

Original Article

Health literacy and risk of viral hepatitis among Chinese school children

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Abstract

Introduction: Poor literacy is associated with hepatitis morbidity and mortality. Adolescents are especially at risk of hepatitis C. This study investigated viral hepatitis literacy, risk, and influencing factors among Chinese middle and high school students.

Methodology: A supervised self-administered survey was conducted with school children from six schools in Shantou, China. Data on demographics, health literacy, and risk of viral hepatitis were analyzed.

Results: A total of 1732 students (from three middle and three high schools) participated in the study. Their major information resources were the internet (39.5%, 685/1732), television (28.8%, 498/1732), family (27.7%, 479/1732), and school (21.2%, 368/1732). The mean literacy score on the manifestations and risk factors of hepatitis was 3.4 ± 2.2 and 4.0 ± 2.3 (out of 8), respectively. Multiple linear regression models showed being female and in high school, having parents with higher education levels, and school or clinicians as an information resource were independent positive predictors, whereas poor awareness of risk factors was a negative predictor for health literacy.

Conclusions: We report the risk of hepatitis among Chinese middle and high school students due to limited literacy and poor attitudes towards health-risk behaviors. Health education in school is recommended for preventable health risks among Chinese adolescents.

Key words: hepatitis; health literacy; school; education; adolescent.

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Introduction

Viral hepatitis is a major global health problem. According to the 2017 Global Hepatitis Report of the World Health Organization (WHO), 325 million people are estimated to be living with hepatitis infection [1]. Among the several types of hepatitis, hepatitis B and C are responsible for the majority of hepatitis-related mortality, accounting for 887,000 deaths out of 257 million people affected with chronic hepatitis B infection in 2015 and 399,000 deaths out of 71 million people affected with chronic hepatitis C virus infection in 2016. The mortality is mostly due to the complications of hepatitis such as cirrhosis and hepatocellular carcinoma [2].

Viral hepatitis is the most prevalent infectious disease in China. In 2018, there were 86 million hepatitis B virus (HBV) and 10 million hepatitis C virus (HCV) infections [3], which accounted for more than 90% of the hepatitis cases in China [4]. Hepatitis viruses can be transmitted to the mucosa and non-intact skin through contaminated foods, drinks, objects, and

bodily fluids [5]. There are many recognized risk factors of hepatitis, among which sexual contact and sharing equipment of recreational drugs or personal items with an infected person, body piercing, and receiving tattoos in unregulated settings are particularly associated with the increasing prevalence of hepatitis C among adolescents [6]. For example, HBV incidence among Chinese adolescents in 2016 was 1.11/100,000 [7]. Considering serious and long-term consequences, the prevention of viral hepatitis in the youth population deserves high priority on the national and global health agenda.

Prevention of hepatitis with vaccines is a simple, safe, and effective approach, but it applies only to hepatitis A and B. Therefore, avoiding known risk factors and risk behaviors are the only and most pragmatic ways to prevent hepatitis in general. Risk avoidance is impossible without awareness of risk factors, risk behaviors, and consequences; therefore, health literacy, specifically hepatitis literacy, should play an important role in hepatitis prevention.

According to one nationwide survey, the health literacy rate among Chinese citizens was only 14.18% in 2017 [8]. Although health literacy has long been recognized as an integral part of health promotion [9,10], there are only a few studies on hepatitis health literacy [11,12], and relevant information on Chinese school children is not available.

The purpose of this study was to investigate viral hepatitis literacy, risk, and influencing factors among Chinese middle and high school students.

Methodology

Study design and population

A cross-sectional self-administered questionnaire survey with high school and middle school students was conducted during 2018-2019. We present this study following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [13].

Ethics approval

This study was approved by the Ethics Committee of Shantou University Medical College (SUMC-2017-38). Since the study was a part of the school health education activity, for which the parents/legal guardians had consented to participate on behalf of their children, only written informed consent from the school heads was obtained.

Study sites

The middle and high schools in Shantou city, Guangdong, China were invited to participate in our study, and six schools (three middle and three high schools) agreed to participate.

Survey instrument

The survey instrument was self-developed based on related literature on the websites of the United States Centers for Disease Control and Prevention (US-CDC), WHO, and the Chinese Centers for Disease Control and Prevention (China-CDC). A total of twelve questions were used to assess participants' demographic information, their attitude toward high-risk behaviors, and viral hepatitis literacy including the manifestations, transmission, prevention, misconceptions, risk behaviors, and risk attitudes about viral hepatitis (see the questionnaire in Supplementary Table 1). The content and construct of the survey instrument were validated by two experts before pilot testing with a group of middle school student volunteers (n = 20) for usability in the study population and technical functionality. The internal consistency (reliability) of the questionnaire measured by Cronbach's α was 0.79.

Survey administration

A supervised written survey was administered to the students by the school teachers during school break times. The teachers in charge provided a brief introduction about the survey to their classes before the survey. Students completed the survey without consulting others or searching for the answers online. Completed questionnaires were collected by the teachers. The study staff manually transferred the data into a database and cross-checked it before analysis.

Data analysis

Data were analyzed using SPSS version 19 (SPSS, Chicago, USA). Associations between categorical variables were analyzed by the Chi square test, normally distributed continuous variables by the t test,

Table 1. Background of study participants.

	All (N = 1732)	Middle School			High School			
		Total n = 612	Grade 1 n = 213	Grade 2 n = 274	Grade 3 n = 125	Total n = 1120	Grade 4 n = 839	Grade 5 n = 281
Age (year), mean (SD)	15.8 ± 1.3	14.4 ± 1.0	13.6 ± 0.8	14.6 ± 0.8	15.4 ± 0.7	16.5 ± 0.8	16. ± 0.8	17.0 ± 0.7
Gender								
Male	844 (48.7)	322 (52.6)	118 (55.4)	142 (51.8)	62 (49.6)	522 (46.6)	404 (48.2)	118 (42.0)
Female	886 (51.2)	288 (47.1)	95 (44.6)	130 (47.4)	63 (50.4)	598 (53.4)	435 (51.8)	163 (58.0)
Missing data	2 (0.1)	2 (0.3)	0 (0)	2 (0.7)	0 (0)	0 (0)	0 (0)	0 (0)
Parental Education[#]								
No formal education	2 (0.1)	0 (0)	0 (0)	0 (0)	0 (0)	2 (0.1)	2 (0.2)	0 (0)
Primary school	109 (6.3)	54 (8.8)	16 (7.5)	25 (9.1)	13 (10.4)	55 (4.9)	30 (3.6)	25 (8.9)
Middle school	713 (41.2)	333 (54.4)	126 (59.1)	133 (48.5)	74 (59.2)	380 (33.9)	248 (29.5)	132 (47.0)
Technical secondary/high school	467 (27.0)	139 (22.7)	47 (22.1)	63 (23.0)	29 (23.2)	328 (29.3)	248 (29.6)	80 (28.4)
Undergraduate/Junior college	291 (16.8)	37(6.0)	11 (5.2)	25 (9.1)	1 (0.8)	254 (22.7)	229 (27.3)	25 (8.9)
Postgraduate	22 (1.3)	6 (0.1)	2 (1.0)	2 (0.7)	2 (1.6)	16 (1.4)	13 (1.5)	3 (1.1)
Missing data	128 (7.4)	43 (7.0)	11 (5.2)	26 (9.5)	6 (4.8)	85 (7.6)	69 (8.2)	16 (5.7)
Parental Occupation[#]								
Healthcare workers (HCWs)	24 (1.4)	9 (1.5)	3 (1.4)	5 (1.8)	1 (0.8)	15 (1.3)	8 (1.0)	7 (2.5)
Non-HCWs	1413 (81.6)	500 (81.7)	194 (91.1)	203 (74.1)	103 (82.4)	913 (81.5)	681 (81.2)	232 (82.6)
Missing data	295 (17.0)	103 (16.8)	16 (7.5)	66 (24.1)	21 (16.8)	192 (17.1)	150 (17.9)	42 (14.9)

Data shown as n (%). [#] Education or occupation of at least one parent.

and non-normally distributed data by the Mann-Whitney U test. Multiple linear regression models were used to investigate the relationships among the variables. All statistical tests were two-tailed. *p* value < 0.05 was considered statistically significant. The level of viral hepatitis literacy was scored separately for the manifestations and risk factors and presented as mean ± standard deviation, SD.

Results

Characteristics of participants

A total of 1732 students from grades 1 to 5 (612 from middle schools and 1120 from high schools) participated in the study. The male-to-female ratio was 1.1:1 (322:288) in the middle schools and 0.9:1 (522:598) in the high schools. The education level of the parents of most students was below high school (47.6%). Only very few parents (1.4%) were employed in healthcare (Table 1).

Health literacy, risk, and misconception of viral hepatitis

The level of health literacy on the awareness and risk of viral hepatitis among the students was quite low (mean ± SD; 3.4 ± 2.2 and 4.0 ± 2.3 out of 8, respectively). More than half of the students did not know the common manifestations of acute hepatitis, such as abdominal pain (55.4%), yellow eyes (69.2%), yellow skin (72.9%), and clay-colored stool (74.1%). Besides, many of them did not recognize the risk factors of viral hepatitis, such as sharing foods with an infected person (59.7%), receiving tattoos (60.9%), receiving piercings (68.2%), and undergoing dental procedures (74.3%). The health literacy level was better among the high school students than the middle school students (*p* < 0.001).

The students` risk of viral hepatitis was reflected by their acceptability of some common risk factors, i.e., sex without a condom (51.1%), sharing household items (34.2%), acupuncture therapy (18.5%), tattoos (11.9%), and piercing (10%), with the mean risk score

Table 2. Health literacy, risk, and misconceptions of viral hepatitis among Chinese school children.

	Total n = 1732	Middle school n = 612	High school n = 1120	<i>P</i>
Awareness of acute hepatitis manifestations¹				
Items ²				
No. (%) of students with correct answers				
Fever	933 (53.9)	260 (42.5)	673 (60.1)	***
Loss of appetite	911 (52.6)	280 (45.8)	631 (56.3)	***
Nausea	901 (52.0)	284 (46.4)	617 (55.1)	***
Vomiting	897 (51.8)	281 (45.9)	616 (55.0)	***
Abdominal pain	772 (44.6)	281 (45.9)	491 (43.8)	
Yellow eyes	534 (30.8)	128 (20.9)	406 (36.3)	***
Yellow skin	469 (27.1)	112 (18.3)	357 (31.9)	***
Clay-colored stool	449 (25.9)	117 (19.1)	332 (29.6)	***
Mean score ± SD (out of 8) ³	3.4 ± 2.2	2.9 ± 2.1	3.7 ± 2.3	***
Awareness of risk factors¹				
Items ²				
No. (%) of students with correct answers				
Using intravenous recreational drugs	1304 (75.3)	348 (56.9)	956 (85.4)	***
Receiving acupuncture with unsterilized needles	1190 (68.7)	312 (51.0)	878 (78.4)	***
Engaging in unsafe sex with a person with hepatitis	1061 (61.3)	269 (44.0)	792 (70.7)	***
Receiving blood transfusion	1039 (60.0)	246 (40.2)	793 (70.8)	***
Sharing foods with a person with hepatitis	698 (40.3)	261 (42.6)	437 (39.0)	
Receiving tattoos	678 (39.1)	120 (19.6)	558 (49.8)	***
Receiving piercing	551 (31.8)	64 (10.5)	487 (43.5)	***
Undergoing dental procedures	445 (25.7)	71 (11.6)	374 (33.4)	***
Mean score ± SD (out of 8) ³	4.0 ± 2.3	2.8 ± 1.9	4.7 ± 2.2	***
Attitudes (acceptability) towards risk behaviors¹				
Items ²				
No. (%) of students with “Yes” answers				
Sex without a condom	885 (51.1)	437 (71.4)	448 (40.0)	***
Sharing household items	592 (34.2)	186 (30.4)	406 (36.3)	*
Acupuncture therapy	321 (18.5)	110 (18.0)	211 (18.8)	
Tattoos	206 (11.9)	54 (8.8)	152 (13.6)	**
Piercing	173 (10.0)	44 (7.2)	129 (11.5)	**
Mean risk score ± SD (out of 5) ³	1.8 ± 1.2	2.0 ± 1.2	1.6 ± 1.2	***
Misconceptions of risk behaviors¹				
Items ²				
No. (%) of students with misconceptions				
Shaking hands with a person with hepatitis	1283 (74.1)	348 (56.9)	935 (83.5)	***
Hugging a person with hepatitis	1278 (73.8)	348 (56.9)	930 (83.0)	***
Having a boyfriend or girlfriend with hepatitis	544 (31.4)	161 (26.3)	383 (34.2)	**

* *p* < 0.05; ** *p* < 0.01; *** *p* < 0.001; ¹ Closed-ended questions with options as “yes, no, not sure”; ² analyzed by χ^2 test; ³ analyzed by t test. The correct answers were taken from the Centers for Disease Control and Prevention (CDC). (<https://www.cdc.gov/hepatitis/hav/afaq.htm#transmission>; <https://www.cdc.gov/hepatitis/hbv/hbvfaq.htm#treatment>; <https://www.cdc.gov/hepatitis/hcv/hcvfaq.htm#section2>).

of 1.8 ± 1.2 out of 5. The middle school students received a higher risk score than did the high school students (2.0 ± 1.2 vs 1.6 ± 1.2 , $p < 0.001$).

Many students had misconceptions related to risk behaviors as they thought they could get hepatitis by shaking hands with an infected person (74.1%), hugging an infected person (73.8%), or having an infected boyfriend or girlfriend (31.4%). More high school students than middle school students had misconceptions ($p < 0.01 \sim 0.001$) (Table 2).

Information resources

There were more than ten resources of hepatitis information identified in this study. The main resource reported by the students was the internet (39.5%, 685/1732), followed by television (28.8%, 498/1732), family (27.7%, 479/1732), school (21.2%, 368/1732), and newspaper (11.0%, 191/1732). Clinicians (7.5%, 130/1732) and friends (6.1%, 105/1732) also contributed to their hepatitis knowledge. There were no school health programs or similar resources in the participating schools (Supplementary Table 2).

Predictors of health literacy and the risk of viral hepatitis

Multiple linear regression models showed independent protective factors for viral hepatitis literacy as being female ($B = 0.47$, 95% CI: 0.11-0.82) and high school student ($B = 1.96$, 95% CI: 1.57-2.35); having parents with a higher education level ($B = 0.42$, 95% CI: 0.23-0.62); and school ($B = 0.68$, 95% CI: 0.21-1.16) or clinicians ($B = 0.85$, 95% CI: 0.14-1.55) as an information resource. On the other hand, the information from television ($B = -0.17$, 95% CI, -0.22

~ -0.02) and poor awareness about risk factors ($B = -0.1$, 95% CI: -0.13 ~ -0.07) were identified as independent risk factors of viral hepatitis (Table 3).

Discussion

Viral hepatitis has been a class B notifiable infectious disease in China since 1978 [14]. It is, therefore, under strict control and surveillance by the infectious disease reporting system developed by the China CDC. According to the China CDC, viral hepatitis ranked first among all reportable infectious diseases with more than 1.2 million new cases in 2019 [4]. Despite its high prevalence and foreseeable health burden, research on hepatitis literacy among Chinese citizens remains scarce. Since this is the first report about limited viral hepatitis literacy and risks among Chinese middle and high school students, our findings should fill the evidence gap.

Limited viral hepatitis literacy and risk behaviors

Health literacy, as defined by the U.S. Department of Health and Human Services, is “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions”. Low health literacy is linked to poor health outcomes [15]. While health literacy is an umbrella concept encompassing all health-related issues, disease-specific literacy concerns a population at risk of that disease. For example, a recent study in Ghana reported poor knowledge and a high risk of hepatitis B among high school students [16]. The level of hepatitis literacy in this study was considerably limited as reflected by the scores on the awareness of the manifestations and risk

Table 3. Multiple linear regression analyses of predictors of viral hepatitis literacy and risk behavior.

	Hepatitis literacy ¹			Risk behavior ²		
	B	95% CI	p	B	95% CI	p
Demographics						
Female gender	0.47	0.11 ~ 0.82	0.01	-0.10	-0.22 ~ 0.03	0.122
High school	1.96	1.57 ~ 2.35	< 0.001	-0.12	-0.26 ~ 0.02	0.096
Parental factors						
Higher parental education level	0.42	0.23 ~ 0.62	< 0.001	-0.03	-0.10 ~ 0.03	0.334
Occupation as healthcare workers	0.84	-0.12 ~ -1.80	0.085	-0.22	-0.55 ~ 0.11	0.191
Information resources						
Internet	0.34	-0.07 ~ 0.75	0.101	-0.09	-0.23 ~ 0.05	0.222
TV	0.10	-0.33 ~ 0.54	0.641	-0.17	-0.22 ~ -0.02	0.031
Family	0.27	-0.18 ~ 0.73	0.239	0.12	-0.04 ~ 0.27	0.149
School	0.68	0.21 ~ 1.16	0.005	0.13	-0.04 ~ 0.29	0.123
Newspapers	0.37	-0.25 ~ 0.98	0.244	-0.19	-0.40 ~ 0.02	0.074
Clinicians	0.85	0.14 ~ 1.55	0.018	-0.10	-0.34 ~ 0.14	0.410
Hepatitis literacy						
Manifestations				0.01	-0.02 ~ 0.04	0.455
Risk factors				-0.10	-0.13 ~ -0.07	< 0.001

¹ Combined mean score of the awareness of hepatitis manifestations and risk factors; ² Mean score of the awareness of hepatitis risk factors.

factors. Since hepatitis A and B are included in the national vaccination program in China, the school children in this study are at particular risk of hepatitis C.

Poor health literacy is known to be associated with health risk behaviors [17]. The risk scores calculated from the attitude towards five well-recognized risk behaviors in this study suggest that the students are at risk. The negative relationships between the knowledge of risk factors and risk behaviors (Table 3) further suggest that limited literacy is associated with their risk.

Factors influencing hepatitis literacy and risk behaviors

Demographics

Relationships between various demographic factors and health literacy [18] or health behaviors [19] have been reported but whether the relationship is direct (positive) or inverse (negative) seems to vary with the study population or geography [20]. In this study, being female and in high school was positively and independently associated with hepatitis literacy. Compared to the students in middle schools, the high school students had significantly better literacy and risk attitudes, but they also had a higher level of misconception about risk behaviors. The pattern of their risk attitudes and misconceptions indicates overcautious behavior, rather than careful precaution; this is probably because although the survey was anonymous, it was administered formally by their teachers.

Parents

Parental education is one of the covariates that influence the health outcome of their children [21, 22], but its association with the child's health literacy is not clear. This study showed that a higher parental education level is a positive independent predictor of the student's literacy. It is, therefore, not surprising that those having parents with a high school and below education level (74.5%, 1291/1732) had limited health literacy.

Although a small fraction of the students with parents working in the healthcare sector (1.4%) received higher literacy scores than other students, it is not clear if these parents have sufficient health literacy or if they could even educate their children because most of them (62.5%) had only high-school level education. We also found no independent relationship between occupation and health literacy or risk behavior in our regression analysis.

The internet

Searching for health information online has become a global trend for all ages. Studies have shown that the internet is the primary source of health information for young people regardless of their health status [23]. This study as well found the internet as the students' main resource about hepatitis. But their lack of information literacy to recognize misinformation, which is widespread on the Chinese internet [24], is reflected by their misconceptions about risk behaviors. The internet is not a predictor for health literacy or risk behavior in this study; however, with the consideration of it being the primary health information resource and the known online threats, it is sensible to integrate information literacy into the school curriculum in China.

School

Despite studying at least 6.5 hours a day in school, the level of students' health literacy observed herein was not good enough for preventing them from hepatitis. Lack of school health education could be partly responsible for this because inadequate health education was a critical barrier to the prevention and control of hepatitis B and C in Southwestern China [25]. The same reason might explain the increasing hepatitis incidence among young Chinese with middle- or high-school-level students in a previous study [26]. China has implemented the "compulsory education law" since 1986, which requires free nine-year compulsory education for its citizens [27]. Accordingly, most children (97% in 2002) [28] have at least junior secondary school level education. Since school was identified as an independent predictor of the student's literacy, effective school health education could improve the health literacy status of Chinese youths.

Need for school health education

More than 1.2 million adolescents die every year globally from mostly preventable causes, with 0.39 million deaths in China in 2015 [1]. Preventable morbidity and mortality among adolescents are associated with health-risk behaviors relating to tobacco, alcohol, and drug use; unhealthy diet; physical inactivity; unsafe sex; and intentional and unintentional self-harm [29].

Since school plays a significant role in a Chinese adolescent's life, health education at school should be a logical intervention approach. Unfortunately, no proper school health programs exist in the Chinese education system, except for a recently introduced school health promotion campaign by China's Ministry of Education on sanitation due to COVID-19 [30].

Disease-specific health educational interventions have been reported previously for hepatitis for adults [25] and mumps-measles-rubella [31] and mental health [32] for adolescents with significant success. As expected from this study, the Chinese students' general health literacy on other infectious diseases or health-risk behaviors will remain insufficient without intervention; therefore, at the national level, an initiative like the comprehensive school health program (CSHP) in the United States of America [33] would be needed in China. Particularly, to promote overall educational success, health, and development of adolescents through schools, partnering with the Focusing Resources on Effective School Health framework [34] jointly developed by the United Nations Educational, Scientific and Cultural Organization, the United Nations Children's Fund, WHO, and the World Bank would be most desirable for China.

On the other hand, for the best possible outcome at the school level, the appropriation of national school health programs should be considered in the background of local culture and beliefs, and youth behavior.

Limitations

We should be cautious in interpreting our findings because our self-reported questionnaire survey was conducted in a formal setting at schools in a socio-culturally conservative region. Thus, we could not verify their honesty and accuracy in describing socially negative issues such as drugs or sex. Even though the survey response rate was 100%, a considerable fraction of missing data from unawareness of parental education and occupation could have affected our results, which should nevertheless influence our key interpretations.

Conclusions

With their limited literacy and poor attitudes towards health-risk behaviors, Chinese middle school and high school students are at predictable risk of hepatitis. As the study topic "hepatitis" represents just the tip of an iceberg of adolescent health issues, mitigating preventable health risks in the Chinese adolescent population through school-based health education intervention is strongly suggested.

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Annex –Supplementary Items

Supplementary Table 1. Questionnaire on health literacy and risk of viral hepatitis among Chinese school children.

❖ Participant’s background		
1	Your school	
2	Your grade	Middle school <input type="radio"/> 1 st year <input type="radio"/> 2 nd year <input type="radio"/> 3 rd year High school <input type="radio"/> 1 st year <input type="radio"/> 2 nd year <input type="radio"/> 3 rd year
3	Your class	
4	Your age	
5	Your gender	<input type="radio"/> Male <input type="radio"/> Female
6	Education of your parents	Father Mother
7	Occupation of your parents	Father Mother
❖ Information resources on viral hepatitis		
1	Do you know what hepatitis is?	<input type="radio"/> Yes <input type="radio"/> No
1.1	If yes, where did you get hepatitis-related information?	
2	Have you or the people around you had hepatitis?	<input type="radio"/> Yes <input type="radio"/> No
2.1	If yes, how did they know about that?	
❖ Essential knowledge about viral hepatitis		
1	What are the symptoms and signs of hepatitis (Multiple choice)	a) Fever b) Loss of appetite c) Nausea d) Vomiting e) Abdominal pain f) Yellow eyes g) Yellow skin h) Clay-colored stool i) Constipation j) Runny nose k) Cough l) Rashes m) Sore throat n) Headache o) Chest pain
2	Which of the following statement about the transmission mode of viral hepatitis is correct? (Multiple choice)	a) Hugging a person with hepatitis b) Shaking hands with a person with hepatitis c) Sharing foods with a person with hepatitis d) Using intravenous recreational drugs e) Receiving tattoos f) Receiving piercing g) Receiving acupuncture with unsterilized needles h) Undergoing dental procedures i) Receiving a blood transfusion j) Engaging in unsafe sex with a person with hepatitis
❖ Attitude (acceptability) towards risk behaviors		
1	Will you accept the following behaviors in the future? (Multiple choice)	a) Having sex without a condom b) Sharing household items with others c) Receiving acupuncture therapy d) Receiving tattoos d) Receiving piercing

Supplementary Table 2. Viral hepatitis literacy and risk among Chinese school students.

	Total		Literacy score				Risk score		
	N = 1732	Manifestations	Risk factors		Both				
Demographics									
Age (year), mean ± SD	15.8 ± 1.3	3.4 ± 2.2		4.0 ± 2.3		7.4 ± 3.7		1.8 ± 1.2	
Gender									
Male	844 (48.7)	3.2 ± 2.4	**	3.9 ± 2.4		7.2 ± 4.0	**	1.8 ± 1.2	
Female	886 (51.2)	3.5 ± 2.1		4.1 ± 2.2		7.7 ± 3.5		1.7 ± 1.2	
Missing data	2 (0.1)				NA				
Current school									
Middle school	612 (35.3)	2.9 ± 2.1	***	2.8 ± 1.9	***	5.6 ± 3.4	***	2.0 ± 1.2	***
High school	1120 (64.7)	3.7 ± 2.3		4.7 ± 2.2		8.4 ± 3.6		1.6 ± 1.2	
Parental factors									
Parental education									
No formal education	2 (0.1)	1.5 ± 2.1		1.5 ± 2.1		3.0 ± 4.2		2.0 ± 2.8	
Primary school	109 (6.3)	2.9 ± 2.1		3.3 ± 2.2		6.2 ± 3.8		2.0 ± 1.3	
Middle school	713 (41.2)	3.1 ± 2.1	***	3.6 ± 2.2	***	6.7 ± 3.5	***	1.8 ± 1.2	*
High/Technical secondary school	467 (27.0)	3.4 ± 2.2		4.0 ± 2.2		7.4 ± 3.5		1.7 ± 1.1	
Undergraduate/Junior college	291 (16.8)	3.8 ± 2.3		4.6 ± 2.3		8.4 ± 3.7		1.6 ± 1.2	
Postgraduate	22 (1.3)	4.0 ± 2.6		5.4 ± 1.9		9.4 ± 3.4		1.9 ± 1.4	
Missing data	128 (7.4)				NA				
Parental occupation									
Healthcare workers (HCWs)	24 (1.4)	4.0 ± 2.4	*	5.3 ± 2.1	***	9.3 ± 3.7	***	1.4 ± 1.2	*
Non-HCWs	1413 (81.6)	3.4 ± 2.2		3.9 ± 2.3		7.3 ± 3.6		1.8 ± 1.2	
Missing data	295 (17.0)				NA				
Information resources									
Internet	685 (39.5)	45.7 ± 26.4	***	55.1 ± 28.0	***	50.4 ± 22.0	***	1.6 ± 1.2	***
TV	498 (28.8)	46.0 ± 26.1	***	54.6 ± 27.5	***	50.2 ± 21.8	***	1.5 ± 1.1	***
Families	479 (27.7)	47.0 ± 27.1	***	56.5 ± 28.1	***	51.8 ± 22.1	***	1.7 ± 1.2	
School	368 (21.2)	47.1 ± 28.0	**	58.9 ± 27.5	***	53.0 ± 22.1	***	1.7 ± 1.2	
Newspaper	191 (11.0)	49.3 ± 27.3	***	62.6 ± 26.3	***	56.0 ± 21.1	***	1.4 ± 1.2	***
Clinicians	130 (7.5)	49.5 ± 26.8	**	59.0 ± 28.8	***	54.3 ± 22.9	***	1.6 ± 1.2	
Friends	105 (6.1)	42.1 ± 28.5		53.6 ± 27.9		47.9 ± 22.0		1.8 ± 1.3	
Others [#]	60 (3.5)	44.0 ± 30.7		57.9 ± 32.3		51.0 ± 24.6		1.8 ± 1.3	

Scores shown as mean ± SD and analyzed by t-test or one-way ANOVA; [#] Books, magazines, and relatives.