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Social, attitudinal and behavioural correlates of fruit and vegetable consumption among Cypriot adolescents

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Abstract

Objective: To examine the prevalence and correlates of fruit and vegetable (FV) consumption in Cypriot adolescents.
Design: A cross-sectional study.
Setting: The Republic of Cyprus.
Subjects: A total of 1966 adolescents with a mean age of 14·7 (SD 2·2) years from nine elementary (*n* 448), six middle (*n* 657), five high (*n* 475) and five technical/vocational schools (*n* 386) in Cyprus. Participants completed a questionnaire assessing FV consumption using a two-item screening measure and a number of social, attitudinal and behavioural correlates of FV consumption.
Results: Overall, 19·3% of adolescents reported consuming five or more portions of FV daily, with elementary and middle school students more likely to meet recommendations (23·8% and 24·4%, respectively) compared with high and technical/vocational school students (14·0% and 12·5%, respectively). Consuming five or more portions of FV was associated with preference for FV (OR = 2·2), family eating patterns (OR = 1·5), friends' FV consumption (OR = 1·2) and school support for FV consumption (OR = 0·8). Consuming at least one portion of fruit daily was significantly associated with preference for FV (OR = 2·0) and family eating patterns (OR = 1·7). Consuming at least one portion of vegetables daily was associated with preference for FV (OR = 4·2) and eating while watching television (OR = 0·8).
Conclusions: Targeting individual and family-based components may enhance the effectiveness of intervention programmes to promote FV consumption.

Keywords
Cyprus
Adolescents
Fruit
Vegetables

Fruit and vegetable (FV) consumption is associated with a reduced risk of cancer, CVD and obesity[1]. A recent study indicated that FV consumption protects against markers of inflammation and oxidative stress from early adolescence onwards[2]. Daily intake of FV in adolescents has declined[3] and studies among children and adolescents have shown that they do not achieve the target of consuming at least 400 g or five portions of FV daily[4,5]. In the UK and Australia 44·8% and 52·4% of adolescents, respectively, meet the recommendation of five or more portions of FV daily[6,7]. Data from nine European countries indicate that 43·2% of children consume fruit and 46·1% consume vegetables every day[8], whereas data from Mexico suggest that 61·0% of children consume FV at least once daily[9]. Studies also indicate that girls are more likely to meet the recommendation of five or more portions of FV daily compared with boys[7,9,10].

Recently, social–ecological models have been proposed for the better understanding of factors that influence nutritional behaviour, as they focus not only on individual factors but also on social and physical environmental factors[11–13]. These multilevel models acknowledge the influence of multiple factors on nutritional behaviour; however, they refer to domains of influence rather than to specific variables[13,14]. Further, as studies have focused on physical environmental variables, more studies are needed that examine the social and cultural environment including the family and school that might influence adolescents' nutritional behaviour[12].

A number of studies have examined the social, attitudinal and behavioural correlates of FV consumption among young people. Taste preference and a liking for FV have been found to be significantly associated with FV consumption of children and adolescents in both the

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USA[15,16] and Europe[8,17]. Parental modelling, including eating breakfast at home with the child[7] and parents consuming FV every day[8], has also been found to be positive correlates of FV consumption. Parental encouragement, including parents trying to persuade their children to eat FV, buying FV and family meal frequency, has also been found to be positively associated with FV consumption among adolescents in the USA[15,18]. Home availability of FV has been found to be the strongest correlate among both children[17,19,20] and adolescents[15,16]. Studies have also investigated the role of television (TV) on FV consumption, with findings indicating that time spent watching TV[15] and eating in front of the TV[21] are negatively correlated with FV intake.

Cyprus is a member country of the European Union and is situated in the Eastern Mediterranean. The difference in the structure of the school day in Cyprus in comparison with that of other European and North American countries may reveal different correlates of FV consumption. In Cyprus, elementary and secondary schools end their day at 13.05 and 13.35 hours, respectively, and no school lunch is provided. Although school lunch is not provided in Cyprus, the canteens in schools may offer FV for sale and schools may participate in health education programmes that promote healthy lifestyles including FV consumption. Examining correlates of FV consumption is especially important, as recent evidence suggests that overweight and obesity levels of school-aged children in Cyprus are increasing[22] and that Cypriot elementary school students have a poor diet[23]. As social–ecological models acknowledge the influence of multiple factors on nutritional behaviour, the models need to be tailored to each population[14]. Therefore, to understand FV consumption in Cyprus it is important to assess how the model applies within this particular environment. However, we are not aware of any data that examine social–environmental, attitudinal and behavioural correlates of nutritional behaviour in Cyprus.

The purpose of the present study was twofold: (i) to examine the prevalence of daily FV consumption among Greek adolescents in Cyprus; and (ii) to examine correlates of FV intake among this population.

Methods

Sampling

The participants of the present study were students from twenty-five schools from all five districts under the control of the Republic of Cyprus. These schools represented 5·4 % of all public schools in Cyprus (*n* 467). Exclusion criteria were applied to only small elementary schools with fewer than six teachers, as those schools had a limited number of students. The smallest school had 188 students and the largest school had 772 students (mean 442 (SD 180)). A proportional stratified sampling method was used for selecting the schools whereby schools located in both urban and rural areas in all five districts were selected from all levels of education, including nine elementary schools, six middle schools, five high schools and five technical schools (these schools represented 2·6 %, 8·3 %, 13·9 % and 34·7 %, respectively, of each type of school in Cyprus). Technical schools offer vocational rather than academic training. Letters were sent to the head teachers of these schools informing them of the purpose of the study and the procedures involved. All twenty-five head teachers gave their consent for the participation of their schools. Students from randomly selected classes from middle, high and technical schools and all sixth grade students from the elementary schools completed questionnaires during class time (*n* 1966, mean age 14·7 (SD 2·2) years). The protocol for the present study was approved by the Cyprus Pedagogical Institute and by the Centre for Educational Research and Evaluation of the Cyprus Ministry of Education.

Measures

FV consumption was assessed using a two-item screening measure developed by Prochaska and Sallis[24]. This measure correlated significantly with a 3 d food record ($r = 0{\cdot}23$, $P < 0{\cdot}01$) and exhibited good reliability (intra-class correlation = 0·68) in a sample of sixth to twelfth grade students from the USA[24]. Children were asked to indicate the number of portions of fruit and the number of portions of vegetables that they consumed during a usual day. For each item, a number of examples of portions of FV were provided that Greek children in Cyprus were most likely to consume, including citrus fruits (oranges and mandarins), tomatoes and cucumbers. The response format for these two questions was on a 5-point scale, ranging from 'zero portions per day' to 'four or more portions per day'.

Correlates of fruit and vegetable consumption

On the basis of the multilevel nature of social–ecological models[13], three domains of variables – social–environmental, attitudinal and behavioural – were created. Items to examine these variables were based on a thorough review of the literature. Items and response formats were adjusted to the Cypriot culture after a pilot study on middle and elementary school students. In total, nineteen items were recorded to assess social–environmental and attitudinal correlates of FV consumption. Attitudinal variables (e.g. 'I like eating FV') and social variables including parental and school encouragement and support to consume FV (e.g. 'My parents at home encourage me to eat FV') were adopted from the study by de Bourdeaudhuij *et al.*[25]. Friends' habits towards FV were also assessed (e.g. 'My friends eat fruit'), as well as friends' habits towards unhealthy foods (e.g. 'My friends eat sweets (e.g. chocolates)'). These were adapted from the study by Cullen *et al.*[19]. Items to assess preference for unhealthy foods (e.g. 'I like eating fast food') were also recorded, as previous

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research suggested that frequency of eating fast food is inversely related to adolescents' FV intake[15]. Children were asked to indicate their agreement with these statements on a 5-point scale, with response options including 'not at all', 'a little', 'enough', 'a lot' and 'very much'.

In total, eleven items assessed behavioural correlates of FV consumption. Items to assess family food practices (e.g. 'I eat my lunch with my family') were recorded. These items were based on a previous study that indicated that family meal patterns were significantly associated with home availability of FV consumption[26]. On the basis of a pilot study conducted on middle school students, items that assessed other meal practices (e.g. 'For lunch, I eat food that I buy from shops (e.g. bakeries, fast foods)') were recorded. Items that assessed snacking patterns while watching TV (e.g. 'I eat snacks while watching TV (e.g. crisps, chocolates)'), adopted from the study by Matheson *et al.*[21], were also recorded. Responses for these items were on a 5-point scale, with response options including 'never', '1–2 d/week', '3–4 d/week', '5–6 d/week' and 'every day'.

Statistical analyses

Descriptive statistics including frequencies and percentages were computed for variables assessing FV consumption. The χ^2 test was used to examine possible differences across levels of education and gender in FV consumption. A principal component analysis using orthogonal rotation (Varimax) was conducted on the nineteen items assessing social–environmental and attitudinal correlates of FV consumption, with a second analysis conducted on the eleven items assessing behavioural correlates. A separate factor analysis was conducted for attitudinal correlates of FV intake as they constituted a different domain of variables.

One item was removed from the initial principal component analysis that was conducted on social–environmental and attitudinal correlates, because it loaded on two factors. A second principal component analysis was then conducted with the remaining eighteen items and resulted in the extraction of five factors that explained 61·8 % of the variance (Kaiser–Meyer–Olkin statistic (KMO) = 0·81, Bartlett's test of sphericity $\chi^2_{(153)} = 9605{\cdot}46$, $P = 0{\cdot}001$). Four items that loaded on the first factor concerned parental practices and therefore this factor was named 'Parent support'. Four items that loaded on the second factor concerned teacher- and school-related practices towards FV consumption and thus this factor was named 'School support'. Four items that loaded on the third factor concerned the child's and his/her friends' preference for sweets and fast food and therefore this factor was named 'Preference for sweets/fast food'. Three items that loaded on the fourth factor were related to the child's preference for FV, which was therefore named 'Preference for FV'. Three items that loaded on the fifth factor concerned friends' healthy eating, which was therefore named 'Friends' FV consumption'. Table 1 presents the percentages of responses for each item, factor loadings after rotation, eigenvalues and percentage of variance explained by each factor, Cronbach's α and mean, SD and the range for each scale. All scales had good internal reliability[27] ($\alpha > 0{\cdot}70$), with the exception of the last factor 'Friends' FV consumption', which had a reliability of 0·63.

The second principal component analysis assessing behavioural correlates was also repeated two times as two items loaded on two factors. This analysis resulted in three factors that explained 52·4 % of the variance (KMO = 0·61, Bartlett's test of sphericity $\chi^2_{(36)} = 1784{\cdot}74$, $P = 0{\cdot}001$). Two of the three items that loaded on the first factor concerned snacking/eating in front of the TV and this factor was named 'Eating in front of the TV'. Two of the four items with the highest loadings on the second factor concerned eating with the family and this factor was therefore named 'Family eating patterns'. Two items loaded on the third factor that concerned food bought from shops, which was therefore named 'Eating ready-made meals'. Table 2 presents percentages of responses for each item, factor loadings after rotation, eigenvalues and percentage of variance explained by each factor, Cronbach's α and mean, SD and the range for each scale. Internal reliability for these scales was low, ranging from 0·47 to 0·61.

Three series of multivariate logistic regression analyses were conducted, with fruit consumption (at least one portion of fruit daily *v.* no consumption), vegetable consumption (at least one portion of vegetables daily *v.* no consumption) and FV consumption (five or more portions of FV daily *v.* fewer than five portions) as the dependent variables and each of the factors extracted from the principal component analyses as the independent variable. Variables with significant bivariate association with the dependent variables were entered in the three multivariate logistic regression models. We used robust (Huber–White sandwich estimates) standard errors to take account of clustering (non-independence between pupils from the same school) in the computation of 95 % CI and *P* values. Analyses were performed using the complex sample procedure in the SPSS for Windows statistical software package version 17·0 (SPSS Inc., Chicago, IL, USA) and α was set at 0·05.

Results

Out of the 1966 students who completed questionnaires, 1030 (52·4 %) were boys and 936 (47·6 %) were girls. A total of 448 (22·8 %) were elementary school students with a mean age of 11·8 (SD 0·4) years, 657 (33·4 %) were middle school students with a mean age of 13·9 (SD 0·9) years, 475 (24·2 %) were high school students with a mean age of 16·9 (SD 1·0) years and 386 (19·6 %) were technical or vocational school students with a mean age of 16·7 (SD 0·9) years. The majority (*n* 1656 (84·2 %)) lived in the four towns of Cyprus (Nicosia, Lemesos, Larnaca and Paphos) and 310 (15·8 %) lived in rural areas.

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Table 1 Percentages of responses and factor analysis of items examining social and attitudinal correlates of FV consumption

	Responses					Factors extracted				
	Not at all	A little	Enough	A lot	Very much					
	%	%	%	%	%	Parent Support	School support	Preference for sweets/fast food	Preference for FV	Friends' FV consumption
My parents try to help me eat FV	3·1	7·1	17·0	23·3	49·6	0·86				
My parents at home encourage me to eat FV	3·0	5·9	13·9	20·5	56·7	0·85				
My parents at home eat FV	2·6	8·5	20·5	28·8	39·6	0·79				
My parents buy FV	2·7	4·1	11·1	24·1	58·1	0·62				
My school encourages healthy nutrition	20·8	17·8	20·1	17·2	24·1		0·84			
My teachers at school encourage me to eat FV	24·1	15·4	17·6	16·2	26·6		0·83			
My teachers at school eat FV	17·9	19·3	28·1	17·6	17·1		0·79			
My school canteen helps me eat FV	56·3	21·2	11·7	5·7	5·1		0·62			
I like eating fast food	7·5	26·4	25·3	18·9	21·8			0·75		
My friends eat sweets (e.g. chocolates, candy, cakes)	3·1	13·1	34·6	25·6	23·5			0·73		
My friends eat fast food	9·7	19·4	27·6	22·4	21·0			0·72		
I like eating sweets (e.g. chocolates, candy, cakes)	3·9	22·6	23·6	21·7	28·3			0·72		
I like eating salads and vegetables	9·7	23·6	25·8	16·8	23·9				0·83	
I like to have vegetables (e.g. tomato, cucumber, lettuce) in my sandwich/lunch that I eat at school	13·1	19·8	19·2	19·9	28·0				0·80	
I like eating fruits	3·5	13·8	24·0	22·3	36·3				0·66	
My friends eat salads and vegetables	7·6	32·6	31·1	16·2	12·4					0·78
My friends eat fruits	7·4	28·8	34·0	18·2	11·5					0·78
My friends eat home-made sandwiches/lunch at school	15·5	30·1	24·5	16·5	13·5					0·58
Eigenvalue						4·9	2·3	1·9	1·6	1·2
Percentage of variance explained						16·3	13·5	11·4	11·1	9·5
Cronbach's α						0·82	0·80	0·70	0·71	0·63
Mean						4·2	2·7	3·4	3·4	2·9
SD						0·9	1·1	0·9	1·0	0·9
Range						1–5	1–5	1–5	1–5	1–5

FV, fruit and vegetables.

Table 2 Percentages of responses and factor analysis of items examining behavioural correlates of FV consumption

	Responses					Factors extracted		
	Never	1–2 d/week	3–4 d/week	5–6 d/week	Every day	Eating in front of TV	Family's eating patterns	Eating ready-made meals
	%	%	%	%	%			
I eat snacks while watching TV (e.g. crisps, chocolates)	12·6	37·0	22·8	9·8	17·8	0·85		
In between meals I eat chocolates, other sweets or crisps	23·5	36·5	19·2	8·2	12·7	0·82		
I eat meals while watching TV	10·0	21·0	19·5	13·8	35·8	0·53		
I eat my supper with my family	13·2	14·4	14·5	13·3	44·6		0·71	
I eat my lunch with my family	20·1	21·2	15·5	9·4	33·8		0·71	
I eat breakfast at home	26·3	24·6	6·3	2·6	40·1		0·53	
In between meals I eat fruits	18·7	34·3	21·4	10·3	15·3		0·51	
For lunch I eat food that I buy from shops (e.g. bakeries, fast foods)	49·1	42·2	5·7	1·1	1·9			0·83
For dinner I eat food that I buy from shops (e.g. bakeries, fast foods)	28·7	56·1	9·6	2·8	2·7			0·82
Eigenvalue						2·1	1·5	1·1
Percentage of variance explained						19·3	17·3	15·8
Cronbach's α						0·60	0·47	0·61
Mean						1·9	2·1	0·8
SD						1·0	0·9	0·7
Range						0–4	0–4	0–4

FV, fruit and vegetables; TV, television.

Overall, 19·3% of students reported consuming five or more portions of FV daily, 88·2% reported consuming at least one portion of fruit daily and 87·7% reported consuming at least one portion of vegetables daily (see Table 3). Mean daily consumption of FV was 3·1 (SD 1·7) portions, mean daily consumption of fruit was 1·6 (SD 1·0) portions and mean daily consumption of vegetables was 1·5 (SD 1·0) portions. The percentage of students consuming five or more portions of FV daily differed by education group ($\chi^2_{(3)} = 34{\cdot}25$, $P = 0{\cdot}001$). Follow-up tests revealed that a higher proportion of students from elementary schools reported consuming five or more portions of FV daily compared with high school (23·8% *v.* 12·5%, $\chi^2_{(1)} = 19{\cdot}86$, $P = 0{\cdot}001$) and technical school students (23·8% *v.* 14·0%, $\chi^2_{(1)} = 12{\cdot}86$, $P = 0{\cdot}001$). A greater proportion of students from middle schools reported consuming five or more portions of FV daily compared with high school (24·4% *v.* 12·5%, $\chi^2_{(1)} = 25{\cdot}37$, $P = 0{\cdot}001$) and technical school students (24·4% *v.* 14·0%, $\chi^2_{(1)} = 16{\cdot}52$, $P = 0{\cdot}001$). No significant difference was observed in the percentage of boys and girls who consumed five or more portions of FV daily (20·0% and 18·4%, respectively; $P = 0{\cdot}36$).

Multivariate analyses indicated that students who reported greater FV preferences (OR = 2·2, 95% CI 1·9, 2·7), family eating patterns (OR = 1·5, 95% CI 1·2, 1·8) and more FV consumption by their friends (OR = 1·2, 95% CI 1·0, 1·4) were more likely to consume five or more portions of FV daily (Table 4). Students from high schools were less likely than students from elementary schools to consume five or more portions of FV daily (OR = 0·5, 95% CI 0·3, 0·8) and students who reported higher support from schools to consume FV were also less likely to consume five or more portions of FV daily (OR = 0·8, 95% CI 0·7, 1·0).

Higher FV preferences (OR = 2·0, 95% CI 1·6, 2·6) and family eating patterns (OR = 1·7, 95% CI 1·4, 2·0) were associated with consuming at least one portion of fruit daily (Table 4). Students from high schools and technical schools were less likely to consume one portion of fruit daily compared with students from elementary schools (OR = 0·3, 95% CI 0·2, 0·5 for both levels of education).

Students with a higher preference for FV (OR = 4·2, 95% CI 3·3, 5·3) were more likely to consume at least one portion of vegetables daily (Table 4). Students from technical schools were less likely to consume one portion of vegetables daily compared with students from elementary schools (OR = 0·5, 95% CI 0·3, 1·0); in addition, those who reported eating while watching TV were also less likely to consume one portion of vegetables daily (OR = 0·8, 95% CI 0·7, 1·0).

Discussion

The purpose of the present study was to examine the frequency and potential correlates of FV consumption among Cypriot adolescents. Overall, 19·3% of adolescents in

Table 3 Number and percentage of fruit, vegetables and FV consumption across the whole sample and level of education

	All (*n* 1966)		Elementary school (*n* 448)		Middle school (*n* 657)		High school (*n* 475)		Technical school (*n* 386)	
Daily serving	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Fruit (portions)										
No	230	11·8	23	5·1	48	7·3	81	17·1	78	20·5
One	820	41·9	175	39·1	258	39·4	221	46·6	166	43·7
Two	590	30·1	153	34·2	225	34·4	126	26·6	86	22·6
Three	202	10·3	69	15·4	80	12·2	28	5·9	25	6·6
Four or more	115	5·9	28	6·3	44	6·7	18	3·8	25	6·6
Vegetables (portions)										
No	240	12·3	43	9·6	67	10·2	59	12·4	71	18·7
One	834	42·7	198	44·3	243	37·1	223	47·0	170	44·9
Two	580	29·7	131	29·3	230	35·1	128	27·0	91	24·0
Three	212	10·8	62	13·9	77	11·8	45	9·5	28	7·4
Four or more	89	4·6	13	2·9	38	5·8	19	4·0	19	5·0
FV (portions)										
No	83	4·3	9	2·0	23	3·5	19	4·0	32	8·5
One	207	10·6	32	7·2	47	7·2	73	15·4	55	14·6
Two	488	25·0	107	23·9	131	20·0	133	28·1	117	31·1
Three	507	26·0	121	27·1	186	28·4	125	26·4	75	19·9
Four	289	14·8	72	16·1	107	16·4	65	13·7	45	12·0
Five or more	377	19·3	106	23·8	160	24·4	59	12·5	52	14·0

FV, fruit and vegetables.
Higher percentages of students from elementary and middle schools reported consuming five or more portions of FV daily compared with students from high and technical/vocational schools ($P < 0·001$ for all comparisons).

Cyprus consume five or more portions of FV daily, a percentage that is lower than that reported in the UK[6] and Australia[7]. The percentage that reported consuming at least one portion of fruit or vegetables daily ranged from 91·5 % to 98·0 %. These levels are higher than those reported in nine European countries[8] and in Mexico[9]. Discrepancies between the countries may be because of the different measures used to assess FV consumption. The low percentage of adolescents consuming FV found in the present study indicates that there is a need to promote FV among this population. Promoting FV availability at home may be an important strategy, as home availability of FV has a higher association with FV consumption among Greek children than among children from other countries[28].

In contrast to findings from other countries indicating that girls are more likely than boys to meet the recommendation of consuming five or more portions of FV daily[7,9,10], our analyses failed to reveal gender differences. The lack of gender differences in FV consumption may be partly explained by the fact that a wider age range of children participated in the present study (mean age ranged from 11·8 to 16·9 years), whereas previous studies were mainly conducted among elementary school students[7,9,10]. Whereas almost all adolescents in our sample consumed at least one portion of fruit or vegetables daily, only approximately one-fifth met the recommendation of consuming five or more portions daily. Efforts to promote FV consumption should be especially geared towards older adolescents, as a lower proportion of them met recommendations in comparison with elementary and middle school students. Recent review evidence also indicates that age in adolescents is negatively associated with FV consumption in European countries[29]. In the present sample this finding may be explained by the fact that students from elementary and middle schools had higher mean values compared with students from high and technical schools in the factors assessing FV (mean 3·5 (SD 1·0) *v.* 3·3 (SD 1·1), $t(1912) = 3·6$, $P = 0·001$) and family's healthy eating patterns (mean 2·3 (SD 0·9) *v.* 1·9 (SD 0·9), $t(1865) = 10·6$, $P = 0·001$, two-sided tests).

Preference for FV and family's healthy eating patterns were the most consistent correlates of FV consumption in the present study. Preference for FV was positively associated with consuming at least one portion of fruit, one portion of vegetables and five or more portions of FV daily. This supports previous findings showing that children with a positive preference for FV have a greater likelihood of consuming FV[10]. Repeated tasting opportunities from early years onwards and more frequent exposure to FV during school years using taste-testing games or school FV schemes have been proposed as strategies to increase preference for FV[29,30]. These strategies may be particularly successful for promoting vegetable consumption, as in the present study a stronger association was found between FV preference and vegetable consumption (OR = 4·2) than with fruit consumption (OR = 2·0).

Family eating patterns were positively associated with consuming at least one portion of fruit daily and five or more portions of FV daily. Family eating patterns as assessed in the present study involved the weekly frequency of eating supper and lunch with the family and other home-related healthy eating practices, including eating breakfast and consuming fruit between meals.

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Table 4 Associations of five or more portions of FV daily, at least one portion of fruit and one portion of vegetables daily with level of education and social, attitudinal and behavioural correlates

	Five or more portions of FV daily				At least one portion of fruit daily				At least one portion of vegetables daily			
	Unadjusted		Adjusted		Unadjusted		Adjusted		Unadjusted		Adjusted	
	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI	OR	95 % CI
School												
Primary	Ref.		Ref.		Ref.		Ref.		Ref.		Ref.	
Middle	1·0	0·7, 1·5	1·1	0·7, 1·9	0·7	0·4, 1·1	0·9	0·5, 1·6	0·9	0·6, 1·6	0·9	0·5, 1·5
High	0·5	0·4, 0·6***	0·5	0·3, 0·8**	0·2	0·1, 0·4***	0·3	0·2, 0·5***	0·7	0·5, 1·1	0·7	0·4, 1·1
Technical	0·5	0·3, 0·8**	0·6	0·3, 1·1	0·3	0·2, 0·4***	0·3	0·2, 0·5***	0·5	0·3, 0·8**	0·5	0·3, 1·0*
Parent support	1·4	1·2, 1·7**	0·9	0·7, 1·1	1·6	1·3, 1·8***	0·9	0·7, 1·2	1·5	1·3, 1·7***	1·2	0·9, 1·5
School support	1·2	1·1, 1·4**	0·8	0·7, 1·0*	1·5	1·3, 1·7***	0·9	0·8, 1·1	1·3	1·1, 1·4***	1·0	0·8, 1·1
Preference for sweets/fast food	0·8	0·7, 1·0*	1·0	0·8, 1·2	0·7	0·5, 0·9**	0·8	0·6, 1·0	0·7	0·6, 1·0*	0·9	0·7, 1·1
Preference for fruit/vegetables	2·4	2·0, 2·7***	2·2	1·9, 2·7***	2·4	1·9, 2·9***	2·0	1·6, 2·6***	3·8	3·2, 4·6***	4·2	3·3, 5·3***
Friends' FV consumption	1·6	1·3, 1·8***	1·2	1·0, 1·4*	1·9	1·6, 2·3***	1·2	1·0, 1·4	1·5	1·2, 1·8**	0·8	0·6, 1·0
Eating in front of TV	0·8	0·7, 0·9**	0·9	0·8, 1·1	0·7	0·7, 0·8***	0·9	0·8, 1·1	0·7	0·6, 0·8***	0·8	0·7, 1·0*
Family eating patterns	1·9	1·6, 2·2***	1·5	1·2, 1·8***	2·4	2·1, 2·8***	1·7	1·4, 2·0***	1·5	1·3, 1·8***	1·0	0·8, 1·2
Eating ready-made meals	0·9	0·7, 1·2	–	–	0·8	0·6, 1·1	–	–	0·8	0·6, 1·0*	1·2	1·0, 1·6

FV, fruit and vegetables; TV, television; Ref., reference category.
The 'unadjusted OR' refers to the bivariate association between the independent and dependent variables, whereas the 'adjusted OR' refers to the association between the independent and dependent variables when taking into consideration the other independent variables.
$*P < 0·05$; $**P < 0·01$; $***P < 0·001$.

Our results extend previous findings indicating that family meal frequency is positively related to FV consumption among adolescents in both cross-sectional[7,18] and longitudinal studies[15]. A potential explanation for this is that family meals provide an opportunity for parents to be positive role models to their children[7] and to talk about healthy eating.

In contrast to findings from other studies[8,18] we did not observe any association between FV intake and parental support, including encouragement, parents consuming FV and buying FV. This might reflect the overall parenting style and inappropriate food-related parental practices within the Cypriot context. For example, previous research indicated that parental practices such as using snack food as a reward for consuming healthier foods had an adverse effect[31]. Although data were not collected in the present study to support this, it could provide a possible explanation given the rapid increase in the fast-food chains that have been introduced in Cyprus during the past decade. It appears that family eating patterns, especially family meal frequency, are more important in promoting FV consumption within the Cypriot context, as the time spent provides an opportunity for the family to get together. Previous research suggests that parental control in child-feeding practices might have positive results if it is exercised in a context of warmth and emotional support[32]. Family eating together may provide a warm and emotionally supportive environmental context that could help promote FV consumption.

Friends eating FV was positively associated with consuming five or more portions of FV daily. Other studies that examined peers' influence on FV intake have produced contrasting results. In studies conducted among adolescents in the USA, baseline peer support was associated only with adolescent males' fruit consumption at follow-up[15], and adolescents' fruit, juice and vegetable consumption was not associated with peers' fruit, juice and vegetable consumption or with peer modelling[19]. It appears that more studies are needed to examine peer influence on adolescents' FV intake.

Two correlates, namely eating in front of the TV and school support, were negatively associated with FV consumption in the present study. Eating in front of the TV was negatively associated with consumption of at least one portion of vegetables daily, a finding that complements results from another study that indicated lower consumption of vegetables by adolescents during TV watching in comparison with vegetable consumption at other times during the day[21]. Studies indicate that children consume snacks more frequently while watching TV[21] and that a positive relationship exists between time spent watching TV and the number of TV foods consumed[33]. This suggests that children's snack choices during TV viewing constitute an important component to be targeted during interventions considering the fact that the majority of advertised food targeting children and

adolescents in Cyprus is of low nutritional quality (high fat and sugar content) with no fruit or vegetable advertised (M Theophanous, unpublished results).

An unexpected finding was that school support was negatively associated with consuming five or more portions of FV daily. School support as assessed in the present study included teacher modelling and encouragement and whether school and canteen help children consume healthy food. Although the school context has many interconnected components such as pupils, teachers, curriculum, teaching and learning, school health policy, school ethos and school environment, parents and community links[34], the components assessed in the present study did not capture all school factors that may help students consume more FV. Our findings provide partial support to recent findings that indicated small school-level effects on 11-year-olds' FV intake and that school effects on FV intake are complex, with students in schools with competitive food choices consuming more FV than students in schools with only FV available[35]. A potential explanation for this association observed in the present study might be the early end of the school day in Cyprus and thus the low impact of schools on students' FV consumption. Nevertheless, strategies such as children bringing fruit to school[8] and providing a free piece of fruit or vegetable at school[36] are effective in increasing children's daily FV intake.

A number of limitations are worth mentioning in interpreting the findings of the present study. First, the cross-sectional design precludes the inference of cause and effect relationships between correlates and FV intake. Second, the use of a two-item measure to assess FV intake may have provided false estimates of the prevalence of FV intake. The use of more detailed and valid measures such as a 24 h recall or an FFQ might have increased the validity of our findings. Third, the inclusion of more correlates such as physical–environmental and personal (e.g. self-efficacy) correlates might have provided a more complete picture of factors correlating with FV intake in this population. The strengths of the present study include the collection of data from all levels of education from all districts and areas of the island and the assessment of potential correlates from different domains.

Conclusions

The present study showed that only 20·0 % of Cypriot adolescents consumed five or more portions of FV daily, a finding that points to the need for the design and implementation of intervention programmes for the promotion of FV intake among Greek adolescents in Cyprus. Significant correlates of FV intake have been found from all domains, including personal (preference for FV), social (family eating patterns and friends' healthy eating) and behavioural (eating in front of the TV). These results suggest that multilevel interventions that are targeted by multisectoral groups as proposed by the social–ecological model[13] are needed in order to effectively promote adolescents' FV consumption. Targeting individual and family-based components in potential interventions may be more effective than targeting solely school-level components.

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