

Nomophobia in healthcare: an observational study between nurses and students

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Abstract. *Background and aim of the work:* Technological devices abuse can be considered a form of addiction defined in the literature as nomophobia. The phenomenon appears to be quite widespread among nurses and nursing students; nomophobic behaviours of professionals can lead to an impoverishment of the care provided. The aim of this study is to investigate the construct in a University and in an hospital in northern Italy and evaluate the levels of nomophobia between nurses and students. *Methods:* It has been conducted an observational study with a questionnaire with a sample of nursing students and nurses. Both the two studies had the common goal to investigate the levels of nomophobia and evaluate the comparison between the two groups. *Results:* In general, both nurses and students they don't seem to demonstrate nomophobia's critical levels. The comparison of the daily use of the smartphone between nurses and students shows that the frequent use of students is balanced by the nurses' daily trend line that progressively decreases. Both nurses and students affirm to use, with a certain frequency their smartphone at work although, above all the students, usually for appropriate and justified reasons. *Conclusions:* It is necessary to consider the development of an educational project that regularizes the use of smartphones, explaining the meaning of nomophobia, right from the beginning of the University career so to correctly address the student's (and future professionals) behaviours to make them aware of mobile phones' misuse, especially in the clinical setting that can easily cause distractions and consequently irreversible errors. (www.actabiomedica.it)

Key words: Nomophobia, nursing students, smartphone, mobile devices, mobile technology, nurs* education, smartphone addiction

Introduction

Over the years, and in particular during the 21st century, we have observed a progressive development of new technologies and devices such as computers, tablets and smartphones; these new devices have completely transformed the way people communicate. Along with the progress of technological development, the shapes of the various devices have also changed, becoming smaller and therefore easy to carry. The ICTs (acronym of Information

and Communication Technologies, acronym used by researchers since the 80s (1) have become particularly widespread and used increasingly in modern cultures and developed countries thanks to their "ever present" nature and considered an irreplaceable part of a society in constant connection. Thanks to smartphones, people can research, carry out economic and recreational activities, download learning tools, undertake school research, carry out economic and recreational activities, have easier and faster social communications through phone calls, messages, emails, social

networks and chats that allow them to be in constant contact with friends and family (2). The data regarding the use of technologies to communicate and get informed, in particular smartphones and mobile phones, testify a capillary diffusion in the world with unequivocal data such as, for example, in Korea where the use rate of smartphones in 2016 was 90%, up to a rate of 99% among young people between 20 and 30 years of age (3) or in the United States where it was shown that in 2015, two thirds of Americans had a mobile phone with a growing trend in its usage (4). In 2014, in Spain, 97,1% of young people had a mobile phone and 90,4% of Spanish teenagers used the Internet from their mobile while, in Portugal, it was estimated that 89% of the population had a mobile phone and internet was used by 77% of them (5). These communicative advantages particularly attract adolescents and young people, who seem to spend a lot of their time using their mobile phones, up to the creation of so-called “cyber spaces” (6), a sort of virtual space in which to communicate by limiting the social anxieties of appearing with possible negative repercussions, in the family and working life of each individual (7). These devices can therefore produce tolerance, that is the growing need to use one’s mobile phone to feel satisfied (8). Excessive use of smartphones can be considered a form of addiction (5) and can therefore be harmful due to some attitudes and problems that result from their use moreover, disorders such as anxiety and depression have proved to be positive predictors of smartphone addiction (9). The intrusiveness and persuasiveness of smartphones have developed negative habits among young people that can be assimilated to compulsive behaviours such as: constantly checking the phone for missed messages or calls, checking if there is an available web connection, keeping the phone on 24 hours a day, never going out without the mobile phone, using the phone even during a conversation with another person who is therefore ignored (a condition that characterizes the behaviour defined as “phubbing”) (10), believe you have heard the phone ring or “ringxiety” a word composed of “ring” and “anxiety” (7) (2). All these symptoms culminate in “Nomophobia”, which indicates the fear of feeling or remaining disconnected with the possibility of not being able to use the mobile phone and the services

it offers, not being able to communicate, losing the connection, information, consequently resulting in feelings of anxiety and anguish due to the loss of the network or if the telephone is discharged (2) (11) (12). According to Bragazzi and Del Puente a nomophobic behaviour is characterized by anxiety of losing coverage or to have low battery; moreover nomophobic persons constantly look at the screen to check the social network updates because they are constantly focused on what is happening among their contacts (13). The abuse of smartphones can also affect social relationships and ruin their quality, especially in the working environment translating into the neglect of one’s duties and the degradation of relationships between colleagues, also causing unemployment and high staff turnover (8). In the healthcare setting, where the phenomenon seems to be widespread, these attitudes can have serious repercussions on patients and compromise their health because they can lead to neglecting essential tasks, forgetting important patient data, making careless mistakes and compromising professional-patient dialogue, causing a reduction in the quality of the treatments provided (8) (6). As for nurses, for example, in a study by Gutierrez-Puertas et al., 75% of them admitted to having used their telephone at work for personal problems (5); other evidence in the literature demonstrates that the problem also seems to affect the nursing training field, specifically nursing students (8). Although numerous investigations have been carried out on the phenomenon of nomophobia both on nurses and nursing students, the literature does not seem to report any evidence from the Italian context. Furthermore, there seems to be a lack of information on the comparison between the two populations in question (students and nurses), since the research has focused on the populations studied individually.

Objective

The aim of our study is therefore to investigate the construct in a University and in a hospital in northern Italy with the aim of evaluating the levels of nomophobia between nurses and students and to compare the two populations investigated.

Method

Ethical implications. Participation was voluntary; participants (nursing students and nurses) were informed that any information given was strictly confidential and used exclusively for the research's purposes and that no personal information will be used to identify the author (in accordance with the regulation UE n. 2016/679, issued April 27th 2016, published on EU Official Journal on May 4th 2016, came into force on May 25th 2016 and executive since May 25th). Consent was required to participate in the study and complete the questionnaire.

Setting. Two studies have been carried out: the first study (study 1) was conducted involving a sample of nursing students (1st 2nd and 3rd year) of the Nursing Course Degree of the University of Parma; the second (study two) with several nurses of the Parma University Hospital, (Northern Italy).

Study 1

Design. Observational and descriptive study, conducted in the period from January to May 2020.

Sample. Convenience sampling was used to select 244 nursing students evenly distributed among 1st 2nd and 3rd year of course not applying specific quality criteria for the admissibility except regular attendance to the classes and the possession of a smartphone with internet web connection.

Procedure. The students were informed about the study's aim with a meeting (in the classroom per year of course) of about 40 minutes underlying the principles of the anonymity guarantee. The students were then informed about the modalities of participation and invited to answer the questionnaire prepared in Google Drive[®] whose link it had been sent to them via personal email.

Instrument

We used a structured questionnaire; in the introductory part we provided a brief presentation of the research, specifying that processing of data was

guaranteed to be in an absolutely anonymous form. To assess the nomophobia's levels, we used a validated self-reporting tool, extensively used in research, the Nomophobia Questionnaire (NMP_Q) Italian version (2), a 20-item questionnaire. All responses were on a seven-point Likert type scale, in which three indicated lower levels of the measured construct (from 1 to 3) and three indicated higher levels (from 5 to 7); the value 4 indicated the theoretical median value. An example of item was '*Mi sento a disagio senza poter accedere costantemente alle informazioni tramite il mio smartphone*' ('*I would feel uncomfortable without constant access to information through my smartphone*'). We added 3 questions structured *ad-hoc*. The first question was: "*How many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?*", with 6 response modes: a) < 1h (less than an hour), b) >1-2h (more than an hour until 2 hours), c) >2-3h, d) >3-4h, e) >4-5h, f) >5h. The choice to join in the same question electronic devices and console, different in nature and aim, was suggested by proposing a global view of the reasons why you spend time per day in connection, in order not to create confusion of answer (hours spent on different types of device rather than console), given that very often console and smartphones are used simultaneously, such as, for example, while playing to search for solutions to games whit the smartphone. The second question was: "*During the last day of traineeship, I consulted my smartphone*", with three different response modes: a) *never*, b) *sometimes*, c) *often/very often*". We then indicated 7 possible reasons (deducted from the literature): a) *deepen didactic topics*, b) *to call friends/acquaintances*, c) *to call family members*, d) *databases consulting*, e) *social network consulting*, e) *messages or email check*, f) *other* (the only free-response question, with the possibility to specify the reason). The last question asked to indicate the year of study (1st 2nd or 3rd).

Study 2

Design. The second study, observational and descriptive, was conducted in the period from January to May 2020.

Sample. Convenience sampling was used to select 72 nurses within various Hospital Units, without adopting any particular criteria of selection but simply questioning nurses who were immediately available and declare the possession of a smartphone with internet web connection.

Procedure. Professionals were contacted via mail and recruited personally by the researchers and informed both about the study's aim and data processing methods with guarantee of anonymity. It went the same way with the students, we informed them about the modalities of participation and invited them to complete the questionnaire prepared in Google Drive® whose link had been sent to them via personal email.

Instrument. To assess the nomophobia's levels with the nurses, we used the same questionnaire used with the students. We adapted the second *ad-hoc* question, changing the sentence "day of traineeship" with "last shift work". The last question eventually concerned the nurses' years of work through 5 ranges: a) < 2 (less than 2 years of work), b) 2-5 years (from 2 to 5), c) > 5-10 years, d) > 10 years.

Data analysis. The descriptive analysis (frequencies, central tendency and dispersion measures), the psychometric properties verification tests (*KMO*, *Barlett's test of sphericity*, α di Cronbach) the χ^2 tests, the correlation analyses (Spearman's Rank correlation coefficient), the comparison means tests (ANOVA, K-W test and ANOVA with Welch correction having previously checked the distribution's normality),

were computed through the IBM SPSS statistical program®, Statistics Version 23.0 software package (IBM Corp. 2014). The CFA were computed with Mplus® Version 7 (Muthèn & Muthèn, 2009) ; eventually *p* values <0.05 were considered statistically significant.

Results:

Study 1

Sample characteristics. The sample size of the study on students is described in table 1. The final sample was made up of 244 students, of whom 79 (32.4%) 1st year of course, 83 (34.0%) 2nd year and 82 (33.6%) 3rd year.

Table 2 represents the answers to the question "How many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?" A certain homogeneity of the answers can be observed ($\chi^2 = 5.718$, $df = 8$, $p = .679$); anyway both 1st and 3rd year students report the greater number of preferences on >5 hours per day and 2nd year students on >4-5 hours per day.

It's very interesting to observe the trend line of the general number of hours per day spent on their smartphone/PC/Tablet and/or games (Playstation, Xbox, Nintendo), almost constantly on the rise, with the greater number of answers on > 5 hours.

NMP-Q Italian version dimensions and psychometric properties. Assuming that 244 subjects constituted a sample size large enough (*N/k ratio 12.2:1*) to compute reliable estimations of correlations among variables (*KMO index .938*, *Barlett's test of sphericity* $\chi^2 = 5,796.28$, $df = 19$, $p < 0.01$), we proceeded with the EFA. Accordingly with the validation study of the Italian version of the NMP-Q questionnaire

Table 1. Students: year of course

Students	N	%
Students 1st year	79	32,4
Students 2nd year	83	34,0
Students 3rd year	82	33,6
Total	244	100,0

Table 2. Students: "How many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?"

Students/hours per day	>1-2h	>2-3h	>3-4h	>4-5h	>5h	Total
Students 1st year	3	15	20	16	25	79
Students 2nd year	4	15	21	22	21	83
Students 3rd year	9	16	18	16	23	82
Total	16 (6.6%)	46 (18.9%)	59 (24.2%)	54 (22.1%)	69 (28.3%)	244 (100%)

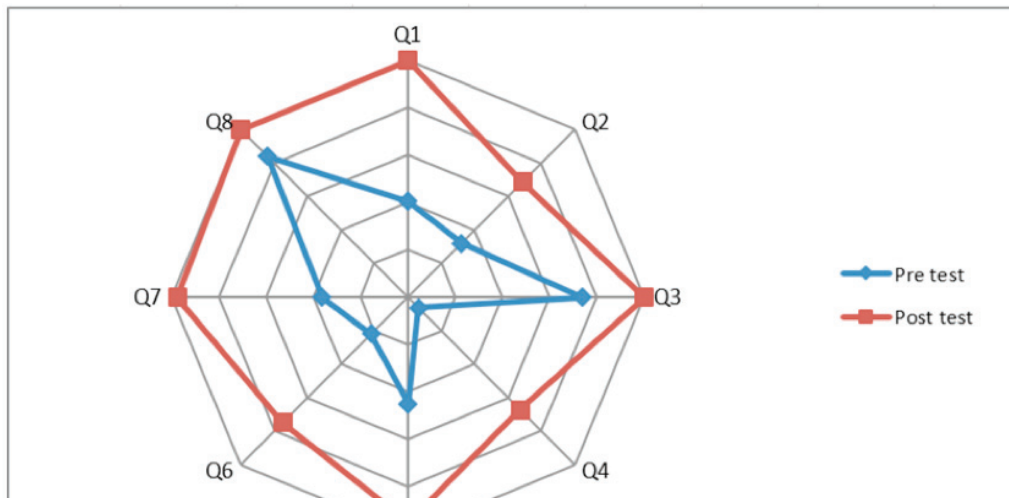


Chart 1. Students: cumulative answers and trend line to the question “how many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?”

Table 3. Students: NMP-Q Mean, standard deviation, kurtosis and skewness

Students	M	SD	kurtosis	Skewness	SE kurtosis	SE skewness
Students 1st year	3,61	1,15	-,501	,287	,535	,271
Students 2nd year	3,60	1,08	-,522	,024	,523	,264
Students 3rd year	3,36	1,30	-,607	,311	,526	,266
Total	3,52	1,18	-,555	,181	,310	,156

Note: M = mean; SD = standard deviation; SE = standard error

(2), it has been performed an *oblimin* rotation that has confirmed the presence of three factors that explained 65.78% of the variance and showed a very good overall Cronbach alpha coefficient ($\alpha = .944$). The visual inspection of the histograms, normal Q-Q plots and box plots showed that the exam scores were approximately normally distributed among the three groups of students with a general skewness of .181 (SE = .156) and kurtosis of -.555 (SE = .310) (see table 3.).

Correlation analysis. The NMP-Q total score correlated with the number of hours spent using a mobile phone ($R_s(244) = .287, p < 0.01$) so the more hours spent per day using a mobile phone the higher the level of nomophobia.

Mean (*M*), standard deviation (*SD*), kurtosis, skewness and related standard errors (*SE*) are shown in table 3. As regards the students, we observe that for the 1st 2nd and 3rd year of course, the scores were below

the scale’s theoretical median score (1st year students $M = 3.61, SD = 1.15$; 2nd year students $M = 3.60, SD = 1.08$; 3rd year students $M = 3.36, SD = 1.30$; *theoretical median score = 4*) and differences were not statistically significant ($F(2,241)=1.180, p = .31, h^2 = 0.10$). The mean overall score of nomophobia was below the scale’s theoretical median score ($M = 3.52, SD = 1.18$).

Table 4 represents the answers to the question “During my last internship, I consulted my smartphone” and the results. We can observe a certain inconsistency among the answers. As regards the 1st year students 46 (58.2%) answered “never”, 30 (38.1%) “sometimes”, only 3 (3.8%) of them “very often”. Different frequencies are revealed among 2nd year students, in fact only 9 (10.9%) answered “never”, 72 (86.7%), most of them “sometimes” and only 2 (2.4%) “very often”. Then among 3rd year students, only 3 (3.6%) answered “never”, 62 (76.5%) “sometimes”

Table 4. Students: “During my last internship, I consulted my smartphone”

		<i>Never</i>	<i>Sometimes</i>	<i>Often/Very Often</i>	<i>Total</i>
Students 1 st year	Count	46 (58.2%)	30 (38.1%)	3 (3.8%)	79
	Exp. count	18.8	53.1	6.8	
	Adj. res.	8.7	-6.7	-1.9	
Students 2 nd year	Count	9 (10.9%)	72 (86.7%)	2 (2.4%)	83
	Exp. count	19.7	55.8	7.1	
	Adj. res.	-3.4	4.7	-2.5	
Students 3 rd year	Count	3 (3.6%)	62 (76.5%)	17 (20.8%)	82
	Exp. count	19.5	55.1	7.4	
	Adj. res.	-5.3	2.0	4.5	
Total	Count	58 (23.8%)	164 (67.2%)	22 (8.6%)	244

Note: Exp. Count = Expected Count; Exp. Res. = Expected Residuals; Adj. Res. = Adjusted Residuals; Adj. Res. in bold are those that exceed +/- 1.96

and 17 (20.8%) “very often”. Considering the overall students’ responses 58 (23.8%) of them answered “never”, most of them 164 (67.2%) “sometimes”, then 21 (9.0%) “very often”. The result of the comparison carried out among the three classes of students, points out statistically significant differences ($\chi^2(4); N = 244) = 93.755; p < 0.01$). As seen in table 4, the analysis of the adjusted residuals reports data with different positive or negative values +/- 1.96 (data in bold) (14) indicating that all three classes have an effect in determining the significant differences.

Table 5 displays the responses regarding the reasons indicated for the smartphone’s consultations during their traineeship and the substantive differences appeared quite clearly. We didn’t perform a χ^2 test because of the presence of expected values <5 in more than 80% of the cells, and cells with expected values less than one 3 (15); the analyses of the adjusted residuals however underlines the differences’ significance (in bold are those that exceed +/- 1.96). The 2nd (50, 60.2%; Adj. Res.= 3.9) and 3rd (43, 52.4%; Adj. Res.= 2.1) year students for the most part claimed to consult their smartphone to “*deepen didactic topics*”, clearly and significantly different from the 1st year students’ answers (12, 15.2%; Adj. Res.= -6.1); This answer eventually ends up being, in general, the most chosen reason to consult the smartphone during traineeship (105, 43.0%). Other substantial differences could be observed at “*databases consulting*” (3rd year students = 6, 7.3%; Adj. Res.= 2.5) and “*social networks*

consulting” (2nd year students = 2, 2.4%; Adj. Res. -2.1; 3rd year students = 12, 14.6%; Adj. Res.= 3.1). The answer “*messages or mail checking*” didn’t show significant differences but resulted in the second most chosen answer (53, 21.7%). It’s curious to observe that only 1 student in training answered that he attends his traineeship without a smartphone; a lot of students eventually didn’t answer the questions (45, 18.4%).

Study 2

Sample characteristics. The sample size of the second study on nurses is described in table 6 and refers to years of work (or professional career). The final sample was made up of 72 nurses; 11 (15.3.4%) nurses belong to the class < 2 years of work, class 2-5 years has 14 (19,4%) nurses, > 5-10 years is represented by 15 (20.8%) nurses and the last class, the older ones with > 10 years had 32 (11.4%) nurses.

Table 7 represents the answers to the question “How many hours per day (cumulative) do you spend on your smartphone/PC/Tablet and/or games (Playstation, Xbox, Nintendo)? We noticed that 10 (13.9%) nurses answered <1h, unlike students where we had 0 preferences. We observed the majority of frequencies between 1-2 h (18, 25%) and >2-3h (17, 23.6%) with marginal differences among the other classes of answer without however a statistical significance ($\chi^2(15; N = 72) = 23.645; p = 0.071$).

Table 5. Students: reasons for the smartphone's consultations during traineeship

		<i>Deepen didactic topics</i>	<i>To call friends or acquaintance</i>	<i>To Call family members</i>	<i>Databases consulting</i>	<i>Social networks consulting</i>	<i>Messa-ges or mail cbeck</i>	<i>Without smart-phone</i>	<i>No answer</i>	<i>Total</i>
Students 1 st year	Count	12 (15.2%)	1 (1.3%)	7 (8.9%)	2 (2.5%)	4 (5.1%)	15 (19.0%)	1 (1.3%)	37 (46.8%)	79
	Exp. count	34.0	.3	4.2	2.6	5.8	17.2	.3	14.6	
	Adj. res.	-6.1	1.4	1.7	-.5	-1.0	-.7	1.4	7.9	
Students 2 nd year	Count	50 (60.2%)	0	3 (3.6%)	0	2 (2.4%)	20 (24.1%)	0	8 (9.6%)	83
	Exp. count	35.7	.3	4.4	2.7	6.1	18.0	.3	15.3	
	Adj. res.	3.9	-.7	-.9	-2.1	-2.1	.6	-2.5	-.7	
Students 3 rd year	Count	43 (52.4%)	0	3 (3.7%)	6 (7.3%)	12 (14.6%)	18 (22.0%)	0	0	82
	Exp. count	35.3	.3	4.4	2.7	6.0	17.8	.3	15.1	
	Adj. res.	2.1	-.7	-.8	2.5	3.1	.1	.7	-5.3	
Total	Count	105 (43.0%)	1 (0.4%)	13 (5.3%)	8 (3.3%)	18 (7.4%)	53 (21.7%)	1 (0.4%)	45 (18.4%)	244

Note: Exp. Count = Expected Count; Exp. Res. = Expected Residuals; Adj. Res. = Adjusted Residuals; Adj. Res. in bold are those that exceed +/- 1.96.

Table 6. Nurses: year of work

<i>Nurses years of work</i>	<i>N</i>	<i>%</i>
Nurses < 2 y	11	15,3
Nurses 2-5 y	14	19,4
Nurses > 5-10 y	15	20,8
Nurses > 10 y	32	44,4
Total	72	100,0

Observing the trend line of the general number of hours per day spent on their smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo), there is a gradually decreasing moving from >1-2h that reports the maximum number of preferences (18, 25%) towards the last two classes (>4-5h and >5h), both indicated by 7 (9.7%) nurses.

NMP-Q Italian version dimensions and psychometric properties.

We computed estimations of correlations among variables with good results (*KMO index* .868; *Barlett's test of sphericity* $\chi^2 = 1403.912$ *df* = 190, $p < 0.01$), then we proceeded with the EFA performing an *oblimin* rotation that has again confirmed the presence of three factors that explained 72.89% of the variance

and showed a very good overall Cronbach alpha coefficient ($\alpha = .950$). The visual inspection of the histograms, normal Q-Q plots and box plots showed that the exam scores weren't normally distributed among the four groups of nurses with a general skewness of .842 (SE = .283) and kurtosis of .430 (SE = .559) (see table 8).

Correlation analysis. It was notable that the same results were found among the students, The NMP-Q total score correlated with the number of hours spent using a mobile phone ($R_s(72) = .319$, $p < 0.01$) so again, the more hours spent per day using a mobile phone the more the higher the level of nomophobia.

Mean, standard deviation, kurtosis and skewness are shown in table 8. We observe for the nurses, that the scores were all below the scale's theoretical median score (nurses <2y $M = 2.49$, $SD = .76$, nurses 2-5y $M = 3.09$, $SD = 1.33$, nurses >5-10y $M = 2.85$, $SD = 1.37$, nurses >10y $M = 2.47$, $SD = 1.05$); the *Kruskall-Wallis test* wasn't statistically significant ($\chi^2(3) = 3.118$, $p = .374$). The mean overall score of nomophobia was below the scale's theoretical median score ($M = 2.67$, $SD = 1.15$; *theoretical median score* = 4).

In table 9 we see the answers to the question "During my last shift work, I consulted my smartphone". In regard to the nurses with less than 2 years of working we can observe that 3 (27.3%) answered "never", 6

Table 7. Nurses: “How many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?”

Nurses/ hours per day	< 1h	>1-2h	>2-3h	>3-4h	>4-5h	>5h	Total
Nurses < 2 y	1	3	2	2	1	2	11
Nurses 2-5 y	0	1	3	6	3	1	14
Nurses > 5-10 y	1	2	6	3	1	2	15
Nurses > 10 y	8	12	6	2	2	2	32
Total	10 (13.9%)	18 (25.0%)	17 (23.6%)	13 (18.1%)	7 (9.7%)	7 (9.7%)	72 (100%)

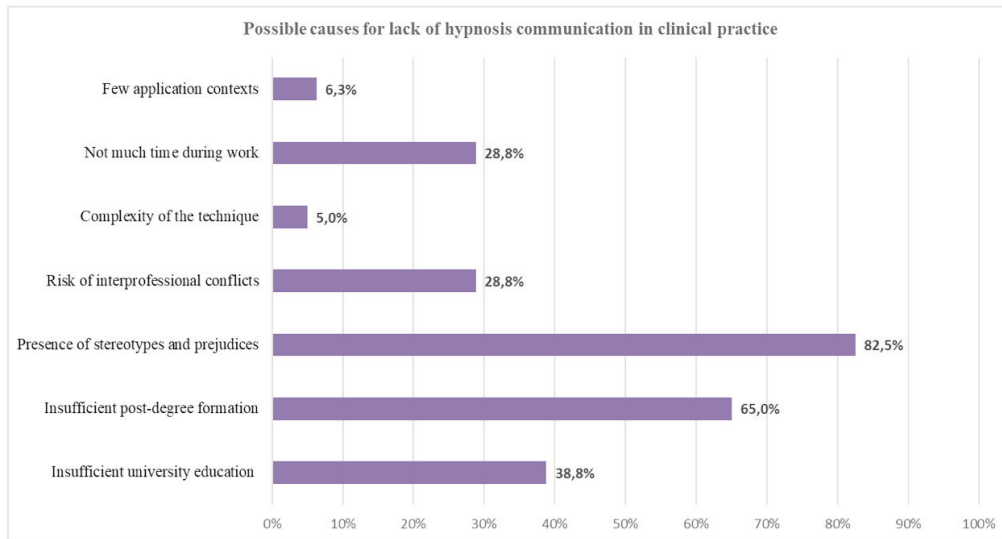


Chart 2. Nurses: cumulative answers and trend line to the question “How many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?”and/or games (Playstation, Xbox, Nintendo)?”

Table 8. Nurses: NMP-Q Mean, standard deviation, kurtosis and skewness

Nurses	M	SD	kurtosis	skewness	SE kurtosis	SE skewness
Nurses < 2 y	2.49	.76	.683	-.565	1.279	.661
Nurses 2-5 y	3.09	1.33	.100	.865	1.154	.597
Nurses > 5-10 y	2.85	1.37	.111	.789	1.211	.580
Nurses > 10 y	2.47	1.05	.189	.696	.809	.414
Total	2.67	1.15	.430	.842	.559	.283

Note: M = mean; SD = standard residuals; SE = standard errors

(54.5%) “sometimes” and 2 (18.2%) of them “often”. None of the nurses with 2-5 years of work experience answered “never”; 10 (71.4%) of them instead answered “sometimes” and 4 (28.6%) “often”. Switching to more

experienced nurses, among those with >5-10 years of career we observe that only 1 (6.7%) answered “never”, and the other 14 (93.3%) “sometimes” and none “often”, Almost comparable (in percentage) to the results with

the most experienced nurses with >10 years of working, in fact we have 8 (25.0%) that answered “never”, all the other 24 (75.0%) of the sample “sometimes” and none again “often”. Considering the overall nurses’ responses 12 (16.7%) answered “never”, 54 (75.0%) “sometimes” and just 6 (8.3%) “often”. We didn’t perform a χ^2 test because the presence of expected values <5 in more than 80% of the cells, and cells with expected values less than one (15); nevertheless the analysis of the adjusted residuals (see table 9 data in bold) indicates that the significant differences are reported only on “often” and between two classes of nurses: 2-5y (*Adj. Res.* = 3.1) vs >10y (*Adj. Res.* = -2.3).

Table 10 displays the responses regarding the reasons indicated for the smartphone’s consultations during their last work shift. As well as students we didn’t perform a χ^2 test because the presence of expected values <5 in more than 80% of the cells, and cells with expected values less than one 3 (15). The analysis of the adjusted residuals shows the little differences’ significance among classes; in particular it denotes the ones who answer “deepen didactic topics” between nurses with >5-10 (7, 46.7%; *Adj. Res.* = 2.0) and >10 (3, 9.4%; *Adj. Res.* = -2.9) years of working. Here again we observe that only 1 nurse answered that he/she goes to work without a smartphone; and there were definitely fewer

nurses (in percentage respect to the students) who didn’t answer the questions (5.6% vs 18.4%).

Comparison between nurses and students.

Table 11 shows the sample size of the 2 populations in the study (nurses and students) with a clear prevalence of students (244; 77.2%) compared to nurses (72; 22.8%). As already pointed out above, the graphic evidence highlights even more that in both studies that the mean scores from the NMP_Q (students $M = 3.52$; nurses $M = 2.67$) are below the theoretical median score (4.0). As previously pointed out, the graphic evidence highlights even more that in both studies that the average scores from the NMP_Q (students $M = 3.52$; nurses $M = 2.67$) are below the theoretical median score (4.0) and both statistically significant as proven by the *one sample t-test* ($p < 0.01$).

The chart 3 shows the comparison between nurses and students regarding the hours spent per day on electronic devices. The contraposition between the trend lines is noteworthy: with the students we can observe “0” frequency on the lowest value (<1h = 0%), and the highest frequency on the highest value (>5h = 28.3%), with the nurses contrariwise, all the highest

Table 9. Nurses: “During my last shift work, I consulted my smartphone”

		<i>Never</i>	<i>Sometimes</i>	<i>Often</i>	<i>total</i>
Nurses <2 y	Count	3 (27.3%)	6 (54.5%)	2 (18.2%)	11
	Exp. count	1.8	8.3	.9	
	Adj. res.	1.0	-1.7	1.3	
Nurses 2-5 y	Count	0	10 (71.4%)	4 (28.6%)	14
	Exp. count	2.3	10.5	1.2	
	Adj. res.	-1.9	-.3	3.1	
Nurses >5-10 y	Count	1 (6.7%)	14 (93.3%)	0	15
	Exp. count	2.5	11.3	1.3	
	Adj. res.	-1.2	1.8	-1.3	
Nurses >10 y	Count	8 (25.0%)	24 (75.0%)	0	32
	Exp. count	5.3	24.0	2.7	
	Adj. res.	1.7	0	-2.3	
Total	Count	12 (16.7%)	54 (75.0%)	6 (8.3%)	72

Note: Exp. Count = Expected Count; Exp. Res. = Expected Residuals; Adj. Res. = Adjusted Residuals; Adj. Res. in bold are those that exceed +/- 1.96

Table 10. Nurses: reasons for the smartphone's consultations during the last shift work

		<i>Deepen didactic topics</i>	<i>Call friends or parents</i>	<i>Call relatives</i>	<i>Consult databases</i>	<i>Watching Social networks</i>	<i>Reading messages or mail</i>	<i>With-out smart-phone</i>	<i>No answer</i>	<i>Total</i>
Nurses < 2 y	Count	3 (27.3%)	0	2 (18.2%)	2 (18.2%)	1 (9.1%)	1 (9.1%)	0	2 (18.2%)	11
	Exp. count	2.9	.2	1.8	.9	.9	3.5	.2	.6	
	Adj. Res.	.1	-.4	.1	1.3	.1	-1.8	-.4	2.0	
Nurses 2-5 y	Count	6 (42.9%)	0	1 (7.1%)	1 (7.1%)	2 (14.3%)	4 (28.6%)	0	0	14
	Exp. count	3.7	.2	2.3	1.2	1.2	4.5	.2	.8	
	Adj. Res.	1.6	-.5	-1.1	-.2	.9	-.3	-.5	-1.0	
Nurses >5-10 y	Count	7 (46.7%)	0	0	1 (6.7%)	1 (6.7%)	6 (40.0%)	0	0	15
	Exp. count	4.0	.2	2.5	1.3	1.3	4.8	.2	.8	
	Adj. Res.	2.0	-.5	-1.9	-.3	-.3	.8	-.5	1.1	
Nurses >10 y	Count	3 (9.4%)	1 (3.1%)	9 (28.1%)	2 (6.3%)	2 (6.3%)	12 (37.5%)	1 (3.1%)	2 (6.3%)	32
	Exp. count	8.4	.4	5.3	2.7	2.7	10.2	.4	.2	
	Adj. Res.	-2.9	1.1	2.3	-.6	-.6	.9	1.1	.2	
Total	Count	19 (26.4%)	1 (1.4%)	12 (16.7%)	6 (8.3%)	6 (8.3%)	23 (31.9%)	1 (1.4%)	4 (5.6%)	72

Table 11. Overall sample frequencies, mean and standard deviation NMP_Q

Sample	N	%	NMP_Q M	NMP_Q SD	M vs theoretic MED (4)
Students	244	77.2%	3.52	1.18	< 0.01
Nurses	72	22.8%	2.67	1.15	< 0.01
Total	316	100.0%	3.33	1.23	

frequencies were concentrated on the lowest values (maximum >1-2h = 25%) and vice versa (>4h-5h and >5h 9.7% respectively). Statistical significance differences proven by a variance analysis *ANOVA* with *Welch* correction because of the frequencies' lack of homogeneity ($F(1,119.03) = 30,280, p = < .01$).

Discussion.

The results of this study offer interesting insights to broaden the discussion. Perhaps the most important

data is that in both the groups (nurses and students) there is a certain deviation from the trend highlighted in the literature because in general they do not seem to demonstrate nomophobia's critical levels. The answers to the *ad-hoc* questions allow us to have a clear view of the behaviours related to the electronic devices' use, especially in regards to students given the sample size's adequacy. The third year students declare that they generally use the mobile phone for a long time during the day and as young people, they align themselves with what is found in the literature (16) (17) (18). When asked: "During my last internship I consulted



Chart 3. Nurses and students' trend comparison: answers to the question "How many hours per day (cumulative) do you spend on your smartphone / PC / Tablet and / or games (Playstation, Xbox, Nintendo)?"

my smartphone", it is observed that the 1st year students are the most "observant" in reducing the time spent on their mobile phones during their training while there is a marked turnaround with both 2nd and 3rd year students. This finding may perhaps be caused by the fact that 1st year students generally have more fear of manifesting attitudes or behaviours that could be seen as improper (including therefore the use of mobile phones) during the internship also because for them it is their first contact with the workplace, while it could be that "growing up" and thus becoming more familiar with the environment, they probably feel more at ease (19) (20) (21) and consequently perhaps tends to decrease the "deterrent effect" of the senior tutor and the internship environment. The reasons for smartphone consultations during the internship, however, re-evaluate senior students who declare that they use their smartphone in a more substantial way to "deepen didactic topics" (2nd (60.2%) and 3rd year (52.4%) , therefore a completely appropriate and justified use. This aspect could be related to the level of preparation of senior students who, being halfway through or close to the end of their studies, have acquired an important wealth of knowledge and are familiar with scientific research

tools (database search engines etc), little treated (and therefore unfamiliar) during the 1st year of the course of study, as indeed confirmed in research (22) (23). In fact, at the beginning of their training course, 1st year students have much less knowledge on the topic than their older colleagues: only 15.2% of them in fact declare that they use smartphones for in-depth didactic study. The data therefore also presents positive aspects: once it is ascertained that students access the web during their internship, it seems to be, for the most part, an appropriate use of technology. The data indicating that 3rd year students use their phones a lot (with statistically significant difference vs the other two years of course), during the internship for "social networks consulting" in contrast to the "good" use of the smartphone in the internship makes one think, and certainly not in a positive sense and tends to cloud the positivity of the previous data a little. The responses to the items "messages or mail checking" between the three years don't show significant differences. The study with nurses shows significant differences from student results, such as those on the use of smartphones: nurses in fact show shorter times of use of smartphones during the day. It is noted that there are significant differences in

the results to the question “*During my last shift work I consulted my smartphone*” among the groups of nurses divided by years of work. The answer “sometimes” predominates, with a total of 75% considering all nurses, testifying a generally moderate use of smartphones at work. The significant peak in response “often” recorded by nurses with 2-5 years of career is underlined; for the same answer, the more experienced nurses (>10 years working) counterbalanced the data with even “0” expressed preferences. As for the item “*why do you consult the phone during the shift work?*”, There are modest significant differences between the classes (for years of work) of the nurses; The data regarding “*deepening didactic topics*” was good, indicated by a quarter of the sample; what unfortunately stands out as negative is that the aggregate data on the reasons for “*messages or email checking*” and “*to call family members*” (activities not related to the workplace’s activities) represents about 50% of the responses; the answers on other motivations are more diluted and less “critical”, including low responses for “*social networks consulting*” which can certainly be understood as positive data. The comparison of the daily use of the smartphone between the two groups shows two diametrically opposite trends: on the one hand the frequent use among students (greater number of preferences on > 4-5 hours and > 5 hours a day), on the other the use of nurses whose trend line progressively decreases to the minimum amounts of time. A common factor between the two groups is represented by the levels of nomophobia being higher as the daily connection time increases, as also noted in the literature (24). The correlation between age and the use of smartphones seems clear: even among nurses, the less experienced (and therefore the youngest) ones declare that they spend more time connected, while the amount of time connected seems to diminish with the experience to further underline the fact that the more experienced nurses, not having lived the same experiences of contact with electronic media as the younger ones, perhaps perceive to a lesser extent the need to stay or “feel” connected. Finally, it is curious that only one nurse and one student answered that they attend work/internship without a smartphone to further testify that the mobile phone, beyond use, has almost become an indispensable object, to have constantly available in the everyday life of students and nurses.

Conclusions

It now seems clear that communication technologies (e.g. smartphones, personal computers, tablets, video games) have modified people’s interaction, behaviour, communication and relationships. The result is an increasingly marked need to stay or feel connected to the point of developing real addictive behaviours as nomophobia, (term coined in the UK in the first decade of 2000’ to indicate an overuse of the mobile phone), that can originate in various psychological factors as social phobia or social anxiety (25). The literature research has shown that nomophobia seems to also involve the university and professional fields, including the workplace and training environments of nurses and has allowed for a clearer picture of the levels of “nomophobia” of health professionals in general. The specific inquiry among nursing students and nurses testifies to nomophobic behaviour at various levels from many quarters with possible negative repercussions both from a social point of view (13) (26) and professional (27) (8). The results of the study seem to deviate from the general trend since in the ambit of investigating a significant dependence on electronic media either among students or among nurses is not highlighted although the youngest of both groups seem to assume behaviours that might predict a subsequent development of the problem. The sample size of students is in fact representative of the reference population, the same cannot be said for nurses: the sample in question is rather far from being fully representative, an aspect that represents an important limitation of the research. Undoubtedly, the problem in question deserves further study and could be the object of study perhaps by expanding the sample of nurses. This would make it possible to carry out a numerically more equitable comparison with further possible inference analyses, perhaps taking into consideration other socio-demographic variables in addition to career years. Another aspect to underline as a limit is that which is classically represented by the use of self-report scales/tools where subjects are inclined to express the most socially acceptable response rather than being truthful. From this point of view, a direct observation of behaviour would have allowed us to directly verify the veracity of what was reported and

which may represent a methodological suggestion of a future field research on the topic. It should be noted that the study was conducted close to the COVID-19 pandemic (at the starting time the problem in practice was not even perceived); in light of this it would be very interesting to carry out an investigation with more homogeneous and uniform samples to try to understand the possible influences also because in many cases it has made electronic media even more useful for maintaining contacts if not even, in certain geographical areas, unique possible points of contact (because they are safe) between people. It would also be interesting to try to understand the influence of tutors in the students' behaviour, also in reference to the use of cell phones and the possible correlations, since students often tend to observe and "absorb" the behaviours and attitudes of their tutors who can assume the role of models to refer to (28) (29). In general, it would be very interesting to deepen the research on smartphone use policies in the wards/units of Italian hospitals in order to consider the development of an educational project that regularizes the use of smartphones, explaining the meaning of nomophobia, right from the beginning of the university career. This could be useful to change the intentions that lead to the misuse of mobile phones, especially in the clinical setting and to avoid behaviours that lead to addiction and consequently to possible distractions and errors.

Conflict of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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Received: 24 March 2021

Accepted: 28 June 2021

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