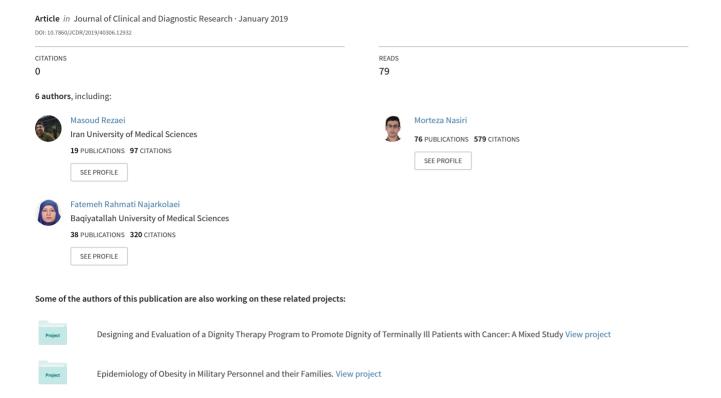# The Bivariate Correlation of Health Literacy and Cell Phone Addiction amongst Iranian Healthcare Students

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Original Article

The Bivariate Correlation of Health Literacy and Cell Phone Addiction amongst Iranian Healthcare Students

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ABSTRACT

Introduction: Health Literacy (HL) is negatively associated with substance addiction. However, no study has examined the bivariate correlation of HL with cell phone addiction.

Aim: To investigate the correlation between HL and cell phone addiction amongst Iranian healthcare students.

Materials and Methods: This descriptive study was carried out on 287 male students (nursing, health, medicine and dentistry) in two medical universities in the northern and central part of Tehran, Iran, during February to May 2016. Data were collected via the Persian version of Mobile Phone Addiction Scale (PMPAS) and the Test Of Functional Health Literacy in Adults (TOFHLA).

Results: The total score of TOFHLA showed a significant and positive correlation with the total score of PMPAS in nursing students (r=0.063, p=0.040), whereas this relationship was negatively significant for non-nursing students (r=-0.219, p=0.023). The total score of TOFHLA significantly and positively correlated with the psychological improvement subscale of PMPAS in total and also nursing students. The same correlation was found between the total score of TOFHLA and self-control inability subscale in total (r=0.142, p=0.016), and also non-nursing students (r=0.286, p=0.003). However, a significant and negative correlation was observed between the total score of TOFHLA and anxiety and sense of loss subscale in total (r=-0.137, p=0.020) as well as non-nursing students (r=-0.260, p=0.007).

Conclusion: HL is significantly correlated with cell phone addiction in some dimensions. Based on findings, it is recommended that authorities should pay attention to HL and cell phone addiction, especially among nursing students.

Keywords: Addictive, Behaviour, Nursing

INTRODUCTION

Healthcare professionals from different fields are responsible to increase society health information through information and decision making process [1]. In this domain, HL has attracted much interest in recent decades and is believed to be a powerful element for promoting health-behaviours and information, by determining health inequalities, both in industrial and developing countries [2,3]. HL is considered as a person's ability to acquire, describe, understand, appraise, and use basic information of health and medical services, which is appropriate for decision making and judgment regarding healthcare, disease prevention, and health promotion in everyday life [4,5]. In Iran, as a developing country, HL has attracted much attention and investigations have revealed insufficient HL in a large percentage of Iranian healthcare students [6-9]. In a cross-sectional study, the students had average HL about the management and recycling of solid waste [8]. In another study, students had low HL about depression in some domains [9].

Despite the importance of HL, few studies were conducted on the link between HL and addiction amongst healthcare students. In this regards, findings revealed that there is an inverse association between HL and substance addiction (i.e., alcohol, smoking, and narcotic drugs) [10-12]. However, there is a lack of knowledge about the relation between HL and behavioural addictions in this population.

Cell phone addiction, is a common behavioural addiction resulting from modern technology, is defined as excessive behavior in using technology, such as smart phones, phone applications or online games [13]. Lately, this type of addiction is on the rise amongst healthcare students in developing countries, especially Iran [14-17]. The prevalence of excessive mobile phone usage was reported to be 36.7% among the healthcare students in northeastern Iran, which was higher than other countries [16]. In another study at Isfahan University of Medical Sciences, the prevalence of cell phone addiction was 56.2% and 64.5% for female and male students [17].

Some recent investigations have emphasised on the role of HL in cell phone usage in different population [18-22]. As far as we know, no study has examined the bivariate correlation of HL with cell phone addiction among college students, yet. Giving the importance of cell phone addiction and HL in healthcare students, we decided to investigate the correlation of these two variables in a sample of Iranian healthcare students and also compare this correlation amongst nursing and non-nursing students. We hypothesised that low HL would be associated with higher cell phone addiction compared to those with higher HL.

MATERIALS AND METHODS

The present cross-sectional, descriptive, correlational study was carried out on male students of nursing, health, medicine, and dentistry in two Iranian universities in the northern and central part of Tehran, Iran, during February to May 2016. The inclusion criteria were as follow: 1) being 18 years or older; 2) having a simple or smart phone; and 3) lack of any confirmed psychological problems. Students who filled out the questionnaires incompletely and those who were unwilling to participate in the study were excluded.

Sampling was done through a cluster random method in a way that students of each educational degree (associate, bachelor, master, and doctor of medicine) were categorised as separate clusters. Clusters were selected randomly and sampling in each cluster was conducted based on the inclusion and exclusion criteria. Based on Cochran formula, a total of 310 students were calculated as sample size, with N (target population number)=1600, p=0.5, q=0.5, d=0.05, and type I error of 5%. To obtain confident results, we

considered 350 students. Out of these, 63 students were excluded due to incomplete questionnaires and final analysis was done on 287 students (114 in one university and 173 in another).

$$n = \frac{\frac{z^2 p\, q}{d^2}}{1 + \frac{1}{N}\left(\frac{z^2 p\, q}{d^2} - 1\right)} \quad n = \frac{384.16}{1 + 1/1600(383.16)} = 310$$

The study was approved by the local Ethics Committee of Baqiyatallah University of Medical Sciences, Tehran, Iran (IR. BMSU.REC.1395.42). Prior to enrolment, a written informed consent was taken from all students. Then, data were collected with three questionnaires including basic information, the Persian version of TOFHLA [23], and the PMPAS [24] through self-report method. In the questionnaire of basic information, the students were investigated in terms of age, marital status, economic status, educational degree, major, and type of cell phone.

The Persian version of the TOFHLA questionnaire was used to measure HL. This questionnaire consists of two sections:

Calculation: This section measures the individual's ability to understand and act based on instructions of healthcare providers or their instructors, which requires calculating capabilities. The section has 10 instructions according to real-life situations which include: a) directions to take medications; b) appointment time to see a doctor; c) calculating financial aid; and d) an example of a clinical test result. The instructions were presented to the students through a series of flash cards and also they were given some relevant questions.

Reading comprehension: This section consists of 50 questions that evaluates the individual's ability to read and comprehend the three prose passages which include: a) instructions to prepare upper gastrointestinal X-ray imaging; b) patient's rights and responsibilities; and c) a standard hospital consent forms.

According to the number of correct answers, the scores of both sections ranges from 0-50 and the total score of the sections is from 0-100 (the higher score indicates the higher HL). Students' HL scores were categorised as insufficient (0-59), border (60-74), and satisfactory (75-100). The validity and reliability of the Persian version of the TOFHLA questionnaire has been evaluated previously, revealing a reliability of 0.79 and 0.88 for calculation and reading comprehension sections [23].

The PMPAS was applied to investigate cell phone addiction. This 15-item scale investigates three subscales of cell phone addiction which include: a) self-control inability (8 items); b) anxiety and sense of loss (5 items); and c) psychological improvement (2 items). Each item has a five-point Likert scale (1=not at all, 2=rarely, 3=occasionally, 4=often, and 5=always). The total score ranges from 15-75, and the higher score indicates the higher addiction to cell phone. In a previous study [24], the Cronbach's Alpha coefficient for internal correlation of the total, subscales of a, b, and c obtained 0.86, 0.84, 0.81 and 0.77, respectively.

STATISTICAL ANALYSIS

All statistical analysis was carried out using SPSS software version 18 (SPSS, Inc. Chicago, IL, USA). The p-value <0.05 was considered to be significant. Quantitative variables are shown as mean±SD and qualitative variables are represented as the number of frequency and their percentage. The Kolmogorov-Smirnov test showed the normal distribution of data. Hence, comparison of cell phone addiction between the border and satisfactory status of HL was done using independent sample t-test, considering the fact that none of the students had insufficient HL. To investigate the correlation between HL and cell phone addiction in total, nursing, and non-nursing students, the Pearson's correlation test was used.

RESULTS

The mean age of the students was 26.2±4.5 years and 71.1% were single. Most students (67.2%) had average monthly income. Regarding educational status, most of them (52.6%) were in bachelor degree program and most (62.4%) were nursing students. In terms of cell phone type, 91.3% used smart cell phones [Table/Fig-1].

Variables			Number	Percent
Marital status	Single		204	71.1
	Married		83	28.9
Monthly income	Weak		67	23.3
	Average		193	67.2
	Well		27	9.5
Educational degree	Associate		31	10.8
	Bachelor		151	52.6
	Master or doctor of medicine		105	36.6
Major	Nursing		179	62.4
	Non-nursing	Medicine	40	13.9
		Health	25	8.7
		Dentistry	43	15
Cell phone type	Simple		25	8.7
	Smart phone		262	91.3

[Table/Fig-1]: General characteristics of the students (n=287).

Total score of TOFHLA and PMPAS were 86.9±8.3 and 34.6±4.1 [Table/Fig-2]. Pertaining to HL, 22 (7.7%) and 265 (92.3%) of the students had a border and satisfactory status. Only the score of psychological improvement subscale of PMPAS among the students with satisfactory HL was significantly higher than those with border HL (p=0.01) [Table/Fig-3].

The correlations between TOFHLA and PMPAS in total, nursing, and non-nursing students are presented in [Table/Fig-2]. The total score of TOFHLA showed a significant and positive correlation with the total score of PMPAS in nursing students (r=0.063, p=0.040), whereas this correlation was negatively significant for non-nursing students (r=-0.219, p=0.023). Also, the total score of TOFHLA significantly and positively correlated with the psychological improvement subscale of PMPAS in total (r=0.169, p=0.004) and also nursing students (r=0.271, p<0.001), whereas, a significant and negative correlation was observed for the anxiety and sense of loss subscale in total (r=-0.137, p=0.020) as well as non-nursing students (r=-0.260, p=0.007).

DISCUSSION

To the best of our knowledge, the present study is the first to investigate the correlation between HL and cell phone addiction amongst university students. Based on the literature review, we could not find any similar study in design to compare with our results.

According to the findings, no significant differences were seen between students with satisfactory and border HL in terms of the total score of PMPAS. In a study amongst pregnant and postpartum women, it was revealed that women with limited HL were more likely to use a cell phone than those with satisfactory HL [25]. Conversely, Bailey SC et al., showed that patients with satisfactory HL were more likely to use mobile phone or smart phone compare to those who had insufficient or border HL, which were more susceptible to cell phone addiction [26]. Also, amongst adults with type 2 diabetes, Bergner EM et al., indicated that participants with limited HL were less likely to use cell phones to access the internet compared to participants with satisfactory HL [27]. Similarly, it was stated that diabetic patients with lower HL levels were less engaged in mobile and Web-delivered self-care interventions [28]. A probable assumption for this finding is that people who have higher HL are more interested and motivated in exploration and understanding

	PMPAS / TOFHLA			Reading comprehension section Mean: 45.3 SD: 4.7		Calculation section Mean: 41.5 SD: 6.2		Total Mean: 86.9 SD: 8.3	
		Mean	SD	r	p-value	r	p-value	r	p-value
Non-nursing (n=108)	Self-control inability subscale	16.54	3.17	-0.165	0.087	0.286	0.003	0.154	0.113
	Anxiety and sense of loss subscale	13.79	2.52	-0.022	0.036	-0.144	0.137	-0.260	0.007
	Psychological improvement subscale	3.52	1.43	-0.114	0.241	0.074	0.447	-0.056	0.565
	Total	33.87	4.27	-0.219	0.023	0.092	0.346	-0.057	0.599
	PMPAS / TOFHLA			Mean: 44.87 SD: 5.03		Mean: 41.45 SD: 6.48		Mean: 86.32 SD: 9.24	
		Mean	SD	r	p-value	r	p-value	r	p-value
Nursing (n=179)	Self-control inability subscale	17.44	3.21	0.063	0.040	0.070	0.351	0.015	0.842
	Anxiety and sense of loss subscale	13.88	2.38	-0.068	0.362	-0.068	0.363	-0.085	0.257
	Psychological improvement subscale	3.82	1.49	0.244	0.001	0.183	0.014	0.271	< 0.001
	Total	35.15	3.95	-0.024	0.755	0.108	0.151	0.063	0.040
	PMPAS / TOFHLA			Mean: 46.25 SD: 4.12		Mean: 41.66 SD: 5.84		Mean: 87.91 SD: 6.44	
		Mean	SD	r	p-value	r	p-value	r	p-value
Total	Self-control inability subscale	17.1	3.2	-0.113	0.056	0.142	0.016	0.042	0.482
	Anxiety and sense of loss subscale	13.8	2.4	-0.115	0.052	-0.096	0.105	-0.137	0.020
	Psychological improvement subscale	3.7	1.4	0.133	0.025	0.152	0.035	0.169	0.004
	Total	34.6	4.1	-0.110	0.063	0.098	0.099	0.011	0.859

[Table/Fig-2]: Pearson product moment correlation matrix of the Test of Functional Health Literacy in Adults (TOFHLA) with the Persian version of Mobile Phone Addiction Scale (PMPAS).

Health literacy Cell phone addiction	Border Mean±SD	Satisfactory Mean±SD	p-value*
Self-control inability subscale	17.0±2.6	17.1±3.2	0.98
Anxiety and sense of loss subscale	14.5±2.3	13.7±2.4	0.14
Psychological improvement subscale	2.9±1.4	3.7±1.4	0.01
Total	34.6±4.6	34.6±4.0	0.96

[Table/Fig-3]: Comparison of cell phone addiction in the students with border and satisfactory health literacy (n=287).
*t-test

of healthcare information in their cell phones and its related virtual networks as scientific resources.

The obtained findings showed a direct and significant correlation of total score of TOFHLA with total score of PMPAS in nursing students, whereas this correlation was indirect and significant for non-nursing students. In total, a non-significant and positive correlation was observed between the total score of TOFHLA with the total score of PMPAS. In a qualitative study using thematic content analysis amongst Iranian Military University students, health information was identified as a strategy to reduce the threats of cell phone [29]. Inconsistent with our findings in a study amongst South Korea nursing students, the quantity of reading had a negative and significant correlation with smart phone addiction [30]. Also, in a study by Choi SW et al., among non-healthcare students in South Korea, an inverse significant association reported between scores of Smart phone Addiction Scale and wisdom and knowledge subscale (encompass curiosity and a love of learning) of Character Strengths Test [31]. In Iranian high school students, a negative significant correlation was reported between score of the Newest Vital Sign questionnaire and daily use of cell phone, measured with a researcher-made questionnaire [32]. Similarly, recent investigations indicated a correlation between HL and internet addiction, which positively correlated with cell phone addiction in university students [17,33]. In a study among students of Iran University of Medical Sciences, a significant and inverse relationship was revealed between information literacy and internet addiction [34]. However, in postgraduate students of Isfahan University of Medical Sciences, Soleymani MR et al., reported no significant association between the internet addiction and none of the dimensions of information-seeking behaviour [35]. In the current study, we found non-significant correlation between the total score of TOFHLA with the total score of PMPAS, which seems to be in line with the findings of Soleymani MR et al., [35].

According to the present study findings, the total score and the reading comprehension and the calculation sections of TOFHLA significantly and positively correlated with the psychological improvement subscale of PMPAS in total and also nursing students. In addition, we found a significant inverse correlation between the total score of TOFHLA and anxiety and sense of loss subscale of PMPAS in total and also non-nursing students. Moreover, the score of the psychological improvement subscale of PMPAS among the students with satisfactory HL was significantly higher than those with border HL, whereas for the anxiety and sense of loss subscale the comparison was not statistically significant. In line with our findings, Dodson S et al., showed that higher HL was associated with fewer symptoms of psychological stress in people receiving dialysis [36]. In the inverse relationship between HL and anxiety and sense of loss, it could be said that those who have satisfactory HL, have much more information on hazards of the excessive use of cell phone; thus, avoid cell phone-driven false excitements and anxiety. Also, those with higher HL might be more aware of the aftermaths of using cell phone and avoid using it constantly.

Findings also showed a significant and positive correlation between the reading comprehension section of TOFHLA and the self-control inability subscale of PMPAS in total and also non-nursing students. However, there was no significant difference in the score of self-control inability subscale among the students with satisfactory and border HL. Indeed, our findings indicated that the higher the reading comprehension, the lower self-control or higher self-control inability. Inconsistent with this finding, it was revealed that lower HL was significantly associated with less self-control of glucose level in adults with diabetes [37]. It

seems that students with higher reading comprehension ability are more interested in using cell phone to communicate with others via social media and connect to the internet through cell phone to search for scientific resources [31]. Also, it was indicated that smart phone use motivations were correlated positively with addiction, and addiction correlated negatively with self-control [38]. Hence, students with higher reading comprehension might have higher dependency to their cell phones and lose their self-control by using the cell phone continuously.

LIMITATION

Although in this research all aspects of cell phone addiction and HL and its sections were studied, there are some points that should be considered when interpreting the findings. First, the study had a considerable dropout rate, which might have affected the results. Second, we enrolled only male students and could not compare male and female about HL and cell phone addiction and also the correlations of these two variables. Third, the study was conducted amongst healthcare students and the results might not be generalizable and applicable to other population. Forth, the study was a cross-sectional; hence, no cause-effect relationship was established between HL and cell phone addiction. Future longitudinal and interventional studies are recommended with focus on the long-term effects of HL on cell phone addiction of both male and female students, considering a much larger sample size.

CONCLUSION

There was a significant correlation between HL and cell phone addiction in some dimensions. Also, the students with satisfactory HL had significantly higher score in psychological improvement subscale of cell phone addiction. In nursing students, total score of TOFHLA significantly and positively correlated with total score of PMPAS. Based on our findings and due to high prevalence of cell phone addiction amongst students, university authorities should promote quality and quantity of the education related to HL in universities, especially nursing students, to prevent or reduce cell phone addiction.

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