

Developing an Understanding of Adolescents' Knowledge, Attitudes, and Practices Toward COVID-19

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Abstract

Adolescents are more likely to engage in risky health practices related to COVID-19. Their compliance with infection control measures is a key factor to mitigate the spread of the disease. The purpose of this study was to explore the knowledge, attitudes, and practices toward COVID-19 and their correlates among Jordanian adolescents. An online cross-sectional survey was utilized. A total of 1,054 Jordanian adolescents aged 12–18 completed and returned the survey. Overall, Jordanian adolescents showed a good base of knowledge regarding COVID-19 (regardless of their demographic characteristics) and tended to hold positive attitudes toward the country's curfew and other protective measures. The majority of adolescents reported that television and social media were their main source of information on COVID-19, while few reported receiving such information from their schools. The majority reported practicing effective health protective behaviors to prevent the spread of COVID-19, which was significantly predicted by their knowledge and attitudes toward these measures. However, there was a relatively small, yet clinically significant, percentage of adolescents who showed poor knowledge on COVID-19, had negative attitudes toward protective measures, and reported being engaged in risky practices related to infection spread. Tailored efforts are needed to improve the levels of knowledge, attitudes, and practices among adolescents. Raising awareness and promoting positive attitudes are vital to change adolescents' health practices. Policy makers should ensure that school nurses are available in all schools and working to their full scope. School nurses are the eyes and ears of public health and primary care. They are essential members on pandemic preparedness, reopening and reentry planning teams, and can lead health care in schools and practice in a holistic culturally competent proactive manner to address the needs of students.

Keywords

adolescents, COVID-19, coronavirus, KAPs, Jordan, online survey, school nursing

Infectious diseases were responsible for the largest global burden of premature death and disability until the end of the 20th century. The development of safe, effective, and affordable vaccines and the increasing availability of antibiotics were key factors in their control and eradication. However, over the past 2 decades, a large family of different viruses called coronaviruses (CoVs) has evolved causing illness ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). These infectious diseases are responsible for a significant morbidity and mortality rates around the globe (Migault et al., 2019; Rothan & Byrareddy, 2020).

A novel CoV is now confirmed as the cause of an infectious disease that had not been previously detected before the outbreak reported in Wuhan, China, in December 2019. On February 11, 2020, the World Health Organization

(WHO, 2020a) announced an official name for this disease, COVID-19. The COVID-19 has so far infected millions of people, causing hundreds of thousands of deaths worldwide (European Center for Disease Prevention and Control, 2020) and the numbers are escalating.

Since the WHO affirmed COVID-19 as a pandemic, recommended outbreak infection control measures are being globally employed (Henry & Oliveira, 2020). Measures to prevent person-to-person transmission were widely implemented, including closing schools and colleges, staying at

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home, working and studying from home, stopping public transportation, terminating all social gathering, employing social distancing, wearing face masks, and strict handwashing and hygiene practices (Oosterhoff & Palmer, 2020). Additionally, global efforts emphasizing special precautions to protect vulnerable population such as elderly people, health care providers, and children were recommended (Rothan & Byrareddy, 2020). To date, no vaccine or antiviral treatment for COVID-19 has been officially approved. Therefore, maximizing compliance with recommended infection control measures is considered vital for slowing the spread of the virus (Oosterhoff & Palmer, 2020).

COVID-19 in Children and Adolescents

Available evidence shows that SARS-CoV and MERS-CoV are less common and severe among children. However, it is possible that true numbers of infected cases among children are underestimated or underreported, as children are frequently asymptomatic or have less severe symptoms, are usually well protected at home and have less exposure to the sources of infection transmission, and are often less tested (Dong et al., 2020; Zimmermann & Curtis, 2020). In general, most diagnosed infected children exhibit less severe signs and faster recovery when compared with adults, except for infants and preschoolers who are more subjected to severe illness of corona infection (Belluck, 2020; Zimmermann & Curtis, 2020).

Adolescents on the other hand are more likely to engage in risky health behaviors and possibly to risky practices related to COVID-19. In a study that investigated Chinese adolescents' knowledge, attitudes, and practices (KAPs) toward COVID-19 (Zhong et al., 2020), results affirmed that adolescents are more likely to engage in health risk behaviors. Further, a study conducted in Iran reported lower scores on knowledge and non-compliance with wearing masks in public places among Iranian adolescents (Erfani et al., 2020).

The public compliance to infection control measures is the key factor to mitigate the spread of the disease that is driven by individuals' KAPs toward COVID-19 (Zhong et al., 2020). Although adolescents are less likely to experience severe symptoms of COVID-19, they contribute to the spread of the virus (Oosterhoff & Palmer, 2020). Therefore, there is a need to explore their KAPs toward infection control measures.

Theoretical Framework

This study is guided by the health belief model (HBM), which is centered on the idea that individuals are most likely to take health-related act if they feel that by doing so they can avoid negative health consequences (Hazavehei et al., 2007). This model involves four dimensions: *perceived susceptibility* theorizing that the more an individual recognizes the risk of a disease, the more likely they will engage in behaviors to decrease that risk; *perceived severity* including some evaluation of the consequences of an illness based on

medical information and knowledge as well as some beliefs about the negative consequences of a certain behavior or disease that might occur for an individual; *perceived benefits* suggesting that individuals perceive the value and usefulness of adopting new behaviors in regard to minimizing the risk of an illness and will likely adopt new behaviors based on their perceptions of their benefits in reducing threats; and *perceived barriers* suggesting that the individuals evaluate the obstacles and difficulties they might encounter when adopting a new behavior (Hayden, 2013).

HBM has revealed success in encouraging persons to engage in preventive measures and adopt new behaviors to address varied health issues in many studies (Costa, 2020; De Bruin & Bennett, 2020). In the current study, the perceived susceptibility denotes adolescents' awareness regardless of their susceptibility to be infected with COVID-19. The perceived severity among the adolescents was their awareness about the consequences of being infected with COVID-19 based on their knowledge and attitudes regarding this infectious disease. The perceived benefits reflects their attentiveness about the value of engagement in protective and preventive measures to avoid being infected with COVID-19. Finally, the perceived barriers denotes adolescents' likelihood to avoid any actions related to misconception or incorrect information regarding COVID-19.

Study Context: The Case of Jordan

The first case of the novel CoV infection in Jordan was confirmed on March 2, 2020 (*The Jordan Times*, 2020b). On March 14, and following the detection of more COVID-19 cases, the Jordanian government implemented a total country lockdown, a national emergency law was declared, and a widespread screening and quarantine measures to reduce the spread of COVID-19 were implemented (Jordanian Ministry of Health, 2020).

The government also took extraordinary measures to mobilize their resources to meet the demands of their citizens for food supply, pharmaceutical drugs, and other necessities for living. Furthermore, it urged all government sectors to develop and employ a strategic plan to protect the lives of people and control the spread of the disease. The country, through its Crisis Center, which is headed by his Majesty King Abdallah II also started to evacuate its citizens from affected countries soon after the pandemic started. To promote social distancing measures, complete school closure was deployed, and education was shifted to be home-based distance learning. This step was among the first instituted in the country in an effort to reduce the virus transmission.

Although dealing with the virus worldwide has not been easy, Jordan received positive recognition internationally for the way they handled the ongoing pandemic despite of its limited fiscal resources and facilities. Jordan's government believes its success relies on mitigation measures related to

drastic lockdown, cooperation and compliance of people, and their knowledge and education about the COVID-19. Additionally, the Jordanian government believes winning the battle against the virus would be achieved by empowering the society with knowledge and unity.

Jordanian government relied heavily on promoting public awareness through its TV channels. There are about 49 TV channels broadcasting from Jordan owned by Jordanian and non-Jordanian corporations. Of these corporation is the Jordan Radio and Television Corporation (JRTV). It is a Jordan corporation broadcasting TV channel that is state-funded and offers public broadcasting services. It broadcast two general channels and one sport channel. One of these three channels is Al-Mamlaka that is the most channel viewed according to the poll carried out by The Center for Strategic Studies in Jordan. In March 14, 2020, JRTV allocated the sport channel to broadcasting school educational classes as response to school closures due to complete lockdown of the country during the COVID-19 crisis (*The Jordan Times*, 2020a). Accordingly, the Ministry of Health in collaboration with the Ministry of Information and the Crisis Center constructed a team that delivers daily televised press conferences for the purpose of updating the people about the ongoing pandemic, lockdown, and others instructions that people should follow to reduce the exposure to COVID-19. Additionally, the televised content was then uploaded and shared onto social media sites to recap instructions and guidance to the public.

Jordan has a population of about 10 million people. The country is disproportionately young with 35% of the population aged under 14, 61% aged 15–59, and only 4% aged 60 or above (Jordan Department of Statistics, 2019). Targeting the young population is therefore of particular importance in this country. The purpose of this study was to explore KAPs toward COVID-19 and their predictors among Jordanian adolescents. Findings would provide important information regarding adolescents' KAPs toward COVID-19. Such information may inform the decision on whether more efforts are needed to enhance adolescents' awareness regarding COVID-19, and whether attitudes and practices of this particular population are negative requiring more correction efforts. Adolescents have increased needs for pre-occupation with self and independence. Thus, studies like the current one that explore adolescents' attitudes regarding their engagement in social distancing and staying at home during COVID-19 pandemic are also needed to design effective strategies that can enhance their psychological, social, and mental well-being.

Method

Design

A cross-sectional, descriptive, and comparative design was used to explore the KAPs toward COVID-19 among

Jordanian adolescents. Data were collected using an online survey. This method was chosen as it was deemed most appropriate amid the COVID-19 crisis and curfew being imposed in Jordan. Institutional review board approval (#14/8/4/2020) was obtained from The University of Jordan School of Nursing.

Sampling and Sample Size

A convenience sample of Jordanian adolescents was recruited. To meet the study's overarching goal, we used the sample calculation method for prevalence survey with finite population correction. The following parameters were used (a) a precision rate of 3%, (b) a population size of 749,134, and (c) a 95% confidence interval. The calculated minimal sample size needed for the study was 1,044. It is documented that if the sample is selected correctly, the larger the sample, the closer the estimate of prevalence in the sample is likely to be to the true prevalence in the whole community from which the sample is drawn (Vaughan & Morrow, 1989). As such, our data collection procedure aimed to gain the largest sample size possible within the shortest period to ensure point prevalence.

Data Collection Procedure and Ethical Considerations

This study used Qualtrics (version 2019), a web-based online survey software, to create survey questions. The link that is generated for completing the survey, along with full description regarding the study's scope, procedures, risks, benefits, and participants' rights, was sent to schools' principals in all regions in the country (north, center, and south). School principals who approved the study were asked to send the study link to parents of adolescents aged 12–18 requiring them to ask their children to participate. The link included two parts, a consent form and the survey questions. An online consent form was developed, and parents of eligible adolescents were instructed to read the informed consent carefully and click on the button of agreement at the end of the consent form if they agree for their children to participate in the study. The consent form contained detailed description on the purpose of the study, its benefits, risks, and procedures. The consent indicated that adolescents' enrollment in the research project is completely voluntary and would not affect their status or rights by any means. Confidentiality was assured through designing the electronic survey with anonymity option in which no identifying information of the participants was included in the survey or would be identified by the e-survey software once it is completed. Completing the study survey was considered a tacit consent.

Measures

The study variables were measured using researcher-adapted questionnaire consisting of two parts related to adolescents' sociodemographics and KAPs toward COVID-19. We collected responses regarding adolescents' gender, age, school

grade, grade point average in the previous school year, type of school, region of residence, place of residency whether city or village, type of residence whether privately owned or rented and number of rooms, family monthly income, and the source of information about CoV COVID-19.

Adolescents' KAPs were measured using a questionnaire adapted from a study conducted in China to assess the KAPs of Chinese residents toward COVID-19 (Zhong et al., 2020), the KAPs questionnaire was modified by the study investigators based on the WHO (2020b) and Jordanian Ministry of Health guidelines (Jordanian Ministry of Health, 2020) regarding COVID-19. The items selected from the Zhong et al. (2020) KAPs questionnaire were translated and back translated to Arabic according to the WHO guidelines for translation (WHO, 2005). This process included forward translation from English to Arabic by one of the study investigators, who is a bilingual expert, followed by a panel of five experts reviewing the translated questionnaire for clarity and translation appropriateness. A blind back translation was conducted by another bilingual expert. Pretesting and cognitive interviewing of the translated instrument was conducted with 10 adolescents representing the study population to make sure that the questionnaire was clear and appropriate.

The other items were developed in Arabic, the official language in Jordan. The questionnaire had 15 questions related to knowledge about COVID-19: five regarding clinical presentations (K1–K5), five regarding transmission routes (K6–K10), and five regarding prevention and control (K11–K15). These questions were answered on a true/false basis with an additional “I don't know” option. A correct answer was assigned 1 point, and an incorrect/unknown answer was assigned 0 point. The total knowledge score ranged from 0 to 15, with a higher score denoting a better knowledge of COVID-19. Attitudes toward COVID-19 were measured by six questions that were answered on “agree,” “don't agree” basis with an additional “I don't know” option (A1–A6). A positive answer was assigned 1 point, and a negative/unknown answer was assigned 0 point. The total attitudes score ranged from 0 to 6, with a higher score denoting more positive attitudes. The assessment of respondents' practices was measured by 14 questions that were answered on always, sometimes, and never basis (P1–P14), with corresponding 2, 1, and 0 scores. The total score ranged from 0 to 28, with a higher score denoting better commitment with healthy practices.

Statistical Analysis

The Statistical Package for Social Sciences Version 24 was used for data entry and analysis. Descriptive statistics of frequencies, means, range, and standard deviations were calculated to describe subjects' demographics. Mean scores and standard deviation around the mean were calculated for the study variables (i.e., KAPs). Pearson's correlation and

independent-sample *t* tests were used to detect the relationship between study variables, and linear and hierarchal multiple regression analyses were used to explore correlates of adolescents' KAPs.

Results

Sample Characteristics

A total of 1,054 Jordanian adolescents (71% females) aged 12–18 completed and returned the online survey. The majority were residing in the central region of the country (72%, $n = 755$), had a family monthly income of less than 1,000 JD (US\$ 1,410) (68%, $n = 713$), had a very good to excellent GPA (65%, $n = 687$), and were enrolled in public schools (63%, $n = 661$). When asked about their source of information regarding COVID-19, the majority of adolescents reported that TV (78%, $n = 822$) was their main source, followed by social media (63%, $n = 670$). Few reported receiving their information on COVID-19 from their schools (10%, $n = 106$; see Table 1).

KAPs Toward COVID-19

Overall, Jordanian adolescents showed a good base of knowledge regarding COVID-19. The mean knowledge score was 11 out of 15 ($SD = 2$), ranging from 0 to 15. They also tended to hold positive attitudes toward the country's curfew and other protective measures. The mean attitudes score was 5 ($SD = 1$), ranging from 0 to 6. The majority reported committing to healthy practices. The mean score on the practices scale was 23 ($SD = 4$), ranging from 0 to 28. However, there was a relatively small, yet clinically significant, percentage of adolescents who showed poor knowledge on COVID-19, had negative attitudes toward protective measures, and reported being engaged in risky practices. To make the KAPs scales comparable, standardized mean scores (out of 100) were calculated. The results were 73, 83, and 82 for the KAPs scales, respectively. Using an independent-sample *t* test, the results showed significant gender differences in practices, $t(1,052) = -4.2$, $p < .001$, with females scoring higher than their male counterparts. No significant gender differences were found on the knowledge and attitudes scales ($p > .05$). Using a Pearson's correlation analysis, the results showed a significant relationship between age and practices, with older adolescents tending to be more engaged in risky practices ($p < .001$). Table 2 describes the KAPs scales. Individual item responses are presented in Tables 3a–c.

Predictors of Adolescents' Knowledge on COVID-19

Multiple linear regression analysis was run to determine predictors of adolescents' knowledge on COVID-19 pandemic. Knowledge total score was entered as an outcome variable, whereas adolescents' gender, age, and region of residence were entered as potential predictors. The results revealed that

Table 1. Sample Characteristics.

Characteristic	Subgroups	n	%
Gender	Female	749	71.0
	Male	305	29.0
Age in years	12	97	9.0
	13	100	10.0
	14	166	16.0
	15	188	18.0
	16	172	16.0
	17	162	15.0
	18	169	16.0
Region of residence	North	193	18.0
	Center	755	72.0
	South	106	10.0
Place of residency	City	905	86.0
	Village	149	14.0
Type of residence	Owned	250	24.0
	Rented	804	76.0
Number of rooms	One	393	37.0
	Two	558	53.0
	Three	5	1.0
	Four or more	98	9.0
Family monthly income	Less than 300 JD	126	12.0
	301–500 JD	292	28.0
	501–700 JD	131	12.0
	701–1,000 JD	164	16.0
	1,001–1,500	212	20.0
Grade	More than 1,500 JD	129	12.0
	7th	168	16.0
	8th	154	15.0
	9th	179	17.0
	10th	209	20.0
	11th	175	16.0
GPA	12th	169	16.0
	Less than 50	9	1.0
	50–60	77	7.0
	61–70	101	10.0
	71–80	180	17.0
	81–90	278	26.0
Type of school	91–100	409	39.0
	Governmental	661	63.0
	Private	339	32.0
	UNRWA	54	5.0
Source of information about coronavirus COVID-19 ^a	Television	822	78%
	Newspapers	28	3%
	Radio	65	6%
	Ministry of Health website	290	28%
	Social media	670	63%
	Family	461	44%
	Friends	221	21%
	School	106	10%

Note. $N = 1,054$. GPA = grade point average; UNRWA = The United Nations Relief and Works Agency for Palestine Refugees.

^aParticipants could choose more than one answer.

overall, the model was not able to predict significant proportion of adolescents' knowledge on COVID-19, $F(3, 1050) = .57, p = .63, \Delta R^2 = -.001$). Further, adolescents' gender, age,

Table 2. Descriptive Statistics and Reliability of Study Scales.

Scale	No.				Cronbach's α
	Items	Mean	Median	Range	
Knowledge Scale	15	11	11	0–15	.61
Attitudes Scale	6	5	6	0–6	.64
Practices Scale	14	23	23	0–28	.81

and region of residence “alone” were not significant predictors. Table 4 shows the model fit.

Predictors of Adolescents' Attitudes Toward COVID-19

Hierarchical multiple regression analysis was run to determine whether adolescents' knowledge on COVID-19 could predict their attitudes toward the country's curfew and other protective measures, above and beyond their gender, age, and region of residence. The results revealed that the first model (containing adolescents' gender, age, and region of residence) did not significantly predict adolescents' attitudes, $F(3, 1050) = .32, p = .81, \Delta R^2 = -.002$). However, the second model showed that adolescents' knowledge on COVID-19 significantly predicts their attitudes toward related measures, $F(4, 1049) = 28.104, p < .001, \Delta R^2 = .12$). Almost 12% of the variability in adolescents' attitudes could be explained by their knowledge level. Table 5 shows the model fit.

Predictors of Adolescents' Practices Toward COVID-19

Hierarchical multiple regression analysis was run to determine whether adolescents' attitudes toward COVID-19 protective measures could predict their health practices, above and beyond their gender, age, region of residence, and knowledge on COVID-19 pandemic. The results revealed that the first model (containing adolescents' gender, age, region of residence, and knowledge) could significantly predict adolescents' practices, $F(4, 1049) = 28.733, p = .001, \Delta R^2 = .11$. The second model showed that adolescents' attitudes toward COVID-19 protective measures significantly predict their related health practices, $F(5, 1048) = 37.583, p < .001, \Delta R^2 = .15$. Almost 15% of the variability in adolescents' health practices could be explained by their attitudes. It should also be noted that gender and age “alone” could also significantly predict health practices ($p < .001$), with females and younger adolescents tending to abide more to healthy practices related to COVID-19. Table 6 shows the model fit.

Discussion

This study was conducted in the early stages of COVID-19 pandemic in Jordan to assess adolescents' KAPs toward the disease. To our knowledge, this is the first study in the Arab region to address this issue. In the next sections, we discuss the main findings related to adolescents' KAPs on COVID-19 and their predictors.

Table 3a. Adolescents' Knowledge on COVID-19.

Item	True	False	I Don't Know
K1. The main symptoms of coronavirus (COVID-19) are high temperature/fever, fatigue, dry cough, and muscle pain/myalgia.	977 (93%)	37 (3%)	40 (4%)
K2. Complications of coronavirus (COVID-19) include pneumonia, acute pneumonia syndrome, kidney failure, and even death.	867 (82%)	67 (6%)	120 (12%)
K3. Unlike common cold, stuffy nose, runny nose, and sneezing are less common in persons infected with the coronavirus COVID-19.	583 (55%)	203 (19%)	268 (25%)
K4. There is currently no effective cure for coronavirus COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	942 (89%)	33 (3%)	79 (8%)
K5. Not all persons with coronavirus COVID-19 will develop to severe cases. Only those who are elderly, and have chronic illnesses, are more likely to be severe cases.	761 (72%)	211 (20%)	82 (8%)
K6. Eating or contacting wild animal meat will result in infection by the coronavirus (COVID-19).	423 (40%)	349 (33%)	282 (27%)
K7. The coronavirus COVID-19 spreads via respiratory droplets of infected individuals through coughing and sneezing.	945 (90%)	71 (7%)	83 (3%)
K8. Persons with coronavirus COVID-19 cannot transmit the virus to others when they don't have fever.	133 (13%)	807 (77%)	114 (10%)
K9. Coronavirus COVID-19 is transmitted indirectly by touching surfaces and devices contaminated with the secretions of the patient and then by touching the mouth, nose, or eye.	982 (94%)	36 (3%)	36 (3%)
K10. Coronavirus COVID-19 is transmitted through contact with patients with the disease.	1,009 (96%)	22 (2%)	23 (2%)
K11. Ordinary people can wear general medical masks to prevent the infection by the coronavirus COVID-19.	846 (80%)	152 (14%)	56 (6%)
K12. It is not necessary for children and young adults to take measures to prevent the infection by the coronavirus COVID-19 virus.	53 (5%)	964 (92%)	73 (3%)
K13. To prevent the infection by coronavirus COVID-19, individuals should avoid going to crowded places such as malls, markets, parties, and avoid using public transportation.	1,012 (96%)	22 (2%)	20 (2%)
K14. Isolation and treatment of people who are infected with the coronavirus COVID-19 are effective ways to reduce the spread of the virus.	1,022 (97%)	12 (1%)	20 (2%)
K15. People who have contact with someone infected with the coronavirus COVID-19 should be immediately isolated in a proper place. In general, the observation period is 14 days at least.	1,016 (96%)	15 (1%)	23 (3%)

Table 3b. Adolescents' Attitudes Toward COVID-19.

Item	Agree	Disagree	I Don't Know
A1. Do you agree with the Jordanian Government's arrangements to close the borders to protect people in Jordan from coronavirus COVID-19?	1,012 (97%)	17 (1%)	25 (2%)
A2. Do you agree with the Jordanian Government's decision to close schools and universities and using online teaching and education to protect people in Jordan from coronavirus COVID-19?	987 (94%)	14 (1%)	56 (5%)
A3. Do you agree with the Jordanian Government's decision related to the closing of all public and private institutions in Jordan to protect against coronavirus COVID-19?	883 (84%)	67 (6%)	104 (10%)
A4. Do you agree to only allow people/citizens to not leave home except in extreme circumstances for the purpose of protection against coronavirus COVID-19?	991 (94%)	7 (1%)	56 (5%)
A5. Do you agree that coronavirus COVID-19 will finally be successfully controlled?	916 (87%)	97 (9%)	41 (4%)
A6. Do you have confidence that Jordan can win the battle against the coronavirus COVID-19?	956 (91%)	83 (8%)	15 (1%)

Adolescents' Knowledge on COVID-19 and Its Predictors

Overall, adolescents showed a good base of knowledge regarding COVID-19. In line with these findings came other national studies on Jordanian university students (Alzoubi et al., 2020) and dentists (Khader et al., 2020) are showing a good level of knowledge regarding COVID-19. The effort of the Jordanian government in educating its people regarding the COVID-19 seemed to

be effective. This study revealed that the majority of adolescents were knowledgeable about the virus, its mode of transmission, main symptoms, treatment, complications, and preventive measures. However, there seemed to be a knowledge deficit related to some issues, particularly transmission of CoV from asymptomatic carriers and the necessity of following preventive measure among children and adult. This result is congruent with a study conducted on adult participants from Jordan, Saudi

Table 3c. Adolescents' Practices Toward COVID-19.

Item	Always	Sometimes	Never
P1. I clean my hands with soap and water for 20 s regularly and thoroughly.	767 (73%)	270 (26%)	17 (1%)
P2. I cover my mouth and nose with a tissue or and if tissue is not available I bent my elbow when I cough or sneeze.	909 (87%)	131 (12%)	14 (1%)
P3. I dispose the used tissue immediately and discard safely in the trash can.	959 (91%)	89 (8.4%)	6 (0.6%)
P4. I avoid contact with anyone with symptoms similar to cold or flu, and keep at least 1 m between us.	898 (85%)	141 (13%)	15 (1%)
P5. I avoid touching my eyes, nose, and/or mouth after touching surfaces without making sure they are clean.	734 (70%)	280 (27%)	40 (3%)
P6. I do eat healthy foods rich in vitamin C.	563 (53%)	467 (44%)	24 (3%)
P7. I wash fruits, vegetables, and all foods before eating them, as well as when purchasing them.	984 (93.4%)	64 (6%)	6 (0.6%)
P8. I dispose the bags that was used in purchasing the food and supplies from outside, and I handle it in a way that prevents the spreading of the virus.	768 (73%)	229 (22%)	57 (5%)
P9. I go to crowded places and gatherings.	41 (4%)	141 (13%)	872 (83%)
P10. I wear a mask when leaving home and I change it if it becomes contaminated.	651 (62%)	280 (26%)	123 (12%)
P11. I wear gloves when leaving home and change them in the event of contamination.	704 (67%)	224 (21%)	126 (12%)
P12. When I return from outside, I take off my clothes that I have worn and put them away from other clothes to be washed alone.	642 (61%)	305 (29%)	107 (10%)
P13. I adhere to the instructions approved by the Jordanian government in terms of not leaving home during the past period and currently.	961 (91%)	82 (8%)	11 (1%)
P14. When I return from outside, I remove my shoes outside the house to protect the house from contamination.	890 (85%)	129 (12%)	35 (3%)

Note. $N = 1,054$.

Table 4. Predictors of Adolescents' Knowledge on COVID-19.

Predictor	df	SE	t Value	B	b	p Value
Gender	3	.120	1.04	.125	.032	.296
Age	3	.029	-1.190	-.006	-.006	.850
Region of residence	3	.104	1.024	.081	.024	.436
R^2					.002	
rR^2					-.001	
F					.567	

Note. $N = 1,054$. df = level of freedom; SE = standard error; B = regression coefficient; b = standardized β .

Arabia, and Kuwait, which also revealed low knowledge scores related to disease transmission (Naser et al., 2020). Therefore, raising public awareness on the risk of disease transmission by asymptomatic carriers and the importance of compliance to protective measures in public places are important.

It is worth noting that the majority of the adolescents in this study received their information regarding COVID-19 from TV and social media. A web-based survey study conducted on Italian secondary schoolers reported that the first source of information was also TV followed by Facebook and other forms of social media. Although it is suggested that TV might be the best outlet for gathering health information (Singh & Ratnamala, 2018), several studies reported that social media plays an important part in adolescents' engagements with health information related to CoV (Abdelhafiz et al., 2020; Medani et al., 2018; Wong et al., 2014). Our results highlight the need to utilize the TV and

social media as powerful, influential, and fast approaches to reach adolescents, spread factual information, and tackle myths and misinformation. We recommend the government to target Jordanians through the governmental TV broadcasting channels disseminating information blitz emphasizing the importance and instructions on social distance, handwashing, and wearing a mask in public places attracting the attention of adolescents.

Our results also showed that almost 44% of the adolescents received information regarding CoV from their family members, which emphasize the importance of involving parents and family members in health education. On the other hand, it is important to highlight the result that only 10% of the adolescents reported that they receive their information on COVID-19 from their schools. This suggests a missed role for schools in this major health emergency. While it is possible that unprecedented closure of schools in the country had limited their roles in this regard, schools resumed classes via online outlets. It seems their focus was on the curriculum with less attention to promoting students' awareness regarding the pandemic.

The study results related to the predictors of adolescents' knowledge on COVID-19 showed that adolescents' gender, age, and region of residence were not significant predictors of knowledge on COVID-19 among Jordanian adolescents. These results were not surprising as the Jordanian Government is keen to protect the health of all Jordanians and had strict laws to fight the pandemic. In the only study conducted on high school students aged 14–19, results showed that females have a slightly better

Table 5. Predictors of Adolescents' Attitudes Toward COVID-19 Protective Measures.

Regression Model	Predictor	df	SE	t Value	B	b	p Value
Model 1	Gender	3	.065	0.752	.049	.023	.452
	Age	3	.016	0.472	.007	.015	.637
	Region of residence	3	.056	-0.338	-.019	-.011	.735
	$R^2 = .001, rR^2 = -.002, F = .320$						
Model 2	Gender	4	.061	0.451	.028	.013	.652
	Age	4	.015	0.557	.008	.017	.577
	Region of residence	4	.053	-0.609	-.033	-.018	.543
	Knowledge	4	.016	10.552	.167	.310	.000**
	$R^2 = .097, rR^2 = .120, F = 28.104$						

Note. $N = 1,054$. df = level of freedom; SE = standard error; B = regression coefficient; b = standardized β .

* $p < .05$. ** $p < .01$.

Table 6. Predictors of Adolescents' Health Practices Related to COVID-19.

Regression Model	Predictor	df	SE	t Value	B	b	p Value
Model 1	Gender	4	.243	4.140	1.008	.122	.000**
	Age	4	.060	-4.590	-0.274	-.136	.000**
	Region of residence	4	.211	0.751	0.159	.022	.453
	Knowledge	4	.063	8.420	0.529	.247	.000**
	$R^2 = .099, rR^2 = .110, F = 28.733$						
Model 2	Gender	5	.236	4.153	0.981	.118	.000**
	Age	5	.058	-4.869	-0.282	-.140	.000**
	Region of residence	5	.205	0.926	0.190	.027	.354
	Knowledge	5	.064	5.735	0.368	.172	.000**
	Attitudes	5	.119	8.116	0.963	.243	.000**
	$R^2 = .162, rR^2 = .148, F = 37.583$						

Note. $N = 1,054$. df = level of freedom; SE = standard error; B = regression coefficient; b = standardized β .

* $p < .05$. ** $p < .01$.

understanding of clinical presentation of COVID-19 than their male counterparts (Dilucca & Souli, 2020). With no sufficient similar studies on adolescent populations, we compared our findings to the adult literature and found ours consistent with many studies that also found no significant difference in knowledge scores based on participants' demographic variables (Abdelhafiz et al., 2020; Hussain et al., 2020; Naser et al., 2020; Salman et al., 2020). However, several other studies revealed better knowledge scores among females compared to their male counterparts (Azlan et al., 2020; Byanaku & Ibrahim, 2020; Mohamad et al., 2020; Wadood et al., 2020; Zhong et al., 2020). Our results also contradict another study findings which found that knowledge level was higher among participants living in the central region of Malaysia than participants living in other regions (Azlan et al., 2020).

Adolescents' Attitudes Toward the Preventive Measures of COVID-19 and Their Predictors

The current study explored adolescents' attitude toward COVID-19 through asking questions in relation to their

satisfaction about the Jordanian government's actions, instructions, and strategies in handling the pandemic. The results revealed that the majority of participants were satisfied with the actions and strategies that the Jordanian government adopted to control the spreading of the virus. Moreover, participants were confident that Jordan will win the battle against this virus. This could be related to the early protective measures that were deployed by the Jordanian government as well as the transparent approach in sharing and reporting the latest details and updates regarding the ongoing pandemic situation. Findings from some unofficial surveys reported that Jordanians feel more reconciled with the government and trust their measures in handling the situation. As of August 7, 2020, the total number of COVID-19 cases in Jordan reached 1,231, number of recovered cases was 1,160, number of cases under treatment was 45, and number of deaths was 11, with overall very limited number of new cases (Jordanian Ministry of Health, 2020).

With regard to attitudes' predictors, the results reflected that attitudes did not vary significantly according to adolescents' gender, age, and region of residence. However,

knowledge on COVID-19 could predict adolescents' attitudes toward the country's curfew and other protective measures, above and beyond their demographic characteristics, which highlight the importance of building a solid knowledge base if to change individuals' attitudes.

Adolescents' Practices Toward COVID-19 and Their Predictors

As they form nearly half of Jordanian general population, adolescents' behavior is likely to have an important impact on the COVID-19 pandemic situation. This study is conducted when the country was under total lockdown to prevent the spread of the pandemic. The findings of the study showed that adolescents have fairly good health practices and assume precautions to prevent being infected with COVID-19. It also showed that the majority of adolescents were compliant to the Jordanian government quarantine measures. A study from Bangladesh showed lower percentages of students who agreed to obey the quarantine law by the government during COVID-19 pandemic (Wadood et al., 2020).

Adolescents in the current study reported positive personal hygiene and disinfecting behaviors such as covering mouth and nose with tissue when coughing or sneezing or bending their elbow if tissue not available. In addition, the majority of them dispose and discard tissue safely immediately after use. Similar findings were reported by all students of secondary schools in Italy (Dilucca & Souli, 2020) and by the majority of a sample from UK and the U.S. general public (Geldsetzer, 2020). Other main positive practice by adolescents of the current study was maintaining adequate social distancing. The majority (85%) avoided contact with anyone with symptoms similar to cold or flu, kept at least 1 m away, and avoided crowded places and social gatherings. Similar findings were reported by adult participants from Jordan, Kuwait, and Saudi Arabia (Naser et al., 2020), China (Zhong et al., 2020), Malaysia (Mohamad et al., 2020), UK and United States (Geldsetzer, 2020).

On the other hand, some important infection preventive practices were not effectively applied by the adolescents of the current study. For example, nearly 40% of adolescents' responses regarding strict handwashing practice ranged from "sometimes" to "never." Unwashed contaminated hands increase the risk of COVID-19 infection transmission when coming into contact with mouths, noses, or eyes (Centers for Disease Control and Prevention, 2020). Accordingly, raising the awareness of adolescents regarding the importance of compliance with strict handwashing to prevent the spread of COVID-19 infection is needed. Other results from this study also showed that nearly 40% of adolescents' responses regarding wearing mask when leaving home ranged from sometimes to never. Interestingly, another Jordanian study on medical and nonmedical university students showed that almost 30% believed that mask wearing might not prevent the spread of CoV (Alzoubi et al., 2020). Apparently,

accurate information related to masks use and misuse is needed. Our study also showed that adolescents often poorly implement protective practices when returning home. During the pandemic, nearly, 30%–40% of adolescents almost never took off their outdoor clothes or separated these clothes from other clothes or discarded shopping bags appropriately.

Interestingly, nearly half of adolescents of the current study reported they eat food that is rich in vitamin C and believe it boosts their immunity against coronavirus. However, there is no proof that vitamin C may protect from coronavirus infection (Shoemaker, 2020). Since the global pandemic of COVID-19, the related studies reported conflicting beliefs of the public regarding the associations between the types of food and the protection from COVID-19 infection, requiring health care providers' efforts in raising awareness regarding relevant facts.

As expected and in line with the study's theoretical framework, findings support that adolescents' knowledge and positive attitudes toward COVID-19 protective measures predict healthier practices. This result is congruent with the findings of another study which found that adolescents who have greater awareness and positive attitudes regarding COVID-19 precautions had better compliance with infection control measures (Oosterhoff et al., 2020). Gender and age "alone" could significantly predict health practices, with females and younger adolescents tending to abide more to healthy practices related to COVID-19. Previous studies have also shown that females are more likely to follow recommended behavioral practices during pandemics such as handwashing and other measures to prevent disease transmission (Erfani et al., 2020; Salman et al., 2020; Wadood et al., 2020). Older adolescents are often more prone to commit risky behaviors and break applied rules (Tymula et al., 2012), this as well require added efforts to protect their health.

Implications for School Nursing

School nurses are the eyes and ears of public health and primary care. They are essential members on pandemic preparedness, reopening and reentry planning teams, and are on the front lines of exposure to students who are sick or who are asymptomatic but infectious. School nurses had an added advantage as health care professionals; they are specialists in public health and can lead health care in schools and practice in a holistic manner to address the needs of students. Furthermore, school nurses are trained to deliver culturally competent proactive school health services for diverse student populations (The National Association of School Nurses [NASN], 2020a).

School nurses can undertake several critical activities to support student health in health crises such as the COVID-19 pandemic. The American National Association of School Nurses conducted a survey in April 2020 to learn what key activities school nurses were providing during the COVID-

19 crisis (NASN, 2020b). School nurses ($N = 4,788$) from all 50 states and the District of Columbia participated. The results revealed that school nurses had significantly supported the health of students at several levels including *student outreach* (e.g., assisting with delivering medication and food to students), *health resource* (e.g., answering phone calls from parents and community, virtual office hours and support groups, screening of staff or others coming to school), *education* (e.g., educating staff on COVID-19 infection control measures, disseminating updates from local health departments, educating community on COVID-19), *chronic condition management* (e.g., assisting students to manage chronic conditions), and *policies and plans updates* (e.g., updating/developing school health policies updating/developing plan to return to school). Their advanced technology skills and experience of working with children and their families through remote methods has stood them in good stead and is proving invaluable in times of such uncertainty.

The reopening of schools after a pandemic is uncharted territory for many. School nurses can significantly aid this process as they have the right knowledge and experience to help students transition successfully and thrive. School nurses can also assess students' performance after the transition and stay mindful of how students are adjusting (Rosário, 2020). Another arena where school nurses can have a unique input is with children and families in vulnerable situations, with no access to digital technologies, struggling to cope with different transitions (Armitage & Nellums, 2020). Nurses have a great responsibility in tapping into and signposting these families and be the first support for their needs through coordination with local/community health units.

School nurses around the globe have proven that they can and are rising to the challenge of COVID-19, building on their resilience, adaptability, willingness, and unique understanding and relationships they have with children and families (White, 2020). Unfortunately, the school nurse is a missed opportunity in the Arab region in general and Jordan in particular (Dardas et al., 2017). Policy makers in Jordan should ensure that school nurses are available in all schools and working to their full scope. At present, school nursing is very limited in some schools and totally absent in many others.

Finally, through COVID-19 health crisis and even after it is over, full recognition should be given to the inherent stresses and emotional strain that school nurses bear on behalf of schools. Ongoing support for nurses' psychological and mental health should be ensured (Maben & Bridges, 2020).

Limitations

Findings from this study need to be considered within the context of their limitation. The cross-sectional descriptive design of this study may limit the explanation of the causal

relationship between the variables. Although online surveys offer many advantages over traditional surveys, reliability of the opinion expressed by the participant is an issue as there is no guarantee of accuracy. Self-selection bias is another limitation of online survey research.

Conclusion

Adolescents represent one third of the Jordanian population and in a pandemic such as the COVID-19, KAPs of this population can affect the future spread of the disease. This study showed that Jordanian adolescents generally demonstrate good knowledge about COVID-19 and the required protective measures. Most adolescents were optimistic regarding the government's ability to contain the spread of the disease through the strict rules and protective measures enforced nationwide. The majority reported practicing effective health protective behaviors to prevent the spread of COVID-19 virus, which was significantly affected by their knowledge and attitudes toward these measures. While the results seemed to be generally promising, more tailored efforts are still needed to improve the levels of KAPs among this vulnerable population. Adolescents can be an important resource in mitigating risks and in community outreach during the COVID-19 crisis. Therefore, schools need to be more involved in providing health education for adolescents with more emphasis on the health protective behaviors, particularly among male and older adolescents. School nurses can align and coordinate school health services to manage, prevent, and/or reduce health issues and define a new way of working to offer optimum safeguarding for children and families.

Author Contributions

All authors met the ICMJE criteria for authorship, which includes substantial contributions to the conception or design of the work; the acquisition, analysis, and interpretation of data for the work; and drafting the work and revising it critically for important intellectual content; and final approval of the version to be published; and agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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