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Coronavirus-related health literacy levels among school administrators and influencing factors

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Abstract

Our study aimed to determine the level of coronavirus-related health literacy among school administrators and the factors that influence this. The sample of this cross-sectional study consisted of 402 school administrators serving in primary, secondary and high schools in Ankara. The data were collected between September 2021 and February 2022 using the descriptive characteristics questionnaire and the Coronavirus-Related Health Literacy Questionnaire (HLS-COVID-Q22). It was seen that 64.4% of the participants were male, 34.6% were 40 years old or younger and 35.6% were working in primary schools; 77.6% of the participants had a sufficient, 16.2% had a problematic and 6.2% had an inadequate level of coronavirus-related health literacy. Age, gender, chronic disease status, type of school they work in, level of knowledge about coronavirus, level of confusion due to knowledge about coronavirus, willingness to be vaccinated, believing that vaccines are safe/effective/compatible with their religious beliefs were found to affect coronavirus-related health literacy ($p < 0.05$). Gender, age, information satisfaction on coronavirus, confusion due to information on coronavirus and 'Overall, I believe that vaccinations are effective' explained 24.9% of HLS-COVID-Q22 variance (Adjusted $R^2 = 0.249$, $F = 13.080$, $p < 0.001$). This study found the coronavirus-related health literacy level among school administrators to be sufficient. It found that their level of health literacy was affected by gender, age, chronic disease status, type of school they worked at, level of knowledge about coronavirus, level of confusion due to information about coronavirus, desire to be vaccinated and their thoughts about vaccines.

Keywords: health literacy, COVID-19 pandemic, vaccines, health promotion schools, health promotion

INTRODUCTION

Health literacy is a concept that expresses individuals' ability to access, understand, appraise and apply health-related information to protect and improve their health (Nutbeam, 2000; Sørensen *et al.*, 2012). Health literacy is a skill that should be developed in primary school and constantly improved thereafter (Paakkari *et al.*, 2019; Paakkari and Okan, 2020; Dadaczynski *et al.*, 2021). The concept of COVID-19-related health literacy, which includes accessing, appraising and applying information about the disease, emerged together with health literacy particularly after the COVID-19 pandemic began (Okan *et al.*, 2020). School administrators play a crucial role in shaping students' COVID-19-related health literacy and implementing pandemic measures (Dadaczynski *et al.*, 2020).

During the COVID-19 pandemic, measures to protect health should be taken in all living areas, particularly in schools, and health in schools should be

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Contribution to Health Promotion

- School administrators are responsible for organizing the school environment to prevent the spread of infectious diseases among students.
- This study found the coronavirus-related health literacy level among school administrators to be sufficient.
- More than half of executives were confused at various levels regarding their coronavirus information.
- This study revealed that gender, age, satisfaction with information about coronavirus, confusion due to information about coronavirus and belief that vaccines are effective are predictors of Coronavirus-Related Health Literacy Questionnaire (HLS-COVID-Q22).
- This study draws attention to the coronavirus-related health literacy of school administrators.

promoted (Dadaczynski *et al.*, 2020). The World Health Organization has created the Health-Promoting Schools initiative to help schools 'strengthen their capacity as a healthy setting for living, learning, and working' and has invited the countries of the world to increase the number of such schools (WHO, 2022a). This initiative includes promoting healthy lifestyle behaviors and combating infectious diseases and encompasses all involved groups both inside and outside of school such as teachers, pupils, the school environment, parents, school administrators and other stakeholders (WHO, 2022b). The roles played by teachers and administrators and what they know about COVID-19 are crucial when implementing health promotion programs in schools and taking precautions against the virus. One study conducted in Turkey found the COVID-19 awareness levels of preservice primary school teachers to be moderate and suggested that they should be improved (Öztürk and Tezel, 2022). A study conducted with school administrators in Germany reported that 29.3% of administrators had limited health literacy (Dadaczynski *et al.*, 2020). As part of the coronavirus protection measures during the COVID-19 pandemic, school administrators should take into account such topics as managing physical distance in the school environment, keeping disinfectants and soaps for hand hygiene readily available and encouraging the use of masks and vaccination (Kavrayıcı and Kesim, 2021).

The COVID-19 pandemic has adversely affected key sectors such as health, the economy, tourism and education. In the education sector, in particular, schools in many countries have switched from formal education to distance education. After the pandemic was declared on 16 March 2020, primary, secondary and high school-level schools in Turkey switched from formal learning to distance learning, which continued until June 2021. It has been reported that school administrators, teachers and students encountered various difficulties such as social isolation, Internet access and adapting to distance learning when the switch was made from face-to-face instruction to online learning at home (Aytaç, 2020; Hebebci *et al.*, 2020). As part of the normalization process, schools in Turkey resumed face-to-face instruction in September 2021. Face-to-face instruction has been accompanied by various challenges. The school environment is a high-risk environment for COVID-19 and other infectious diseases because people spend a lot of time indoors together. In their study of secondary school students, Ayran *et al.* (Ayran *et al.*, 2022) reported that more than half of the students use the mask they wear throughout the day, touch the mask with their hands while on the face, and do not wash their hands before putting on the mask (Ayran *et al.*, 2022). School administrators should organize training for all people working at the school starting with the students to teach them how coronavirus spreads, the symptoms, the cure and ways of protection.

School administrators are the leaders in the school environment. This is why school administrators need to overcome these difficulties and manage the process by prioritizing health protection both in distance learning and in face-to-face instruction (Dadaczynski *et al.*, 2020). For school administrators to manage this process well, they must have a sufficient level of COVID-19-related health literacy, including how to access, appraise and apply information about COVID-19 (Dadaczynski *et al.*, 2020). Studies on school administrators' health literacy or coronavirus health literacy are sparse (Dadaczynski *et al.*, 2020; Van Duong *et al.*, 2021). This study aimed to determine the level of coronavirus-related health literacy among school administrators and the factors that influence this.

Research questions

1. What is the Coronavirus-Related Health Literacy Level of school administrators?
2. What are the factors influencing the coronavirus-related health literacy level of school administrators?

METHOD

Design and participants

This study is part of the COVID Health Literacy School Principals Survey, which is participated in by many countries globally and is a cross-sectional study

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(The COVID-HL School Survey, 2023). The population of the research consists of the administrators and deputy administrators of primary, secondary and high schools in Ankara, Turkey. There are a total of 2481 educational institutions in Ankara consisting of 838 primary schools, 730 secondary schools and 913 high schools. Assuming that there is one administrator and at least one deputy administrator in each institution, this makes 4962 administrators in total at these schools. Accordingly, the sample size was calculated as 357 with a sampling error of 0.05 for a population of ~5000. The questionnaire link for the study was sent to 436 school administrators and deputy administrators, but 34 of them stated they were unwilling to participate in it and did not answer any questions. The study's sample thus consists of the 402 school administrators and deputy administrators who agreed to participate.

Instruments

Data were collected using the descriptive characteristics questionnaire and the Coronavirus-Related Health Literacy Questionnaire (HLS-COVID-Q22).

Descriptive characteristics questionnaire

This questionnaire consists of questions about gender, age, chronic disease, type of school, information satisfaction on coronavirus, confusion due to information on coronavirus and thoughts about vaccines.

HLS-COVID-Q22

Okan *et al.* developed the HLS-COVID-Q22 in 2020. The validity and reliability study for the Turkish version of the HLS-COVID-Q22 was conducted by Soylar *et al.* using an adult sample of 18 years and older; the study in question is currently being published (Soylar *et al.*, 2022). In the original and Turkish version, Items 1–6 ask about access, 7–12 understand, 13–17 appraise and apply 18–22. The validity and reliability study of the scale reported that Cronbach's alpha coefficients were 0.95 for the overall score, 0.87 for the access to information subdimension, 0.90 for the understand subdimension, 0.88 for the appraise subdimension and the apply subdimension. In this study, Cronbach's alpha coefficients were found to be 0.97 for the overall score, 0.92 for the access to information subdimension, 0.96 for the understand subdimension, 0.92 for the appraise subdimension and 0.94 for the apply subdimension. The Likert-type questionnaire ranges from 1 (very difficult) to 4 (very easy). The questionnaire contains no reverse-coded items. A high score shows the participant has a high level of coronavirus-related health literacy. The participants' coronavirus-related health literacy levels based on their average scores are evaluated as follows:

- Average score of ≤2.5: inadequate health literacy.
- Average score of 2.51–2.99: problematic health literacy.
- Average score of ≥3: sufficient health literacy.

Data collection

The data were collected between September 2021 and February 2022. The instruments were prepared online with Google Forms. After obtaining official and ethical permission, official correspondence was sent to the district national education directorate in each of Ankara's 25 districts giving them detailed information about the research, permissions and the link to the questionnaire and asking them to share the link with the school administrators of the primary, secondary and high schools. However, a sufficient sample size could not be reached with this method. So, the first author telephoned each primary, secondary and high school in Ankara and talked with the school administrators. They briefed them on the research and gave shared the questionnaire link with them. Those who volunteered to participate in the study completed the questionnaire. Data collection ended when sufficient sample size was reached. It took ~15–20 min to complete the online forms.

Data analysis

The SPSS Statistics Version 14.0 (SPSS Inc., Chicago, IL, USA) program was used to analyze the data. The statistical methods to be used in the study were determined by first taking into account whether or not the average scores of the scale and subdimensions showed normal distribution. As an indicator of the normality of the data, the skewness and kurtosis coefficient values were taken into consideration and were found to be within normal limits for all subdimensions of both scales. Categorical variables were presented as frequencies and percentages. Continuous variables were expressed as mean ± standard deviation (SD). One-way ANOVA test was used to compare the means of three or more groups while the independent samples *t*-test, one of the parametric statistical methods, was used to compare the means of two independent groups. Tukey's multiple comparison test was used to identify the groups from which the differences found using ANOVA came. The independent variables predicting the coronavirus-related health literacy were evaluated with multiple linear regression analysis. The existence of multiple correlations between variables was evaluated with VIF and tolerance. Variables with a tolerance value >0.2 and a VIF value <10 were included in the regression analysis. The significance level was accepted as 0.05.

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FINDINGS

It was determined that 64.4% ($n = 259$) of the participants were male, 34.6% ($n = 139$) were 40 years old or under, 35.6% ($n = 143$) were working in primary school, 49.5% (199) of them had a satisfactory level of satisfaction with information about coronavirus, 55.5% (223) of them were a little confused because of the information they had about coronavirus and 28.9% (116) of them had a chronic disease (Table 1).

The mean scores of the HLS-COVID-Q22 scale were 3.36 (SD = 0.55). The mean score of the access subdimension was 3.45 (SD = 0.52), the mean score of the understand subdimension was 3.39 (SD = 0.61), the mean score of the appraise subdimension was 3.27 (SD = 0.63) and apply subdimension was 3.33 (SD = 0.62). In addition, 77.6% (312) of the participants had a sufficient, 16.2% (65) had a problematic and 6.2% (25) had an inadequate level of coronavirus-related health literacy (Tables 1 and 2).

Table 1: Descriptive characteristics ($N = 402$)

Descriptive characteristics	*n*	%
Gender		
Male	259	64.4
Female	143	35.6
Age (years)		
≤40	139	34.6
41–50	134	33.3
≥51	129	32.1
Type of school		
Primary school	143	35.6
Secondary school	120	29.8
High school	110	27.4
Other	29	7.2
Information satisfaction on coronavirus		
Very informed	53	13.2
Good	137	34.1
Satisfactory	199	49.5
Poor	13	3.2
Confusion due to information on coronavirus		
Not at all confused	116	28.9
A little confused	223	55.5
Quite confused	54	13.4
Very confused	9	2.2
Having any chronic disease		
Yes	116	28.9
No	286	71.1
HLS-COVID-Q22 levels		
Inadequate health literacy (≤2.5)	25	6.2
Problematic health literacy (2.51–2.99)	65	16.2
Sufficient health literacy (≥3.00)	312	77.6

It was found that men had a significantly higher mean score than women in the HLS-COVID-Q22 scale total score, access and appraise subdimensions ($p < 0.05$). Participants aged 51 or over had significantly lower HLS-COVID-Q22 scale total scores and mean scores in all dimensions than the other age groups. The HLS-COVID-Q22 scale total score, the mean scores for access, understand and appraise subdimensions of the participants with chronic disease were significantly lower than those without chronic disease ($p < 0.05$) (Table 3).

The mean scores of the participants who worked in primary schools in the HLS-COVID-Q22 scale total scores and mean scores the access subdimension were significantly lower than those who worked in high school ($p < 0.05$). It was found that coronavirus-related health literacy increased with the level of knowledge about coronavirus. It was determined that the HLS-COVID-Q22 scale and all subdimension mean scores of those whose level of satisfaction with coronavirus information was 'Very informed' were significantly higher than those with 'Satisfactory' and 'Poor' levels ($p < 0.05$). It was found that those whose level of satisfaction with coronavirus information was 'Very informed' scored significantly higher in the understanding subdimension than those with a 'Good' level ($p < 0.05$). It was determined that the level of coronavirus-related health literacy increased as the level of confusion due to coronavirus information decreased. The HLS-COVID-Q22 scale and all subdimension mean scores of those whose level of confusion due to coronavirus information was 'Not at all confused' were found to be significantly higher than other groups ($p < 0.05$) (Table 3).

The HLS-COVID-Q22 scale, the access and understand subdimension mean scores of the school administrators who answered that they would probably/definitely be vaccinated were significantly higher than those who answered 'maybe-unlikely/definitely not' ($p < 0.05$). No significant difference was found between the HLS-COVID-Q22 scale and all subdimension mean scores of those who agreed with the statement 'Vaccines are important for protecting me and my family' and those who did not ($p > 0.05$). The HLS-COVID-Q22 scale and all subdimension mean scores of those who agreed with the statements 'Generally, I believe that vaccines are safe', 'I believe that vaccines are effective in general' and 'Vaccination is compatible with my attitudes or religious beliefs' were significantly higher than those who disagreed ($p < 0.05$) (Table 4).

The regression model established to test the effect of HLS-COVID-Q22 on independent variables is

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Table 2: Mean scores of HLS-COVID-Q22 and subscales ($N = 402$)

Scales	Mean (SD)	Min–Max
Overall score	3.36 (0.55)	1.55–4.00
Access	3.45 (0.52)	2.00–4.00
Understand	3.39 (0.61)	1.33–4.00
Appraise	3.27 (0.63)	1.00–4.00
Apply	3.33 (0.62)	1.00–4.00

meaningful ($F = 13.080$, $p < 0.001$). Gender, age, information satisfaction on coronavirus, confusion due to information on coronavirus and 'Overall, I believe that vaccinations are effective' explained 24.9% of HLS-COVID-Q22 variance (Adjusted $R^2 = 0.249$, $F = 13.080$, $p < 0.001$) (Table 5).

DISCUSSION

Since schools are a collective living space, they are extremely risky in terms of respiratory diseases such as COVID-19. In addition to managing education in schools, administrators also ensure that measures are taken to protect health of the institution (Dadaczynski *et al.*, 2020). Very few studies investigate what administrators in schools know about this subject (Dadaczynski *et al.*, 2020; Van Duong *et al.*, 2021). This study examined the COVID-19-related health literacy status of school administrators and the factors influencing this.

School administrators act as a gatekeeper in protecting the health of students and teachers, and their health literacy levels are very important (Dadaczynski *et al.*, 2020). This study found the mean score of the HLS-COVID-Q22 scale and its subdimensions to be above 3, which equates to 'sufficient'. Similarly, Van Duong *et al.* (Van Duong *et al.*, 2021), in their study of school principals in Taiwan, found the mean score for coronavirus-related health literacy to be 3.2 ± 0.4 (Van Duong *et al.*, 2021). In the study conducted by Lau *et al.* (Lau *et al.*, 2022) on school principals in China, they found that the mean of coronavirus-related health literacy was 3.09 ± 0.42. In the study conducted by Okan *et al.* (Okan *et al.*, 2020) on adults in Germany, the coronavirus-related health literacy score was reported as being 2.99 ± 0.49. In the present study, 77.6% (312) of the participants had a sufficient coronavirus-related health literacy level, while 22.4% (90) had a 'problematic' level and (16.2%) had an 'inadequate' (6.2%) level. Considering that schools are risky institutions in terms of the spread of infectious diseases, the finding that most school administrators have sufficient knowledge is important in terms of protecting employees, families and children. The fact that more than half of the school administrators have a sufficient level of coronavirus-related health literacy may be because the study was conducted in the nation's capital city. The presence of the Ministry of Health in the capital and the ease of access and use of health services at the provincial level may have helped the managers increase their level of coronavirus-related health literacy. Although most of the participants had sufficient health literacy, the fact that one in five administrators had a problematic or inadequate coronavirus-related health literacy level was considered remarkable. It is therefore thought that the topic of health literacy should be addressed as part of in-service training for school administrators. Although the coronavirus-related health literacy of school administrators was found to be sufficient in this study, considering the finding that more than half of the participants have various levels of confusion, efforts should be made to improve the current health literacy level of administrators.

'There is an "infodemic" associated with the COVID-19 pandemic—an overabundance of valid and invalid information' (Okan *et al.*, 2020). This study found that as the level of knowledge about coronavirus increased, the level of health literacy about coronavirus also increased. It also found that the HLS-COVID-Q22 scale and all subdimension mean scores of those with a 'Very informed' level of satisfaction with coronavirus information were significantly higher than those with 'Satisfactory' and 'Poor' levels. It was determined that the level of coronavirus-related health literacy increased as the level of confusion due to coronavirus information decreased. In this study, 'Information satisfaction on coronavirus' and 'Confusion due to information on coronavirus' are among the factors predicting HLS-COVID-Q22. The study found that the HLS-COVID-Q22 scale and all subdimension mean scores of those whose level of confusion due to coronavirus information was 'Not at all confused' were significantly higher than other groups. As the level of knowledge about coronavirus increases and the level of confusion due to information about coronavirus decreases, the level of coronavirus-related health literacy is expected to rise as a result. Our study found that 3.2% of the participants had a poor level of satisfaction with coronavirus information, but 71.1% had different levels of confusion in terms of coronavirus information. Similarly, the study conducted by Okan *et al.* (Okan *et al.*, 2020) reported that more than half of the participants were confused due to the coronavirus information. Duong *et al.* reported that 12.1% of school administrators had insufficient/poor/well-informed levels of knowledge about COVID-19 updates and that 9.9% had Quite/Very confused levels of confusion concerning COVID-19-related information (Duong *et*

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Table 3: Distribution of HLS-COVID-Q22 and subscales scores according to descriptive characteristics ($N = 402$)

Variables		*n*	HLS-COVID-Q22Mean (SD)	AccessMean (SD)	Understand Mean (SD)	Appraise Mean (SD)	ApplyMean (SD)
Gender	Male	259	3.41 (0.55)	3.49 (0.52)	3.42 (0.61)	3.35 (0.61)	3.37 (0.62)
	Female	143	3.27 (0.56)	3.37 (0.51)	3.33 (0.61)	3.13 (0.65)	3.26 (0.62)
	Test value		$t = 2.245$	$t = 2.234$	$t = 1.355$	$t = 3.243$	$t = 1.661$
	*p		**0.025*** **	**0.026*** **	0.176	**0.001*** **	0.098
Age	≤40[a]	139	3.46 (0.57)	3.53 (0.53)	3.48 (0.64)	3.38 (0.64)	3.46 (0.59)
	41–50[b]	134	3.45 (0.52)	3.54 (0.49)	3.46 (0.55)	3.36 (0.62)	3.43 (0.54)
	≥51[c]	129	3.17 (0.53)	3.28 (0.53)	3.21 (0.60)	3.08 (0.59)	3.08 (0.67)
	Test value		$F = 12.199$	$F = 9.845$	$F = 8.329$	$F = 9.625$	$F = 15.463$
	**p		**0.001*** ** *Post hoc*:c < a-b	**0.001*** ** *Post hoc*:c < a-b	**0.001*** ** *Post hoc*:c < a-b	**0.001*** ** *Post hoc*:c < a-b	**0.001*** ** *Post hoc*:c < a-b
Having any chronic disease	Yes	116	3.27 (0.60)	3.36 (0.56)	3.28 (0.66)	3.17 (0.68)	3.23 (0.66)
	No	286	3.40 (0.53)	3.48 (0.50)	3.43 (0.58)	3.31 (0.60)	3.37 (0.61)
	Test value		$t = 2.256$	$t = 2.006$	$t = 2.298$	$t = 2.038$	$t = 1.935$
	*p		**0.025*** **	**0.046*** **	**0.022*** **	**0.042*** **	0.054
Type of school	Primary school[a]	143	3.26 (0.54)	3.34 (0.52)	3.29 (0.60)	3.17 (0.61)	3.22 (0.63)
	Secondary school[b]	120	3.41 (0.57)	3.46 (0.55)	3.42 (0.61)	3.34 (0.62)	3.39 (0.61)
	High school[c]	110	3.46 (0.55)	3.58 (0.48)	3.49 (0.60)	3.34 (0.67)	3.40 (0.65)
	Other[d]	29	3.32 (0.53)	3.40 (0.49)	3.33 (0.64)	3.23 (0.58)	3.33 (0.48)
	Test value		$F = 3.085$	$F = 4.255$	$F = 2.572$	$F = 2.152$	$F = 2.425$
	**p		**0.027*** ** *Post hoc*: a < c	**0.006*** ** *Post hoc*: a < c	0.054	0.093	0.065
Information satisfaction on coronavirus	Very informed[a]	53	3.64 (0.49)	3.70 (0.44)	3.67 (0.50)	3.59 (0.53)	3.55 (0.68)
	Good[b]	137	3.42 (0.59)	3.51 (0.54)	3.42 (0.65)	3.33 (0.66)	3.41 (0.64)
	Satisfactory[c]	199	3.27 (0.53)	3.36 (0.51)	3.31 (0.59)	3.17 (0.60)	3.23 (0.59)
	Poor[d]	13	3.03 (0.41)	3.12 (0.41)	3.08 (0.41)	2.87 (0.67)	3.03 (0.44)
	Test value		$F = 8.201$	$F = 8.289$	$F = 6.451$	$F = 8.475$	$F = 5.695$
	**p		**< 0.001*** ** *Post hoc*:c-d < a	**< 0.001*** ** *Post hoc*:c-d < a	**< 0.001*** ** *Post hoc*:b-c-d < a	**< 0.001*** ** *Post hoc*:c-d < a	**< 0.001*** ** *Post hoc*:c-d < a
Confusion due to information on coronavirus	Not at all confused[a]	116	3.64 (0.49)	3.67 (0.48)	3.67 (0.53)	3.58 (0.55)	3.63 (0.52)
	A little confused[b]	223	3.29 (0.53)	3.40 (0.51)	3.31 (0.58)	3.19 (0.60)	3.23 (0.62)
	Quite confused[c]	54	3.11 (0.55)	3.22 (0.47)	3.14 (0.66)	2.96 (0.65)	3.07 (0.63)
	Very confused[d]	9	3.15 (0.60)	3.20 (0.53)	3.09 (0.72)	3.11 (0.72)	3.22 (0.52)
	Test value		$F = 17.150$	$F = 12.666$	$F = 14.416$	$F = 16.675$	$F = 15.415$
	**p		**< 0.001*** ** *Post hoc*:b-c-d < a	**< 0.001*** ** *Post hoc*:b-c-d < a	**< 0.001*** ** *Post hoc*:b-c-d < a	**< 0.001*** ** *Post hoc*:b-c < a	**< 0.001*** ** *Post hoc*:b-c < a

*t-test.
**ANOVA test.
***p < 0.05

al., 2021). Confusion is possible in extraordinary situations such as pandemics, but this can be overcome with crisis management skills and effective leadership (Kavrayıcı and Kesim, 2021). Confusion over the coronavirus information can hinder the measures to be taken in this regard at school. School administrators

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need to improve their crisis management and leadership skills and be given the correct coronavirus information. Advice centers where they can ask questions when necessary should be established.

In this study, gender was found to be one of the factors predicting HLS-COVID-Q22. Men were found to score significantly higher than women in the HLS-COVID-Q22 scale total score and access to information and appraisal subdimensions. This suggests that male administrators have obtained and applied more health information about the disease due to the seriousness of the course of COVID-19 and the fact that men have a greater likelihood of being hospitalized and are more at risk of dying (Womersly *et al.*, 2020). Contrary to the findings of the current study, other studies have reported that women have higher levels of coronavirus health literacy than men (Ifroh and Asrianti, 2020; Duong *et al.*, 2021). Duong *et al.* found that women have higher levels of COVID-19 health literacy in their study (Duong *et al.*, 2021). The study conducted by Ifroh and Asrianti (Ifroh and Asrianti, 2020) on young adults showed that the proportion of women (45.2%) with sufficient COVID-19 health literacy was higher than that of men (19.5%).

In this study, it was determined that age was a predictive factor for HLS-COVID-Q22, and the total and all subdimension mean scores of the participants aged 51 and over were significantly lower than the other age groups. This is consistent with the literature, which states that health literacy decreases with age and the level of health literacy among the elderly is lower (Liu *et al.*, 2015; Oo *et al.*, 2015; Ayaz Alkaya and Öztürk, 2021; Yang *et al.*, 2021). Digital resources are generally used to access information about COVID-19. As age increases, it becomes harder to use digital resources. The decrease in physical and cognitive functions with age may have negatively affected the processes of accessing, appraising and applying coronavirus information.

To manage chronic diseases comprehensively, individuals need to be able to access, understand, appraise and use health information. Health literacy, therefore, plays an extremely important role in the treatment and management of chronic diseases (Van der Heide *et al.*, 2018). This study found that the HLS-COVID-Q22 scale total score and the mean scores of all subdimensions of the participants with chronic disease were significantly lower than those without chronic disease. Similarly, Yang *et al.* (Yang *et al.*, 2021) stated that people without chronic diseases have higher health literacy. The findings of the current study and the literature underline the need to improve the levels of COVID-19 health literacy in individuals with chronic diseases.

This study examined the coronavirus-related health literacy of primary, secondary and high school administrators. It was found that the type of school where they worked affected coronavirus health literacy. The HLS-COVID-Q22 scale total and access to information mean scores of the participants who work in primary schools are significantly lower than the participants who work in high schools. The low level of coronavirus health literacy among primary school administrators may be because of the administrators' perception that the main responsibility on the first rung of education lies with the families. Considering that the basis of children's health literacy is formed in primary school (Paakkari *et al.*, 2019; Paakkari and Okan, 2020) and they need more information about coronavirus protection, it is essential to improve the health literacy level of primary school administrators.

At the global level, all people worry about infection during the COVID-19 pandemic. Fighting infectious diseases is even more important, especially in collective living spaces such as schools. Our most effective weapon in fighting infectious diseases is immunization with safe and effective biomedical vaccines (Okan *et al.*, 2022). In this study, the HLS-COVID-Q22 scale and access to information and understanding subdimension mean scores of school administrators who stated that they would probably/definitively be vaccinated when it was their turn (91.3%) were significantly higher than those who were undecided and did not intend to get vaccinated (8.7%). In this study, the response to the phrase 'Overall, I believe that vaccinations are effective' was found to be a predictor for HLS-COVID-Q22. Participants who thought that vaccines were protective (95.3%), safe (89.6%), effective (91.5%) and compatible with their attitudes and beliefs (90.5%) had higher coronavirus-related health literacy. Similarly, Duong *et al.* (Duong *et al.*, 2021) reported that school administrators with high coronavirus-related health literacy had less vaccine hesitation. In this study, although the majority of school administrators had positive thoughts about vaccines, some reported that vaccines were not important in protecting themselves and their families (4.7%), some said vaccines were not safe (10.4%), vaccines were not effective (8.5%) and vaccines were not compatible with their attitudes and religious beliefs (9.5%). Based on these findings, it is obvious that school administrators need to be correctly informed about vaccines.

Limitations

The present study has some limitations. First, the findings are limited to the evaluation of the scales used in the research, and causal inference cannot be made. Second, the findings are limited to the sample of the study; generalizations should be made with caution. Finally, as a result of the regression in this study, the predictive power of the dependent variable and the

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Table 4: Distribution of HLS-COVID-Q22 scale scores according to participants' opinions about vaccines ($N = 402$)

Opinions on vaccines	*n*	%	HLS-COVID-Q22Mean (SD)	AccessMean (SD)	Understand Mean (SD)	Appraise Mean (SD)	ApplyMean (SD)
Will you be vaccinated against coronavirus when it's your turn to vaccinate?							
Yes. certainly/ Likely	367	91.3	3.38 (0.55)	3.47 (0.52)	3.41 (0.60)	3.29 (0.63)	3.13 (0.55)
Maybe/Unlikely/ Certainly not	35	8.7	3.15 (0.55)	3.20 (0.54)	3.16 (0.64)	3.09 (0.60)	3.35 (0.63)
Test value			$t = 2.389$	$t = 2.942$	$t = 2.281$	$t = 1.739$	$t = 1.935$
*p			**0.017****	**0.003****	**0.023****	0.083	0.54
Vaccinations are important to protect myself and my family							
Totally agree/ Agree	383	95.3	3.37 (0.56)	3.45 (0.52)	3.39 (0.61)	3.27 (0.63)	3.33 (0.63)
Not agree/Not agree at all	19	4.7	3.30 (0.55)	3.35 (0.57)	3.31 (0.64)	3.25 (0.55)	3.27 (0.53)
Test value			$t = 0.536$	$t = 0.863$	$t = 0.550$	$t = 0.158$	$t = 0.420$
*p			0.592	0.389	0.583	0.875	0.675
Overall, I believe that vaccinations are safe							
Totally agree/ Agree	360	89.6	3.40 (0.54)	3.47 (0.52)	3.43 (0.58)	3.31 (0.60)	3.36 (0.60)
Not agree/Not agree at all	42	10.4	3.08 (0.62)	3.28 (0.54)	3.05 (0.70)	2.92 (0.77)	3.06 (0.72)
Test value			$t = 3.469$	$t = 2.233$	$t = 3.860$	$t = 3.799$	$t = 2.928$
*p			**0.001****	**0.026****	**0.001****	**0.003****	**0.004****
Overall, I believe that vaccinations are effective							
Totally agree/ Agree	368	91.5	3.39 (0.55)	3.46 (0.52)	3.41 (0.60)	3.30 (0.61)	3.35 (0.61)
Not agree/Not agree at all	34	8.5	3.11 (0.60)	3.28 (0.56)	3.08 (0.67)	2.94 (0.72)	3.10 (0.70)
Test value			$t = 2.829$	$t = 1.955$	$t = 3.043$	$t = 3.242$	$t = 2.269$
*p			**0.005****	**0.051****	**0.002****	**0.001****	**0.024****
Vaccination is compatible with my attitudes or religious beliefs							
Totally agree/ Agree	364	90.5	3.39 (0.55)	3.47 (0.52)	3.42 (0.59)	3.30 (0.62)	3.36 (0.61)
Not agree/Not agree at all	38	9.5	3.10 (0.58)	3.24 (0.49)	3.08 (0.71)	2.98 (0.70)	3.06 (0.68)
Test value			$t = 3.104$	$t = 2.564$	$t = 3.246$	$t = 2.941$	$t = 2.748$
*p			**0.002****	**0.011****	**0.001****	**0.003****	**0.006****

*t-test.
**$p < 0.05$

independent variables was ~25%. Although this value is very low for pure science, it is an acceptable value for social sciences dealing with human behavior (Ozili, 2023). Social sciences deal with human behavior or human relationship that is subject to change from time to time. Human behavior may change due to individual self-interest, group dynamics, feelings and other factors. Therefore, the low predictive power of the independent variables used in this study can be considered as a limitation.

CONCLUSION

This study found the coronavirus-related health literacy level among school administrators to be sufficient. Although the level of coronavirus-related health literacy among school administrators was found to be sufficient in this study, it is noteworthy that more than half of the administrators have various levels of confusion about coronavirus. It found that their level of health literacy was affected by gender, age, chronic disease status, type of school they worked at, level of knowledge about

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Table 5: Regression model predicting HLS-COVID-Q22

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% CI	
	B	Std. Error	Beta			Lower bound	Upper bound
(Constant)	5.296	0.214		24.725	0.000	4.875	5.718
Gender	−0.171	0.056	−0.147	−3.046	**0.002***	−0.281	−0.061
Age	−0.020	0.003	−0.311	−6.383	**0.000***	−0.026	−0.014
Type of school	0.026	0.026	0.045	1.016	0.310	−0.025	0.078
Information satisfaction on coronavirus	−0.071	0.035	−0.097	−2.052	**0.041***	−0.139	−0.003
Confusion due to information on coronavirus	−0.157	0.039	−0.199	−4.038	**0.000***	−0.233	−0.081
Will you be vaccinated against coronavirus when it's your turn to vaccinate?	−0.46	0.041	−0.065	−1.139	0.255	−0.126	0.034
Vaccinations are important to protect myself and my family	0.109	0.068	.122	1.617	0.107	−0.024	0.242
Overall, I believe that vaccinations are safe	−0.009	0.072	−0.012	−0.124	0.901	−0.150	0.132
Overall, I believe that vaccinations are effective	−0.180	0.076	−0.231	−2.370	**0.018***	−0.329	−0.031
Vaccination is compatible with my attitudes or religious beliefs	−0.077	0.045	−0.105	−1.700	0.090	−0.165	0.012
Having any chronic disease	−0.029	0.056	−0.024	−0.527	0.598	−0.139	0.080

Durbin–Watson = 2.061; $F = 13.080$. $p < 0.001$; $R = 0.519$; $R^2 = 0.269$; Adjusted $R^2 = 24.9\%$.
Abbreviations: CI, confidence interval; SE, standard error; β, standardized regression coefficient.
*Significance level was accepted as $p < 0.05$ and shown in bold..

coronavirus, level of confusion due to coronavirus information and their thoughts about vaccines. The predictors of HLS-COVID-Q22 were gender, age, 'Information satisfaction on coronavirus', 'Confusion due to information on coronavirus' and 'Overall, I believe that vaccinations are effective'. The authors recommend taking into account the factors that affect school administrators' coronavirus-related health literacy levels when planning school health promotion activities. This research was conducted during the pandemic period. Since the pandemic has been brought under control, it is recommended to be repeated with a larger sample. Crisis management skills and current health trainings for school administrators can be planned for possible future crises or extraordinary situations.

IMPLICATIONS FOR SCHOOL HEALTH

In addition to managing education at school, school administrators also manage studies on issues such as organizing the school environment, encouraging the use of masks when necessary, maintaining physical distance and providing hand hygiene to prevent the spread of infectious diseases. This is why the health literacy levels of school administrators matter. Our study found that although the coronavirus-related health literacy level among school administrators was sufficient, more than half of the administrators had various levels of confusion concerning coronavirus information. To eliminate the confusion concerning coronavirus information, it is recommended that nurses be employed in schools, guidelines created to solve the coronavirus-related problems experienced in schools and that school administrators be given health education about coronavirus. According to these research findings, priority should be given to school administrators who are women, over 50, who are confused and have little knowledge about COVID-19, in COVID-19 trainings. While the majority of school administrators in this study had positive thoughts about vaccines, some reported that vaccines were not important in protecting themselves and their families, that vaccines were not safe or effective, and that vaccines were not compatible with their attitudes and religious beliefs. Future research should examine school administrators' health literacy concerning vaccination and develop plans to improve it.

AUTHORS' CONTRIBUTIONS

Study design: F.O.O., P.S., S.S., O.O. and K.D. Data collection and data analysis: F.O.O. Manuscript writing: F.O.O., P.S. and S.S. Critical revisions for important intellectual content: F.O.O., O.O. and K.D.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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ETHICAL APPROVAL

Before collecting the data, ethical approval was obtained from Fırat University (Date: 22 April 2021, Nr. 06/32), and written permission was given by the Provincial Directorate of National Education. An informed consent form was placed on the first page of the online questionnaire, and the statements 'I agree to participate in the study' and 'I do not agree to participate in the study' were added at the end of the consent form. Participants who read the consent form and checked the 'I agree to participate in the study' box answered the online questionnaire. The participants who checked the 'I do not agree to participate in the study' left the system without seeing the survey questions.

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