Factors Associated With Self-efficacy Toward Healthy Eating and Physical Activity Among Kuwaiti Adolescent Girls

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Research

Keywords: healthy eating, self-efficacy, dietary habits, Kuwait, adolescents, physical activity

DOI: https://doi.org/10.21203/rs.3.rs-74824/v1

Abstract

Background: The factors that may influence adolescents' health-related behaviors in Kuwait are unclear. We hypothesized that girls' self-efficacy would be negatively associated with their weight statuses and positively associated with healthy eating-related behaviors. This study aimed to measure healthy eating-related parameters, including self-efficacy, dietary habits, dietary beliefs, nutrition knowledge, and physical activity, in a sample of Kuwaiti adolescent girls and assess the correlates of self-efficacy, including weight status and dietary and health behaviors.

Methods: In this cross-sectional, self-administered survey at the school level, we evaluated students of three schools in different governorate locations in Kuwait. The participants were adolescent girls (n=301; mean age, 16.6±1.2 years) who attended secondary schools. The main outcome measures were self-efficacy, dietary habits, dietary beliefs, nutrition knowledge, physical activity, and weight status per body mass index (BMI) categories. Pearson's correlation analysis was performed to determine the associations among the healthy behavior related parameter scores. The independent samples *t*-test was used to examine the differences in scores between participants' characteristics and self-efficacy scores (SES). Multivariate regression analysis was used to determine the final independent correlates of SES.

Results: Only 19.9% of the participants had high self-efficacy toward healthy eating behaviors, 20.9% had "satisfactory eating habits," 11.3% had a good comprehension of the meanings of healthy and unhealthy dietary habits and food, 16.3% had good nutrition knowledge, and 29.2% had an active lifestyle. SES was negatively correlated with BMI (r=-0.074, P=0.03) and positively correlated with all domains of healthy eating and physical activity. However, SES was not associated with nutritional knowledge. The independent correlates of SES in the multivariate regression analysis were governorate, eating beliefs, healthy eating score, and physical activity (R^2=38.3%).

Conclusions: Adolescent girls in Kuwait demonstrated a high level of self-efficacy toward healthy eating and behaviors and had firm nutritional beliefs; however, they failed to translate their beliefs into good nutritional habits. It is necessary to develop interventional nutrition programs at the school level that aim at improving healthy behaviors among adolescents.

Background

Adolescent obesity is a major health concern in Kuwait. According to the latest survey conducted by the 2018 Kuwait Nutrition Surveillance System [1], 21.5% of adolescents are overweight, and 27.5% had obesity. Overweight and obesity correlate with age in both sexes [2]. There is consensus among researchers that adolescence is a transition period when teenagers gradually become independent and responsible for their own eating behaviors and attitudes [3]. During adolescence, young people assume responsibility for their own eating habits, health-related attitudes and behaviors, and their growing independence is often associated with unconventional eating patterns. Any retained dietary habits and nutritional knowledge acquired in adolescence may persist in adulthood and would have important

lifelong ramifications [4, 5, 6]. Unhealthy eating habits commonly reported among Kuwaiti adolescents include fast food consumption, skipping breakfast, consumption of high-calorie snacks, and low consumption of fruits and vegetables [7, 8]. Fewer studies have reported on the factors that affect the eating habits of Kuwaiti adolescents. Musaiger et al. [9] found that the lack of information and motivation were the main barriers keeping adolescents from eating a healthy diet. It is unclear what factors may influence adolescents' health-related behaviors in Kuwait, and more studies are needed to identify what motivates and helps adolescents adopt healthy eating habits.

According to the social cognitive theory, behaviors are mediated by variables such as self-efficacy, attitudes, and knowledge. The concept of self-efficacy was defined by Albert Bandura as an individual's beliefs toward his/her own ability to do something or his/her confidence in doing so. Martens et al. [10] found that food choice decisions were affected mainly by attitudes toward health, with positive attitudes being associated with higher intake of fruits and breakfast and less intake of high-fat snacks. Fitzgerald et al. [11] found that higher self-efficacy toward making healthy food choices was associated with healthy food intake among adolescents in Ireland. Furthermore, knowledge about healthy food choices may help improve eating habits and thus facilitate the adoption of a healthy diet [12, 13, 14]. Such factors influencing food choices and eating behaviors and their interrelations have never been investigated in Kuwaiti adolescents. This research is important to determine the intervention strategies needed to address adolescents' nutrition-related health problems and improve healthy eating behaviors among them.

The present study was conducted to measure psychosocial determinants of eating behaviors in a sample of Kuwaiti adolescents, focusing on self-efficacy as the major outcome measure and to investigate the relationship between self-efficacy and dietary beliefs, physical activity, nutritional knowledge, and weight status in a sample of Kuwaiti adolescent girls. We hypothesized that girls' self-efficacy would be associated negatively with their weight statuses and positively with healthy eating-related behaviors.

Methods

Study design

The present cross-sectional study was conducted between October 2014 and February 2015 among adolescent girls recruited at three different high schools in Kuwait. A self-administered survey questionnaire was used to collect data on sociodemographic characteristics, anthropometric variables, body weight, dietary behavior, and health-related lifestyle habits. The data were collected during regular school hours.

Recruitment and sampling

Three hundred and one participants (n = 301) were conveniently sampled at three different schools located in three different governorates: Asema and Al-Jahra (both public schools), and Hawally (a private school). Each school location is characterized by special demographic and socio-cultural features as per

the residential governorate of the students. For example, the educational levels of the Kuwaiti residents in Al-Jahra had been noted to be lower than those of Kuwaiti residents in Asema and Hawally. Although intermediate or secondary education is the dominant education category in each governorate among the adult population, 28.7% of Al-Jahra residents received only primary education or lower, whereas more than 40% of residents of Asema and Hawally reported being educated to college level or higher [15]. Several schools were invited to participate in the study, and only those who showed a willingness to cooperate in the research were approached by the research team. Ethical approval was obtained from the Ministry of Health and the Ministry of Education (approval no. 34751, January 26, 2015). Participating classrooms were chosen by the school administration based on scheduling convenience, and students were selected from each classroom randomly. Parental written informed consent was obtained prior to collecting data. All students aged 13–19 years who were willing to participate were included in this study.

Survey questionnaire: construction and validation

The survey questionnaire was initially adopted from that formulated by Turconi et al. [16]; however, many of the items were modified to render the final questions appropriate for Kuwaiti adolescents. The survey questionnaire included six main sections in addition to the first section on demographic information. The questionnaire contained a total of 48 questions. The survey questionnaire included the following six scales. (1) Self-efficacy: measured the level at which participants can assume attitudes and behaviors that can improve health statuses related to nutrition, with the possible outcomes presented as the shortest form of the Likert scale that included “yes,” “I do not know,” and “no” and scored as 3, 2, and 1, respectively. This section consisted of seven questions. The maximum possible score was 21, and the scores were divided into three tertiles categories based on sample distribution: low self-efficacy (scored 0 to 16), moderate self-efficacy (scored 16 to 19), and high self-efficacy (scored 19 to 21). (2) Nutritional knowledge: assessed a few nutritional aspects. This section consisted of 7 items. The maximum possible score was 7, and the total scores were divided into three categories based on sample distribution: insufficient knowledge (scored 0–3), good knowledge (scored 3–4), and very good (scored 4–7). (3) Dietary beliefs: measured participants’ understanding levels in identifying the concepts of a healthy diet, the healthiest foods, and the healthiest cooking methods. This section consisted of three items. The maximum possible score was 12, and the total scores were divided into three categories based on sample distribution: little comprehension of the meaning of healthy and unhealthy food and dietary habits (scored 0 to 9), sufficient comprehension of the meaning of healthy and unhealthy food and dietary habits (scored 9 to 11), and good comprehension of the meaning of healthy and unhealthy food and dietary habits (scored 11 to 12). (4) The healthy eating score (HES) was determined from participants’ food frequency consumption, which represented the adequacy of intake of major food groups, including the daily consumption of fruits and vegetables, dairy products, carbohydrates, and meat. Furthermore, the intake of sweets, fast food, high sugar drinks, and energy drinks were measured. Frequency of intake was measured as daily intake or intake per week if the food was not consumed daily; the ideal answer had the highest value, while the worst answer had the lowest value, according to the USDA sex and age-specific guidelines [17]. The serving sizes were explained verbally, and illustrative graphics were included in the questionnaire to ensure that the adolescents could estimate food intake

more accurately [18]. This section consisted of 19 items. The maximum possible score was 94, which indicated the best possible food intake pattern. (5) Dietary habits: assessed breakfast habits, consumption of foods containing high sugar levels after meals, the number of main meals in the day, and the type of snacks consumed daily. This section consisted of four items. The maximum possible score was 16, and the scores were divided into tertiles based on sample distribution: “inadequate eating habits” (scored 0–9), “partially satisfactory eating habits” (scored 9–12), and “satisfactory eating habit” (scored 12–16). (6) Physical activity: assessed physical activity levels, types of activity, and the number of hours spent in physical education (PE) classes. This section consisted of seven items. The maximum possible score in this section was 18, and the scores were divided into three categories: sedentary physical activity level (scored 0–8), moderate physical activity level (scored 8–10), and an active physical activity level (scored 10–18). The possible choices from all scales were coded in descending order from the healthiest answer (best value) to the least healthy one (least value).

The adopted survey questionnaire was tested for validity and reliability through four stages. The survey questions were reviewed for face validity by two faculty members of the Department of Nutrition and were translated into Arabic and back translated to English by a professional translator. A student researcher also reviewed the Arabic version to ensure that the wording was appropriate for the Kuwaiti students and could be understood clearly. Inconsistencies between the two versions were discussed and revised by the researchers. The modified questionnaire was tested for content validity by five local experts in nutrition using Lawshe’s method. All items with content validity ratios below 0.78 were excluded, and adjustments were made until a consensus was reached on the final version [19]. Comprehensiveness and clarity were assessed by conducting structured interviews with a sample of adolescents (n = 10) who were not included in the main survey sample to confirm comprehension and feasibility for this age group. The final version of the questionnaire was assessed for reliability using an additional group of adolescents (n = 33). Scores of the same students (2 weeks between 2 sittings) were assessed for test-retest reliability; however, these students were not included in the main study sample. Cronbach’s α was calculated for total subscales and recalculated if an item was removed from a subscale to improve consistency. The good consistency of the scale was defined for Cronbach’s α values between 0.5 and 0.7 based on the dimensionality of the scale [20]. However, a lower Cronbach’s α was considered sufficient to indicate consistency for scales with less than ten items [20]. Cronbach’s α values ranged from 0.43 to 0.76, demonstrating acceptable internal consistency, similar to that reported in a study conducted by Turconi et al. [16].

Anthropometric measurements

Students’ weights and heights were measured using a beam balance scale (Detecto eye-level scale with height rod, model number 2391; Acculab Digital Scales, USA). Students were asked to take off their shoes prior to measurement. Weights were recorded to the nearest decimal fraction, while heights were recorded to the nearest whole digit. The body mass index (BMI) was calculated by dividing the weight in kilograms by the square of the height in meters. The weight status was assessed using the Centers for Disease Control and Prevention growth charts and classifications such that underweight, normal weight,

overweight, and obesity were defined as a BMI < 25th percentile, 25th ≤ BMI < 85th percentile, 85th ≤ BMI < 95th percentile, and BMI ≥95th percentile, respectively [21].

Sociodemographic information

The questionnaire included questions on each student's governorate, student's nationality, father's and mother's nationalities, father's and mother's educational levels, mean family income, major (science or literature), birth date, in addition to two questions: "Are you interested in receiving nutrition information?" and "What is the preferred source of any received nutrition information?"

Statistical methods

All variables were assessed for normality. Descriptive statistics were provided using means and standard deviations for continuous variables, frequencies and proportions for categorical variables, and prevalence for weight status. Analysis of variance with Bonferroni's correction was used to study the associations between tertiles of self-efficacy scores and other health-related domains. Pearson's correlation coefficients were determined for the relationship between the scores of the six scales and BMI. All scores, except for the HES, were divided into tertiles based on the sample distribution. Analysis of variance was used to compare the differences in mean scores across tertiles. Multivariate regression was used to determine the final independent correlates of self-efficacy scores (SES). The data were coded, entered, and analyzed using SPSS Statistics version 24 (SPSS Inc., Chicago, IL, USA). Analysis items with $P < 0.05$ were considered statistically significant.

Results

Population characteristics

A total of 301 participants (mean age, 16.6 ± 1.2 years) completed the study. We obtained equal participation from all three locations: Asema (n = 100, 33.2%), Al-Jahra (n = 100, 33.2%), and Hawally governorate (n = 101, 33.6%) (Table 1). Kuwaiti students constituted 73.5% of the sample, whereas 26.5% were of other nationalities. Most of the students' parents had educational levels of bachelor's degree and higher (78.5% and 74.9% for fathers and mothers, respectively). With regards to family income, 11.2% reported income levels less than 1500 Kuwaiti dinar (KWD) per month, 41.4% reported income levels between 1500 and 2000 KWD per month, and 47.4% reported income levels above 2000 KWD per month (Table 1). Sixty-six of the participants (66.2%) reported that they were interested in receiving information on nutrition, while 15.2% were not interested in receiving information on nutrition, and 18.6% were unsure. When asked about their preferred source of nutritional information, 43.6% reported having received information from social media. The majority of students reported that they were not getting any nutritional information from health professionals (73.5%) or their schools (89.9%) (data not shown in the tables). The mean BMI was 25.26 ± 5.61 kg/m^2. We found that 2.4% of participants were underweight, 54.9% had normal weights, 24.1% had overweight, and 18.5% had obesity.

Table 1
Participant characteristics

Variables	n (%)
Governorate	
Asema	100 (33.2)
Al-Jahra	100 (33.2)
Hawally	101 (33.6)
Nationality (%)	
Kuwaiti	221 (73.5)
Others	80 (26.5)
Mean household income per month, KWD	
Low (< 1500)	33 (11.2)
Medium (1500–2000)	125 (41.4)
High (> 2000)	143 (47.4)
Fathers educational level	
High school and lower	65 (21.5)
Bachelor's degree and higher	236 (78.5)
Mothers educational level	
High school and lower	76 (25.1)
Bachelor's degree and higher	225 (74.9)
Abbreviations: KWD, Kuwaiti dinar	

Assessment of the six individual scales of the survey questionnaire

Table 2 shows the percentage distribution of participants according to tertiles of scores of the six domains. For **self-efficacy**, the mean score was 17.03 ± 3.26 (at 81% of the total score; interquartile range [IQR] 15–19). More than a quarter of the sample (25.6%) was in the "low self-efficacy" category, half (54.5%) was in the "moderate self-efficacy," and 19.9% was in the "high self-efficacy" category (Table 2). For the **HES** determined from **food frequency consumption**, the mean score was 45.88 ± 7.95 (at 49% of the total score; IQR 40–51). Only 8.3% and 7% of the total sample met the recommended amount of fruits (3 servings/day) and vegetables (3–4 servings/day), respectively. In addition, 3.7% met the recommended number of servings for dairy products (3 cups/day), 44.5% consumed meat or chicken once per day, and 31.9% consumed seafood once to twice per week. Only 19.9% consumed legumes more than four times

per week, and 38.5% consumed legumes once per 10 to 15 days. Fast food meals were consumed once or twice per week by 43.2% of the participants and three to four times per week by 20.6% (Additional Table 1). For the **dietary habits** score, the mean was 10.33 ± 2.46 (at 65% of the total score; IQR 9–12). Approximately forty percent (40.2%) reported that they ate breakfast sometimes, 55.1% ate breakfast always or often, and only 4.7% never ate breakfast. Approximately half the sample (51.5%) reported that they sometimes ate sweets after meals. More than a third of the sample (41.5%) consumed snacks such as candies, chocolates, cakes, and ice creams. Students also reported consuming fast foods (17.3%); salty foods, such as chips (17.3%); or healthy snacks (19.9%), such as fruits, fruit juices, milk, laban, dried fruits, or dates. The number of main meals reported during the day varied; only 32.9% consumed three main meals daily. However, 40.5% consumed two main meals daily (Additional Table 2). Overall, 20.9% of participants had “satisfactory eating habits,” 55.9% had “partially satisfactory eating habits,” and 23.3% had “inadequate eating habits” (Table 2). For **dietary beliefs**, the mean score was 9.51 ± 1.97 (at 79% of the total score; IQR 8–11). Twenty-nine percent (28.9%) of participants showed poor comprehension about healthy and unhealthy food and dietary habits, 59.8% showed sufficient comprehension, and only 11.3% showed good comprehension (Table 2). More than sixty percent (68.4%) of the students believed that “a healthy diet is varied and includes all food groups,” 64.8% of the participants identified correctly “washed ready to eat vegetables” as the healthiest food item from a list; 65.1% identified “cooking on a grill/in boiled water” as the healthiest cooking method, but the best answer was “cooking in the oven without fats” answered correctly by 21.9% of the sample.

Table 2
Distribution of participants across tertiles of scores

Section	The max total possible score	% (n) of participants		
		Low	Moderate	High
(1) Self-efficacy [a]	21	25.6 (77)	54.5 (164)	19.9 (60)
(2) Dietary habits [b]	16	23.3 (70)	55.8 (168)	20.9 (63)
(3) Dietary beliefs [c]	12	28.9 (87)	59.8 (180)	11.3 (34)
(4) Physical activity [d]	18	30.9 (93)	39.8 (120)	29.2 (88)
(5) Nutrition knowledge [e]	7	19.6 (59)	64.1 (193)	16.3 (49)
[a] Self-efficacy score tertiles: low (0–16), moderate (16–19), and high (19–21)				
[b] Dietary habits score tertiles: low (0–9), moderate (9–12), and high (12–16)				
[c] Dietary beliefs score tertiles: low (0–9), moderate (9–11), and high (11–12)				
[d] Physical activity score tertiles: low (0–8), moderate (8–10), and high (10–18)				
[e] Nutrition knowledge score tertiles: low (0–3), moderate (3–4), and high (4–7)				

For **physical activity** (Table 2), the mean score was 9.05 ± 2.72 (at 50% of the total score; IQR 7–11). Almost a third of the sample (30.9%) had sedentary physical activity levels, more than a third (39.8%) had moderate physical activity levels, and another third (29.2%) reported active physical activity levels. Only 9% reported that their physical activity levels were high during their free time with activities such as brisk walking, dancing, swimming, and biking. More than two-thirds of the students (75.4%) reported that they participated in school-based PE classes, and 41.9% spent one hour per week in PE. Students perceived PE classes as “boring” (48.2%), “tiring” (15.3%), “make me feel well, healthy, and happy” (23.9%), and only 8% found PE classes to “stimulate them away from routine classroom activities.” With regard to sedentary behaviors, 79.7% reported that they preferred watching television, listening to music, using the computer, or reading a book during their free time. Moreover, 33.9% spent more than 6 hours per day engaging in sedentary activities such as watching television, sitting at the desk, and playing with electronic gadgets. The average score for **nutrition knowledge** was 3.44 ± 1.12 (at 49% of the total score; IQR 3–4) (Table 2). Overall, the nutritional knowledge was insufficient in 19.6% of the sample, good in 64.1%, and very good at 16.3%. Students were able to identify sources of carbohydrates (76.3%) and proteins (78.7%), and less able to identify sources of fiber (43%). The majority of participants failed to identify foods that were low in fat (73.9%) or calorie-dense (79.4%). Most of the students (85%) were familiar with the concept that a “balanced diet” contains all the nutrients in proper quantities.

Comparison among locations

Differences in the mean scores of the six survey domains among school locations were assessed (Additional Table 3). There were no significant differences in the mean scores of HES among locations. In terms of food habits score, the Al-Jahra governorate had significantly the lowest mean score (9.6 ± 2.4 vs. 10.5 ± 2.4 for Asema and 10.9 ± 2.4 for Hawally), and the Hawally governorate school had significantly the highest physical activity score (10.1 ± 3.1 vs. 9.0 ± 2.2 for Asema and 8.0 ± 2.4 for Al-Jahra), dietary beliefs (10.3 ± 1.6 vs. 9.4 ± 2.1 for Asema and 8.9 ± 2.0 for Al-Jahra), and nutritional knowledge (4.0 ± 1.2 vs. 3.3 ± 0.9 for Asema and 3.0 ± 1.0 for Al-Jahra). The Asema governorate had significantly the lowest mean self-efficacy score (15.7 ± 4.0 vs. 17.4 ± 2.8 for Al-Jahra, and 17.9 ± 2.5 for Hawally). There were no differences in BMI and BMI percentiles among locations ($P > 0.05$).

Table 3
Anthropometric characteristics and survey parameters scores of participants according to tertiles of self-efficacy scores

Variables	Total	SES Tertiles		
		Tertile 1 (0-15.9)	Tertile 2 (16-18.9)	Tertile 3 (19–21)
Age (years)	16.6 ± 1.2	16.8 ± 1.1[a]	16.6 ± 1.2[a]	16.5 ± 1.2[a]
BMI (Kg/m^2)	25.3 ± 5.6	26.0 ± 6.8[a]	25.6 ± 5.4[a]	24.6 ± 5.0[a]
School Locations (distribution %)				
Asema	100 (33.2%)	11.6 ± 2.9	17.0 ± 0.9	19.5 ± 0.9
Al-Jahra	100 (33.2%)	13.3 ± 1.7	17.4 ± 0.7	19.8 ± 0.8
Hawally	101 (33.6%)	13.2 ± 1.5	17.0 ± 0.8	19.8 ± 0.8
Healthy eating (score out of 94)	45.9 ± 7.9	44.0 ± 7.0[a]	45.0 ± 8.3[a]	47.6 ± 7.9[b]
Dietary habits (score out of 16)	10.3 ± 2.5	9.6 ± 2.2[a]	10.4 ± 2.3[b]	10.7 ± 2.6[b]
Dietary beliefs (score out of 12)	9.5 ± 3.4	8.7 ± 2.1[a]	9.7 ± 1.9[b]	9.9 ± 1.8[b]
Physical activity (score out of 18)	9.1 ± 2.7	8.3 ± 2.5[a]	8.7 ± 2.6[a]	9.7 ± 2.8[b]
Nutrition knowledge (score out of 7)	3.4 ± 1.1	3.4 ± 1.3[a]	3.4 ± 1.1[a]	3.5 ± 1.0[a]
[a,b] Differences at the 0.05 significance level according to the analysis of variance and post-hoc test				
SES, self-efficacy scores				

Correlates of self-efficacy

Students who were in the highest SES tertile had the highest HES (47.6 ± 7.9) and physical activity score (9.7 ± 2.8) (Table 3). Furthermore, those in the upper two tertiles for SES scored higher than the 1st tertile for dietary beliefs (9.7 ± 1.9) and dietary habits (9.9 ± 1.8), respectively. When analyzing food frequency components, we found a significant association between SES and intake of dairy products, fast food, and sugar-sweetened beverages (Additional Table 1). Students with higher SES consumed dairy products

more frequently and consumed fast food and sugar-sweetened beverages less frequently compared to those with lower SES. Also, we found significant associations between SES and snacking habits; that is, those participants with high SES tended to snack more on fruits or fruit juices/ milk or laban/yogurt/ dried fruits/ dates and were less likely to snack on candies/ chocolates/ sweets and cakes/ ice cream (Additional Table 2).

SES was positively associated with HES, dietary habits, dietary beliefs, and physical activity, but not with nutrition knowledge. Both SES and physical activity were negatively associated with BMI (Additional Table 4). In the univariate analysis, the final correlates of SES, which we included in our multilinear regression model, were the governorates, BMI, and the scores of the following domains: HES, dietary habits, physical activity, and dietary beliefs (Table 4). In the multivariate linear regression analysis, SES remained significantly associated with the governorate ($\beta = 0.813$, $P < 0.001$), physical activity ($\beta = 0.153$, $P = 0.038$), dietary beliefs ($\beta = 0.245$, $P = 0.026$), and HES ($\beta = 0.173$, $P = 0.023$) (Table 5).

Table 4
Univariate analysis of the associations between variables and self-efficacy scores

Variables	Regression Coefficient Beta	Standardized regression coefficient, B	95% confidence interval		P-value
			Lower	Upper	
Age	-0.266	− .095	-0.591	0.059	0.109
Governorate	0.899	.246	0.648	1.521	0.000
BMI	− .074	-0.128	-0.140	-0.008	0.027
Healthy eating score	0.082	0.199	0.036	0.128	0.001
Dietary habits score	0.223	0.168	0.074	0.372	0.003
Physical activity score	0.242	0.202	0.108	0.376	0.000
Dietary beliefs score	0.381	0.230	0.198	0.564	0.000
Nutrition knowledge score	0.036	0.012	-0.295	0.367	0.832

Table 5
Multivariate linear regression analysis for identifying independent correlates of self-efficacy scores

Stepwise Model	Unstandardized Coefficients		Standardized Coefficients	t	P-Value
	B	Std. Error	Beta		
(Constant)	10.905	1.626		6.708	.000
Physical activity	.153	.073	.125	2.082	.038
Dietary beliefs	.245	.110	.146	2.235	.026
Dietary habits	.080	.090	.059	.891	.374
Nutrition knowledge	.455	.185	.154	2.459	.532
Healthy eating score	.057	.025	.137	2.283	.023
Governorate	.813	.211	.224	3.861	.000
BMI	− .045	.034	− .076	-1.343	.180
[a] Dependent variable: self-efficacy					
[b] Predictors: (constant), BMI, nutrition knowledge, healthy eating score, governorate, physical activity, dietary beliefs, and dietary habits					

R-squared = 0.383

Discussion

To our knowledge, the present study is the first to attempt to assess self-efficacy in relation to health-promoting behaviors, such as physical activity and healthy eating among adolescent girls in Kuwait. The sample of adolescent girls assessed in this study demonstrated a moderate level of self-efficacy. However, those with the highest level of self-efficacy had better health-related behaviors, including more engagement in physical activity and consistent healthier dietary habits and food choices. This is in accordance with the results of several studies among adolescents that showed correlations between self-efficacy and increasing physical activity [22], increasing intake of fruits and vegetables, and engagement and adherence to weight control behaviors [23]. Self-efficacy is gained through knowledge, understanding, and skill development, and it is an important component in effective health communication and disease prevention interventions [24]. Self-efficacious people tend to be optimistic about engaging in behaviors, rather than focusing on negative thoughts about their inability to achieve a goal, are more likely to take on challenges easily, have a greater sense of commitment, and cope better with unexpected events or disappointment [24]. Non-efficacious people avoid challenges and fail at tasks perceived to be beyond their abilities, and they have little incentive to act or persevere in the face of difficulties [24]. Fitzgerald et al. [11] showed that higher self-efficacy was associated with ‘healthy food

intake' in adolescents aged 13–18 years. In addition, lower self-efficacy for healthy eating and higher peer support for unhealthy eating were associated with 'unhealthy food intake.' Nastaskin and Fiocco [25] found that high self-efficacy was associated with the lowest levels of fat and sodium intake.

We found that female students with the highest self-efficacy had higher scores on dietary beliefs; that is, they had a better comprehension of what constitutes healthy versus unhealthy dietary practices. Dietary beliefs can influence motivation and behavior; thus, it can guide the individual's capacity to carry out actions and make decisions that are part of success in progressing to positive outcomes. This is consistent with the role of self-efficacy in decision making, outlined by Bandura's social cognitive theory. Glasofer et al. [26] found that among adolescent girls (n = 110, mean age 14.5 ± 1.7 years; mean BMI 27.1 ± 2.6 kg/m^2), self-efficacy (both general and eating-related) was negatively associated with self-reports of disinhibited eating behaviors (i.e., less frequent loss of control while eating in the past month). The researchers identified that those girls least likely to believe in their ability to influence outcomes were most vulnerable when faced with a toxic food environment such as a buffet meal [26]. Further, higher self-efficacy correlated positively with weight-conscious behaviors, such as eating more proteins as promoted by diet culture [26]. Several studies showed that self-efficacy was positively associated with healthy eating behaviors and negatively with unhealthy eating behaviors. Among female adolescents in Minnesota, self-efficacy toward making healthy food choices was significantly positively related to calcium intake [27]. Moreover, another study showed that self-efficacy toward low-fat milk consumption was correlated positively with low-fat milk consumption and negatively with sweetened beverages consumption [28]. In this study, self-efficacy toward health and nutrition was positively correlated with healthy eating habits and physical activity, and negatively with BMI.

We found that students with sufficient nutrition knowledge about healthy and unhealthy foods and dietary habits had better eating habits. Musaiger et al. [9] found that one of the main barriers to healthy eating among adolescents was not having enough information on what constitutes a healthy diet. Wardle et al. [14] reported that nutritional knowledge was associated with higher intakes of fruits and vegetables and less intake of fat. Grosso et al. [12] demonstrated that improving nutrition knowledge in children and adolescents may lead them to adopt healthier eating behaviors. Contrary to our expectation, we did not find a relationship between nutrition knowledge and self-efficacy. Among the adolescent girls, we identified a gap in knowledge about dietary fiber, protein, and energy contents of food, which may indicate that they face difficulties in translating nutritional advice into food choices that improve their diet [29]. The overall nutrition knowledge in our sample was low, similar to that in previous reports among Kuwaiti adolescents and college students [30, 31]. We also found that the father's educational level was positively associated with students' level of nutritional knowledge [31]. The education of the father may reflect his high awareness and acquaintance with healthy nutrition and its impact on family health, and thus, may influence their children's knowledge. Nutritional knowledge may be a predisposing factor for eating behaviors; however, voluntary behavior improvement requires motivation, ability, and opportunity to improve one's behavior. For example, having more experience with meal preparation and kitchen experiences increase confidence and independence in dietary decisions [32]. Lack of nutritional

knowledge may be due to the lack of knowledge on nutrition-specific information related to dietary concepts more than those gained with a general understanding developed through the family environment or peer pressures [11]. In support of these concepts, students from the Hawally governorate showed better nutritional knowledge scores than those from the other two governorates in terms of nutritional knowledge and dietary beliefs. We speculate that this is because it was the only school that reported providing a nutrition class in their curriculum. The school environment can be an important setting for providing, promoting, and supporting healthy lifestyles among youth [33]. It was clear from the students' responses about their source of information that there was a lack of a reliable source for this age group, as the majority of the female students reported getting information on nutrition from social media (43.6%) and rarely getting any information on nutrition from schools (10.1%) or health professionals (26.5%).

In support of the above findings, we found that self-efficacy differed significantly according to governorates, and the governorate was found to be a major correlate in the multivariate regression model. Students from Al-Jahra scored the lowest in dietary habits and belief scores, physical activity, and nutrition knowledge. Students from the Asema governorate scored the lowest in SES. These observations can be partly explained by the fact that each governorate in Kuwait is characterized by special demographic and socio-cultural features. Similar to the results of a prior national survey, we found that according to the variations in parental educational levels among governorates, 28.7% of the Kuwaiti residents in Al-Jahra had received only primary education or less, whereas intermediate or secondary education was the dominant education category in other governorates, and over 40% of respondents in Asema and Hawally reported having received college education or higher [15]. Much of the variations found in SES between governorates may be due to sociodemographic characteristics, family dynamics, and parenting style, which need further exploration in future studies [34, 35].

The prevalence of overweight and obesity (42.6%) was high in our sample, similar to those reported at the national level [1]. This can be partly explained by the poor eating habits found among the adolescent girls, evidenced by very low consumption of fruits and vegetables and high frequency of fast food intake, snacking on sweets, and drinking sugary beverages. These findings are similar to those reported in earlier surveys [8]. Many factors increase fast food consumption among adolescents in Kuwait, including the availability of fast food restaurants 24 hours per day and 7 days per week, accessibility by home delivery, and the low prices [36]. In our sample, snack components were mainly sweets such as candies, chocolate, and ice creams (41.5%). The preference for sweets may be related to sex; as adolescent girls, hormonal changes may affect food choices and desires. Similarly, a preference for sweets as a snack choice was reported in Bahrain, where female students consumed sweets and chocolates more than males, and the majority of the female students reported that they consumed sweets and chocolates daily [37]. Stress was also shown to affect adolescents' food choices, but self-efficacy may be the moderator between stress and food intake [25].

Notably, in our sample, BMI was negatively associated with self-efficacy as shown by other researchers [38, 39]; however, this relationship did not remain after considering all the various covariates in the

multivariate regression model. In fact, there was no difference in weight status among SES tertiles in our sample. Our data showed that the relationship between weight status and self-efficacy could be modulated by physical activity, dietary beliefs, HES, and interacting factors related to the variations in the governorate or school location. All these factors may individually or synergistically affect weight status and susceptibility to overweight or obesity. Therefore, it is difficult to tease out an independent relationship.

Overall, physical activity levels were moderate in our sample at a higher level in the private school. Physical activity scores showed that a majority (81%) of participants spent their free time engaging in sedentary activities such as listening to music and using their tablets, laptops, and computers, and only 10% spent their free time engaging in high-level physical activities. In addition, more than a third of the sample spent more than six hours per day, engaging in sedentary activities. These observations are similar to those of previous studies conducted among adolescents [8, 38], which showed that adolescents' lifestyle habits consisted of spending several hours engaging in sedentary activities. Women are faced with more barriers to physical activity than men in Arab countries [9]. Some of the main barriers that were perceived to be somewhat important or important among female adolescents in Kuwait were "not having the time to be physically active," "the climate is not suitable for exercising," the "lack of motivation for physical activity," "less support from teachers," and the "lack of time." Similarly, we noted that increasing engagement in physical activity and decreasing sedentary behaviors among female adolescents are areas that need attention to promote a healthier and happier school environment among them. Expressing boredom and tiredness in relation to their PE classes, demonstrated that the students lacked motivation and had low self-efficacy.

Self-efficacy could be a primary target area for interventions leading to healthier lifestyle habits among adolescents. Particularly, combating the growing problem of obesity in adolescents in Kuwait is a public health priority. However, Boodai et al. [40] found poor adherence to obesity interventions among adolescents with obesity and their families in Kuwait, and their engagement in the offered interventions was limited. Adolescents and their parents expressed a low degree of concern about obesity, especially with respect to the fact that health-related quality of life was not impaired compared to that of their peers with healthy weights [40]. Furthermore, Al-Isa et al. [41] found multiple cardiometabolic risk factors in adolescents with obesity in Kuwait. Therefore, to implement effective interventions among adolescents, researchers should begin with a period of efficacy building, followed by a period of behavior change to yield maximum results. Furthermore, programs with such a structure should be evaluated in a subsequent randomized controlled trial [42].

The strengths of this study are: we collected data from 3 different schools in the largest governorates in Kuwait and used locally validated scales to measure SES and health-related behaviors. The limitations were: the sample consisted of only adolescent girls aged 13–19 years old, and therefore, the results may not be generalizable to adolescent males or younger females. Due to the recruitment strategy, these results may not be representative of their schools or their governorates and can only be considered as results of a pilot study. Therefore, future larger studies are warranted to determine these relationships in a

more randomized sample using a cluster sampling method. This would require national efforts from the Ministry of Education to facilitate research, as cooperation from the school administration was very limited. In addition, due to the cross-sectional nature of this analysis, we can only infer associations among these variables but not a causal relationship. Future research should use a larger sample size to test statistical assumptions and evaluate the generalizability of results. Finally, prospective interventional studies should assess whether a change in self-efficacy may increase participation and adherence to health-promoting interventions.

Conclusions

Identifying self-efficacy and the interacting factors related to adolescents' health-promoting behaviors, including engagement in physical activity and healthy eating, is needed to design effective interventions for adolescents. These domains are important, warrant inclusion as part of the main outcomes of interventions, and may be more informative than focusing on weight alone. Teachers and health professionals should put more effort into helping adolescents understand the importance of meeting their dietary recommendations, especially encouraging the consumption of fruits and vegetables. Schools should promote physical activity and ensure that PE classes are encouraging, age-appropriate, and enjoyable by offering a variety of activities. Furthermore, programs that target self-efficacy for healthy eating could be beneficial in improving eating habits among adolescents in Kuwait.

List Of Abbreviations

BMI Body mass index

HES Healthy eating score

PE Physical education

SES Self-efficacy scores

KWD Kuwaiti dinars

Declarations

Ethics approval and consent to participate: Ethical approval was obtained from the Ministry of Health and the Ministry of Education (approval no. 34751, January 26, 2015). A written consent to participate was obtained from the students and their parents.

Consent for publication Consents provided by the parents and school administration via a protocol approved by the Ministry of Education, Kuwait

Availability of data and materials Upon reasonable request from the Corresponding author

Competing interests There are no competing interests.

Funding This project was funded by the Kuwait University, Research Sector (Project #WF01/14)

Authors' contributions DA and LA conceived and designed the study; LA conducted recruitment and study methods; DA and LA coordinated data collection and entry, provided data analysis and results interpretations; LA and DA wrote the manuscript. Both authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Acknowledgements We acknowledge the participating schools and the student's participants of this study.

References

1. The Kuwait Nutrition Surveillance System. (2018 Annual Report). (2019). Ministry of Health, Food and Nutrition Administration. https://www.moh.gov.kw/FoodNutrition/KNSSReport2018.pdf.
2. Jackson RT, Al-Hamad N, Prakash P, Al-Somaie M. Age- and Gender-Specific Smoothed Waist Circumference Percentiles for Kuwaiti Adolescents. Med Prin Pract. 2010;19:269–74.
3. Spear BA. Adolescent Growth and Development. J Am Diet Assoc. 2002;102:23–9.
4. McNaughton SA, Ball K, Mishra GD, Crawford DA. Dietary Patterns of Adolescents and Risk of Obesity and Hypertension. Nutr J. 2008;138:364–70.
5. Uauy R, Solomons N. Diet, Nutrition, and the Life-Course Approach to Cancer Prevention. Nutr J. 2005;135:2934–45S.
6. Whincup PH, Gilg JA, Donald AE, Katterhorn M, Oliver C, Cook DG, et al. Arterial distensibility in adolescents: the influence of adiposity, the metabolic syndrome, and classic risk factors. Circulation. 2005;112:1789–97.
7. Al-Haifi AR, Al-Fayez MA, Al-Athari BI, Al-Ajmi FA, Allafi AR, Al-Hazzaa HM, et al. Relative contribution of physical activity, sedentary behaviors, and dietary habits to the prevalence of obesity among kuwaiti adolescents. Food Nutr Bull. 2013;34:6–13.
8. Allafi A, Al-Haifi AR, Al-Fayez MA, Al-Athari BI, Al-Ajmi FA, Al-Hazzaa HM, et al. Physical activity, sedentary behaviours and dietary habits among Kuwaiti adolescents: Gender differences. Public Health Nutr. 2014;17:2045–52.
9. Musaiger AO, Al-Mannai M, Tayyem R, Al-Lalla O, Ali EYA, Kalam F, et al. Perceived barriers to healthy eating and physical activity among adolescents in seven arab countries: a cross-cultural study. Sci World J. 2013;1–11.
10. Martens M, van Assema P, Brug J. Why do adolescents eat what they eat? Personal and social environmental predictors of fruit, snack and breakfast consumption among 12– 14-year-old Dutch students. Public Health Nutr. 2005;8:1258–65.

11. Fitzgerald A, Heary C, Kelly C, Nixon E, Shevlin M. Self-efficacy for healthy eating and peer support for unhealthy eating are associated with adolescents' food intake patterns. Appetite. 2013;63:48–58.
12. Grosso G, Mistretta A, Turconi G, Cena H, Roggi C, Galvano F. Nutrition knowledge and other determinants of food intake and lifestyle habits in children and young adolescents living in a rural area of Sicily, South Italy. Public Health Nutr. 2013;16:1827–36.
13. Sharma SV, Gernand AD, Day RS. Nutrition knowledge predicts eating behavior of all food groups except fruits and vegetables among adults in the Paso del Norte region: qué Sabrosa Vida. J Nutr Educ Behav. 2008;40:361–8.
14. Wardle J, Parmenter K, Waller J. Nutrition knowledge and food intake. Appetite. 2000;34:269–75.
15. UNISCO. *World Data on Education 2010/11 Kuwait* 7th ed. http://www.ibe.unesco.org/fileadmin/user_upload/Publications/WDE/2010/pdf-versions/Kuwait.pdf.
16. Turconi G, Guarcello M, Maccarini L, Cignoli F, Setti S, Bazzano R, et al. Eating habits and behaviors, physical activity, nutritional and food safety knowledge and beliefs in an adolescent Italian population. J Am Coll Nutr. 2008;27:31–43.
17. U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2015–2020 Dietary Guidelines for Americans*. 2015. https://health.gov/our-work/food-and-nutrition/2015-2020-dietary-guidelines/.
18. Livingstone MBE, Robson PJ, Wallace JMW. Issues in dietary intake assessment of children and adolescents. Br J Nutr. 2004;92:213–22.
19. Ayre C, Scally AJ. Critical values for Lawshe's Content Validity Ratio: revisiting the original methods of calculation. Meas Eval Couns Dev. 2014;47:79–86.
20. Cortina JM. What is coefficient alpha? An examination of theory and applications. J Appl Psychol. 1993;78(1):98–104.
21. Centers for Disease Control and Prevention *Use and Interpretation of the WHO and CDC Growth Charts for Children from Birth to 20 Years in the United States*. (2013). Centers for Disease Control and Prevention. https://www.cdc.gov/nccdphp/dnpa/growthcharts/resources/growthchart.pdf
22. Verloigne M, Cardon G, De Craemer M, D'Haese S, De Bourdeaudhuij I. Mediating effects of self-efficacy, benefits and barriers on the association between peer and parental factors and physical activity among adolescent girls with a lower educational level. PLOS ONE. 2016;11:e0157216. https://doi.org/10.1371/journal.pone.0157216
23. Luszczynska A, Hagger MS, Banik A, Horodyska K, Knoll N, Scholz U. Self-Efficacy, planning, or a combination of both? a longitudinal experimental study comparing effects of three interventions on adolescents' body fat. PLOS ONE. 2016;11:e0159125.
24. Muturi NW, Kidd T, Khan T, Kattelmann K, Zies S, Lindshield E, et al. An examination of factors associated with self-efficacy for food choice and healthy eating among low-income adolescents in three U.S. States. Front Commun. 1.

25. Nastaskin RS, Fiocco AJ. A survey of diet self-efficacy and food intake in students with high and low perceived stress. Nutr J. 2015;14:42.
26. Glasofer DR, Haaga DAF, Hannallah L, Field SE, Kozlosky M, Reynolds J, et al. (2013). Self-efficacy beliefs and eating behavior in adolescent girls at-risk for excess weight gain and binge eating disorder: Self-Efficacy Beliefs and Eating Behavior. *Int J Eat Dis*. 2013;*46*:663–8.
27. Larson NI, Story M, Wal M, Neumark-Sztainer D. Calcium and dairy intakes of adolescents are associated with their home environment, taste preferences, personal health beliefs, and meal patterns. J Am Diet Assoc. 2006;106:1816–24.
28. Thompson VJ, Bachman C, Watson K, Baranowski T, Cullen KW. Measures of self-efficacy and norms for low-fat milk consumption are reliable and related to beverage consumption among 5th graders at school lunch. Public Health Nutr. 2008;11:421–6.
29. Turconi G, Guarcello M, Maccarini L, Cignoli F, Setti S, Bazzano R, et al. Eating habits and behaviors, physical activity, nutritional and food safety knowledge and beliefs in an adolescent Italian population. J Am Coll Nutr. 2008;27:31–43.
30. Al-Isa AN. Obesity among Kuwait University students: An explorative study. J R Soc Promot Health. 1999;119:223–7.
31. El-Sabban F, Badr HE. Assessment of nutrition knowledge and related aspects among first-year kuwait university students. Ecol Food Nutr. 2011;50:181–95.
32. Hall E, Chai W, Albrecht JA. Relationships between nutrition-related knowledge, self-efficacy, and behavior for fifth grade students attending Title I and non-Title I schools. Appetite. 2016;96:245–53.
33. Ofosu NN, Ekwaru JP, Bastian KA, Loehr SA, Storey K, Spence JC, et al. (2018). Long-term effects of comprehensive school health on health-related knowledge, attitudes, self-efficacy, health behaviours and weight status of adolescents. *BMC Public Health*. 2018;*18*:515.
34. Peters J, Dollman J, Petkov J, Parletta N. Associations between parenting styles and nutrition knowledge and 2–5-year-old children's fruit, vegetable and non-core food consumption. Public Health Nutr. 2013;16:1979–87.
35. Asakura K, Todoriki H, Sasaki S. (2017). Relationship between nutrition knowledge and dietary intake among primary school children in Japan: Combined effect of children's and their guardians' knowledge. *J Epidemiol*. 2017;*27*:483–91.
36. Nezakati H, Kuan YL, Asgari O. Factors Influencing Customer Loyalty Towards Fast Food Restaurant. 2011;10.
37. Musaiger AO, Bader Z, Al-Roomi K, D'Souza R. Dietary and lifestyle habits amongst adolescents in Bahrain. *Food Nutrition Research*. 2011;55:7122.
38. Steele MM, Daratha KB, Bindler RC, Power TG. (2011). The relationship between self-efficacy for behaviors that promote healthy weight and clinical indicators of adiposity in a sample of early adolescents. *Health Educ Behav*. 2011;*38*:596–602.
39. Losekam S, Goetzky B, Kraeling S, Rief W, Hilbert A. Physical activity in normal-weight and overweight youth: associations with weight teasing and self-efficacy. Obesity Facts. 2010;3:239–44.

40. Boodai SA, McColl JH, Reilly JJ. National adolescent treatment trial for obesity in Kuwait (NATTO): project design and results of a randomised controlled trial of a good practice approach to treatment of adolescent obesity in Kuwait. Trials. 2014;15:234.
41. Al-Isa AN, Thalib L, Akanji AO. Circulating markers of inflammation and endothelial dysfunction in Arab adolescent subjects: Reference ranges and associations with age, gender, body mass and insulin sensitivity. Atherosclerosis. 2010;208:543–9.
42. Stephens JD, Althouse A, Tan A, Melnyk BM. The role of race and gender in nutrition habits and self-efficacy: results from the young adult weight loss study. J Obes. 2017;1–6.

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