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Diet quality, overweight and daily monetary allowance of Greek adolescents

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Abstract:
Objective: To investigate cross-correlates of pocket-money on diet quality and weight status of Greek adolescents.
Methods: A total of 172 adolescents (55.2% boys), aged between 10 and 15 years old were recruited. Body weight and height were measured, body mass index (BMI) was computed. Weight status was assessed according to the International Obesity Task Force criteria and diet quality was evaluated via the Healthy Eating Index (HEI) – 2010.
Results: Adolescents were allowed a mean allowance of €4.63 ± 3.66 daily. Among boys participants, BMI correlated with pocket money ($r = 0.311$, $p \leq 0.002$) and normoweight boys received statistically less money than their overweight peers ($p \leq 0.019$). In both sexes, normoweight was more prevalent in the lowest monetary quartiles. Pocket money was not associated with HEI. Among boys, moderate HEI was more prevalent in the third quartile of pocket money, significantly higher compared to all others ($p \leq 0.01$ for all). For girls, the prevalence of moderate HEI declined by each ascending pocket money quartile ($p \leq 0.05$ for all).
Conclusion: In our sample, adolescents exhibited high rates of pooled overweight including obesity. The majority of the participants followed a diet of moderate quality. Pocket money was associated with BMI only among boys. As pocket money was not associated with diet quality, it is highly possible that adolescents might choose to spend their money on items other than foods. Our study shows that pocket money should be controlled during adolescence and teenagers should be educated on spending their money on healthier food choices.

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Introduction

Access to money from a young age, in the form of pocket money and additional allowances provided mostly by grandparents, have increased the buying capacity of children [1]. This small economic power provided to children however, is not without caveats, especially when food purchases are concerned. In Tunisia [2], the majority of children use more than 75% of their pocket money on street food, including candy, sandwiches, pastries, pizza or chocolate. In the US [3], physical activity, gender and pocket money are significant predictors of overweight among public school students, whereas a multicenter European study correlated pocket money to children's soft drinks consumption [4].

It seems that parents underestimate the fact that the youngsters' perspectives on healthy eating are often diametrically different compared to that of adults [5], while additionally, children appear to be particularly prone to food advertising [6]. Therefore, this buying capacity produces an unfavorable effect on the diet quality and weight status of minors.

In Greece, overweight and obesity among children is an important public health concern [7], [8] with the majority of the young population abandoning the traditionally healthy diet in favor of a more Westernized regimen [9], [10]. But what is the actual effect of pocket money on diet quality and weight status? In order to

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answer this question, the present study was designed, aiming to investigate cross-correlates of pocket money on diet quality and weight status of Greek youngsters.

Methods

The sample herein consists of 172 adolescents (55.2% boys), aged 10–15 years old (Table 1). The sample was recruited for this study, through families and friends of undergraduate students from our department. Participation in the study was voluntary, after their caregivers provided written permission. The study was approved by the Alexander Technological Educational Institute Ethics Committee.

Diet quality and buyer's capacity

Information regarding the adolescents' dietary choices were derived through two non-consecutive 24-h intake recalls. Diet quality was evaluated through the 2010 Healthy Eating Index (HEI), an index describing the rate to which one follows the 2010 Dietary Guidelines for Americans [11]. Buyer's capacity, in euros (€), was assessed according to the adolescents' self-reported daily monetary allowance (pocket money).

Anthropometry

Weight was recorded in morning hours, to the nearest 0.1 kg (SECA 874 portable scales, SECA, Hamburg, Germany), along with stature (SECA 214 portable stadiometer, SECA, Hamburg, Germany). Body mass index (BMI) was computed as weight divided by the height square (kg/m^2). Weight status was defined according to the International Obesity Task Force cutoffs [12], [13]. Due to the low rates of obesity, excessive body weight was computed as pooled overweight, including obesity, for statistical purposes.

Statistical analyses

Data are presented as mean ± standard deviation (SD) or frequencies (%). Differences between categorical variables were evaluated with the χ^2 test. Normal distribution was assessed with the Kolmogorov-Smirnov test. Correlations were examined with Pearson's tests and differences in means were examined with independent t-tests and analysis of variance (ANOVA) for normally distributed variables, or Mann-Whitney and Kruskal-Wallis for not normally distributed variables. Prevalence ratios (PR) were calculated when possible, with their confidence intervals (CI). Statistical analysis was performed using SPSS 21.0 (IBM® SPSS® Inc., Hong Kong). The level of significance was set at 0.05.

Results

In the total sample, nine adolescents were underweight (5.2%), 64.5% attained normal body weight, while 26.2% and 4.1%, respectively, were either overweight or obese. Boys experienced greater overweight and lower normoweight rates than girls ($p \leq 0.001$ for both). Mean HEI was 63.8% ± 10.0%, irrespectively of sex. In terms of diet quality, 9.3% exhibited low HEI, the vast majority endorsed a diet of moderate quality (87.8%), while only a mere 2.9% of the adolescents exhibited adequate HEI. Adolescents received a mean daily allowance of €4.63 ± 3.66, without significant sex differences.

Table 1: Adolescents' general characteristics (n = 172).

	Boys	Girls
Sample size (n)	95	77
Age, years	12.2 ± 1.4	12.4 ± 1.5
Weight, kg	52.0 ± 11.9	45.7 ± 10.3***
Height, cm	1.56 ± 0.13	1.54 ± 0.10

Weight status		
Underweight (n)	3 (3.2%)	6 (7.8%)
Normoweight (n)	50 (52.6%)	61*** (79.2%)
Overweight (n)	36 (37.9%)	9*** (11.7%)
Obese (n)	6 (6.3%)	1 (1.3%)
Residence (urban/ rural)	38/57	24/53

Values are expressed either as mean ± SD or n. *** Significantly different compared to the boys, ($p \leq 0.001$).

Differences in monetary allowance and diet quality with regards to weight status are presented in Table 2. While a trend for a positive association between BMI and pocket money was noted, only normoweight boys received statistically less money than their overweight/obese peers ($p \leq 0.019$). BMI was positively correlated to pocket money in boys ($r = 0.311$, $p \leq 0.002$), but this effect was not extended in girls ($r = 0.126$, $p \leq 0.276$). HEI score failed to correlate to BMI or pocket money.

Table 2: Differences in monetary allowance and diet quality according to weight status, for boys and girls.

Variables	Boys					Girls				
	Under weight	Normo weight	Pooled OW + OB	Total	p	Under weight	Normo weight	Pooled OW + OB	Total	p
	n = 3	n = 50	n = 42	n = 95		n = 6	n = 61	n = 10	n = 77	
Pocket money (€)	2.00 ± 1.00	4.24 ± 2.60	6.30 ± 4.44*	5.08 ± 3.68	F = 5.07, $p \leq 0.008$	3.33 ± 1.37	4.02 ± 3.40	4.95 ± 5.40	4.08 ± 3.58	NS
HEI score	61.0 ± 11.5	65.9 ± 9.2	61.1 ± 9.0	63.7 ± 9.4	NS	61.5 ± 9.7	64.6 ± 10.7	62.0 ± 12.0	64.1 ± 10.7	NS

HEI, Healthy eating index; OW, overweight; OB, obese; NS, not significant. Pocket money was tested with ANOVA and HEI score was tested with the Kruskal-Wallis test. *Statistically different compared to normoweight boys, ($p \leq 0.05$).

Associations among buyer's capacity quartiles and weight status or diet quality are stressed in Table 3. For boys, body weight within the norm was more prevalent in the lowest pocket money quartile, compared to the second (PR = 1.30, 95%CI: 1.08–1.55, $p \leq 0.043$) and the fourth quartile (PR = 1.46, 95%CI: 1.17–1.83, $p \leq 0.014$). Again for boys, pooled overweight was more prevalent within the 3rd quartile compared to the first (PR = 2.27, 95%CI: 1.56–3.31, $p \leq 0.004$) and the highest quartile (PR = 2.09, 95%CI: 1.36–3.20, $p \leq 0.001$). In girls, the only significant differences were apparent in the normoweight group. As seen in the boys participants of the study, healthy weight was more prevalent in the lowest quartile compared to all others (1st *vs*. 2nd: PR = 1.21, 95%CI: 1.08–1.36, $p \leq 0.04$; 1st *vs*. 3rd: PR = 1.97, 95%CI: 1.54–2.51, $p \leq 0.001$; 1st *vs*. 4th: PR = 1.50, 95%CI: 1.26–1.79, $p \leq 0.002$).

When diet quality was concerned, low HEI highly prevailed in the first quartile (42.9%) and high HEI in the third quartile, among boys participants, though not statistically significantly. Moderate HEI was more prevalent in the 3rd quartile, significantly higher compared to the lowest (PR = 1.97, 95%CI: 1.54–2.51, $p \leq 0.001$), the second (PR = 1.74, 95%CI: 1.43–2.12, $p \leq 0.007$) and the highest quartile (PR = 1.66, 95%CI: 1.33–2.06, $p \leq 0.001$). For girls, the prevalence of moderate HEI declined by ascending pocket money quartile (1st *vs*. 2nd and 3rd: PR = 1.61, 95%CI: 1.25–2.07, $p \leq 0.001$; 1st *vs*. 4th: PR = 1.32, 95%CI: 1.10–1.59, $p \leq 0.004$; 2nd *vs*. 3rd: PR = 1.36, 95%CI:1.16–1.60, $p \leq 0.031$).

Discussion

In the total sample of adolescents herein, 5.2% were underweight, the vast majority exhibited healthy body weight (64.5%), while pooled overweight affected 30.3% of them. A diet of moderate quality was highly endorsed (87.8%) by participants, while buyer capacity mostly influenced their BMI, leaving their diet quality unaffected.

Regarding pocket money and weight status, a moderate correlation was observed between BMI and pocket money among boys ($\rho = 0.311$, $p \leq 0.002$). According to recent literature, the daily allowance adolescents receive is positively linked to their BMI, either directly [14], [15], or via increased soft-drinks consumption [4]. Although according to the literature [16], it would be expected that the aforementioned trend would also apply to the girls, in the present sample this was not the case. Thus, we speculate that as adolescent girls are more prone

to facilitate dietary restrictions [17] in order to attend a self-satisfying body image [18], it is highly likely that they chose to spend less money on food items, regardless of their allowance. Another possible explanation of this discrepancy between boys and girls could be that in parallel, adolescent boys tend to exhibit greater rates of overweight compared to the girls, as verified both by the present study and previous research on Greek adolescents [7], [19].

The prevalence of normoweight was greater in the lowest monetary quartiles for both boys and girls. Among the first, pooled overweight was more prevalent in the third pocket money quartile compared to the lowest (PR = 2.27, 95%CI: 1.56–3.31, $p \leq 0.004$) and the highest quartile (PR = 2.09, 95%CI: 1.36–3.20, $p \leq 0.001$). These findings indicate a positive association between an adolescent's buying capacity and overweight [3], [20], [21]. Additionally, as pooled overweight did not prevail in the highest economic quartile, but in the third, the findings also suggest that among adolescent boys, the effect of pocket money on overweight is not unlimited but tends to reach a plateau. As far as girls are concerned, normoweight was statistically more prevalent in the lowest quartile compared to all other tertiles, while no other significant association was noted. During adolescence, low economic power has been linked to overweight, as processed, calorie-dense food items tend to be cheaper compared to healthier options [22]. It is not clear why this scenario failed to apply to the girls herein, although we hypothesize that healthier food choices are mediated through the weight control practices which tend to be more common among girls [17].

A vast body of evidence is pointing out a socioeconomic gradient in diet quality [22], with the latter being positively associated with family affluence [9]. In the present study, diet quality failed to correlate to pocket money. One would expect that pocket money, as a surrogate marker of a family's income, would predict dietary quality [23]. However, as a large proportion of adolescents herein adhered to a diet of moderate quality (87.8%) compared to other studies [24], it is highly likely that this affected the relationship between pocket-money and diet quality.

In girls, the prevalence of moderate diet quality declined by each ascending monetary quartile (1st vs. 2nd and 3rd: PR = 1.61, 95%CI: 1.25–2.07, $p \leq 0.001$; 1st vs. 4th: PR = 1.32, 95%CI: 1.10–1.59, $p \leq 0.004$; 2nd vs. 3rd: PR = 1.36, 95%CI: 1.16–1.60, $p \leq 0.031$), while among boys moderate HEI highly prevailed in the 3rd monetary quartile over the others ($p \leq 0.01$ for all). According to the literature, in the youngsters, greater diet costs are associated with increasing diet quality [22], [25], while pocket money appears to mediate dietary choices [26]. The fact that our results do not follow the same pattern might indicate that Greek adolescents favor spending their money either on non-food items (i.e. tobacco) or on food choices of lower quality.

As in any study, the present one has its limitations. Our sample was relatively small, though sufficient for statistical purposes. Data concerning parental educational level and economic status might have identified associations with the examined factors, yet they were not included in the study, mainly due to the adolescents' inability to recall them. Additionally, the cross-sectional design did not allow for defining the causal mechanisms behind the observed associations. In any case, given the lack of similar literature and the gap on the role of pocket money on diet quality, the associations reported in the present study are noteworthy. Future studies should also record the goods/services where pocket-money is spent among adolescents.

Overall, the present adolescents exhibited high rates of pooled overweight (30.3%) and the vast majority endorsed a diet of moderate quality (87.8%). Monetary allowance correlated with boys' BMI, highlighting a modifiable predictor of adolescent boys overweight. As pocket money was not associated with diet quality, the fact that adolescents choose to spend their money on non-food items should be considered. It becomes evident that pocket money provided by the familiar environment should be controlled, while adolescents should be educated on spending their money on healthier choices.

Table 3: Associations among weight status and diet quality according to buyer's capacity quartiles, for boys and girls.

	Boys								Girls							
	1st quartile		2nd quartile		3rd quartile		4th quartile		1st quartile		2nd quartile		3rd quartile		4th quartile	
	n = 25		n = 12		n = 35		n = 22		n = 32		n = 18		n = 18		n = 9	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Weight status																
Underweight	2	66.6	1	33.3	0	0.0	0	0.0	2	33.3	2	33.3	2	33.3*	0	0.0
Normoweight	15	30.0	8	16.0	16	32.0	11	22.0	25	41.0	14	23.0	15	24.5**	7	11.5
Pooled OW + OB	8	19.0	3	7.1	19	45.2	12	28.7	5	50.0	2	20.0	1	10.0	2	20.0
HEI																
Low	3	42.9	1	14.3	2	28.6	1	14.3	1	11.1	4	44.4	4	44.4	0	0.0

Moderate	21	25.0	11	13.1	31	36.9	21	25.0	30	44.8	14	20.9	14	20.9	9	13.4
High	1	25.0	0	0.0	2	50.0	1	25.0	1	100	0	0.0	0	0.0	0	0.0

OW, Overweight; OB, obese. Significantly different compared to boys of the same quartile and weight status * $p \leq 0.05$; ** $p \leq 0.01$.

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Conflict of interest: None declared.

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