Aspects of Internet Use among Adolescents in Saudi Arabia

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Short Research Article

ABSTRACT

Background: In Saudi Arabia, there is a growing concern about Internet use among adolescents, who make up a significant portion (≈ 15%) of the population.
Method: We administered a survey to students (Grades 7-12, n =2321) in randomly selected middle and high schools in three cities of Saudi Arabia in the spring of 2020 prior to COVID-19. We inquired about their demographics, lifestyle factors, devices, motivation for Internet use, and their family members' use.
Results: The mean (± SD) age of starting to use the Internet was 10.45 ± 3.02. Smartphones were the most used device (86.0%), followed by computers (6.3%), tablets (5.2%), game consoles (4.5%), and smart TVs (1.9%). The primary motivations for Internet use were social media (64.9%), watching videos (19.6%), gaming (6.2%), and other (studying, communication, etc.) (9.3%). Participants mostly described their parents' Internet use as moderate and their siblings' use as heavy. About a third (32.2%) of participants' parents did not supervise or place restrictions on their

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children's Internet use, a quarter (27.8%) of the parents only supervised their Internet use, a quarter (23.3%) placed restrictions only, and 16.7% engaged in both supervision and restriction.
Conclusion: Adolescents report that their own Internet use via smartphones is high, and a high proportion of family members are heavy Internet users.

1. INTRODUCTION

Problematic Internet Use (PIU) among adolescents is high in Saudi Arabia. It affects their mental, physical, and social health as well as their academic performance adversely [1]. Additionally, it disrupts family harmony and deteriorates parent-child relationships [2].

Recently, we conducted a nationwide survey about PIU among adolescents from which we reported significant individual correlates (i.e., young age of Internet use and high screen time) and family-level correlates (i.e., poor socioeconomic status, low family harmony) of PIU [3, 4,5]. Previously, we also reported that adolescents with low family harmony have risky lifestyles [6]. Little is known about Internet usage among their family members or the motivation for and means of Internet use.

In this short communication, we report various aspects of adolescents' Internet use, including preferred devices, screen time, age, motivation for use, Internet usage by their family members, and parental oversight.

2. MATERIALS AND METHODS

This was a cross-sectional study of middle and high school students enrolled in government schools in three cities of Saudi Arabia (i.e., Buraidah, Jeddah, and Riyadh) during the period of January to March 2020. The study was approved by the Research and Development Office at the Ministry of Education. More detailed methodology for this study has been published previously [3, 4].

2.1 Inclusion Criteria

Male and female students enrolled in grades 7 through 12 in government schools were included.

2.2 Sample Size

In Saudi Arabia in 2019, there were ~ 1.8 million individuals between the ages of 15 and 19 [7], which is the average age range of students in grades 7 through 12. We collected data from schools in Buraidah (n=704), Jeddah (n=885), and Riyadh (n=732), arriving at a total sample of 2,321. The sample size equation was based on the study's primary outcome of PIU, which was estimated to be between 20% to 50% at the time of the study. The study details have been published elsewhere [3].

2.3 Sampling Strategy

We used a stratified, cluster sampling strategy using schools as clusters and gender for stratification. We obtained a list of all middle schools and high schools in each city from the General Directorate of the Ministry of Education. Aiming to enroll 125 students from each school, we needed 24 schools to fulfill the quota. We randomly selected eight schools from each city (four middle schools and four high schools; four boys' schools and four girls' schools).

2.4 Study Procedure

Each school was visited twice by trained research assistants. On the first visit, they explained the study to the school administration and to selected classrooms. Students were invited to participate, and willing students were given informed consent forms to be signed by their legal guardians. At the second visit, all students who did not bring an informed consent form indicating refusal were given a survey to complete (passive consent). The paper-based self-administered questionnaire took the participants 20-30 minutes to complete. The questionnaire was pretested on five adolescents who fit the inclusion criteria to confirm questions were clear and answer options were relevant and mutually exclusive.

2.5 Informed Consent and Confidentiality

Research assistants provided an informed consent form to be signed by the participants' guardians and explained its content to the participants. The consent form included a general description of the purpose and

procedures of the study, participants' risks and benefits, responsibilities of participation, the right to withdraw from the study, and data confidentiality. Collected information was kept confidential. Each participant was given a unique identification code which was used for the data entry and analysis. All survey materials were kept in a locked cabinet at Sulaiman Al Rajhi University.

2.6 Assessment

The questionnaire assessed various aspects of Internet use. Screen time was assessed as the number of hours per day spent using any type of electronic device (e.g., television, computer, smartphone, etc.); we categorized the variable into 5 groups (ref: ≤ 2, 3-4, 5-6, 7-8, and > 8 hours/daily). The age participants first started using the Internet was categorized as ≤ 8, 9-10, 11-12, and ≥ 13 years old. The participants chose their primary reason for using the Internet from a list of items provided (e.g., communication, educational activities, gaming, social media, YouTube/movies). We inquired from the participants about the Internet use (i.e., nonuser, light, moderate, or heavy) of their father, mother, brothers, and sisters. The participants also reported the control their parents exercised over their Internet use (i.e., no restriction or supervision, supervision only, restriction only, or both restriction and supervision). The complete questionnaire is in Appendix A.

2.7 Statistical Analysis

Descriptive statistics for the included variables are reported as frequency (percentage) for categorical variables and mean ± standard deviation for continuous variables. T-test was used to compare the age of starting Internet use between boys and girls. The chi-square test was used to compare the following categories between genders: primary motivation for using the Internet, device used, and screen time.

3. RESULTS

3.1 Demographics

The sample consisted of adolescents enrolled in middle and high school from the cities of Jeddah (38.1%), Riyadh (31.5%), and Buraidah (30.3%). All six levels of middle and high school were represented, with a slight majority being high school students (52.5%). Girls (54.4%) slightly outnumbered boys, and more than two-thirds (69.2%) were Saudi nationals. Most participants described their socioeconomic status as upper-middle class (65.1%), while others reported being rich (18.8%), lower-middle class (1.8%), or poor (14.3%). Almost all participants (99%) had at least one sibling, and about two-thirds (67.5%) had five or more (see Appendix B).

3.2 Adolescents' Internet Behaviors

The mean age ± SD of starting to use the Internet was 10.45 ± 3.02. More than half (51.0%) of the participants started using the Internet between 9 and 12 years of age, 23.7% started before age 8, and 25.3% started after age 13. Smartphones were the most used devices for accessing the Internet (86.0%). Computers were a very distant second (6.3%), followed by tablets (5.2%), game consoles (4.5%), and smart TVs (1.9%). Most participants (64.9%) described social media as their primary motivation for Internet use. Other participants cited watching YouTube, movies, and/or series (19.6%), gaming (6.2%), and other uses (studying, communication, etc.) (9.3%) as their primary motivation (see Table 1). A higher proportion of boys reported accessing the Internet via a gaming console (6.6% vs. 2.8%) and gaming as their primary motivation (10.3% vs. 2.7%) than girls. While a higher proportion of girls reported accessing the Internet via smartphone (87.7% vs. 84.4%) and using it primarily for social media (66.0% vs. 63.6%).

3.3 Internet Usage of Family Members

Participants were most likely to describe their parents' Internet use as moderate and their siblings' use as heavy. A higher proportion of female participants reported heavy Internet use among parents and siblings compared to male participants (*P* < .05) (Table 2). About a third (32.2%) of participants' parents did not supervise or place restrictions on their children's Internet use, a quarter (27.8%) of the parents only supervised their Internet use, a quarter (23.3%) placed restrictions only, and a sixth (16.7%) engaged in both supervision and restriction (see Table 2). Overall, a higher proportion girls reported their family members to be heavy users of the Internet compared to boys. There were no significant differences in parental control over Internet use between boys and girls.

Table 1. Adolescents' Internet behaviors in Saudi Arabia (N=2321)

	Overall		Boys (n=1058)		Girls (n=1263)		Chi-square *P* value
	Count	(%)	Count	(%)	Count	(%)	
Age when started using the Internet							
≤ 8 years	550	(23.7%)	261	(24.7%)	289	(22.9%)	.049
9-10 years	568	(24.5%)	272	(25.7%)	296	(23.4%)	
11-12 years	615	(26.5%)	251	(23.7%)	364	(28.8%)	
≥13 years	588	(25.3%)	274	(25.9%)	314	(24.9%)	
Uses a smartphone to access the Internet							
No	324	(14.0%)	169	(16.0%)	155	(12.3%)	<.010
Yes	1997	(86.0%)	889	(84.0%)	1108	(87.7%)	
Uses a tablet to access the Internet							
No	2200	(94.8%)	1036	(97.9%)	1164	(92.2%)	<.001*
Yes	121	(5.2%)	22	(2.1%)	99	(7.8%)	
Uses a computer to access the Internet							
No	2175	(93.7%)	997	(94.2%)	1178	(93.3%)	.341
Yes	146	(6.3%)	61	(5.8%)	85	(6.7%)	
Uses a smart TV to access the Internet							
No	2277	(98.1%)	1043	(98.6%)	1234	(97.7%)	.122
Yes	44	(1.9%)	15	(1.4%)	29	(2.3%)	
Uses a game console to access the Internet							
No	2216	(95.5%)	988	(93.4%)	1228	(97.2%)	<.001*
Yes	105	(4.5%)	70	(6.6%)	35	(2.8%)	
Primary motivation for using the Internet							
Social media	1506	(64.9%)	673	(63.6%)	833	(66.0%)	<.001*
YouTube, movies, series	456	(19.6%)	181	(17.1%)	275	(21.8%)	
Gaming	143	(6.2%)	109	(10.3%)	34	(2.7%)	
Other (study, communication etc.)	216	(9.3%)	95	(9.0%)	121	(9.6%)	
Daily screen time							
≤ 2 hours	672	(29.0%)	316	(29.9%)	356	(28.2%)	.147
3-4 hours	633	(27.3%)	303	(28.6%)	330	(26.1%)	
5-6 hours	411	(17.7%)	186	(17.6%)	225	(17.8%)	
≥ 7 hours	605	(26.1%)	253	(23.9%)	352	(27.9%)	

Table 2. Internet Usage of Family Members and Parental Control among adolescents in Saudi Arabia (N=2321)

	Overall		Boys (n=1058)		Girls (n=1263)		Chi-square *P* value
	Count	(%)	Count	(%)	Count	(%)	
Father's Internet use							
Nonuser	147	6.3%	90	8.5%	57	4.5%	<.001*
Light user	640	27.6%	333	31.5%	307	24.3%	
Moderate user	990	42.7%	429	40.5%	561	44.4%	
Heavy user	481	20.7%	180	17.0%	301	23.8%	

	Overall		Boys (n=1058)		Girls (n=1263)		Chi-
Not applicable	63	2.7%	26	2.5%	37	2.9%	
Mother's Internet use							
Nonuser	91	3.9%	57	5.4%	34	2.7%	<.001*
Light user	717	30.9%	343	32.4%	374	29.6%	
Moderate user	1018	43.9%	449	42.4%	569	45.1%	
Heavy user	472	20.3%	194	18.3%	278	22.0%	
Not applicable	23	1.0%	15	1.4%	8	0.6%	
Brother's Internet use							
Nonuser	88	3.8%	50	4.7%	38	3.0%	.036
Light user	158	6.8%	69	6.5%	89	7.0%	
Moderate user	451	19.4%	225	21.3%	226	17.9%	
Heavy user	1490	64.2%	659	62.3%	831	65.8%	
Not applicable	134	5.8%	55	5.2%	79	6.3%	
Sister's Internet use							
Nonuser	104	4.5%	56	5.3%	48	3.8%	<.001*
Light user	220	9.5%	122	11.5%	98	7.8%	
Moderate user	504	21.7%	241	22.8%	263	20.8%	
Heavy user	1318	56.8%	549	51.9%	769	60.9%	
Not applicable	175	7.5%	90	8.5%	85	6.7%	
Parents' control of Internet use							
No restriction or supervision	747	32.2%	333	31.5%	414	32.8%	.919
Supervision only	645	27.8%	295	27.9%	350	27.7%	
Restriction only	541	23.3%	250	23.6%	291	23.0%	
Full restriction and supervision	388	16.7%	180	17.0%	208	16.5%	

4. DISCUSSION

The main study findings were 1) the majority of adolescents used a smartphone to access the Internet, 2) approximately 40% of the participants reported 5 or more hours of screen time per day, 3) a high proportion of family members were reported to be heavy users of the Internet (range: 20% - 64%), and 4) the majority of participants reported that their parents supervised and/or restricted their Internet use.

Overall, the study findings are in line with other literature from Saudi Arabia. An earlier study also reported that smartphones were the most commonly used device for accessing the Internet among children and adolescents [8]. A similar study in Riyadh reported that 69% of participants had more than 6 hours of screen time per day, which is comparable to the 40% with 5 or more hours per day in the current study [9]. Thirty-one percent of participants from that same study reported that family and friends influenced their Internet use.

Parents can influence their adolescent's Internet use in two ways: 1) the parents' own use and 2) control measures to regulate an adolescent's use (supervision/restriction). A recent study showed that having heavy Internet users in the family was associated with adolescents who were more likely to have PIU. Furthermore, adolescents were more likely to have PIU when parents did not use any regulatory strategies for Internet use than when parents used supervision and restriction [4].

5. CONCLUSION

Understanding the aspects of Internet use among adolescents in Saudi Arabia is critical because many studies have shown that excessive screen time and addiction to the Internet have several implications for adolescents' health and well-being [10]. The primary limitation of the current study was its cross-sectional design. One should interpret the results without any causal inferences. The samples were roughly equal sizes in all three cities, which were not proportionate to their population sizes. This may have affected the representativeness of the sample.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

The authors hereby declare that NO generative AI technologies such as Large Language Models

(ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

ETHICAL APPROVAL

The study was approved by the Research and Development Office at the Ministry of Education.

CONSENT

An informed consent form to be signed by the participants' guardians was provided to all participants. Participants who did not bring an informed consent form indicating refusal were included (passive consent).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX

Appendix A. Questionnaire

City	1= Qassim, 2= Riyadh, 3=Jeddah, 4=Jeddah
School level	1= Intermediate, 2= High school
School type	1= Male, 2= Female
School Code:	1-32
Unique ID	Qassim=1 -1200, Riyadh=1201-2400, Dammam=2401 -3600, Jeddah=3601-4800

SECTION A

1. Age	……… in years	
2. Gender	1. Male 2. Female	
3. Nationality	1. Saudi 2. Syrian 3. Egypt 4. Sudan 5. Jordan 6. Palestine 7. Yemen 8. Other ( )	
4. Grade level	1. Grade 7 2. Grade 8 3. Grade 9 4. Grade 10 5. Grade 11 6. Grade 12	
5. Academic Performance (last year)	1. Excellent (90-100%) 3. Good (65-79%) 5. Poor (<50%) 2. Very Good (80-89%) 4. Fair (50-65%)	
6. Parents' Socioeconomic Status	1. Rich 2. Upper Middle Class 3. Lower Middle Class 4. Poor	
7. Parental Marital Status	1. Married 2. Divorced 3. Father passed away 4. Mother passed away 5. Both passed away	
8. Father's current Occupation	1. Working 2. Not working	
9. Mother's current Occupation	1. Working 2. Not working (housewife)	
10. Total number of father's wives	1- Your mother only 2. Two wives 3. Three wives 4. Four wives	
11. Smoking status	1. No 2. Yes If yes: (number of months: …………. , cigarettes/day: ……………)	
12. Generally, how religious are you? (0 is the lowest and 10 is the highest)	0 1 2 3 4 5 6 7 8 9 10 **Not at all Religious** **Moderately religious** **Very**	
13. At what age did you start using the internet regularly?	…….. years	
14. What device do you use for accessing the internet (you may choose more than one device)	1. Smartphone 2. Tablet (iPad included) 3. Computer 4. Gaming consoles (e.g. PlayStation, Xbox) 5. Smart TV	

15. What is the primary motivation for your internet use? (choose one)	1. Social media (WhatsApp, Facebook, Snapchat, Twitter, Instagram….etc.) 2. YouTube, movies, and series 3. Gaming 4. Studies 5. Communications (emails, talking) 6. Others (specify) ………………..
16. How would you describe your parent's control of your internet usage?	1- No restriction and no supervision 2- Supervision only 3- Restriction only 4- Full restriction and supervision
17. During the past 7 days on how many days were you physically active for a total of at least 60 minutes per day?	(0) = 0 days (3) = 3 days (6) = 6 days (1) = 1 day (4) = 4 days (7) = 7 days (2) = 2 days (5) = 5 days
18. How do you rate your diet?	(1) Very Healthy (2) Somewhat healthy (3) Somewhat unhealthy (4) Very Unhealthy
19. During the **past 7 days**, how would you rate your sleep quality overall? (please select one only)	0 1 2 3 4 5 6 7 8 9 10

SECTION B. INTERNET USE

Instructions: Please read each question carefully and choose a response (✓) that best describes your situation

Questions	Rarely	Occasionally	Frequently	Often	Always	Does Not Apply
1. How often do you find that you stay online longer than you intended?						
2. How often do you neglect household chores to spend more time online?						
3. How often do you prefer the excitement of the Internet to intimacy with your partner (e.g. friend, husband, wife, family member, roommate)?						
4. How often do you form new relationships with fellow online users?						
5. How often do others in your life complain to you about the amount of time you spend online?						
6. How often do your grades or school-work suffer because of the amount of time you spend online?						
7. How often do you check your e-mail before something else that						

you need to do?
8. How often does your job performance or productivity suffer because of the Internet?
9. How often do you become defensive or secretive when anyone asks you what you do online?
10. How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?
11. How often do you find yourself anticipating when you will go online again?
12. How often do you fear that life without the Internet would be boring, empty, and joyless?
13. How often do you snap, yell, or act annoyed if someone bothers you while you are on-line?
14. How often do you lose sleep due to late-night log-ins?
15. How often do you feel preoccupied with the Internet when on-line, or fantasize about being on-line?
16. How often do you find yourself saying "just a few more minutes" when online?
17. How often do you try to cut down (decrease) the amount of time you spend online and fail?
18. How often do you try to hide how long you've been on-line?
19. How often do you choose to spend more time on-line over going out with others?
20. How often do you feel depressed, moody, or nervous when you are online, which goes away once you are back on-line?

SECTION C. Family Atmosphere Scale
Instructions: Please read each question carefully and choose a response (✓) that best describes your situation

Questions	Strongly Agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
1. My childhood has been a happy one.					
2. I respect my parents.					
3. My parents fight a lot.					
4. I have a happy and close relationship with my mother					

| 5. My house is full of tensions and disagreements. |
| 6. I enjoy being around my family. |
| 7. I have a happy and close relationship with my father. |
| 8. My family listen and take notice of what I say. |
| 9. My parents rarely argue. |
| 10. Sometimes members of my family are physically violent to each other. |

SECTION D. How would you rate your family members' internet usage?
Instructions: Please choose a response (✓) that best describes the situation for each family member. Please answer each question with one response, unless otherwise indicated.

Family member	Non-user	Light Use	Moderate Use	Heavy Use	Not Applicable
Father					
Mother					
Brothers					
Sisters					

SECTION E. Further questions related to internet use

1.	Total number of brothers and sisters (from both your mother and your father's other wives)	Please state the total number:
2.	How many <u>sections</u> of Quran have you memorized?	a) <0.5 section c) 2-5 sections e) 11-29 sections b) 0.5- 1 section d) 6-10 sections f) All 30 sections
3.	How much time do you spend daily in screen activity (TV, smart phone, computer, video games etc.)?	(1) < 1 hour (4) 5-6 hours (2) 1-2 hours (5) 7-8 hours (3) 3-4 hours (6) >8 hours
4.	How much time do you spend daily in screen activity for <u>educational purposes</u> (studying from presentations, articles, electronic books, preparing presentations, and watching lectures)?	(1) < 1 hour (4) 5-6 hours (2) 1-2 hours (5) 7-8 hours (3) 3-4 hours (6) >8 hours
5.	How often have you had the following symptoms during the past 6 months? a) Headache e) Feeling low b) Abdominal pain f) Irritable/bad temper c) Backache g) Nervous d) Dizziness h) Sleeping Difficulties	(1) About every day (2) More than once a week (3) About every week (4) About every month and rarely or never
6.	How do you rate your physical activity?	(1) Very Inactive (3) Somewhat Active (2) Somewhat Inactive (4) Very Active

7. How addicted are you to internet?	(0) Not at all	(1) Not really	(2) Undecided	(3) Somewhat	(4) Very much

SECTION F. Patient Health Questionnaire (PHQ-9)
Instructions: Please read each question carefully and choose a response (✓) that best describes your situation

Over the last 2 weeks how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things				
2. Feeling down, depressed, or hopeless				
3. Troubles falling or staying asleep, or sleeping too much				
4. Feeling tired or having little energy				
5. Poor appetite or overeating				
6. Feeling bad about yourself or that you are a failure or have let yourself or your family down				
7. Troubles concentrating on things, such as reading a newspaper or watching television				
8. Moving or speaking so slowly that other people could have noticed. Or, the opposite being so fidgety or restless that you have been moving around a lot more then usual				
9. Thoughts that you would be better off dead, or of hurting yourself.				

SECTION G. Jenkins Sleep Scale
How often in the past month did you (please select one)?

Questions	Not at all	1-3 days	4-7 days	8-14 days	15-21 days	22-30 days
1- Have trouble falling asleep?						
2- Wake up several times per night?						
3- Have trouble staying asleep (including waking far too early)?						
4- Wake up after your usual amount of sleep feeling tired and worn out?						

Appendix B. Participants' characteristics, national survey of students (grades 7 to 12) across Saudi Arabia (January-March 2020)

Characteristics	Count	(%)
Number of participants	2321	(100%)
Grade		
1st year of middle school	314	(13.5%)

Characteristics	Count	(%)
2nd year of middle school	377	(16.2%)
3rd year of middle school	412	(17.8%)
1st year of high school	386	(16.6%)
2nd year of high school	337	(14.5%)
3rd year of high school	495	(21.3%)
Gender		
Boys	1058	(45.6%)
Girls	1263	(54.4%)
Nationality		
Saudi	1605	(69.2%)
Non-Saudi	716	(30.8%)
Socio-economic status		
Rich	437	(18.8%)
Upper-middle class	1511	(65.1%)
Lower-middle class	41	(1.8%)
Poor	332	(14.3%)
Number of siblings		
0	23	(1.0%)
1-4	730	(31.5%)
5-8	1145	(49.3%)
>8	423	(18.2%)
Academic performance		
Excellent (90-100%)	1171	(50.5%)
Very good (80-89%)	707	(30.5%)
Good (65%-79%)	380	(16.4%)
Fair (50-65%)	53	(2.3%)
Poor (<50%)	10	(0.4%)
Physical activity		
Very active	512	(22.1%)
Somewhat active	948	(40.8%)
Somewhat inactive	660	(28.4%)
Very inactive	201	(8.7%)
Diet		
Very healthy	260	(11.2%)

Characteristics	Count	(%)
Somewhat healthy	1298	(55.9%)
Somewhat unhealthy	631	(27.2%)
Very unhealthy	132	(5.7%)
Smoking		
No	2210	(95.2%)
Yes	111	(4.8%)

Peer-review history:
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