With a smartphone in one's pocket: A descriptive cross-sectional study on smartphone use, distraction and restriction policies in nursing students

Jagoba Zarandona[a],[*], Susana Cariñanos-Ayala[a], Estíbaliz Cristóbal-Domínguez[b], Jesús Martín-Bezos[a], Alaitz Yoldi-Mitxelena[a], Itziar Hoyos Cillero[c]

[a] Vitoria-Gasteiz Nursing School, Osakidetza-Basque National Health Service, Jose Atxotegi s/n, 01009 Vitoria-Gasteiz, Basque Country, Spain
[b] Hospital Universitario Araba, Osakidetza-Basque National Health Service, Spain
[c] Faculty of Medicine and Nursing, Department of Nursing, University of the Basque Country (UPV/EHU), Spain

ABSTRACT

Background: The use of personal smartphones is a reality in healthcare settings. Current research is allowing us to understand in what ways they help with communication and decision making at the point of care and their impact on patient safety.
Objectives: The objectives of this study were to characterize the use of smartphones by nursing students, and assess their opinions about the use of such phones as a distracting factor during clinical practicum and smartphone restriction policies.
Design: Descriptive cross-sectional study.
Participants: 234 students from one School of Nursing in Spain completed the survey in 2017.
Methods: A questionnaire was created based on various validated instruments for assessing students' use of smartphones, distraction associated with this use and the development of policies on their use during clinical practice.
Results: While 23.3% of participants admitting to using their smartphone for personal reasons at least once during their practicum, they perceived that their own level of distraction was low (6.9%). Notably, the level of distraction associated with others' smartphone use was perceived to be higher than that associated with their own use. Students' opinions about policies were significantly related to the frequency of witnessing other students and nurses being distracted ($r = 0.139, p < 0.05$), but not to their own distraction experiences ($r = 0.114, p = 0.084$).
Conclusions: Smartphones are not widely used for professional purposes among nursing students, while personal use is commonplace. Nurse educators, students and nurse mentors need to work together to introduce strategies to facilitate care delivery through the use of mobile devices but at the same time must be aware of the risks associated with distractions, including to patient safety.

1. Background

Over the last decade, we have witnessed a growth and development of mobile technologies and the Internet, as well as the ways in which these are changing the provision of healthcare (Eckler et al., 2010) and the training of future professionals in the health sciences (Raman, 2015; Strandell-Laine et al., 2015). Among mobile technologies, the rapid evolution of smartphones is particularly notable (McNally et al., 2017). As well as the characteristics classically associated with a mobile phone,

these devices are handheld computers that make it possible to access information anytime anywhere (Beauregard et al., 2017). They have become tools for communication and interaction via social networks (Strandell-Laine et al., 2015) and, thanks to the development of applications (apps) that address a vast range of areas in the health sciences, tools to support decision making at the point of care (Grabowsky, 2015; Mobasheri et al., 2015; Strandell-Laine et al., 2015).

In this context, both health organizations (Mobasheri et al., 2015) and nurse educators (O'Connor and Andrews, 2015; Raman, 2015)

---

* Corresponding author.
E-mail addresses: jagoba_zarandona@ehu.eus (J. Zarandona), susana_carinanos@ehu.eus (S. Cariñanos-Ayala),
estibaliz.cristobaldominguez@osakidetza.eus (E. Cristóbal-Domínguez), jesus_martin@ehu.eus (J. Martín-Bezos), alaitz_yoldi002@ehu.eus (A. Yoldi-Mitxelena),
itziar.hoyos@ehu.eus (I. Hoyos Cillero).
@j_zaran (J. Zarandona)

worldwide are seeking strategies to improve care through the use of mobile technologies. Nevertheless, there is still very little evidence on how widely and the ways in which mobile devices are used. Moreover, numerous research studies have raised concerns about the use of smartphones, related to their cost, their battery life, the need for IT support (Raman, 2015; Strandell-Laine et al., 2015), Internet access (Grabowsky, 2015) and infection control (Ulger et al., 2015). While some studies describe how facilitating access to information enables improvements in patient care, others point out that these mobile devices may pose a threat to patient safety, as they are a source of distraction (Cho and Lee, 2016; McBride et al., 2015; Mendoza et al., 2018).

Innovation, technology and learning are not contradictory concepts but neither are they necessarily harmonious. Hence, nurse educators should approach technological advances in a critical way. Such an approach implies being aware of both the learning opportunities and the associated risks and threats (Goodchild, 2018).

1.1. Aim

The objectives of this study were to:

1. Characterize the use of smartphones by nursing students
2. Assess their opinions about the use of such phones as a distracting factor
3. Assess their opinions about policies on the use of smartphones during clinical practicum.

2. Methods

2.1. Design

We conducted a descriptive cross-sectional study.

2.2. Participants

The study population corresponded to all nursing students registered for practicum subjects at one School of Nursing in Spain.

2.3. Instrument for data collection

We developed a questionnaire specifically for this research. It contained items regarding the students' practicum, sociodemographic characteristics, age, sex, and setting of their most recent clinical placement (hospital, including all units where students are placed in the hospital/non-hospital, referring to placements in primary care and social care services). To assess the general use of smartphones by students, we used items from various validated instruments (Pew Research Center, 2015; Longo et al., 2017).

Further, for this research, we used 23 items taken from various validated instruments: 10 items assessing the frequency of experience of professional use of smartphones during clinical practicum (Q1-Q10) (Cho and Lee, 2016; McBride et al., 2015; Tran et al., 2014); 9 items assessing the use of smartphones and distractions during clinical practicum (Q12-Q20) (Cho and Lee, 2016; Tran et al., 2014); and 4 items assessing the opinion of students concerning the development of polices on smartphone use (Q21-Q24) (Cho and Lee, 2016).

The nine items on the professional use of smartphones (Q1-Q9) and the nine on the use of smartphones and distractions (Q12-Q20) were scored on a 5-point Likert scale with the following response options: never $= 1$, rarely (1–4 times/month) $= 2$, sometimes (1–6 times/week) $= 3$, often (1–10 times/day) $= 4$, and always (> 10 times/day) $= 5$. The four items on policies on smartphone use (Q21-Q24) and Q10 were also scored on a 5-point Likert scale, but with different response options: strongly disagree $= 1$, disagree $= 2$, uncertain $= 3$, agree $= 4$, and strongly agree $= 5$. The composited questionnaire was

not validated as part of the study. However, in 2016, the questionnaire was tested with 10 nursing graduates to ensure its feasibility.

2.4. Data collection

As part of the teaching activity designed for all clinical practice in the 2016/2017 academic year, students attended the School of Nursing between 21 March and 9 June 2017 for an activity at which attendance was compulsory. At the end of the activity over the two and a half month period, the principal investigator presented a detailed script to four cohorts outlining the goals of the study and underlining that their participation was voluntary. Then, the questionnaire in paper format was handed out to the students in class. To avoid students feeling under pressure to participate in the study, none of the members of teaching staff or research team remained in the class after the presentation of the study. Students were given 1 week to return the questionnaires, by dropping them into a box at the School's reception.

2.5. Analysis of the results

Analysis was performed using IBM SPSS Statistics for Windows, Version 23.0. Normality of continuous data was examined using the Kolmogorov-Smirnov test. General characteristics of nursing students, frequency of smartphone use, distraction experiences and opinions on smartphone restriction policies were analysed using descriptive statistics (frequencies and total percentages, means and standard deviations). Relationships between distraction experiences and opinions on smartphone restriction policies, smartphone professional use, students' perception of their own work efficiency when using a smartphone and the use of a smartphone for academic activities were analysed using Spearman's Rho correlation analysis. The Mann-Whitney *U* test was used to compare distraction experiences and opinions on smartphone restriction policies by clinical practice location. Differences among academic years regarding the mobile use for personal matters and other students' distraction due to mobile use were analysed using Chi-square and Kruskal-Wallis tests, respectively. Alpha was set at < 0.05.

2.6. Ethical considerations

The study was approved by the Institutional Review Board (No. M10_2016_263). No payments or other incentives were offered to students for their participation. Completion and return of the questionnaire was taken as implied consent.

3. Results

A total of 303 questionnaires were distributed, one to each of the students registered for Introduction to Care Practice, or Practicum I, III or V during the 2016/2017 academic year. Overall, 234 students returned completed questionnaires (response rate 77.23%), 86.3% women and 11.5% men (5 respondents not stating their sex). The mean age of participants was 21.55 years old ($\pm$ 3.42).

Data concerning sociodemographic characteristics, hours of smartphone use per day, and what students used their phone for are summarized in Table 1.

Participants included nursing students from all the academic years, 15% being students from the Introduction to Care Practice (first year), 30.3% from Practicum I (second year), 30.3% from Practicum III (third year) and 24.4% from Practicum V (fourth year). Regarding setting of the most recent clinical placement, 64.1% and 35.9% had been on hospital and non-hospital placements, respectively.

All the students reported having a mobile phone, a smartphone in 99.1% of cases. As for the time spent using a smartphone, most (39.7%) claimed to use their phone 3 to 5 h a day and nearly as many (35.3%) 1 to 3 h a day, while 20.7% admitted using it > 5 h a day. Most students used their smartphones for accessing social networks (98.3%), followed

Table 1
Participants' sociodemographic characteristics (N = 234).

Variable		N (%)
Sex	Man	27 (11.5)
	Woman	202 (86.3)
Age, years	18–25	210 (91.7)
	26–30	13 (5.7)
	31–50	6 (2.6)
Practicum	Introduction to Practicum (1st year)	35 (15.0)
	Practicum I (2nd year)	71 (30.3)
	Practicum III (3rd year)	71 (30.3)
	Practicum V (4th year)	57 (24.4)
Most recent clinical placement	Hospital	150 (64.1)
	Non-hospital	84 (35.9)
Type of mobile phone	Smartphone	232 (99.1)
	Non-smartphone	2 (0.9)
	None	0 (0)
Amount of smartphone use	< 1 h/day	10 (4.3)
	1–3 h/day	82 (35.3)
	3–5 h/day	92 (39.7)
	> 5 h/day	48 (20.7)
Reason for smartphone use	Social networks	227 (98.3)
	▪ WhatsApp	223 (96.5)
	▪ Instagram	157 (68)
	▪ Facebook	142 (61.5)
	▪ YouTube	127 (55)
	▪ Twitter	56 (24.2)
	Surfing the Internet	180 (77.9)
	Sending/receiving messages	67 (29)
	Voice calls	155 (67.1)
	Music and videos	165 (71.4)
	Games	27 (11.7)
	Other	19 (8.2)

by Internet searches (77.9%).

3.1. Frequency and experience of professional use of smartphones during practicum

Table 2 presents the data regarding professional use of smartphones during practicum.

When students were asked how much they used their smartphones in working hours during their practicum, the great majority claimed to use it for < 1 h (94.8%; 95% CI 88.35%–95.41%). The main reasons cited for professional use of smartphones during practicum were to find answers to queries about drugs (49.6%), followed by accessing

university resources (42.3%). Other cited uses were as a tool for communication and coordination with other team members (19.4%) and for accessing apps to support patient care (13.4%).

We should highlight that, in general, students claimed not to use their smartphone to share personal information regarding patients (94.4%), and also that they had the impression that nurses did not use their smartphones for this purpose during their practicum (86.2%). On the other hand, only 28.1% of students said that they agreed or strongly agreed with the statement that smartphones made their work more efficient.

3.2. Frequency of smartphone use and resulting distraction, and opinions on restriction policies during clinical practice

Table 3 presents the data concerning smartphone use and distraction, both of the respondents themselves and the effect they perceived on other nursing students and nursing staff, and opinions about rules/ restrictive policies on smartphone use.

Overall, 23.3% of participants admitted to having used their smartphone for personal reasons at least once during their practicum. Notably, this figure increases with academic year (Table 4), the difference being statistically significant (p = 0.005). Further, 2.6% of students admitted to having used their smartphone for personal reasons at least once while they were with a patient, and 8.3% of students admitted to having answered or made calls and/or sent messages or emails while in a training session.

Despite the above mentioned figures, students' perceived their own level of distraction to be low, just 6.9% recognizing that they had been distracted at least once by their personal use of smartphones during their practicum. Interestingly, a higher percentage of students claimed to have been distracted at least once by the smartphone use of other students (11.7%).

Indeed, both other nursing students and nurses' level of distraction associated with their smartphone use was perceived to be higher than that associated with their own use. Notably, the perceived distraction of other students and nurses due to their smartphone use examined together also increased with academic year, the difference being significant (p < 0.001). Specifically, 21.6% of students reported having seen other students get distracted due to their use of mobiles at least once during their practicum, this percentage increasing to 38.4% in the case of nurses' distraction due to their smartphone use. Further, 21.1% of students reported having at least once seen nurses use their mobile while with a patient.

Table 2
Frequency of use and professional use of the smartphone during practicum (N = 232).

Item	Frequency N (%)					Mean	SD
	Never	Rarely	Sometimes	Often	Always		
Q1- I use my mobile as a tool for communicating and coordinating with other members of the team.	141 (60.8)	45 (19.4)	22 (9.5)	17 (7.3)	6 (2.6)	1.70	1.078
Q2- I access the Internet to find answers to queries about drugs.	58 (25.2)	58 (25.2)	68 (29.6)	35 (15.2)	11 (4.8)	2.49	1.163
Q3- I access apps that help me with patient care.	163 (70.9)	35 (15.2)	21 (9.1)	7 (3)	3 (1.3)	1.47	0.885
Q4- I use my mobile as a calculator for medication doses.	105 (45.3)	36 (15.5)	46 (19.8)	33 (14.2)	12 (5.2)	2.19	1.288
Q5- I surf the Internet to search for information related to the clinical placement.	92 (39.8)	48 (20.8)	62 (26.8)	20 (8.7)	6 (2.6)	2.10	1.138
Q6- I access university resources.	80 (34.5)	54 (23.3)	50 (21.6)	36 (15.5)	12 (5.2)	2.34	1.241
Q7- I submit documents for academic assessment	176 (76.2)	27 (11.7)	11 (4.8)	9 (3.9)	8 (3.5)	1.47	0.999
Q8- I use my mobile to send messages/emails to colleagues containing patient data (e.g., their reference number, bed number, medical record number, etc.)	218 (94.4)	9 (3.9)	2 (0.9)	2 (0.9)	0	1.08	0.381
Q9- I have seen my tutor/reference nurse use their personal mobile to send messages/emails to colleagues containing patient data	200 (86.2)	15 (6.5)	9 (3.9)	4 (1.7)	4 (1.7)	1.26	0.764
Items	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Mean	SD
Q10- My use of my smartphone makes my work more efficient.	19 (8.2)	54 (23.4)	93 (40.3)	56 (24.2)	9 (3.9)	2.92	0.979
Q11- In working hours during my practicum I use my mobile: < 1 h/day	217 (94.8)						
1–3 h/day	12 (5.2)						

SD: standard deviation.

Table 3
Frequency of Smartphone use and resultant distraction, and opinion about restriction policies (n = 232).

Item	Frequency (%)						
	Never	Rarely	Sometimes	Often	Always	Mean	SD
Smartphone use and distraction							
Q12- I have used my mobile for personal matters (e.g., calling, sending messages, accessing social networks, etc.) during the practicum	96 (41.4)	82 (35.3)	38 (16.4)	13 (5.6)	3 (1.3)	1.90	0.955
Q13- I've answered/made phone calls and/or sent messages or emails from my mobile when I was with a patient	211 (93)	9 (4)	3 (1.3)	2 (0.9)	1 (0.4)	1.11	0.486
Q14- I've answered/made phone calls and/or sent messages or emails from my mobile when I was in a training session.	179 (77.2)	34 (14.7)	15 (6.5)	2 (0.9)	2 (0.9)	1.34	0.714
Q15- Have you been distracted by your use of your smartphone during your practicum?	176 (75.9)	40 (17.2)	16 (6.9)	0 (0)	0 (0)	1.31	0.595
Q16- Have you been distracted by other students' use of their smartphone during your practicum?	159 (68.8)	44 (19)	24 (10.4)	3 (1.3)	0 (0)	1.43	0.736
Witnessing other students' and nurses' smartphone use and distraction							
Q17- Have you seen other students' being distracted by the use of their smartphone during the practicum?	132 (57.1)	49 (21.2)	44 (19)	5 (2.2)	1 (0.4)	1.68	0.886
Q18- Have you seen nurses being distracted by the use of their smartphone during their working hours?	73 (31.5)	70 (30.2)	63 (27.2)	20 (8.6)	6 (2.6)	2.21	1.061
Q19- I have seen my tutor/reference nurse answer/make phone calls and/or send messages or emails when he/she was with a patient.	146 (62.9)	37 (15.9)	27 (11.6)	15 (6.5)	7 (3)	1.71	1.093
Q20- I have seen my tutor/reference nurse answer/make phone calls and/or send messages or emails when he/she was in a training session.	134 (57.8)	50 (21.6)	26 (11.2)	15 (6.5)	6 (2.6)	1.73	1.064
Items	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree	Mean	SD
Opinion about Smartphone restriction policies							
Q21- I don't want students to use their smartphone during clinical practice.	34 (14.6)	61 (26.2)	71 (30.5)	52 (22.3)	15 (6.4)	2.80	1.136
Q22- I don't want nurses to use their smartphone during working hours.	25 (10.7)	60 (25.8)	75 (32.2)	59 (25.3)	14 (6)	2.90	1.084
Q23- There is a need for policies restricting smartphone use by students during clinical practice.	35 (15)	69 (29.6)	77 (33)	50 (21.5)	2 (0.9)	2.64	1.009
Q24- There is a need for policies restricting smartphone use by nurses during working hours.	31 (13.3)	69 (29.6)	80 (34.3)	50 (21.5)	3 (1.3)	2.68	0.998

SD: standard deviation.

Students were asked for their opinions about policies restricting smartphone use during clinical practice. Although 28.7% of the students agreed or strongly agreed that they did not want students to use smartphones during clinical practice, only around 22.4% agreed or strongly agreed that a policy restricting students' smartphone use in healthcare settings was needed. Figures increased when they were asked about nurses, 31.3% of the students agreeing or strongly agreeing that they did not want nurses to use smartphones at work.

Table 5 lists the correlations for relationships of distraction experiences with opinions about smartphone restriction policies, smartphone professional and academic use, and students' perception of their own work efficiency when using a smartphone.

Students' opinions about policies were significantly related to the frequency of witnessing other students and nurses being distracted ($r = 0.139$, $p < 0.05$), but not to their own distraction experiences ($r = 0.114$, $p = 0.084$). Students' own distraction experiences were not significantly associated with their smartphone professional use ($r = -0.001$, $p = 0.993$), their perception of their own work efficiency when using a smartphone ($r = 0.012$, $p = 0.86$), or their smartphone use for academic activities ($r = 0.114$, $p = 0.308$).

The mean scores for students' own distraction were 1.36 in the hospital setting and 1.37 in non-hospital settings (out of 5, a higher value implying more frequent distraction). Regarding distraction by other students and nurses, mean values were higher, being 2 in the hospital setting and 1.83 in non-hospital settings (again, out of 5 and higher values implying more frequent distraction). In addition, the mean scores for the need for smartphone restriction policies were 2.73 in the hospital setting and 2.78 in non-hospital settings (out of 5, a higher value implying greater agreement). None of the differences in these variables between the two types of setting of students' clinical practice were significant (Table 6).

4. Discussion

The rise of mobile technology, both for personal and professional use, has progressively consolidated over the last decade (Raman, 2015) to the point of being considered a tool with a key role in the provision of healthcare (Beauregard et al., 2017; Mobasheri et al., 2015). In studies since 2015, most of the samples of nursing students (Cho and Lee, 2016), nurses (Grabowsky, 2015; McBride and LeVasseur, 2017; Mobasheri et al., 2015) and other health professionals (Mobasheri et al., 2015) analysed claim to own a smartphone. Findings in the general population are similar, especially among people aged between 18 and 29 years old (Pew Research Center, 2018).

The growth in the number of people who use a smartphone is accompanied by rise in the amount of time spent on these devices. Almost two-thirds (60.4%) of participants in our study spent 3 or more hours a day using their smartphones. This figure is similar to that found by Cho and Lee (2016) in nursing students from South Korea and consistent with findings obtained in the general population that South Korea and Spain are among the countries where people spend the most time using smartphones (Armstrong, 2017). As in previous studies, the main use of smartphones was to access social networks (Duke et al., 2017).

Regarding time spent using smartphones during practicum, only around 5% of the students in our study claimed to use their phone for 1 h or more a day. Similar to findings of previous research in nursing students and nurses, our results indicate that the main professional uses of smartphones during practicum are seeking answers to queries about drugs, calculating medication doses, obtaining information related to the clinical placement and accessing university resources (Cho and Lee, 2016; Grabowsky, 2015; McBride and LeVasseur, 2017; McNally et al., 2017; Mobasheri et al., 2015).

In our study, 19.4% of nursing students claimed to have used their smartphone to communicate and coordinate with other members of the healthcare team, and only 13.4% to have used apps to help them in provision of care. These results differ markedly from other research

Table 4

Changes among academic years regarding the mobile use for personal matters and others' distraction due to their use.

	Frequency N (%)								
Changes among academic years	First year		Second year		Third year		Fourth year		
	Rarely	Frequently	Rarely	Frequently	Rarely	Frequently	Rarely	Frequently	P[a]
I have used my mobile for personal matters (e.g., calling, sending messages, accessing social networks, etc.) during the practicum (Q12)	29 (16.3)	6 (10.7)	63 (35.4)	8 (14.3)	49 (27.5)	22 (39.3)	37 (20.8)	20 (35.7)	0.005
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	P[b]
Others' distraction due to their use (Q17-Q18)	1.78	0.95	1.70	0.81	2.05	0.75	2.17	0.63	< 0.001[b]

Rarely (includes never and rarely) and frequently (sometimes, often and always).

[a] Chi-square statistics.

[a] Kruskal-Wallis.

Table 5

Correlations of distraction experiences with opinions about smartphone restriction policies, smartphone academic and professional use, and students' perception of their work efficiency when using the smartphone.

	Distraction due to own use (Q15-Q16)		Others' distraction due to their use (Q17-Q18)	
	r	p	r	p
Opinions about smartphone restriction policies (Q21-Q24)[a]	**0.114**	**0.084**	**0.139**	**0.034**
Smartphone professional use (Q1-Q5)[a]	−0.001	0.993		
Smartphone use makes work more efficient (Q10)[a]	0.012	0.86		
Smartphone use for accessing university resources and sending documents for assessment (Q6-Q7)[a]	0.068	0.308		

[a] Spearman's Rho.

which has identified smartphones as a facilitator in the nursing student-teacher relationship (Strandell-Laine et al., 2015). Our findings may be due to a sense that the use of smartphones during working time is not compatible with the professional attributes of nurses (Beauregard et al., 2017). We did not collect data on the apps students used to obtain information to support them in decision making. This area deserves further research, since they may be searching directly in Google without checking the quality of the sources (Moore et al., 2012).

In our study, the percentage of students who used their mobile for personal reasons at least once during their practicum increased with academic year. The personal use of smartphones during working hours has also been reported by other researchers (McBride and LeVasseur, 2017). These findings highlight the need to develop safe, professional and ethical practices among students and nurses regarding the use of smartphones.

The use of smartphones in healthcare settings may represent a threat to privacy, understood as the right of individuals to control the collection, use and disclosure their health-related data, and confidentiality, which refers to the obligation of those who receive information to respect the interests of the individuals from whom the personal data were obtained (Avancha et al., 2012). Notably, 5.6% of students participating in our study admitted having sent personal data through their smartphone. Further, 32 students (13.6%) reported having seen their tutor/reference nurse use their smartphones to send

messages or emails including patient data. These rates are lower than those found in a study with student doctors, 22% of whom admitted having shared this type of data and 56% of whom claimed to have seen their tutors sharing patient data via smartphones (Tran et al., 2014). In both studies, participants claimed that they shared personal data in this way less than their peers and professionals in their field.

The use of smartphones for sharing patient data does not necessarily imply a breach of confidentiality. Nevertheless, regarding the right to privacy, we cannot assume that patients would want their personal data to be shared in ways that may not preserve their confidentiality. Boyles et al. (2012) observed that 57% of adults in a study the USA had uninstalled or refused to install certain apps on their devices due to concerns about sharing of personal data. Chen et al. (2016) observed that 66.3% of individuals did not share their personal data primarily for privacy and anonymity reasons, even though the main use of this data was the monitoring and recording of their progression through health applications.

It is the responsibility of clinicians to know the weaknesses of particular operating systems, protect their smartphones with a password and use apps to ensure their devices are secure (Barber, 2016). In this context, nursing students, who in due course will be nursing professionals, must make considered judgements not only about what information they pass to others but also about the way it is transmitted, shared and stored.

Table 6

Distraction experiences and opinions about restriction policies according to students' clinical practice setting.

Setting	Distraction due to own use (Q15-Q16)		Others' distraction due to their use (Q17-Q18)[a]		Opinion on restriction policies (Q21-Q24)[b]	
	Mean (SD)	p*	Mean (SD)	p*	Mean (SD)	p*
Hospital	1.36 (0.57)	0.664	2 (0.81)	0.146	2.73 (0.87)	0.562
Non-hospital	1.37 (0.56)		1.83 (0.76)		2.78 (0.85)	

SD: standard deviation.

* Mann-Whitney *U*.

[a] The higher the value, the greater the frequency.

[b] The higher the value, the greater the agreement.

The use of smartphones is changing habits, behaviours and the way we interact. Even though research on the use of smartphones and their impact on people's lives is at an early stage (Samaha and Hawi, 2016) we are starting to become aware of the adverse effects of their use, including the distraction they cause. The results of our study show low levels of perceived self-distraction, only 6.9% of participants admitting to having been distracted at least once due to their own use of smartphones for personal matters during their practicum. On the other hand, they felt that they were more distracted by other students' use of smartphones than their own use of their phone.

Previous studies have indicated that distraction by smartphone use during clinical practice is common among professional nurses (McBride, 2015) and students (Cho and Lee, 2016). In the present study, 21.6% and 38.4% of nursing students reported that they have regularly witnessed other students and nurses being distracted by smartphones during work, respectively. That is, students perceived the level of distraction to be greater in other students than themselves and even greater in nurses than other students.

It seems that nursing students tend to recognize others' distraction more than their own. These results are consistent with other studies among professionals (McBride and LeVasseur, 2017; Smith et al., 2011) and students (Cho and Lee, 2016), in which others' level of distraction has been more easily identified than an individual's own level of distraction. This may be due to individuals' lack of awareness about their own personal use or overuse of the smartphone, which may partially explain a belief that they are not being distracted or a perception of their own distraction as low or very low (McBride and LeVasseur, 2017; Smith et al., 2011).

Research shows that distractions have an impact on memory and learning (Mendoza et al., 2018). The mere presence of a phone in your pocket is associated with a decrease in attention, given that when there is a sound or a vibration indicative of a message, there is a significant decrease in performance in tasks requiring attention (Stothart et al., 2015). Classroom studies have reported that multitasking hinders focus on a given task; specifically, paying attention to a smartphone and a lecture requires the division of cognitive resources (Mendoza et al., 2018). In the clinical setting, diverting attention away from the patient and from the specific task being undertaken may result in failure to recognize potential complications during techniques or procedures related to nursing care. Westbrook et al. (2010) reported an association between interruptions and clinical errors, indicating that the greater the frequency of interruptions, the greater the severity of the errors. For instance, nurses should dedicate their full cognitive attention to the administration of a medication. In relation to this, various studies have indicated that technology can be a preventative or contributory factor in adverse effects, including medication errors (Brady et al., 2009; Kalisch and Aebersold, 2010). Although the relationship between such interruptions and patient safety has yet to be addressed rigorously and in depth (Hopkinson and Jennings, 2013), the argument that distraction is damaging to patient safety becomes more important when we draw a parallel with driving studies. In relation to this, it has been established that using the mobile phone while driving can be considered one of the main risk factors for traffic accidents (NHS, 2016).

In this study, students' opinion about smartphone restriction policies was significantly related to the frequency of witnessing other students and nurses being distracted, but not to their own distraction experiences. This is in concordance with a recently published study, where students' opinion about policies was also significantly related to the frequency of witnessing other students and nurses being distracted, but not to their own experiences of distraction (Cho and Lee, 2016). In the present study, however, students' own distraction experiences were not related to their smartphone academic or professional use or perception of their own work efficiency when using the smartphone.

Stratifying by clinical setting, we found no significant differences regarding distraction, either in individuals' own level of distraction or that of others, or in opinions about smartphone restriction policies.

Future research should consider including type, size and characteristics of the healthcare setting where students are placed during their clinical practicum, as levels of distraction may be related to differences in opportunities for smartphone use in clinical settings. Moreover, workload and safety culture may also vary between healthcare settings influencing smartphone use, and in turn, opinions about the need for restriction policies.

5. Limitations

First, this study was based on a sample taken from a single educational institution. The sample included students from all academic years and who did their clinical placements in different healthcare settings. Nevertheless, the fact that it was based on one nursing school could affect the generalizability of the findings. Second, the growth in the use of smartphones is relatively recent. Likely for this reason, there continues to be a lack of consensus in the literature on a single term referring to smartphones, as pointed out by Beauregard et al. (2017), which is a limitation in that it makes it difficult to identify other research results for comparison. Finally, the cross-sectional nature of this study found associations between smartphone use, site of clinical placement, perceived levels of distraction and opinions on restriction policies. Nevertheless, due to the study design, it is not possible to establish causal relationships.

6. Conclusions

Smartphones have arrived and are here to stay. They enable to us to improve communication and decision making regarding patient care. Given that their use is widespread, we believe that they should become a key element in nurse education. The results of our study demonstrate that, currently, students largely use these devices for personal matters and that professional use is not commonplace. Further, the perception of distraction by others is sufficiently high to warrant taking the matter seriously, given the potential threat in terms of patient safety. We must highlight their great potential for communication and decision making at the point of care but also the risks associated with distraction and the importance of fostering environments that preserve patient confidentiality and privacy. Finally, we should develop joint actions with care organizations, to align policies on the use of mobile devices. In this way, nurses and tutors will be able to strengthen the professional role of nursing students.

Declaration of competing interest

No conflict of interest has been declared by the authors.

Ethical approval

The study was approved by the Institutional Review Board (No. M10_2016_263). No payments or other incentives were offered to students for their participation. Completion and return of the questionnaire was taken as implied consent.

References

Armstrong, M., 2017. Smartphone addiction tightens its global grip [WWW Document]. Statista. URL https://www.statista.com/chart/9539/smartphone-addiction-tightens-its-global-grip/ (accessed 5.2.18).

Avancha, S., Baxi, A., Kotz, D., 2012. Privacy in mobile technology for personal healthcare. ACM Comput. Surv. 45, 1–54. https://doi.org/10.1145/2379776.2379779.

Barber, H., 2016. Smartphone and mobile phone security for the clinician. Br. J. Hosp. Med. 77, 467–470. https://doi.org/10.12968/hmed.2016.77.8.467.

Beauregard, P., Arnaert, A., Ponzoni, N., 2017. Nursing students' perceptions of using smartphones in the community practicum: a qualitative study. Nurse Educ. Today 53, 1–6. https://doi.org/10.1016/j.nedt.2017.03.002.

Boyles, J.L., Smith, A., Madden, M., 2012. Privacy and data management on mobile devices concerns about personal information. Pew Res. Center's Internet Am. Life Proj. 1–19.

Brady, A.-M., Malone, A.-M., Fleming, S., 2009. A literature review of the individual and systems factors that contribute to medication errors in nursing practice. J. Nurs. Manag. 17, 679–697. https://doi.org/10.1111/j.1365-2834.2009.00995.x.

Pew Research Center, 2015. The Smartphone Difference. Washington, DC (USA).

Chen, J., Bauman, A., Allman-Farinelli, M., 2016. A study to determine the most popular lifestyle smartphone applications and willingness of the public to share their personal data for health research. Telemed. e-Health 22, 655–665. https://doi.org/10.1089/tmj.2015.0159.

Cho, S., Lee, E., 2016. Distraction by smartphone use during clinical practice and opinions about smartphone restriction policies: a cross-sectional descriptive study of nursing students. Nurse Educ. Today 40, 128–133. https://doi.org/10.1016/j.nedt.2016.02.021.

Duke, V.J.A., Anstey, A., Carter, S., Gosse, N., Hutchens, K.M., Marsh, J.A., 2017. Social media in nurse education: utilization and e-professionalism. Nurse Educ. Today 57, 8–13. https://doi.org/10.1016/j.nedt.2017.06.009.

Eckler, P., Worsowicz, G., Rayburn, J.W., 2010. Social media and health care: an overview. PM R 2, 1046–1050. https://doi.org/10.1016/j.pmrj.2010.09.005.

Goodchild, T., 2018. Does technology really enhance nurse education? Nurse Educ. Today 66, 69–72. https://doi.org/10.1016/j.nedt.2018.04.005.

Grabowsky, A., 2015. Smartphone use to answer clinical questions: a descriptive study of APNs. Med. Ref. Serv. Q. 34, 135–148. https://doi.org/10.1080/02763869.2015.1019320.

Hopkinson, S.G., Jennings, B.M., 2013. Interruptions during nurses' work: a state-of-the-science review. Res. Nurs. Health 36, 38–53. https://doi.org/10.1002/nur.21515.

Kalisch, B.J., Aebersold, M., 2010. Interruptions and multitasking in nursing care. Jt. Comm. J. Qual. patient Saf. 36, 126–132.

Longo, O., Bilbao, M., Corcuera, N., 2017. Juventud Vasca 2016, Gazteak Bilduma. Gobierno-Vasco, Vitoria-Gasteiz.

McBride, D.L., 2015. Distraction of clinicians by smartphones in hospitals: a concept analysis. J. Adv. Nurs. 71, 2020–2030. https://doi.org/10.1111/jan.12674.

McBride, D.L., LeVasseur, S.A., 2017. Personal communication device use by nurses providing in-patient care: survey of prevalence, patterns, and distraction potential. JMIR Hum. factors 4, e10. https://doi.org/10.2196/humanfactors.5110.

McBride, D.L., LeVasseur, S.A., Li, D., 2015. Non-work-related use of personal mobile phones by hospital registered nurses. JMIR mHealth uHealth 3, e3. https://doi.org/10.2196/mhealth.4001.

McNally, G., Frey, R., Crossan, M., 2017. Nurse manager and student nurse perceptions of the use of personal smartphones or tablets and the adjunct applications, as an educational tool in clinical settings. Nurse Educ. Pract. 23, 1–7. https://doi.org/10.1016/j.nepr.2016.12.004.

Mendoza, J.S., Pody, B.C., Lee, S., Kim, M., McDonough, I.M., 2018. The effect of cell-phones on attention and learning: the influences of time, distraction, and nomophobia. Comput. Human Behav. 86, 52–60. https://doi.org/10.1016/J.CHB.2018.04.027.

Mobasheri, M.H., King, D., Johnston, M., Gautama, S., Purkayastha, S., Darzi, A., 2015. The ownership and clinical use of smartphones by doctors and nurses in the UK: a multicentre survey study. BMJ Innov. 1, 174–181.

Moore, S., Anderson, J., Cox, S., 2012. Pros and cons of using apps in clinical practice. Nurs. Manag. 19, 14–17. https://doi.org/10.7748/nm2012.10.19.6.14.c9316.

NHS, 2016. Mobile phone safety [WWW Document]. NHS Choices. URL https://www.nhs.uk/conditions/mobile-phone-safety/ (accessed 5.2.18).

O'Connor, S., Andrews, T., 2015. Mobile technology and its use in clinical nursing education: a literature review. J. Nurs. Educ. 54, 137–144. https://doi.org/10.3928/01484834-20150218-01.

Pew Research Center, 2018. Demographics of mobile device ownership and adoption in the United States [WWW Document]. Fact Sheets. http://www.pewinternet.org/fact-sheet/mobile/ (accessed 5.2.18).

Raman, J., 2015. Mobile technology in nursing education: where do we go from here? A review of the literature. Nurse Educ. Today 35, 663–672. https://doi.org/10.1016/j.nedt.2015.01.018.

Samaha, M., Hawi, N.S., 2016. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. Comput. Human Behav. 57, 321–325. https://doi.org/10.1016/j.chb.2015.12.045.

Smith, T., Darling, E., Searles, B., 2011. 2010 survey on cell phone use while performing cardiopulmonary bypass. Perfusion 26, 375–380. https://doi.org/10.1177/0267659111409969.

Stothart, C., Mitchum, A., Yehnert, C., 2015. The attentional cost of receiving a cell phone notification. J. Exp. Psychol. Hum. Percept. Perform. 41, 893–897. https://doi.org/10.1037/xhp0000100.

Strandell-Laine, C., Stolt, M., Leino-Kilpi, H., Saarikoski, M., 2015. Use of mobile devices in nursing student–nurse teacher cooperation during the clinical practicum: an integrative review. Nurse Educ. Today 35, 493–499. https://doi.org/10.1016/j.nedt.2014.10.007.

Tran, K., Morra, D., Lo, V., Quan, S.D., Abrams, H., Wu, R.C., 2014. Medical students and personal smartphones in the clinical environment: the impact on confidentiality of personal health information and professionalism. J. Med. Internet Res. 16, e132. https://doi.org/10.2196/jmir.3138.

Ulger, F., Dilek, A., Esen, S., Sunbul, M., Leblebicioglu, H., 2015. Are healthcare workers' mobile phones a potential source of nosocomial infections? Review of the literature. J. Infect. Dev. Ctries. 9, 1046–1053.

Westbrook, J.I., Woods, A., Rob, M.I., Dunsmuir, W.T.M., Day, R.O., 2010. Association of Interruptions with an increased risk and severity of medication administration errors. Arch. Intern. Med. 170, 683. https://doi.org/10.1001/archinternmed.2010.65.