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Problematic smartphone usage and quality of life among Saudi adults

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Abstract. – OBJECTIVE: Problematic use of and/or addiction to smartphones is a cause of concern for sociologists, psychologists, and health professionals. We aimed to assess the correlation between smartphone use and perceived quality of life.

SUBJECTS AND METHODS: We conducted a sample survey of university students and the general public that visited health facilities in the Qassim region of Saudi Arabia. We used previously developed and validated questionnaires to elicit information on the extent and pattern of smartphone use and perceived quality of life. We conducted analysis of variance and binary logistic regression to evaluate the correlation between smartphone use and perceived quality of life.

RESULTS: About 73% of participants were university students aged 18 to 24 years; there were slightly more women than men. The mean quality of life scores for physical and psychological health was significantly lower among women, singles, students, and those 18 to 24 years old. Perceived quality of physical and psychological health was significantly lower among users of applications for music and movies than users of religious applications. Participants with the lowest level of perceived quality of physical and psychological health were between 2.5 and 2.7 times more likely to have the highest level of problematic smartphone use.

CONCLUSIONS: We found that problematic smartphone use was strongly associated with perceived quality of life in the Qassim region of Saudi Arabia. We recommend awareness campaigns to reduce problematic smartphone use, particularly among the younger population and physician training on the diagnosis and management of problematic smartphone use/addiction.

Key Words:
Smartphone, Smartphone addiction, Problematic use of smartphones, Mobile phone dependence, Quality of life, Saudi Arabia.

Introduction

Quality of life (QOL) is defined by the World Health Organization (WHO) "as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"[1].

Although studies have shown that one's quality of life may improve by using certain applications on a smartphone[2,3], if one's use becomes problematic, it may adversely affect quality of life[4,5]. Problematic smartphone use is a growing concern because when use becomes uncontrolled or excessive, it has an impact on daily living[6]. There are many negative outcomes, including financial problems and sleep disturbance[7-9].

Problematic smartphone use has also been categorized as smartphone addiction, a behavioral addiction similar to other nonchemical addictions, such as pathological gambling, compulsive shopping or videogame addiction[10]. Several studies[11-15] have shown that overall quality of life negatively correlates with such addiction; in particular, excessive use may lead to negative effects on physical and mental health[16].

Samaha and Hawi[17] evaluated the correlation between smartphone addiction and satisfaction with life mediated by stress and academic performance. Their results showed that smartphone addiction was positively related to perceived stress, but perceived stress was negatively related to satisfaction with life. Additionally, a smartphone addiction was negatively related to academic performance, but academic performance was positively related to satisfaction with life[17]. Another study[18] found that life satisfaction levels increased as participants' smartphone addiction levels decreased.

A study in South Korea examined the relationship between maternal life satisfaction, smartphone

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addiction, and parenting behavior. Results revealed that maternal life satisfaction had a significant and direct influence on parenting behavior, and its indirect influence on parenting behavior was mediated by a smartphone addiction tendency[19].

Saudi Arabia is a high-income country, and much of the population has access to the latest smartphone technology. Many people have multiple devices; the number of mobile connections in Saudi Arabia in 2021 was 113% of the population and Internet penetration was 96%[20]. A meta-analysis[21] of 83 studies from 24 countries conducted from 2014 to 2020, which included almost 34,000 participants, attempted to quantify smartphone addiction, and focused on adolescents and young adults (15-34 years). The study found that China, Saudi Arabia, and Malaysia had the highest smartphone addiction scores in the world. In particular, Saudi adolescents and young adults aged 10-24 years (who make up about 22% of the population[22]) spend a considerable amount of time using social media and entertainment applications. In addition, as a traditionally conservative religious society, Saudi Arabia has restrictions on many Western-style entertainment activities, particularly outside of the largest cities. This lack of recreational and extracurricular choices, along with high temperatures during much of the year, likely contributes to a reliance on electronic devices for indoor entertainment. However, to our knowledge, research in Saudi Arabia on the relationship between problematic smartphone use and users' quality of life is limited. Our study was designed to investigate the relationship between problematic smartphone use and quality of life among an adult Saudi population aged 18 to 65, in Qassim region of Saudi Arabia.

Subjects and Methods

Study Design and Settings

We conducted a cross-sectional survey of adult residents of Qassim, Saudi Arabia. We recruited participants from Qassim University and Primary Healthcare Centers (PHCs) in the Qassim region. Qassim, officially known as the Emirate of Al-Qassim, is an administrative province of Saudi Arabia. It is located in the north-central part of the kingdom and has an estimated 1.02 million people living in 65,000 square kilometers[23].

Sampling and Participants

Male and female Saudi residents aged between 18 and 65 years were considered eligible for our study. Individuals were excluded if they were suffering from any communicable respiratory illness or any other disease that made it difficult for them to participate in the study. We recruited participants from Qassim University and PHCs in the Qassim region using multi-stage cluster sampling. First, we developed a sampling frame comprising the primary sampling units – a list of Qassim University's 15 colleges situated on the main campus, and a list of all PHCs (N=158) in Qassim. We randomly selected six colleges and 52 PHCs from the list. We calculated our sample size using the Epi Info™ version 7. For a probability value of 0.05 and 50% expected prevalence, we needed 384 participants from each group (university and PHCs).

Data collectors visited the colleges over a period of two months to randomly enroll students for the study. To recruit adults from the PHCs, our data collector invited every third adult patient or visitor entering the selected PHC on three consecutive days each week. Data collection continued over a period of three months (between December 2019 and February 2020). We had to stop data collection after 715 interviews because of COVID-19 lockdown measures, which resulted in an over-representation of university students in the sample. Participants' socio-demographic characteristics are presented in Table I.

Questionnaire

The structured questionnaire included demographic information and the short version of the Smartphone Addiction Scale (SAS-SV)[24]. Demographic information included participants' age, gender, educational level, marital status, current occupation, and income. The SAS-SV is a 10-item scale developed and validated in South Korea to measure smartphone addiction among adolescents[24]. We also included the validated Arabic version of the WHOQOL-BREF scale aiming to assess our participants' quality of life[25].

Our questionnaire, including the SAS-SV, was translated into Arabic, reverse translated into English, and both were compared to ensure accuracy before starting data collection. We then conducted field testing with 24 Saudi adults to ensure that our questionnaire was understandable by our target population. The participants for field testing were purposively sampled to ensure diverse demographics for good representation of genders, income levels, education levels, and age groups. Field testing of the preliminary questionnaire was conducted by two male and two female medical students who were native Arabic speakers. Field testing was conducted in three phases of eight

Table I. Respondents' demographic and socioeconomic characteristics.

Respondent's characteristics	Male (%) (N=323)	Female (%) (N=381)	Total (N=704)
Age-group			
18-24 years	75.5	71.7	73.4
25-34 years	13.6	18.1	16.1
≥ 35 years	10.8	10.2	10.5
Education			
Up to intermediate	79.3	69.4	73.9
Diploma	8.4	16.1	12.5
University	12.4	14.5	13.5
Working status			
Unemployed/Housewife	3.7	13.1	8.8
Student	76.0	70.9	73.2
Employed	20.2	16.0	17.9
Current marital status			
Single	83.5	74.7	78.7
Married	16.5	25.3	21.3
Monthly income (Saudi Riyal):			
< 1,500	14.8	13.8	14.3
1,500-5,000	14.5	14.0	14.3
5,000-10,000	22.9	31.7	27.6
10,000-20,000	34.8	26.2	30.2
> 20,000	12.9	14.3	13.7
Duration of using smartphone:			
Less than 1 year	0.3	0.5	0.4
1-3 years	1.2	1.9	1.6
More than 3 years	98.5	97.6	98.0

interviews each, with the questionnaire undergoing revision after each phase. The final survey was administered face-to-face by six male and six female final-year medical students who were trained to use the instrument.

Ethical Issues

All researchers completed the ethics course recommended by the local institutional review board (IRB). We received Ethics approval from the IRB of the Ministry of Health, Qassim region, Saudi Arabia (approval No. 1378136-1440). All study participants received a detailed informed consent document that explained the purposes of the study and highlighted the topics, types of questions, and the time involved in the study. Confidentiality and anonymity of all information collected from the participants were maintained, and the participants retained the right to refuse to answer specific questions or to opt out of the study at any time.

Statistical Analysis

Data entry and analyses were done using the SPSS version 20 (SPSS Inc., IBM, Armonk, NY, USA). To classify problematic use of smartphones, we first computed participants' scores on each of the 10 SAS-SV items. We used 31 and 33 as the male and female cutoff points, respectively, to determine problematic use[24]. We did descriptive analysis of sociodemographic and smartphone usage characteristics, which were reported as percentages and frequencies. We did multivariable logistic regression analysis to investigate the factors associated with problematic smartphone use, reported as odds ratio (OR) with a 95% confidence interval (CI). A p-value of <0.05 was considered statistically significant.

We computed a problematic use of mobile phone (PUMP) score using the 10 questions related to the perception of problematic smartphone use issues. Each of these questions used a five-category Likert scale. We assigned a score to each question as follows: Strongly Agree +2; Agree +1; No Answer 0; Disagree -1; Strongly Disagree -2. We then summed scores from the 10 questions to compute the PUMP score, which was further divided into quartiles based upon the distribution of the data. The lowest quartile (Q1) had the least number of problems associated with the use of smartphones, while the highest quartile (Q4) had the greatest number of problems associated with the use of smartphones.

To compute the scores for the four quality-of-life domains (physical health; psychological; social networking; and environment), we followed the WHO-QOL guidelines[26]. We then transformed the domain scores into binary variables as follows: the lowest quartile (Q1) of the domain score (the poorest perceived quality of life in its domain) was regarded as poor quality of life; the remaining three quartiles (all scores above the 25th percentile) were regarded as good quality of life. We conducted analysis of variance (ANOVA) to evaluate the correlation between PUMP score and the quality-of-life domain score in both directions.

We conducted logistic regression analysis to estimate the effects of PUMP on the four domains of the quality of life, whereby the latter were converted into a binary variable (poor and good quality of life), as described above.

Results

Our sample comprised in large part university students, while only about 18% of the respondents were employed. About three-fourths of the respondents, both male and female, were students who were unmarried and below age 25. Among the women, 13% were housewives. The median monthly income was about 9,000 Saudi Riyals. Almost all respondents had been using a smartphone for over three years, although about 2% reported that they had been using one for less than three years (Table I).

Table II presents the mean perceived quality of life (QOL) scores in each of the four domains by demographic characteristics. The mean QOL scores for physical health and psychological health were significantly lower among the youngest age group (18-24 years), women, singles, students, and those with an intermediate-level education. The mean QOL score for social relations was significantly lower among men and singles, but there were no significant differences by age, education, or employment status. The mean QOL score for environment did not vary significantly by age, gender, marital status, education, or employment status.

Among the many applications that the respondents were using on their smartphones, only three seemed to have an association with quality of life.

Table II. Mean values of perceived quality-of-life domain scores by demographic variables†.

	Quality of life domain				
Variable	**Physical health**	**Psychological**	**Social relations**	**Environment**	**N**
Age-group					
18-24 years	14.73	14.68	14.90	15.04	517
25-34 years	15.37	15.44	15.46	14.97	113
≥ 35 years	15.27	15.76	15.54	14.99	74
	$p = 0.018$	$p = 0.001$	$p = 0.111$	$p = 0.958$	
Gender					
Male	15.36	15.10	14.55	15.04	323
Female	14.48	14.76	15.49	15.01	381
	$p < 0.001$	$p = 0.108$	$p < 0.001$	$p = 0.880$	
Marital status					
Single	14.77	14.70	14.80	15.01	552
Married	15.33	15.72	16.00	15.11	149
	$p = 0.014$	$p < 0.001$	$p < 0.001$	$p = 0.691$	
Education					
Intermediate	14.72	14.74	14.92	15.08	519
Diploma	15.08	15.21	15.24	15.06	88
University	15.57	15.55	15.58	14.63	95
	$p = 0.007$	$p = 0.020$	$p = 0.176$	$p = 0.309$	
Employment					
Not working	14.80	15.21	15.27	15.12	62
Student	14.69	14.70	14.90	15.04	514
Employed	15.73	15.58	15.53	14.93	126
	$p < 0.001$	$p = 0.005$	$p = 0.141$	$p = 0.885$	

†*p*-values computed using F-test through ANOVA.

Those apps were related to knowledge (newspapers, books, learning forums, etc.), religion (for reading the Quran or searching for religious information), and music and/or movies. The mean QOL score for psychological health was higher among those who used the phone for knowledge compared to those who did not; there were no significant differences in the mean scores of the other three domains. The respondents who reported using their phone for religious information had significantly higher mean QOL scores in all four domains, compared to those who did not use religious apps on their phones. The respondents who used their phones to listen to music and/or watch movies had significantly lower mean QOL scores for physical and psychological health but not for the other two domains (Table III).

Table IV presents a multivariate analysis of the association between problematic use of mobile phone (PUMP) and the four domains of perceived quality of life. Through logistic regression, the association between PUMP score quartiles and WHO-QOL was estimated after controlling for the effects of age, gender, education, and income group. The likelihood of reporting a poor quality of life in all four domains significantly increased with an increase in problematic use of smartphones/mobile phones, as shown in the table. This was most remarkable for the high and very high levels of smartphone use. The overlap in confidence intervals suggests that the two highest levels of problematic use are equally detrimental to perceived quality of life and are significantly higher than the reference category. This is true for all four domains of the WHO-QOL scale (Table V).

Discussion

Our study has provided evidence that among our sample, comprising a large proportion of young, unmarried, male and female university students, but also including housewives and older adults, perceived quality of life is directly related to problematic smartphone use. Similar findings have been reported in several other studies. For example, a review study from Iran reported that problematic use of mobile phones adversely affected mental health and self-esteem[27]. An Australian study comparing samples from 2005 and 2018 found that problematic use of mobile phones was increasingly related with mental health problems and was sometimes used as a coping strategy in times of life challenges[28]. Similar findings were seen among medical students in two studies[14,29].

As the intensity of problematic smartphone use increases, the perceived level of quality of life goes down in all four domains of the WHO-QOL scale. This finding remains valid after controlling for the effects of age, gender, marital status, and income level. These findings are consistent with the results of Shahbaz et al[30].

It follows that problematic smartphone use affects perceived quality of life in the domains of physical health, psychological health, social relations, and living environment. A study among medical students showed that the domain most affected by smartphone addiction is the psychological domain[11]. The reasons behind this may be that smartphone addiction leads to sleep interference and is often accompanied by substance and behavioral abuses and other comorbidities such

Table III. Mean values of perceived quality-of-life (WHO-QOL) domain scores by reason for using a smartphone.

Reason for using apps	WHO-QOL domain				
	Physical health	Psychological	Social relations	Environment	N
Knowledge					
No	14.77	14.75	14.93	14.98	479
Yes	15.13	15.24	15.30	15.10	223
	$p = 0.073$	$p = 0.032$	$p = 0.176$	$p = 0.583$	
Religion					
No	14.69	14.67	14.87	14.82	526
Yes	15.48	15.63	15.58	15.62	176
	$p < 0.001$	$p < 0.001$	$p = 0.015$	$p < 0.001$	
Music/movies					
No	15.32	15.31	15.23	15.24	311
Yes	14.54	14.59	14.90	14.83	391
	$p < 0.001$	$p = 0.001$	$p = 0.190$	$p = 0.40$	

WHO-QOL: World Health Organization Quality of Life scale.

Table IV. Logistic regression models to predict the lowest level of perceived quality of life[†] in the four WHO-QOL domains by PUMP score quartiles, after controlling for the effects of the socio-demographic variables[‡].

QOL Domain	Levels of problematic use of smartphone/mobile phone[§]	Adjusted Odds Ratio (95% CI)
Domain 1: Physical health	Lowest level	Ref.
	Middle level	1.02 (0.61-1.73)
	High level	2.16 (1.31-3.57)
	Very high level	2.52 (1.54-4.12)
Domain 2: Psychological health	Lowest level	Ref.
	Middle level	1.82 (1.03-3.20)
	High level	3.13 (1.80-5.45)
	Very high level	2.76 (1.59-4.81)
Domain 3: Social relations	Lowest level	Ref.
	Middle level	1.57 (0.79-3.13)
	High level	3.21 (1.63-6.31)
	Very high level	1.48 (0.72-3.04)
Domain 4: Environment	Lowest level	Ref.
	Middle level	1.94 (1.16-3.23)
	High level	2.30 (1.37-3.86)
	Very high level	2.80 (1.69-4.61)

PUMP: problematic use of mobile phone; WHO-QOL: World Health Organization Quality of Life scale.
[†]The lowest quartile of the WHO-QOL score represents poor quality of life, while the remaining three quartiles are regarded as good quality of life, thus creating a binary outcome variable.
[‡]Age-group, gender, education, and income group.
[§]PUMP score quartiles: Q1 (reference category) depicts the lowest level of problematic use of mobile phone; Q4 reflects a very high level of problematic use of mobile phone.

as stress, anxiety, and depression. Another study showed that addiction to smartphones tends to make one's life more stressful and results in unsatisfactory relationships[31].

Problematic smartphones use commonly affects sleep; it has been linked to poor sleep quality and sleep disorders[32]. Similar findings were also seen in Saudi Arabia[33]. Social relations are also affected by problematic smartphone use as shown by Guo et al[34]. Horwood and Anglim[35] suggested a potential explanation for how problematic smartphone use may negatively impact users' social relationships; one element of problematic smartphone use is known as 'phubbing,' short for 'phone snubbing,' the act of avoiding socializing with others in favor of using a smartphone[35]. Such usage is associated with poorer relationship satisfaction as shown in a number of studies. A previous study[36] in Saudi Arabia showed that Internet use led to significant changes in social relations.

We also found that the purpose of using a smartphone (reflected in the types of applications used) may also have an impact on perceived quality of life. Perceived quality of life among users of religious applications was not as adversely affected as that among users of music and movie applications. Greater religious observance has been associated with choosing fewer risky behaviors, such as less screen time, and more healthy behaviors like exercise and proper diet[37,38]. Similarly, in

Table V. Mean quality-of-life domains scores by quartiles of PUMP score.

WHO-QOL domain	PUMP score Q2-Q4	PUMP score Q1	Significance
Physical health	0.151	3.045	$p < 0.001$
Psychological	0.161	3.624	$p < 0.001$
Social relations	0.741	2.479	$p = 0.035$
Environment	0.046	3.198	$p < 0.001$

PUMP: problematic use of mobile phone; WHO-QOL: World Health Organization Quality of Life scale
Table V further confirms the findings of Table IV, by comparing the mean WHO-QOL score by levels of problematic use of smartphones/mobile phones. Clearly, the mean of the perceived quality of life score is significantly and remarkably higher among those who use smartphones/mobile phones most sparingly and carefully.

a Saudi study on adolescents, those with higher self-rated religiosity and a better family atmosphere exhibited a less risky lifestyle[39].

In this study, we did not try to discriminate between problematic and addictive use of smartphones. There is increasing evidence that smartphones, similar to computer games, may cause behavioral addictions. Indeed, some of the earliest researchers on smartphones use conceptualized problematic use as a form of addiction which is nonchemical and behavioral in nature[6, 40-42]. Davazdahemami et al[43] looked specifically at addiction to applications used on smartphones. As mentioned earlier, other researchers believe that smartphone addiction may be analogous to addiction to gambling or excessive Internet use; smartphone addiction may include uncontrolled psychological dependency, craving for a smartphone, and anxiety or even symptoms of withdrawal when a smartphone is not available[44-46]. We believe that we have observed in our study signs of smartphone addiction in general as well as an addiction to certain applications, and they have had an adverse impact on users' perception of quality of life.

Saudi Arabia is traditionally a conservative religious society, having strong tribal and family systems that served as a barrier to outside influences, but this is rapidly changing. Just during the last decade, major changes in social, legal, and societal norms have been observed, which have modernized and Westernized Saudi society. It is an increasingly open environment with fewer restrictions, especially in terms of social media use and Western-style entertainment[47].

Saudi Arabia, with a relatively young population[22], has one of the highest rates of Internet use; up to 93% of the adult population uses the Internet, according to websites that track Internet use. The most commonly used applications are YouTube, Instagram, Facebook, Twitter, and Pinterest, in that order. Entertainment and social interaction seem to be the favorite pastimes on smartphones. However, gaming is also becoming very popular, and marketing data suggest that Saudi Arabia holds a very large market share in gaming app use. Apparently, educational use of Internet is not nearly as common[48].

A young society moving from conservative to liberal with an increasingly robust buying power, and future developments in Internet and social media are factors that will further increase smartphone addiction in Saudi Arabia, resulting in potentially detrimental effects on mental health and quality of life[49]. It is the responsibility of public health experts, psychiatrists, social activists, and communities to preempt and prevent smartphone addiction from becoming a major public health hazard in Saudi Arabia.

Conclusions

Although the sample comprised mostly young university students, it also included older adults who were either employed or housewives. We found that problematic smartphone use was strongly associated with poor perceived quality of life in the Qassim region of Saudi Arabia. Problematic smartphones use mostly impacts physical and psychological health, although it is also associated with social relationships. This association persists after controlling for the effects of gender, age, employment status, and income.

We recommend launching awareness campaigns on social and electronic media to reduce the problematic use of and/or addiction to smartphones among the general public, with special focus on younger population groups. It appears that problematic smartphone use is increasingly a social and psychological problem in Saudi Arabia. Physicians and psychiatrists should, therefore, be aware of this problem in order to provide help to patients showing signs of such problematic use and/or addiction.

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Author Contributions

Conceptualization: AM, MH, and FM; methodology: AM, MH, and FM; software and formal analyses: FM; investigation: AM and MH; writing— original draft preparation: AM and FM.; writing—review and editing: AM, MH and FM; supervision: AM. All authors have read and agreed to the published version of the manuscript.

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Conflict of Interest

The authors declare no conflict of interest.

Data Availability Statement

Data supporting reported results are available from the corresponding author on reasonable request.

Institutional Review Board Statement

The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board of the Ministry of Health, Qassim region, Saudi Arabia (approval no: 1378136-1440). All researchers successfully completed the bioethics course recommended by the IRB.

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

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