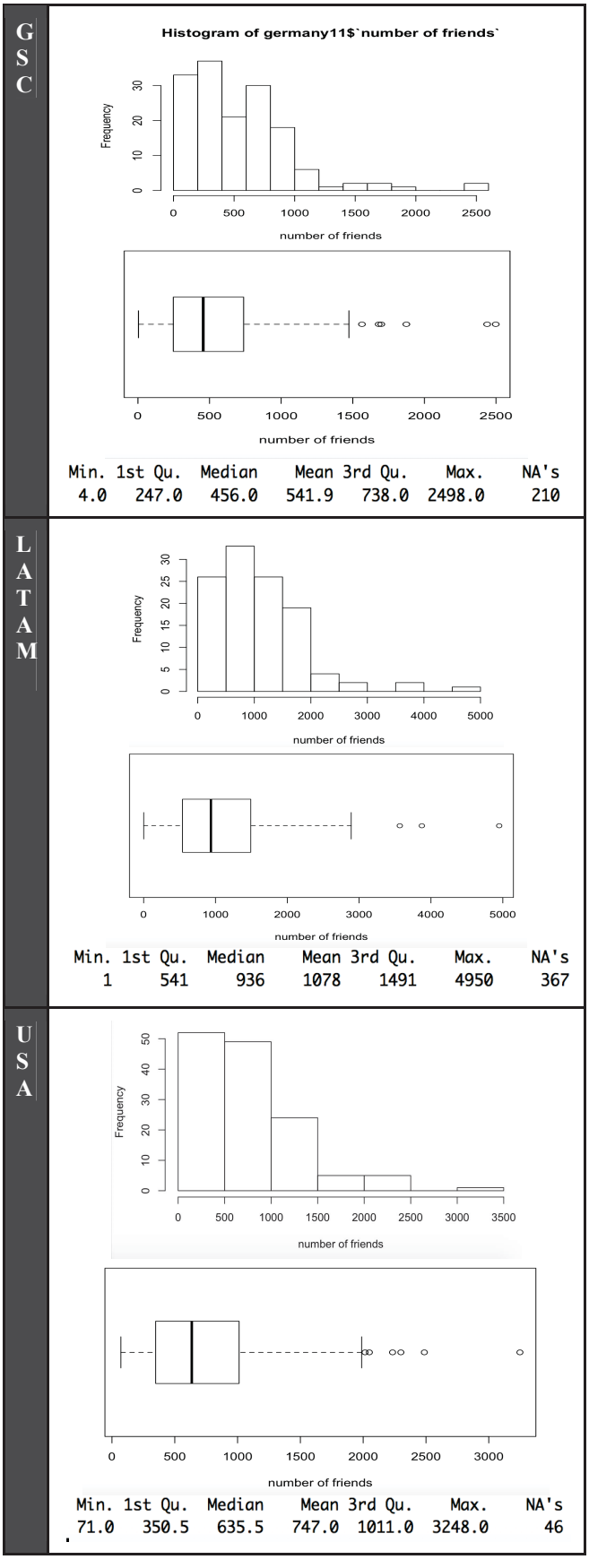

Fig. 2. Histogram and Boxplot of number of friends

When looking at the percentage of shared group pictures it becomes visible, that Americans seems to be a lot more group oriented than the Germans and the Latin Americans. Nearly 3/4 of the Americans share at least one group profile picture, which can be defined as a picture with more than one person on it. In contrast, only 22.16 % of the German speaking and 29.29 % of the Latin Americans show a group oriented attitude concerning their profile picture.

Yet, it has to be stated, that Latin Americans and American students tend to share more than double as many profile pictures as Germans do. The maximum of shared profile pictures in Germany is 106, while the extreme of Latin America is 188 and in the USA even 270 profile pictures (see boxplots and histograms below). This unequal distribution has to be considered when looking at the ratio of different kinds of profile pictures.

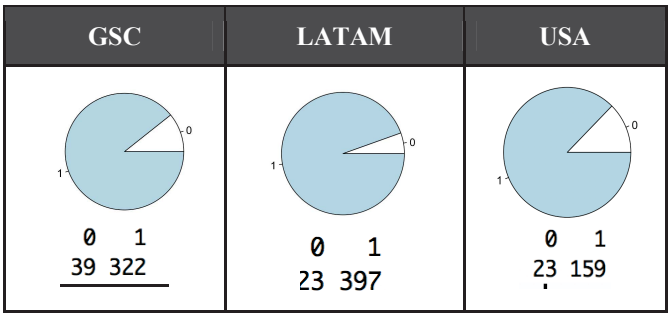

Fig. 3. Individual profile pictures

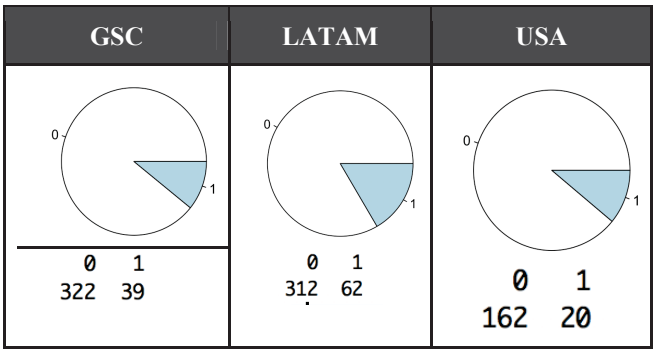

Fig. 4. Non-human profile pictures

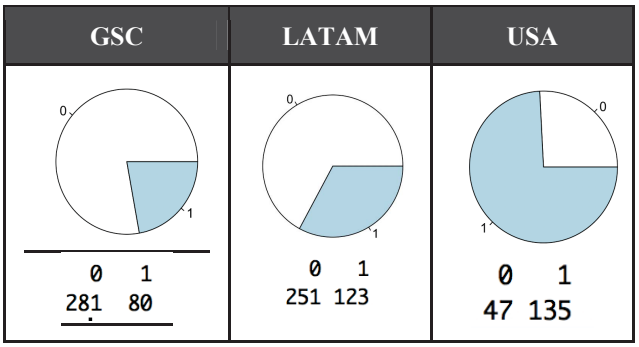

Fig. 5. Group profile pictures

Since we already addressed the deviation of the number of profile pictures before, a closer look follows by showing Boxplots and Histograms of the certain distribution of the number of friends.

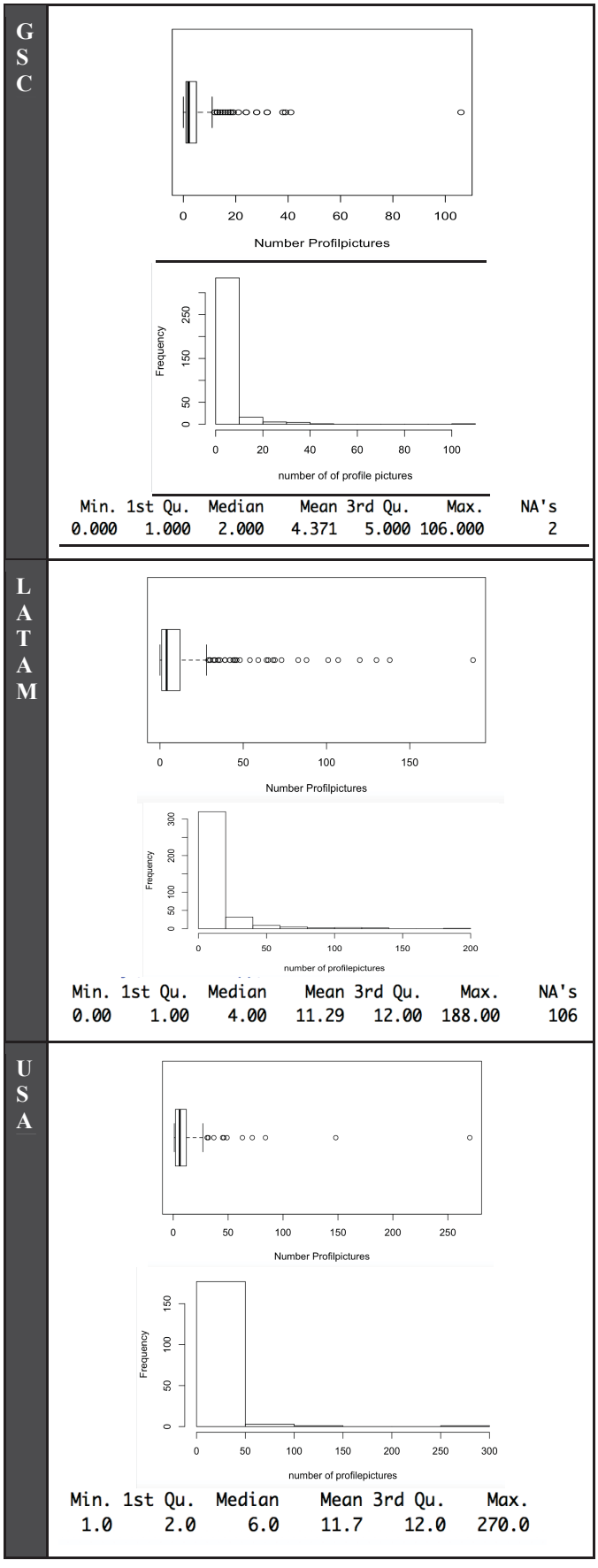

Fig. 6. Boxplot and Histogram: Number of Profile Pictures

Again, right skewed distributions can be found in all three cases. As explained before, this can be interpreted as follows: Most students are in the area of having a certain amount profile pictures, while the amount of few students are almost unlimited.

The Boxplot shows, that German outliers are mostly ranged close to the amount of pictures nearly 100% of the German speaking students share. It can be seen that there is a huge gap between one outlier and the rest of the outliers.

In contrast, the Boxplot of Latin America reveals much more outliers, which are lying one hand close to the almost 100% border, but also in a quite regular distance.

Looking at the American Boxplot it can be seen, that there are three groups of outliers, the first, which is close to the almost 100% border contains most of the outliers close to each other in a row, then an outlier lies with a great gap close to 150 Profile pictures. The next outlier follow with another gap builds the maximum of 270 profile pictures shared.

As described before it can be concluded that the number of profile pictures shared varies a lot especially between Germany and America/Latin America, since Germans tend to provide much less pictures.

Hypothesis 4: German profiles will have less profiles with public posts than the US, but more than Latin America

Finally, we have analyzed, whether the students shared additional pictures and if their posts are public. It can be seen, that German students tend to share more additional profile pictures than students from USA, but less than Latin America. In other words the ranking of sharing is as follows: first LATAM, then GSC and finally USA. This is a quite interesting finding, since Latin Americans also share the most profile pictures, so it can be concluded that photos and sharing their life is an important factor for Latin Americans.

Concerning the postings public Latin Americans are again the most open group, in fact nearly 50% of the students do provide their postings to everyone. In Germany and the USA a different tendency can be observed: 31% of the Germans provide public postings and 40% of the American students. In this field, it is a surprise that more Latin Americans share their postings than Americans.

V. Limitations

As always, the results obtained have to be taken with a grain of salt. Firstly, the uneven number of observations per region have to be kept in mind. While Latin America and German speaking countries have 360, the USA only 180 observations. Thus, the data might lack in validity as 180 observations might not be enough.

A second source of unreliability with regard to the data can lie in the fact that we, in part, used public groups due to admission issues with the private ones. They still always included the starting or finishing year of the class and thus should mostly contain people within expected age range. However considering that the groups were public older or younger people could have been in there as well. Also, the fact that a class was started in a specific year does not ensure that a person is between 18 and 21. However, we excluded observations that obviously, e.g. through their profile picture or shared date of birth, were not within our studied age range. Thus, we believe that most observations indeed were within our age range. In addition to this issue, we can not control for possible well managed fake profiles being included in our sample.

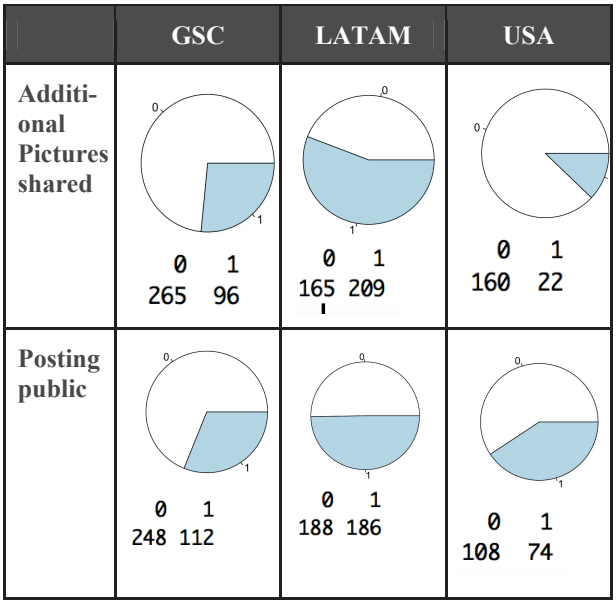

Fig. 7. Pie charts of additional pictures and posts public

Another limitation that should be mentioned is related to the analysis of number of friends. While we notice that Latin American students tend to have more friends than students in the other regions, most of them choose not to share their number of friends at all. Due to the fact that people with a high number of friends seem to be less private people already, this could be explained by the high number of students who do not share their number of friends at all possibly having less Facebook friends and, thus, the actual number of friends not differing between the regions to such a high extent as observed.

VI. Conclusion

The differences between students across the world when it comes to their privacy preferences on social media don't appear to be big. When we compare the means between the 14 parameters making up the sharing behavior we find that US students lead the table in ten of them, meaning that they share the most. At the same time Germans seem not to publish as much content having the lowest mean in ten out of 14 categories. While this can maybe show a tendency it can not be taken as a valid and reliable result as the variation of means is not statistically significant.

Considering our analysis of number of friends a person has, the number does differ significantly between the regions. This can also be interpreted as an indicator for privacy. People with a high number of friends seem to be less selective with who they want to share their private information. A person with a small number of friends, however, chooses to only share information with a closer circle and can be considered to be more private. Interpreting it this way we can conclude that Latin American students are the most open, whereas Germans appear to be more selective of who they share their information with.

When analyzing the sharing of pictures there does not seem to be a big hesitation to publish at least one personal profile picture. Profile pictures of the person by itself are shared by at least 87.36%. An interesting difference between the regions lies in the number of pictures that are shared. Latin Americans as well as students from the US share almost the double amount of pictures compared to students from German speaking countries.

With regard to additional pictures or public postings, German speaking students share the least. Latin Americans are at the other side of the spectrum with nearly 50% of students publicly post content.

Summarizing our findings it can be said that students from German speaking countries are the most private when it comes to their behaviour on social media. Latin Americans and students from the US lead in different categories with that regard. While Latin Americans have the highest number of friends on average US students share the most of their general information.

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