A Statistical Neutrosophic Analysis to Measure WhatsApp's Effect on Academic Performance

Prayas Sharma[1], Ashish Kumar Singh[2], Benedict Afful Jr.[3], Bharti Agrawal[4], Gopal Kumar Gupta[5,*]

[1]Department of Statistics, Babasaheb Bhimrao Ambedkar University, Lucknow, India

[2]School of Business, Galgotias University, Greater Noida, UP, India

[3]Department of Economic Studies, School of Economics, University of Cape Coast, Cape Coast, Ghana

[4]Department of Mathematics, Medicaps University, Indore, India

[5]Symbiosis Institute of Technology Nagpur Campus, Symbiosis International (Deemed University), Pune, India

Emails: prayassharma02@gmail.com; ashish80@gmail.com; benedictaffuljr@gmail.com; profbhartiagrawal@gmail.com; gopalkumar.gupta@sitnagpur.siu.edu.in

Abstract

There has been an unending debate about the effect of WhatsApp on students' performance globally. This paper seeks to contribute to this debate by investigating the extent of WhatsApp usage and its' effect on Uttarakhands' post-graduate students' academic performance. Estimation tools such as simple descriptive statistics, the difference in difference, and ordinary least square regression analyses were applied to a survey of 250 post-graduate students. At the top of the study, we found that most MBA students in India use WhatsApp during academic activity, connect with their professor via WhatsApp, and spend between 1 – 2 hours each day on WhatsApp. We also found a significant difference between the GPAs of students who are connected with their professors and those who are not connected with their professors. Again, we found a low level of addiction to WhatsApp but severe threats to circulating and withholding information by post-graduate students. It was also discovered that student connection with the professors via WhatsApp and spending 3 – 5 hours on WhatsApp increases ones' academic performance. Therefore, we recommend that; school management put policies that will promote a positive and healthy relationship between professors and students, primarily via WhatsApp. The Indian Ministry of Information should enact laws that frond on sending false information on social media and possible punishment. Finally, we recommend that school management institutions have strict policies to prevent students from using WhatsApp during academic activity.

Keywords: Academic Performance; Education; India; Management; Statistical Neutrosophic Analysis; Student; WhatsApp

1. Introduction

The Internet is an acquaintance technology that has entered into every aspect of life as data, trade and communication platforms. Social media, which is an extension of internet technology, has changed communication among people. Within the present aeon of rapid development of Information and Communication Technology (ICT), scholars such as [1] and [2] believe that social media is the most useful channel of communication among people. There are notable number of social media applications, which comprises of WhatsApp, Facebook, Instagram, Telegram etc. In the presence of these numerous applications, [3] classify WhatsApp has the most popular and very addictive social media handle. Currently, WhatsApp is used for sharing information, files, pictures, audio and video, updating status, location, sending instant messages, and conducting real-time conversations. According to [4], young people who priorities family and friends relationships use WhatsApp on an outsized scale.

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According to former employees of Yahoo! Brain Acton and Jan Koum, the professed purpose of the developers of WhatsApp was to make communication easier, faster and better [5]. Points above made WhatsApp very fashionable among students. The benefits of using WhatsApp among tertiary students are enormous and includes improving learning motivation, offering personalized course materials, developing collaborative abilities and relationship enhancement [6], [7]. WhatsApp can enhance tertiary students' learning performance. Compared to other social media platforms, WhatsApp offers other technical advantages such as its simplicity, affordability and privacy.

Several researches have been conducted on the use of WhatsApp among tertiary education students in countries like England, USA, Spain, Malaysia and Ghana [8]. However, existing literature suggests that there is a non-ending debate on the role of WhatsApp usage on performance of tertiary students. Some researcher claims that WhatsApp is advantageous in improving the academic performance[9]–[11] whereas others claim it has addictive and adverse effect on academic performance [3], [12]–[14]. The aim of this study is to extend the current knowledge on the effect of WhatsApp usage on academic performance by examining the relationship between WhatsApp usage and the academic performance among postgraduate management students at the various universities of Dehradun, India. In the context of India, with the fast-growing educational sector of India, especially in Dehradun also known as capital of education in India, it has become necessary for such a study to be conducted here in India. Results from this study can provide knowledge to other institutions on the use of WhatsApp in tertiary institution in India, that how WhatsApp facilitates or even potentially hampers students' learning outcomes as well as the society and possibly discuss some policy implementations.

2. Related Work

Over the years, there has been a great evolution in the communication between students and their teachers. In this modern era, communication between students and their teachers has taken digitalized face which is usually in the form of e-mail, SMS, Facebook and WhatsApp[15]. Each of these social media platforms has its distinct characteristics which affect its pertinence in teaching and learning [16]. Given the technical and economic advantages of WhatsApp, WhatsApp has become the most popular means of communication between teachers and students in higher learning institutes.

The theoretical premise of the present study can be linked to the gratification theory, which according to [17] leads the thinking about social media consumption. This theory assumes social media as a tool to achieve knowledge along with social interaction and diversion by users. It can further be assumed that a user may be entangled with their favorite social media platform like an addictive drug. It is within this norm that discharges how this addiction affects the academic performance of management students of Uttarakhand while using the social media particularly WhatsApp during the academic activity.

Several authors, including [18]–[20] studied the impact of use of mobile phone / social media on teaching and learning process, which shows both positive and negative effects. The knowledge on the use of WhatsApp was extended by[10] and also highlighted the challenges faced by the undergraduates while using WhatsApp. The study found that the undergraduates get benefited by using WhatsApp in terms of discussing and sharing information related to their studies. They concluded that distractions and exposure to unregulated messages or information are some of serious issues undergraduates' face in the course of using WhatsApp. Few authors including [25]-[27] have explored related works using statistical neutrosophic analysis.

A study conducted in Karnataka on usage of WhatsApp among postgraduate students during University environment and discovered that majority of the postgraduate students use WhatsApp for educational purpose [21]. The study revealed that constant use of WhatsApp for educational purpose improves a students' academic performance.

Appiah [22] studied the effect of WhatsApp on the study habit of university students in the Kumasi metropolis of Ghana. It was established in this study that 46.7% of the students frequently (more than ten times a day) use WhatsApp. Appiah [22] further discovered the reasons behind the frequent use of WhatsApp to include sharing contents (news, videos and photos) and experience or insight, establishing romantic relationship, studying, group discussion, networking, killing loneliness, politics, and business.

A research on university students' perception on possible integration of WhatsApp usage into their education work was conducted by [23]. He found that the students use WhatsApp mainly for sharing media and other information with family and friends. The study also revealed that students use WhatsApp for sharing course related resources, announcements and links to topics. He concluded that students do not have any problem with the integration of WhatsApp usage in their education. According to [23] students are ready to embrace the new order when introduced.

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The impact of WhatsApp use on academic achievement among Saudi medical students was studied by [24]. Finding of the study indicate that there is no relationship of WhatsApp usage with the academic performance of students. It was found that 99 % of the respondents were using WhatsApp and over 53 % were using it for academic activity. Gascon et al. [25] conducted an observational and descriptive study on 332 students of Spanish university. The study revealed that the students have a high degree of dependence on WhatsApp and around 97 % of the students use WhatsApp more than ten times a day. They found that WhatsApp has adverse impact on the performance of the students.

The use of social media in higher education system is always a great concern of the researcher working in all the field of academics [26], [27]. In an attempt to examine the effect of WhatsApp usage on the academic performance of University of Cape Coast undergraduate students, [9] made use of 493 students. The study was in twofold; first was to find out the effect of some socio demographic factors on time allocated to study and secondly to examine the effect of WhatsApp on student is CGPA. They discovered that the more a student allocated time to study, better his or her CGPA. Applying regression model, they established that WhatsApp usage could positively influence academic performance of students.

A study on the role of WhatsApp in enhancing learning among medical students was conducted by[28]. He selected 82 students of the MBBS profession, who use smart phones and have WhatsApp on their phones. Furthermore, students were identified as slow learners and fast learners depending on their results in the first semester examinations. He concluded that the use of WhatsApp expands the knowledge of slow learners by creating their interest and enhances their academic performance. A study of [29] studied the role of WhatsApp in enhancing students' academic performance. They used the connectivism and gratification theories and revealed that students use WhatsApp on a medium level. They found a positive correlation between use of WhatsApp and academic performance of students. In their study, they recommended that students should try to use WhatsApp as much as possible to assist their academics. It was discovered that using WhatsApp has a beneficial impact on students' academic performance as far as the primary use is for educational purposes [9], Besides academic goals, students utilize this site to wish/congratulate each other, participate in extracurricular activities, and have fun[30], By refining teaching methodologies and its application, the research has produced an in-depth insight of WhatsApp's usefulness for learning objectives [11] and The use of Facebook, WhatsApp, Twitter, and YouTube by teachers and students had a favorable impact on secondary school pupils' academic performance, according to the study [31].

Although several studies are conducted on the topic, there's a contextual gap previous studies have not yet addressed. Even though India has share similar features with some of the countries where such studies have been conducted, we cannot conclude for India since technology is not a one-side fit all. The present study will fill the existing gap by examining the characteristics of students who use WhatsApp during the academic activity and those are connected with their professors and the life style of the respective students. This paper will study the effect and the extent of effect of WhatsApp usage on academic performance among postgraduate students in India.

3. Methodology

The aim of this paper is to observe and understand whether use of WhatsApp has any effect on academic performance of Management Students of Private Universities of Uttarakhand state in India.

3.1 Source of the data & Data

In this present study, we used primary data collected from postgraduate management students of Uttarakhand. Since we want to generalize our result to greater population of Uttarakhand, which is heterogeneous in nature in terms of background, knowledge and understanding therefore use of stratified random sampling with proportional allocation of samples are advisable. Each university has taken as strata and then from each stratum we took samples using simple random sampling. Each university has different number of students; therefore, we have taken the data using proportional allocation that is small samples from small number of students, large samples from large number of students. The total size of population i.e. the management students using smartphone is around 800 therefore using [32], we decided the sample size to be between 252-278 under 10% and 5% margin of errors respectively.

3.2 Data Collection and Field work

For the stated objective to be achieved, data were collected through survey using google form of postgraduate management students from 5 different universities of Dehradun, which undoubtedly represent the suitable population as a whole for study of our objectives. The questionnaire consisted of forty-three (43) clear, non-offensives and easy to respond questions, which encompasses of both closed-ended and open-ended questions. The instrument requested for the information on demographic background, academics and technology issues. The data collected on this aspect are used to comparing the use of WhatsApp among different age groups and program. To ensure the reliability and high quality of data, which were collected we first informed and trained the

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respondents about the survey then we conducted the pilot study on 30 students (17 postgraduates & 13 graduates). The pilot survey was conducted during March 12th -18th and the data were collected by using final instrument during March 25th – April 10th, 2020. This was the timing of lockdown at India level and students could spend proper time to read and provide the required information. Keeping the non-response in view, we sent the questionnaire (Google form) to 340 students out of which, we received 258 (response rate 75.8%) which shows that survey is valid [33] and proper usable responses can be further utilized for analysis.

The variables collected in the survey are deploy to explore five categories : (1) Demographic information of WhatsApp users like gender, age, academic year, GPA, school, university; (2) Appropriation: factors or points that helps in WhatsApp adoption; (3) Incorporation: time spent per day on WhatsApp, why use WhatsApp, what features are used and types of information transferred; (4) Objectification: the value of WhatsApp and (5) Conversion: challenges and addiction factors while using WhatsApp.

3.3 Empirical model and estimation techniques

The interest of this paper is to examine the effect of the use of WhatsApp has on academic performance of Management Students of Private Universities of Uttarakhand state in India. In order to address research questions (a) and (c), a simple descriptive statistic tools were applied. Research question (b) was addressed by applying difference in difference technique to see the differences in GPA across students' gender, place of stay, use of WhatsApp during academic activity and connection with professor. Finally, research questions (d) and (e) were addressed with the help of Ordinary Least Square estimator. For linear regression (GPA as a dependent variable), the equation was:

$$GPA = \beta_0 + \beta_1 Usewhtaca_i + \beta_2 Cwithprof_i + \beta_3 Age_i + \beta_4 noofgroup_i + \beta_5 Year_i + \beta_6 pfs_i + \beta_7 Gender_i + \beta_8 hrsfs_i + \beta_9 tsoa_i + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

where *GPA* is a continuous variable, which takes on the value 0 to 10; *Usewhtaca* is a dummy variable for whether a student uses WhatsApp during academic activity or not; *Cwithprof* is also a dummy variable for whether a student is currently connected with their professor via WhatsApp; *Age* is the age of the student in categorical terms; *noofgroup* is a continuous variable which tries to identify the number of groups a student is engaged in; *Year* represent the number of years the student has been on the programme; *pfs* represents the place of stay of student that is on campus and off campus; *Gender* is a dummy variable for whether a student is a female or a male — it is zero if the student is male and one if the student is female. *hrsfs* represents the number of hours a student sleep in a day; and *tsoa* is a categorical variable for the number of hours a student spent on WhatsApp.

4. Data Analysis

Table 1 shows that out of the 250 sampled students, 212 (84.80%) of them use WhatsApp during academic activity while 193 (77.20%) are connected with their professor via WhatsApp. This evidence means that not all the students who uses WhatsApp during academic activity are connected with their professor. But who will they be connected to or why are they not connected to their professor? Does this necessarily going to affect their academic performance?

Zeroing in to the gender dimension, it was found that majority (58.8%) of the respondents were males. Male dominance was also found in the areas of using WhatsApp during academic work and connectivity with professor via WhatsApp. This could be simply explained by the higher numbers of males in the sample but we could also explain this by looking at the ease with which a male student can easily talk with a professor (male or female) compared to that of female student. Could this affect the female academic performance?

Picking on the age dimension, the students between the ages 18 – 20 years constituted the largest majority of our respondents and of course, similar findings are expected in the course of usage of WhatsApp during academic work and connectivity with professor. Judgment based on this could be deceptive so, within-group analysis was done and we found that 100%, 96.77%, 83.84% and 81.74% of the students between the ages of 27 – 29, 24 – 26, 21 – 23 and 18 – 20 years (with reference to our sample) respectively uses WhatsApp during academic work. However, in terms of connectivity with professor, the students between the ages of 27 – 29 years came last.

It is evident in Table 1 that 86%, 11.6% and 2.4% for the respondents are in first, second and third year of the MBA programme. This suggests that our largest respondents are first years', followed by second years' and finally third years' MBA students. Even though the percentages changed with the different analyses (across-groups and within-groups), this order remain. The possible explanation could be that in the first year most of the students begin to socialized and want their professors to know them so they turn to use more of WhatsApp during academic work and connect with their professors. As the years go-by they turn to experience certain things and then begin to reduce the usage of WhatsApp during academic work and connectivity with their professors via WhatsApp.

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Table 1: Descriptive statistics

Variable	Use WhatsApp during academic work		Connected with my professor via WhatsApp		Total	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Gender						
Male	122	57.55	114	59.07	147	58.80
Female	90	42.45	79	40.93	103	41.20
Age						
18 – 20	94	44.34	96	49.74	115	46.00
21 – 23	83	39.15	68	35.23	99	39.60
24 – 26	30	14.15	26	13.47	31	12.40
27 – 29	5	2.36	3	1.55	5	2.00
Year						
First	184	86.79	167	86.53	215	86.00
Second	24	11.32	22	11.40	29	11.60
Third	4	1.89	4	2.07	6	2.40
University						
UPES	123	58.02	127	65.80	149	59.60
DIT	4	1.89	3	1.55	4	1.60
IMS	82	38.68	59	30.57	93	37.20
Graphic Era	3	1.42	4	2.07	4	1.60
Place of Stay						
On campus	96	45.28	94	48.70	112	44.80
Off campus	116	54.72	99	51.30	138	55.20
Number of groups in						
0	10	4.72	10	5.18	19	7.60
1 – 2	76	35.85	65	33.68	90	36.00
3 – 4	84	39.62	77	39.90	96	38.40
5 and above	42	19.81	41	21.24	45	18.00

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Time spent on WhatsApp						
1 – 2 hr	113	53.30	102	52.85	137	54.80
3 – 5 hr	71	33.49	67	34.72	81	32.40
6 – 7 hr	20	9.43	18	9.33	22	8.80
8hr and above	8	3.77	6	3.11	10	4.00
Number of hours sleep						
Below the required hours of sleep for adults	61	28.77	55	28.50	73	29.20
Required hours of sleep for adults	150	70.75	136	70.47	174	69.60
Above the required hours of sleep for adults	1	0.47	2	1.04	3	1.20
GPA						
6.6 –10.0	172	81.13	164	84.97	202	80.80
5.0 – 6.5	28	13.21	20	10.36	34	13.60
4.0 – 4.9	10	4.72	7	3.63	10	4.00
0.0 – 3.9	2	0.94	2	1.04	4	1.60
Observation	**212**	**84.80**	**193**	**77.2**	**250**	**100.00**

Source: Authors, 2020

Table 1 shows that 59.6 % of our respondents (250) are from UPES, 37.20% are from IMS, and 1.60% each from DIT and Graphic Era. With a cross-group analysis, UPES comes first in terms of student usage of WhatsApp during academic activity and connectivity with professor. However, for within- group analysis, larger proportion of students from DIT uses WhatsApp during academic work followed by IMS, UPES and the Graphic Era. Larger proposition of student from Graphic Era are connected with the professors which is followed by UPES, DIT and IMS.

It can be gleaned from Table 1 that out of the 250 respondents, 44.80 percent of them stay on campus and 55.20 percent of them stay off campus. Having majority of students staying off campus pose a lot of problems to the students given that they need to access information, get feedbacks and also prompts to certain academic works which can easily be accessed by those on campus. This requires that students who stay off campus should find an innovative way (one of the possible means is WhatsApp) of getting this information. It is not surprising that students who stay off campus led the use of WhatsApp during academic work and connectivity with professors.

Even though in the minority (7.60%), it is very shocking to see an MBA student who is not in any group. Students who were in more than 5 groups was also alarming (18%), since majority of their time will be spent in group meeting. Apart from these two extreme cases, majority (38.40%) of the respondents had 3 – 4 groups followed by 1 – 2 groups. Using the within-group analysis, it was found that 93.33% and 91.11% of students in more than 5 groups use WhatsApp during academic work and connected with their professors respectively. The possible explanation could be that the student with more than 5 groups has to be chatting with a lot of members whiles in class and also connect with professor to get first-hand information for members of their groups.

As seen in many of the previous studies, majority (54.8%) of students spent between 1 - 2 hours (in a day) of their time on WhatsApp. This finding substantiates the finding of [9] & [34], which showed that most of the tertiary students spent 1–2 hr on social media on a daily bases. It was also found that the students who uses 1 – 2 hours of

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the time on WhatsApp constitute the greater portion of students who uses WhatsApp during academic work and as well as those who are connected with their professor.

Table 1 shows that out of 250 respondents, 69.6% of them sleep within the required adults sleeping hours (7 – 9 hours per day), 29.20 % sleep below the required adults sleeping hours and 1.20% sleep above the required adults sleeping hours. It is quite encouraging to see onlyn1.20% of the respondents sleeping above the required adult sleeping hours which implies (somehow) that India students are not lazy. It will interest you to know that using both the across-group and with-group analysis, students who sleep with the required adults sleeping hours came on top followed by those who sleep below the required time and those who sleep above the required time came last. Does this necessarily translate to a better grade?

With a very high response rate, it is very clear from Table 1 that majority (80.8%) of the respondents are in the first division followed by second division, third division and fail. Among those who uses WhatsApp during academic work, 81.13% are in first division, 13.21 % are in second division, 4.72% are in third division and 0.94% fail. Even though there was a slight change in the percentages when it comes to connectivity with professor, the story remains the same. The question is does usage of WhatsApp during academic work and connectivity with professor enhances academic performance? This needs to be further investigated with more robust technique like difference in difference.

Table 2 presents the test results of differences in GPA among various categories of a variable and also justify whether the differences are statistical difference among the categories by using t-test value and the P-value. The differences in two out of the four variables were statistically significantly different. This implies that there is a significant different GPA across gender and connectivity with professor.

Table 2: Difference in difference (in terms of GPA)

Group	**Obs**	**Mean**	**Std. Err**	**Std. Dev.**	**t-value**	**P-value**
Gender						
Male	147	7.162585	0.102271	1.239972		
Female	103	7.55699	0.107198	1.087943		
Difference		-0.39441***	0.151603		-2.6016	0.0098
Place of Stay						
On campus	112	7.3575	0.113699	1.203274		
Off campus	138	7.298768	0.10122	1.189071		
Difference		0.058732	0.152038		0.3863	0.6996
Use WhatsApp during Academic work						
Yes	212	7.299717	0.081078	1.180511		
No	38	7.466579	0.206028	1.270044		
Difference		-0.16686	0.210388		-0.7931	0.4285
Connected with my Professor via WhatsApp						
Yes	193	7.40487	0.077729	1.079843		
No	57	7.054912	0.198172	1.496165		
Difference		0.349958*	0.178892		1.9563	0.0516

*, ** and ***denotes significance at the 10%, 5% and 1% levels respectively.

Source: Authors, 2020

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From Table 2, the mean GPA of Males stood at about 7.16 whiles the females recorded an average GPA of about 7.66. It can be concluded that gender does not have influence of the division a student will belong to since the average GPA of both males and females lay in the first division. However, the average GPA of the adopters of females was a little higher than that of the males. It was further noticed that the mean GPA of the males and the females is significantly different at 1% significant level. This difference is very meaningful especially in the course of scholarship. Even though there are difference in GPA of students who stay on campus and those, who do not as well as between those who use WhatsApp during academic work and those who do not, these differences are not statistically significant.

The mean GPA of students who connect with their professor is differs significantly from that of the mean GPA of those who do not connect with their professor. It is noticed that there is a meaningful 10% significance difference in the means GPAs of students who connect with their professor and those who do not. This difference is very meaningful since the standard deviation difference is large and very big difference in average GPA among the groups.

Although lots of information has been gathered in Table 2, these do not tell as the direction and the degree of the effect of these variables on academic performance of a student. Further statistical Neutrosophic analysis about this was considered and estimated using regression.

Table 3: Value and Usage of WhatsApp

Variable	Freq.	Percent
Value of WhatsApp		
My life	88	35.20
My best friend forever	80	32.00
Normal communication application	147	58.80
Forward information		
Yes (regardless if the information is useful or true)	127	50.80
No (regardless if the information is useful or true)	75	30.00
No	48	19.20
Use WhatsApp in the next 2 years		
Yes	168	67.20
No	8	3.20
May be	74	29.60
Use WhatsApp if it is no longer free/cheap		
Yes	79	31.60
No	33	13.20
May be	138	55.20
Observation	**250**	**100**

Source: Authors, 2020

According to Table 3, about 35.20% and 32.00% of the respondents do not consider WhatsApp as their life and best friend forever respectively. This is an impressive observation and also gives a good sign that India students are not addicted to WhatsApp but is considered as a mere communication application. However, there is a disturbing finding, which says that 50.80% of the MBA students' forward information regardless if the information is useful, relevant or believed to be true. This is a very disturbing practice needs a serious attention for authority.

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If care is not taken many false information may find their way to homes of larger population (especially during this Corona pandemic) of India since most of these highly educated people fail to cross-check the validity of information before forwarding it to others. Given that the information is coming from an MBA student majority of the recipient might believe the information is true or valid. It was also found that about 30.00% of the respondents do not forward information regardless if the information is useful, relevant or believed to be true. This is also worrying because such people can withhold many important messages. Massive education on the importance of validating information before sending to third part is highly necessary in the sense that majority (67.20%) of these WhatsApp users intend to use the App in the next 2 years even if the App is no longer free 31.60% will use it.

5. Results and Discussion

Before we discuss the findings, we performed robustness check by using the model specification test (Link-test) that is insignificant for the _hat and insignificant for the _hatsq which implies that the model is correctly specified [35][36]. As indicated under Table 4, the multiple regression model for the OLS estimation passed the model specification test (see last 3 & 4 rows of Table 4) indicating that the model has no omitted variable bias. The mean VIF for the model was 1.70, which is far less than the conventional level of 10. With this 1.70<10, [37] & [38] give us assurance of non-violation of the principle of multicollinearity. Finally, the p-value for the heteroscedasticity test was insignificant and indicating that the model has no heteroscedasticity. With a model diagnostics validation, the study proceeds with the discussion of the results as presented in Table 4.

For students who connect on WhatsApp with their professor, their academic performance increases by 0.39 points and it is statistically significant at 5 percent indicating the relevance of such variations. The possible explanation to this could be that being in connection with professor can enhance personal access to the professor, which could lead to further explanation to certain concepts that the student did not understand during the general meeting. The student can also use the platform to ask questions and even request for trial or practice questions or further notes. Our findings corroborate that of [39] who found that healthier contact and more closeness between teachers and students leads to higher student motivation and academic performance.

Compare to students within 18-20 age group, those within 27-28 age bracket's academic performance decreases by 1.155 points. What this might mean is that younger students in terms of age are likely to do better than their older counterparts academically. The plausible explanation could be that students between the ages of 27 – 28 could be saddled with other responsibilities which affect the retention and concentration whiles those in the within 18 – 20 years may have nothing or little to worry about. This finding is supported by Clark and Ramsay (1990) and [25], [40] who found that the younger the student the higher the academic performance and the older student the lower the academic performance.

Relative to a first-year student, a second years' academic performance increases by 0.596 points and that of the third year by 1.073 points on the same programme. The implication of this finding is that the more a person stays on a programme the better their academic performance. This means that the first years of a person on a programme should not be used to measure the overall performance of the person. In the first year, the student might be struggling to be acquainted with the norms and practices of the university as well as the programme and this might bring some impediments in the students' performance.

Table 4: Use of WhatsApp and academic performance

Variables	Coef.	Std. Err.	t	P>t
Use WhatsApp during academic activity	-0.233	0.216	-1.08	0.281
Connected with my Professor via WhatsApp	0.391**	0.185	2.11	0.036
Age	*Base = 18 -20*			
21-23	0.123	0.174	0.71	0.481
24-26	0.110	0.248	0.44	0.657
27-28	-1.153**	0.574	-2.01	0.046
No of groups in	*Base = No group*			

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1 - 2	-0.070	0.303	-0.23	0.818
3 - 4	-0.012	0.313	-0.04	0.969
5 and above	-0.033	0.348	-0.09	0.925
Year	*Base = First year*			
Second	0.596**	0.232	2.58	0.011
Third	1.073**	0.535	2.00	0.046
Living	*Base = On Campus*			
Off Campus	0.006	0.152	0.04	0.968
Gender	*Base = Male*			
Female	0.315**	0.154	2.05	0.042
Hours of sleep	-0.057	0.060	-0.96	0.340
Time spent on WhatsApp	*Base = 1 - 2hr*			
3-5hr	0.409**	0.167	2.44	0.015
6-7hr	0.231	0.275	0.84	0.402
8hr and above	0.537	0.391	1.38	0.170
Constant	7.213***	0.513	14.07	0.000
Observation	250			
F(16, 233)	2.45***			
Prob > F	0.0019			
R-squared	0.1438			
Linktest	_hat:P>|z|= 0.958 _hatsq:P>|z|= 0.664			
Omitted variable bias (ovtest)	0.62			
Homoskedasticity (hettest)	0.75			
Mean VIF	1.70			

*, ** and ***denotes significance at the 10%, 5% and 1% levels respectively.

Source: Authors, 2020

Female's academic performance increases by 0.35 points more compared to their male counterparts. The implication of this finding is that females are academically better than males. Female's turn to be more organized, focus and multi-tasking than males. Given these abilities, they are able to focus more on their studies and achieve higher GPAs than males. Females also have more adaptive ways of learning than males [41] hence better academic achievement. These are consistent with[42] but were, however, in contrast with [43] which reported that gender is not significant predictors of academic performance.

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Spending 3-5 hours' time on WhatsApp increases one's academic performance by 0.409 points compared to those who spend between 1-2 hours. Probably, spending 3 to 5 hours on WhatsApp increases a student access to information from other students and professors. However, using WhatsApp during academic work does not necessarily improve one's academic performance. From Table 4, the use of WhatsApp during academic work is seen to be negative and statistically insignificant. This means that the act of using WhatsApp during academic work has its own negative effect on academic performance but not necessarily significant.

Living on-campus or off-campus has no statistically significant effect on one's academic performance even though living off campus can improve a students' GPA marginally but not statistically significant. Hours of sleep and number of groups joined by a student were also found to have a negative effect on academic performance although they are not statistically significant.

6. Conclusion and recommendations

Several researchers have attempted to establish the relationship between usage of WhatsApp and academic performance. However, there is a contextual gap since previous studies have not paid critical attention to India. Even though India has share similar features with some of the countries where such studies have been conducted, we cannot conclude for India since technology is not a one-side fit all. This study sought to investigate the extent of the use of WhatsApp and academic performance of management students of Uttarakhand. To achieve the set objective, the following research questions were raised: (a) what are the features of students who use WhatsApp during the academic activity and those are connected with their professors? (b) Are there no difference in GPA across students' gender, place of stay, use of WhatsApp during academic activity and connection with professor? (c) is the share of information via WhatsApp a threat to India? (d) is there any relationship between the use of WhatsApp and academic performance? (e) To what extent does WhatsApp affect the academic performance? Based on a primary data collected from 250 postgraduate management students of Uttarakhand in India, preceding analyses sought to clarify this matter.

The following conclusions were reached. First of all, majority of MBA students in India are: males, between the 18 – 20 years, stay off campus, use WhatsApp during academic activity, connected with their professor via WhatsApp, spend between 1 – 2 hours a day on WhatsApp, sleep for 7 - 9 hours a day, and first-class division. Secondly, female students and students who are connected with their professor have higher GPA than male students and those who do not connect with their professors respectively. Thirdly, where a student stay (off or on campus) and usage of WhatsApp during academic work does not explain variations in GPA. Fourthly, postgraduate students in India are not addicted to WhatsApp but poses serious threats to circulating and withholding of information. Fifthly, student connection with professor via WhatsApp, the higher the years spent on programme, spending 3 – 5 hours and being a female student increases ones' academic performance. Finally, aging (specifically between 27 – 28 years) reduces a students' academic performance.

Given the above conclusions, we recommend that; school management should put in place policies, which will promote positive and healthy relationship between professors and students especially via WhatsApp. We again recommend that parents and guardian should ensure that their children peruse higher learning (MBA) before turning age 27. The Indian Ministry of Information should enact laws which fronds on sending false information on social media and possible punishment. Finally, we recommend that school management should institution strict policies to prevent student from using WhatsApp during academic activity.

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